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STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

REPORTS OF THE
DIVISION OF WATER RESOURCES
EDWARD HYATT, State Engineer

BULLETIN No. 22

Volume II
of Two Volumes

DRAWINGS

ACCOMPANYING REPORT ON

SALT WATER BARRIER

Below Confluence of Sacramento and San Joaquin Rivers, California

By WALKER R. YOUNG, Engineer,
U. S. Bureau of Reclamation

Prepared under contracts executed jointly by the U. S. Bureau of Reclamation, the California Department of Public Works, and the Sacramento Valley Development Association

1929

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO, 1929

70686

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70686

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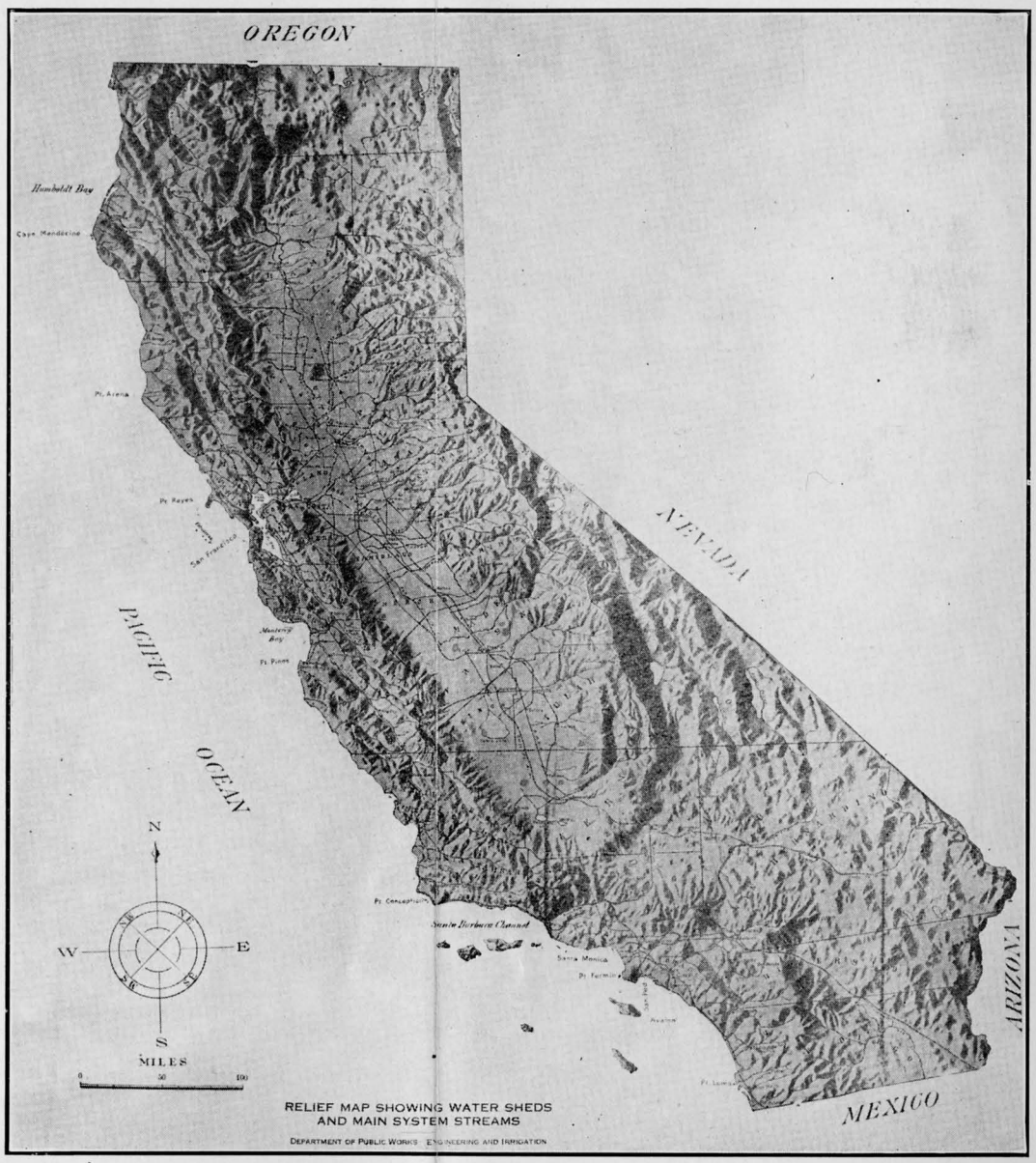
Plate 1-1

RELIEF MAP OF CALIFORNIA

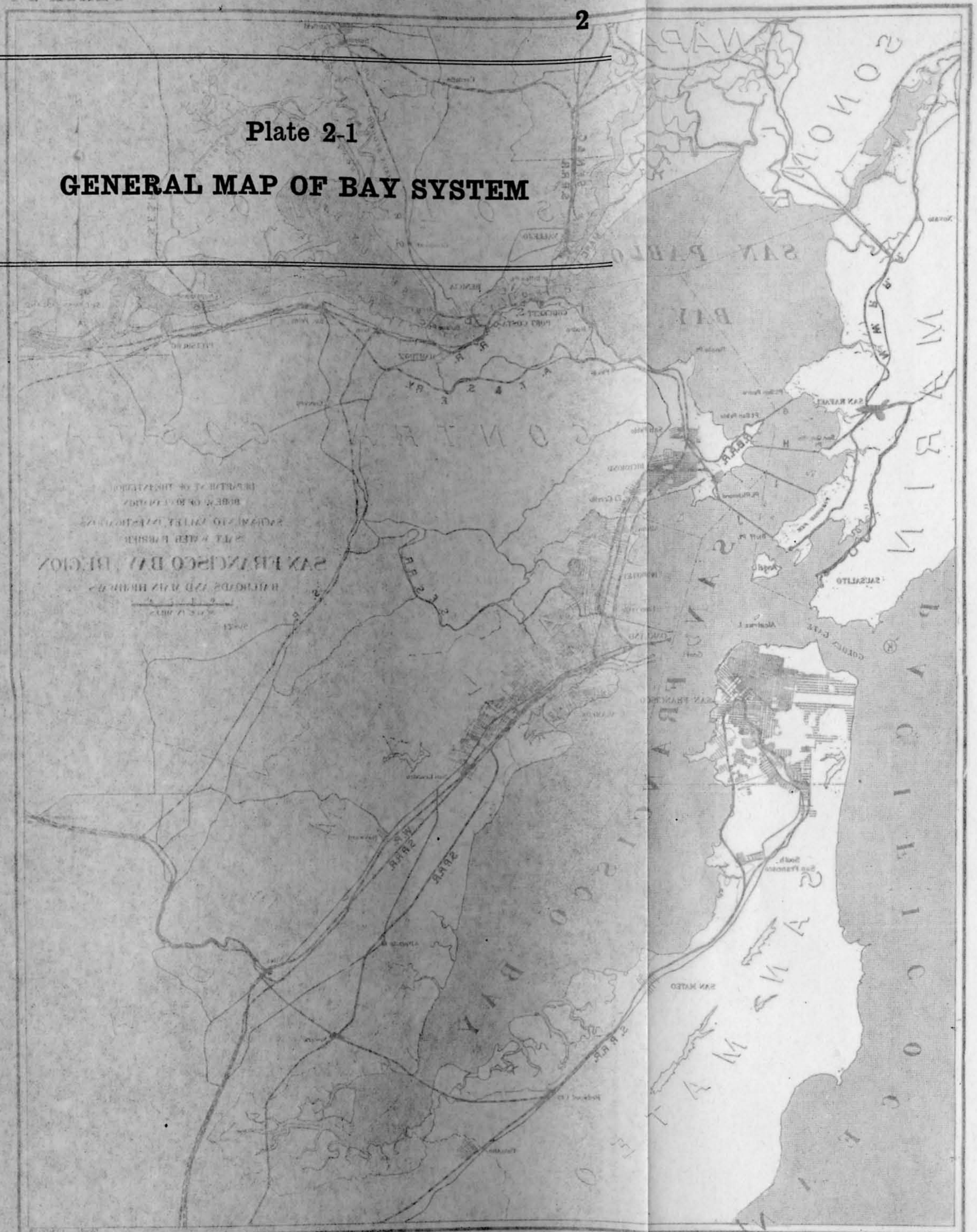


RELIEF MAP SHOWING WATER SHEDS
AND MAIN SYSTEM STREAMS

DEPARTMENT OF PUBLIC WORKS · ENGINEERING AND IRRIGATION

Plate 2-1

GENERAL MAP OF BAY SYSTEM



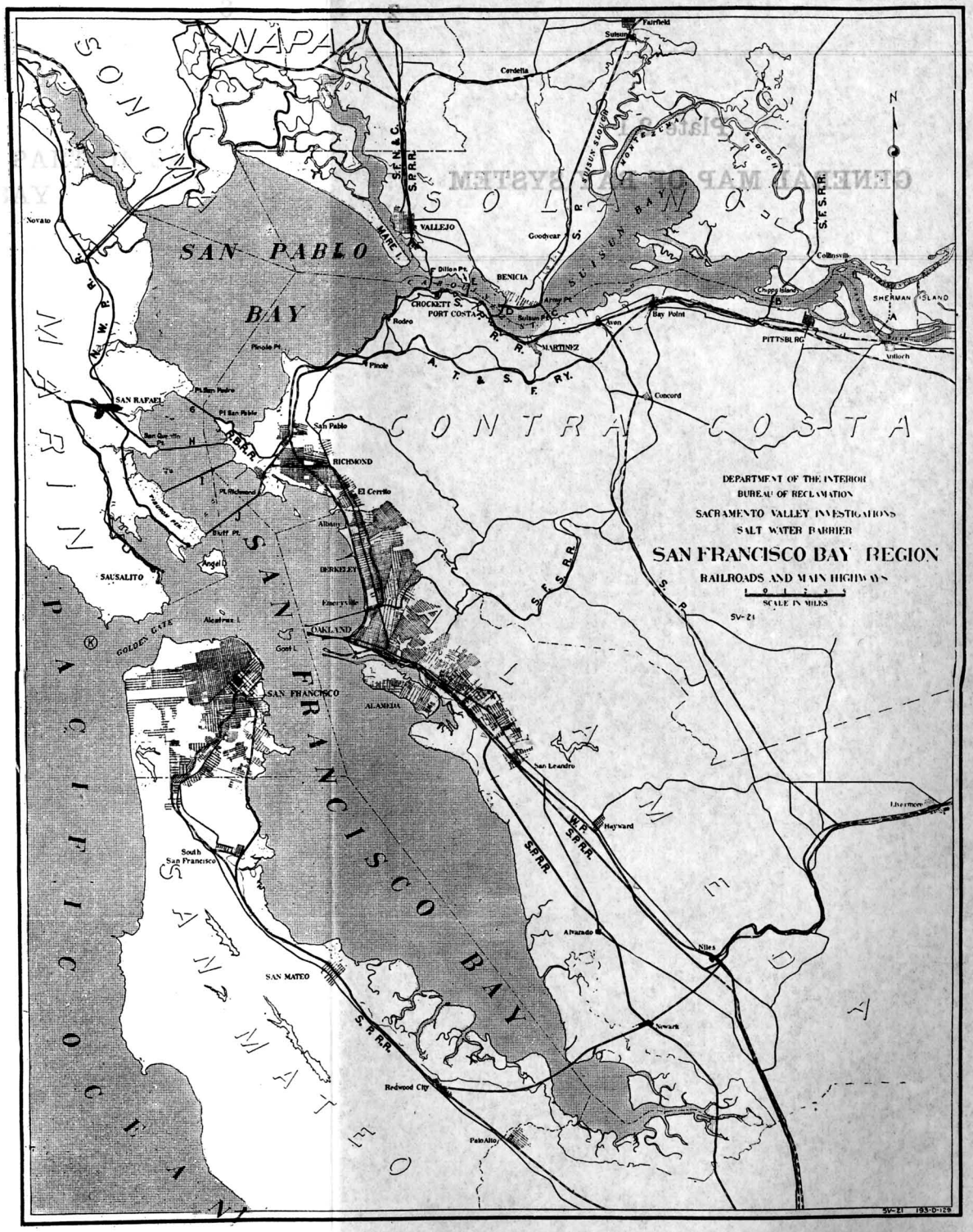

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SAN FRANCISCO BAY REGION
RAILROADS AND MAIN HIGHWAYS
SCALE IN MILES
SV-21
SV-21 193-D-128
SONOMA
NAPA
SOLANO
CONTRA COSTA
MARIN
SAN MATEO
ALAMEDA
SAN PABLO BAY
SAN FRANCISCO BAY
SUISUN BAY
PACIFIC OCEAN
Fairfield
Suisun
Cordelia
Novato
VALLEJO
MARE I.
Goodyear
BENICIA
Dillon Pt.
CROCKETT
PORT COSTA
Rodeo
Pinole Pt.
Pinole
Pt. San Pedro
Pt. San Pablo
SAN RAFAEL
San Quentin Pt.
Pt. Richmond
Bluff Pt.
Angel I.
SAUSALITO
GOLDEN GATE
Alcatraz I.
Goat I.
San Pablo
RICHMOND
El Cerrito
Albany
BERKELEY
Emeryville
OAKLAND
SAN FRANCISCO
ALAMEDA
South San Francisco
SAN MATEO
Redwood City
Palo Alto
San Leandro
Hayward
Alvarado
Niles
Newark
Livermore
Collinsville
Chipps Island
SHERMAN ISLAND
Bay Point
Port Chicago
MARTINEZ
PITTSBURG
Antioch
Concord
Suisun Pt.
Army Pt.
N.W.P.R.R.
S.F.N.&C.
S.P.R.R.
S.F.S.R.R.
A.T.&S.F.RY.
S.F.R.R.
S.P.R.R.
W.P.R.R.
S.F.R.R.
S.P.R.R.
N

Plate 2-2

CHART OF NORTHERN PART OF SAN FRANCISCO BAY

UNITED STATES - WEST COAST
SAN FRANCISCO ENTRANCE
CALIFORNIA
SAN RAFAEL
MOUNT TAMALPAIS
BOLINAS BAY
SV-145
193-D-130

Plate 2-3

CHART OF SAN PABLO BAY

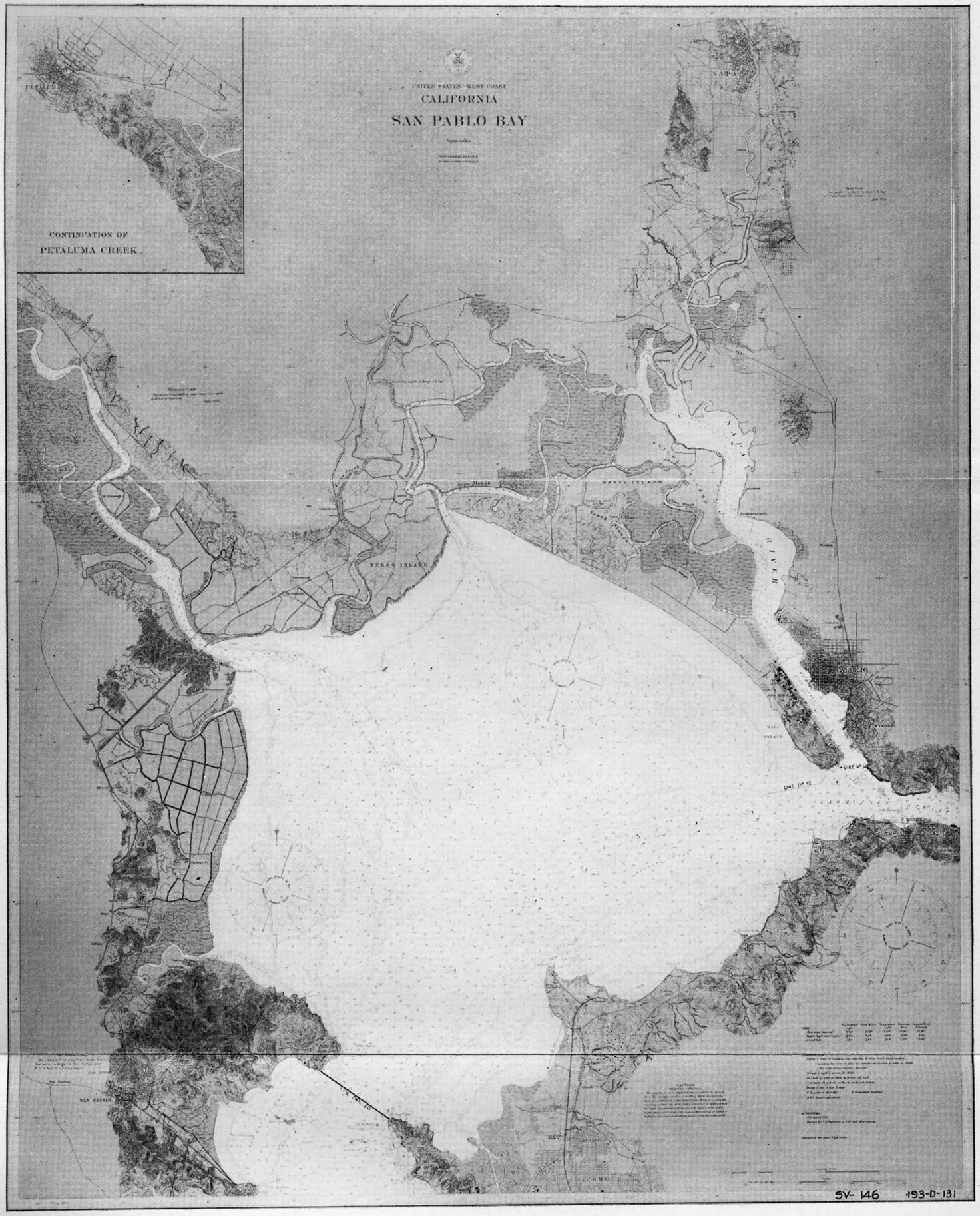

UNITED STATES WEST COAST
CALIFORNIA
SAN PABLO BAY
CONTINUATION OF
PETALUMA CREEK
NAPA
PETALUMA
TURNS ISLAND
RANTI ISLAND
SAN PABLO
SAN RAFAEL
RICHMOND
SV- 146
193-D-131

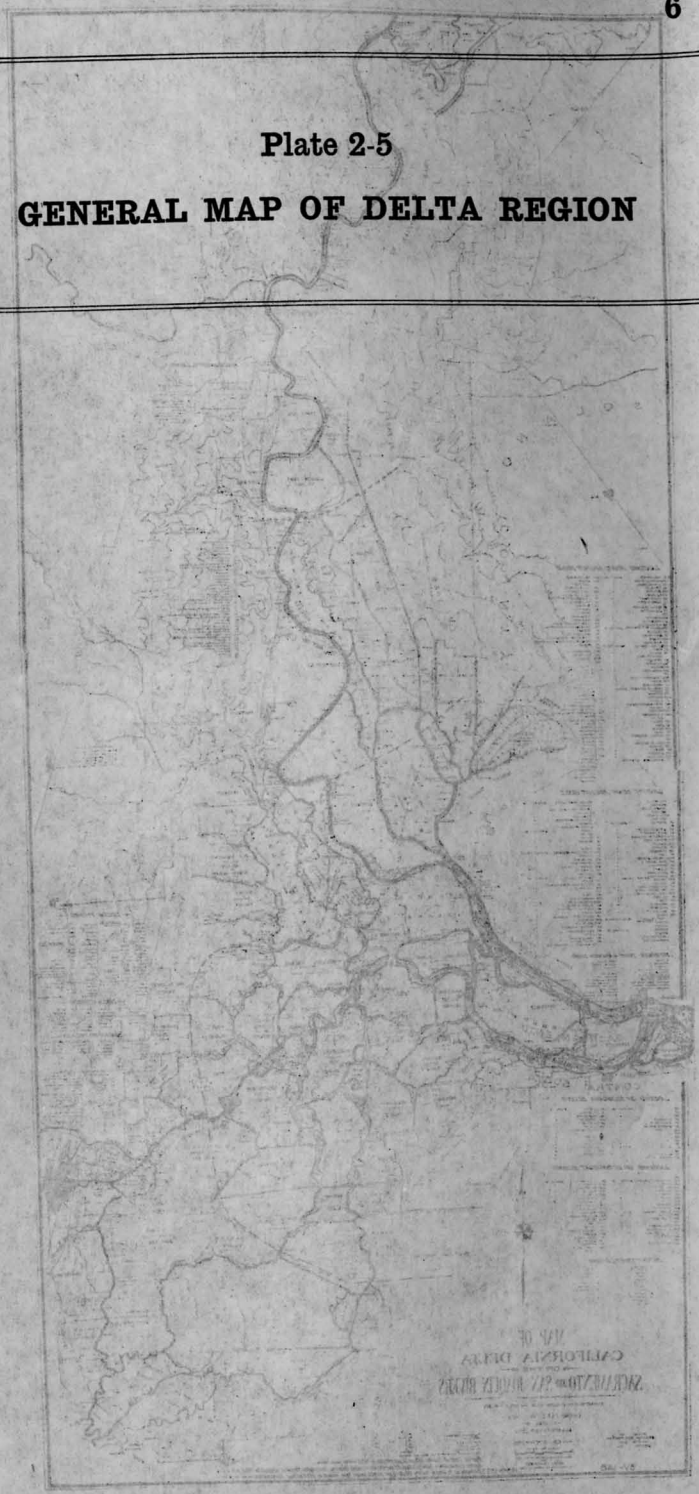
Plate 2-4

CHART OF SUISUN BAY

UNITED STATES - WEST COAST
SUISUN BAY
CALIFORNIA
FAIRFIELD
GRIZZLY BAY
SIMMONS ISLAND
WHEELER ISLAND
HIPPS ISLAND
SAN SIMEON ISLAND
(Exact location not determined)
SHERMAN I.
SACRAMENTO RIVER
SAN JOAQUIN RIVER
ANTIOCH
MARTINEZ
BENICIA
CARQUINEZ BRIDGE
LINE DRILLED
SV-147
193-D-132

Plate 2-5

GENERAL MAP OF DELTA REGION



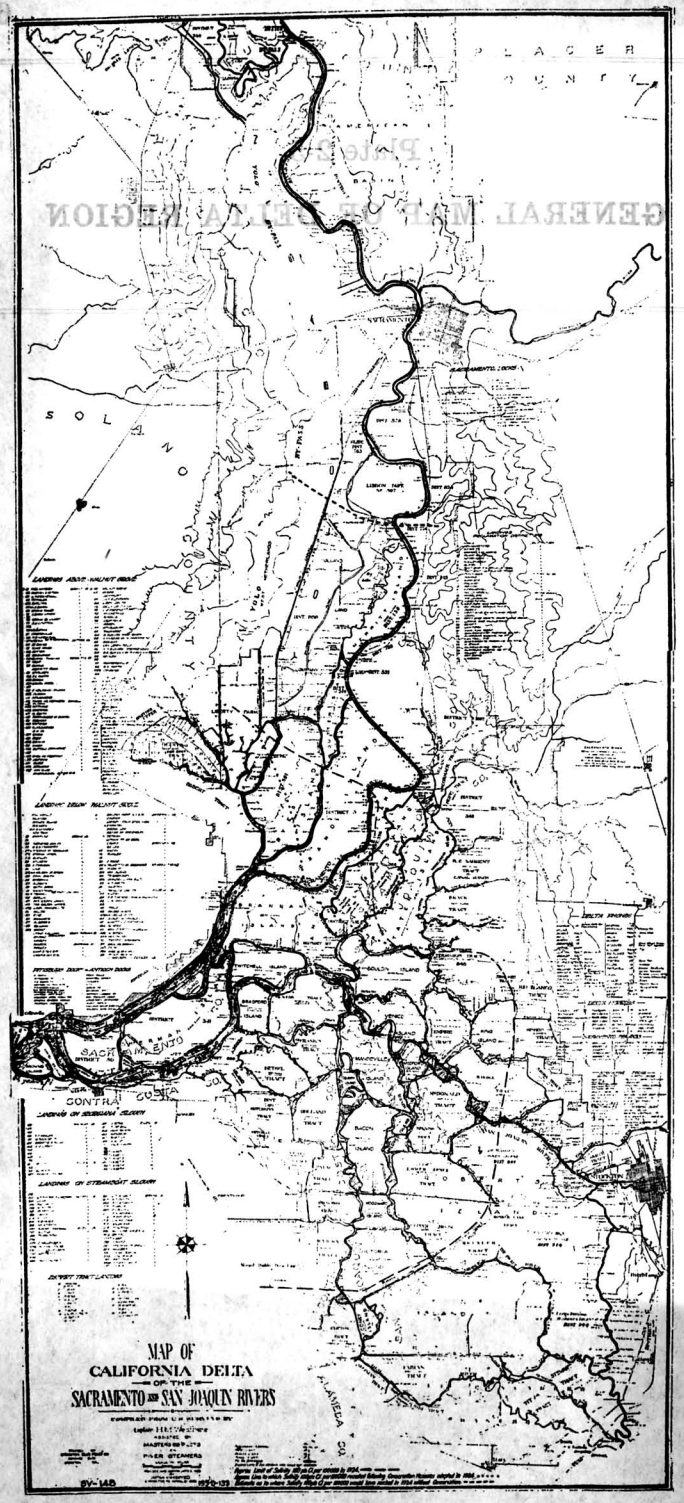

PLACER
SOLANO
SACRAMENTO
CONTRA COSTA
ALAMEDA
MAP OF
CALIFORNIA DELTA
OF THE
SACRAMENTO AND SAN JOAQUIN RIVERS

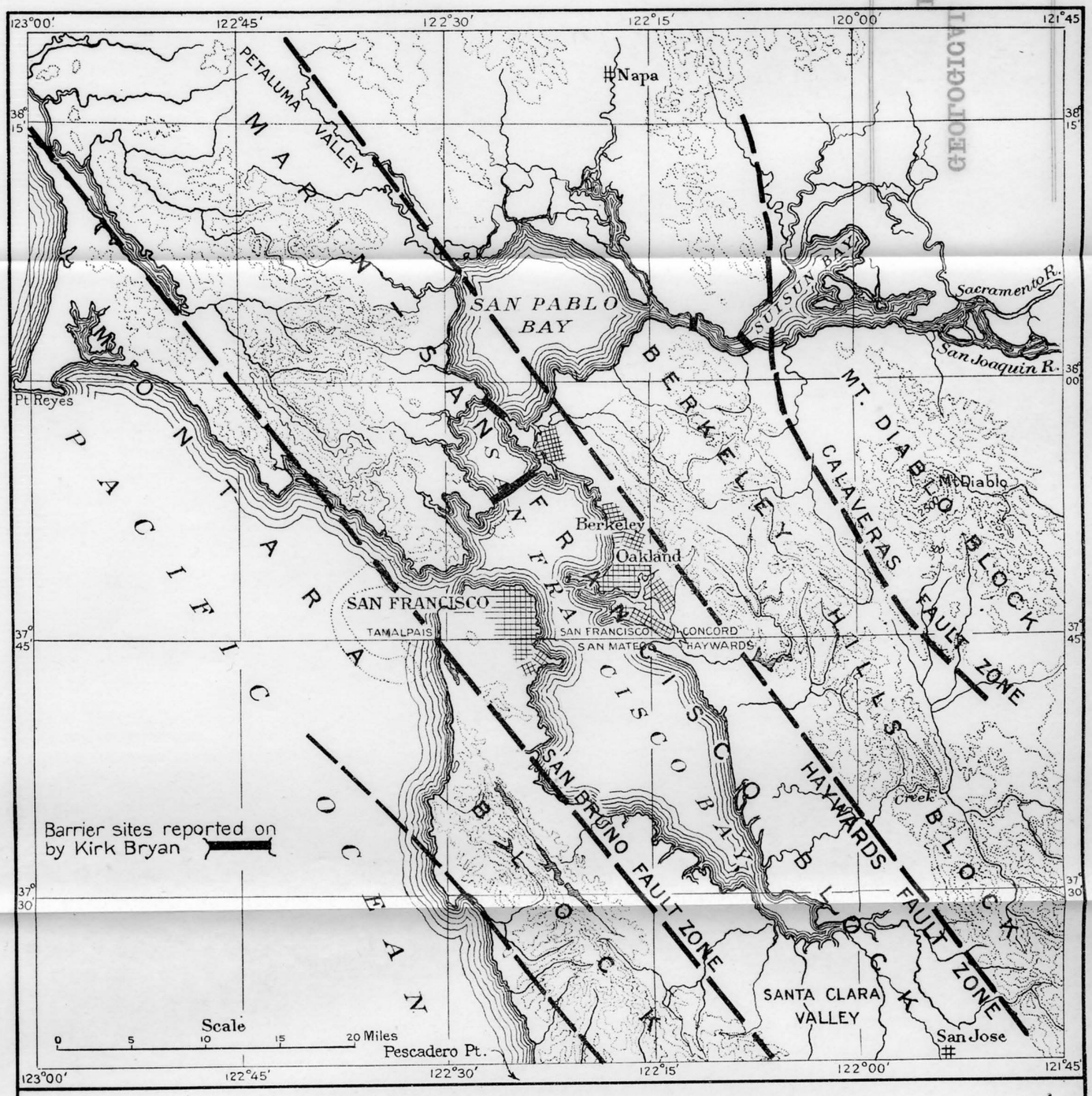
Plate 3-1

GEOLOGICAL MAP OF SAN FRANCISCO BAY REGION

Map of vicinity of San Francisco Bay showing topographic features and the geomorphic divisions resulting from the adjustment by tilting of great fault blocks

The eastern boundary of the Berkeley Hills block is not sharply defined; it may be drawn along a general zone of overthrust folding and faulting just east of the Berkeley Hills, on which the Mt Diablo thrust block has ridden westward. This thrust movement antedated the tilting of blocks to the west. The submerged bar outside the Golden Gate originated as a delta deposit of the stream that flowed in the old valley of San Francisco Bay before the land was submerged.

From Geologic Atlas of the United States-San Francisco folio- by Andrew C. Lawson - Published by U.S. Geological Survey, Folio No 193. (Supplementary data has been added for this report.)



Map of vicinity of San Francisco Bay showing topographic features and the geomorphic divisions resulting from the adjustment by tilting of great fault blocks

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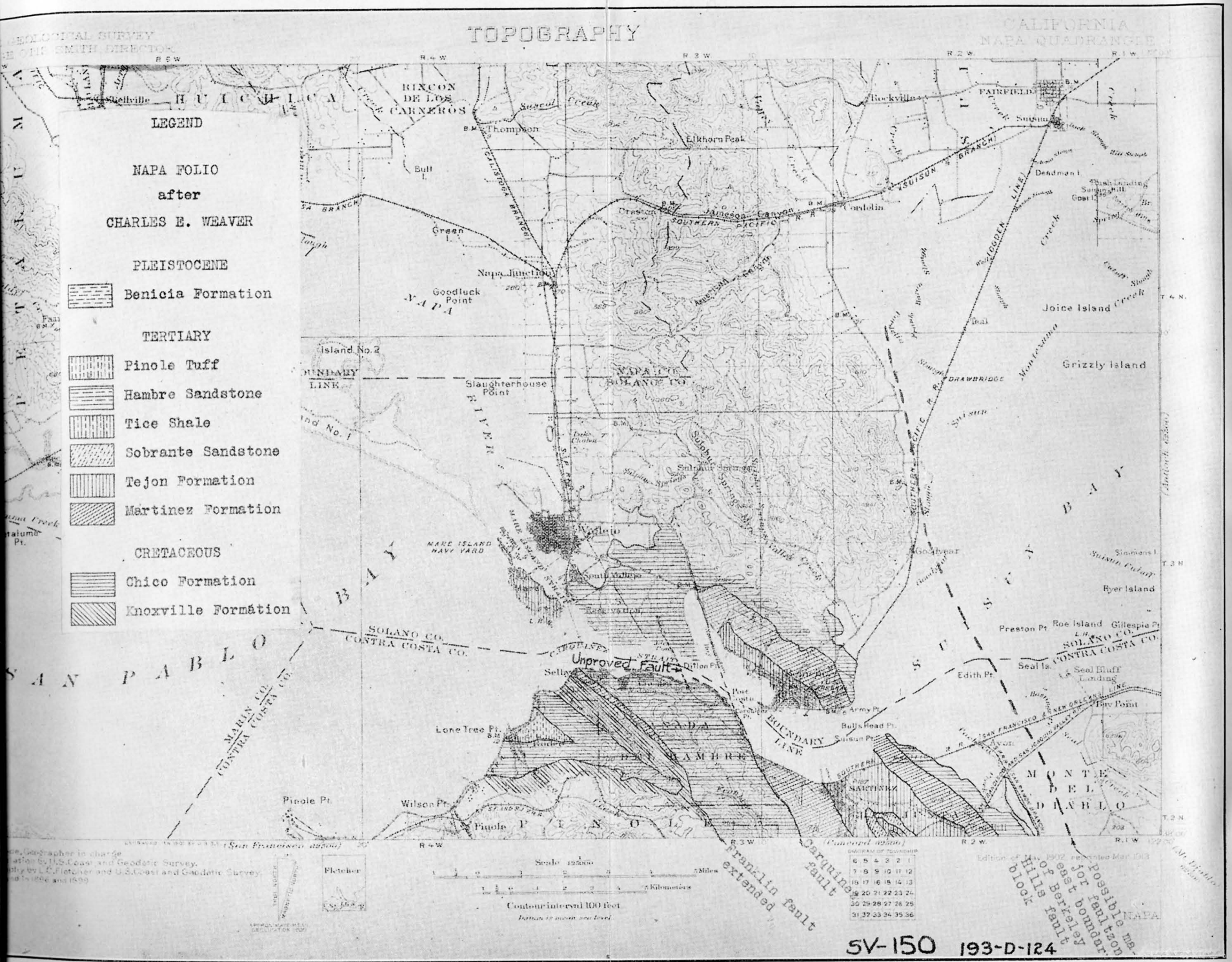
From Geologic Atlas of the United States - San Francisco Folio - by Andrew C. Lawson - Published by U.S. Geological Survey, Folio Nº 193. (Supplementary data has been added for this report.)

Plate 3-2

GEOLOGICAL MAP OF CARQUINEZ STRAIT


TOPOGRAPHY
CALIFORNIA
NAPA QUADRANGLE
LEGEND
NAPA FOLIO
after
CHARLES E. WEAVER
PLEISTOCENE
Benicia Formation
TERTIARY
Pinole Tuff
Hambre Sandstone
Tice Shale
Sobrante Sandstone
Tejon Formation
Martinez Formation
CRETACEOUS
Chico Formation
Knoxville Formation
RINCON DE LOS CARNEROS
Thompson
Elkhorn Peak
Rockville
FAIRFIELD
Suisun
Deadman I.
Cordelia
Jameson Canyon
Green I.
Napa Junction
Goodluck Point
Joice Island
Grizzly Island
Island No. 2
Slaughterhouse Point
NAPA CO.
SOLANO CO.
Vallejo
MARE ISLAND NAVY YARD
South Vallejo
Reservation
Goodyear
Simmons I.
Ryer Island
Preston Pt.
Roe Island
Gillespie Pt.
Seal Is.
Seal Bluff Landing
Edith Pt.
Bull's Head Pt.
Suisun Pt.
Lone Tree Pt.
Pinole Pt.
Wilson Pt.
Pinole
Unproved Fault
SOLANO CO.
CONTRA COSTA CO.
MARIN CO.
SAN PABLO BAY
SUISUN BAY
MONTE DEL DIABLO
Franklin fault extended
Carquinez fault
Hills fault block
Hot Berkeley east boundary fault
possible main zone
Scale 1:125000
Contour interval 100 feet
SV-150 193-D-124

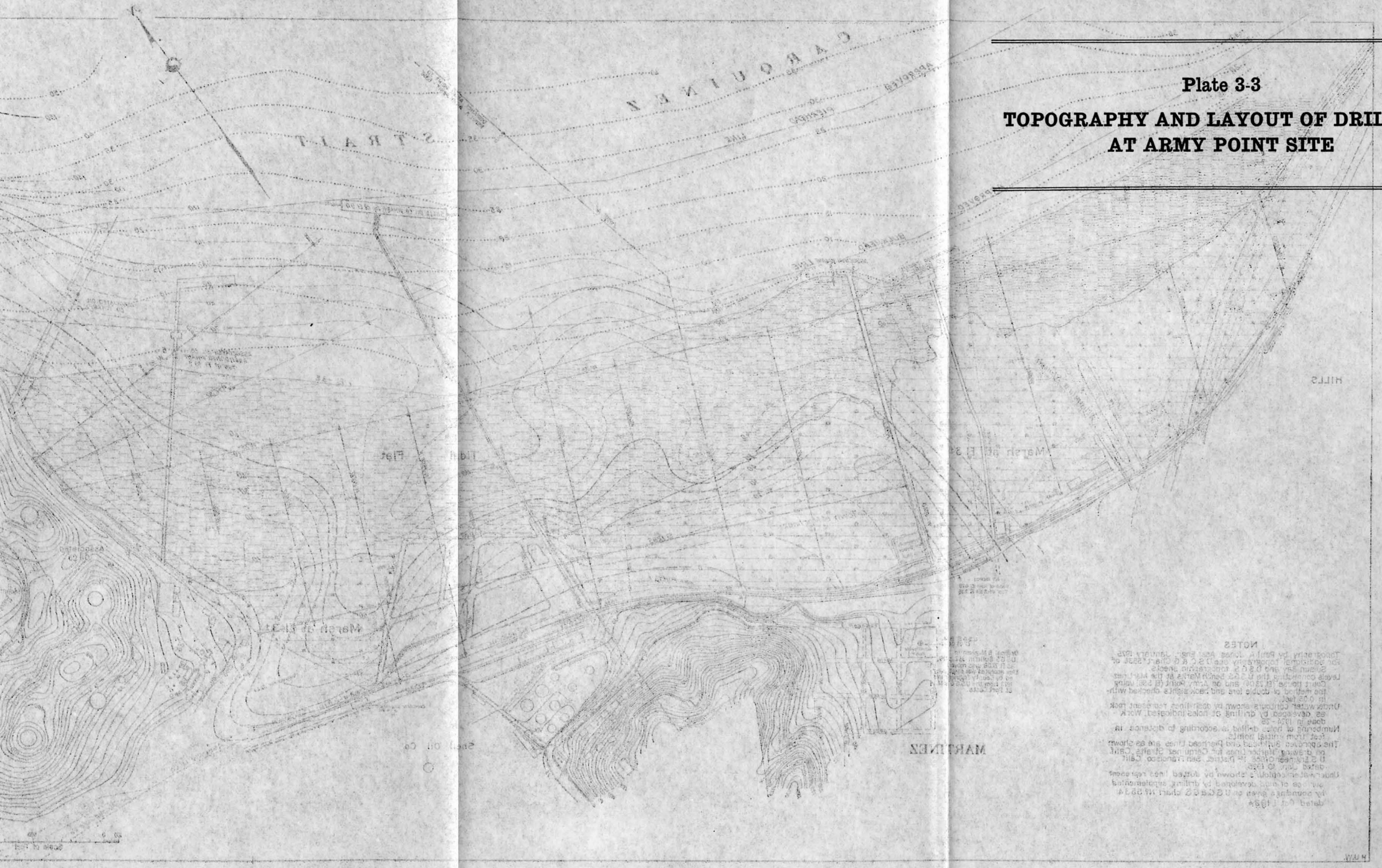
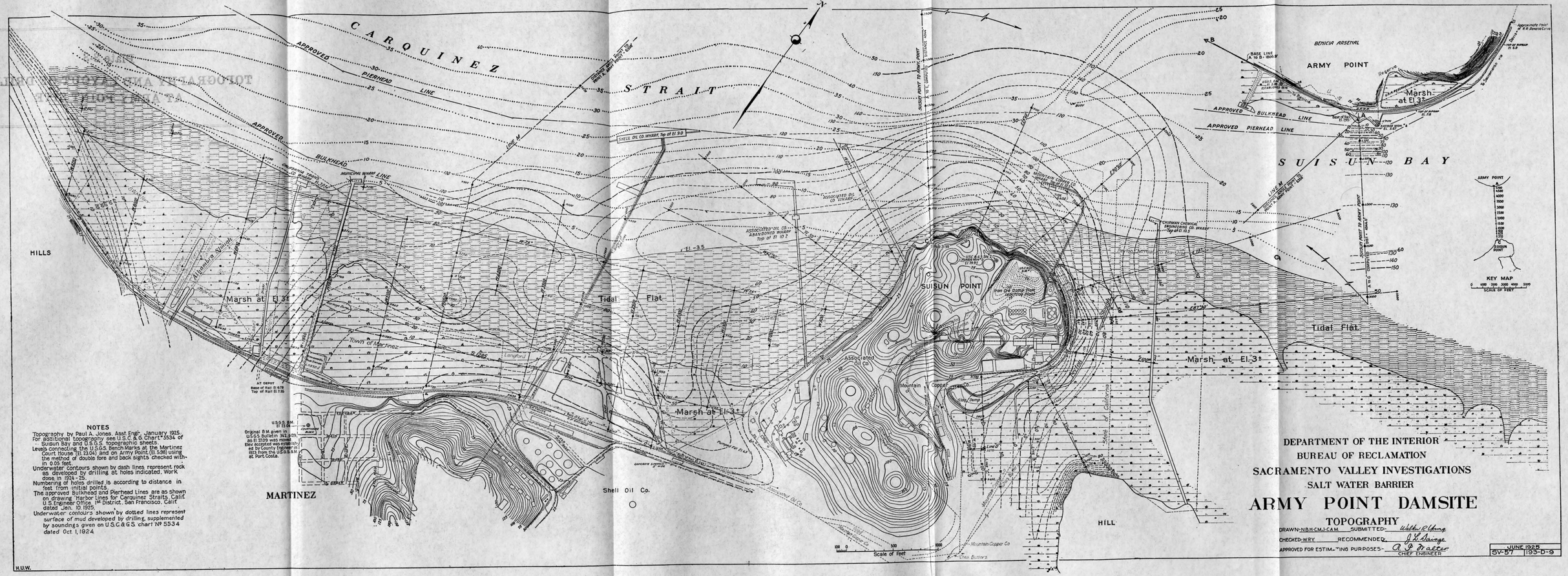


Plate 3-3

TOPOGRAPHY AND LAYOUT OF DRILLING AT ARMY POINT SITE



DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

ARMY POINT DAMSITE

TOPOGRAPHY

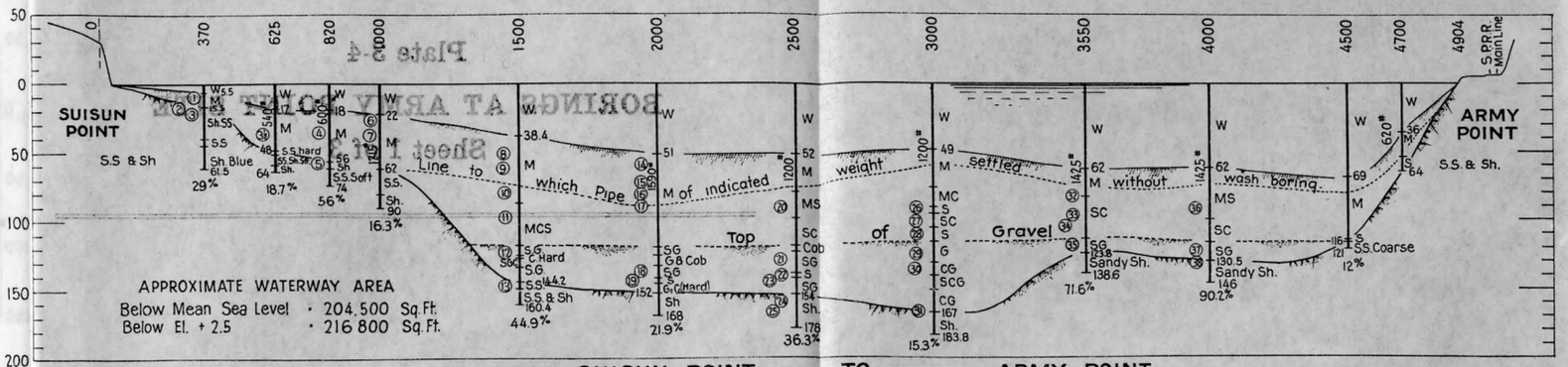
DRAWN-NBH.CM.J.CAM SUBMITTED- Walter R. Young
CHECKED-WRY RECOMMENDED- J. L. Savage
APPROVED FOR ESTIMATING PURPOSES- A. J. Parker, CHIEF ENGINEER

JUNE 1925
SV-57 193-D-9

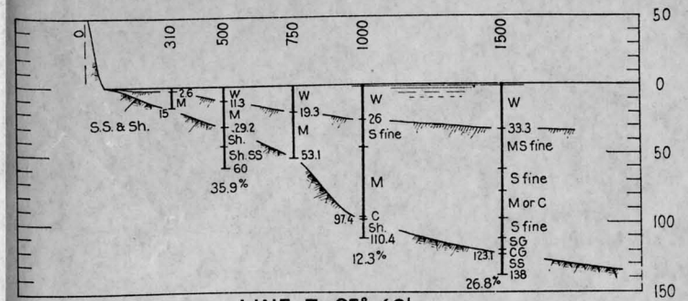
Plate 3-4

BORINGS AT ARMY POINT SITE

Sheet 1 of 3



SUISUN POINT TO ARMY POINT

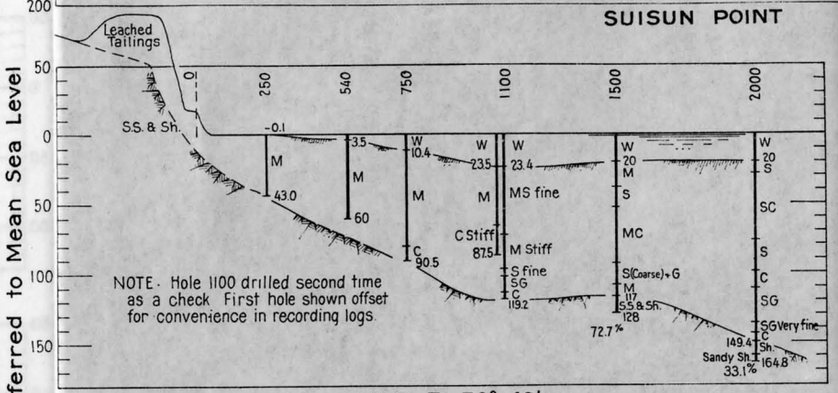


LINE E 25°-40'

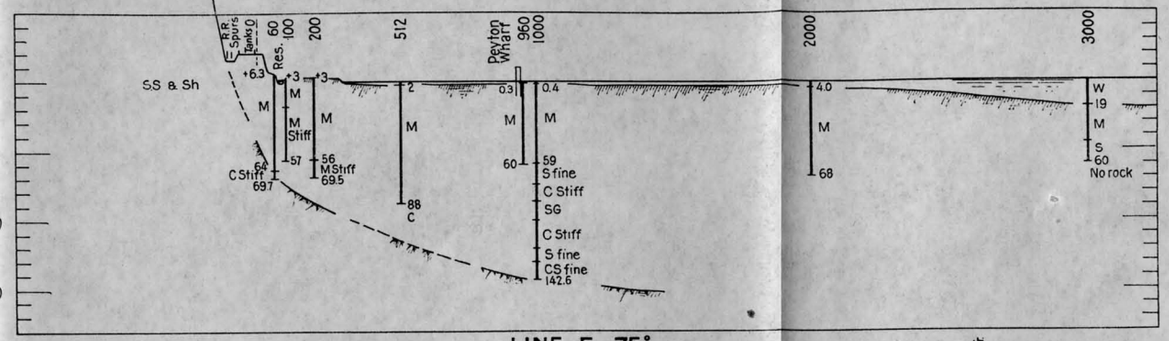
APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

LEGEND

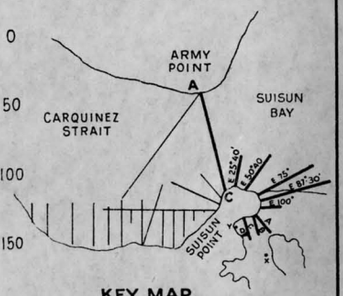
W - Water
M - Mud
S - Sand
C - Clay
G - Gravel
Sh. - Shale
SS - Sandstone
5.6% Percentage of core recovered
⑤ - No. of Sample



LINE E 50°-40'

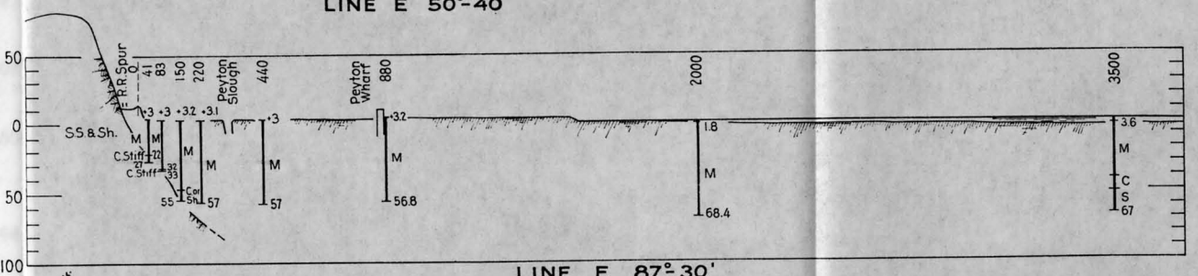


LINE E 75°

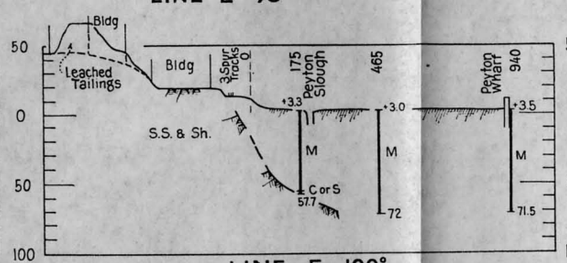


KEY MAP

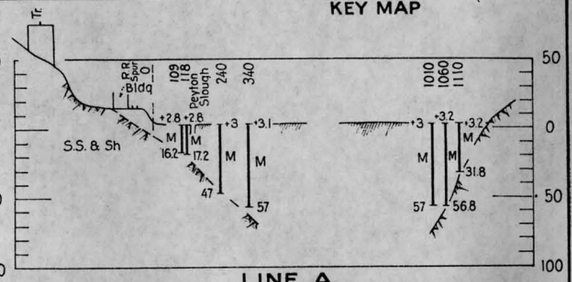
Elevations referred to Mean Sea Level



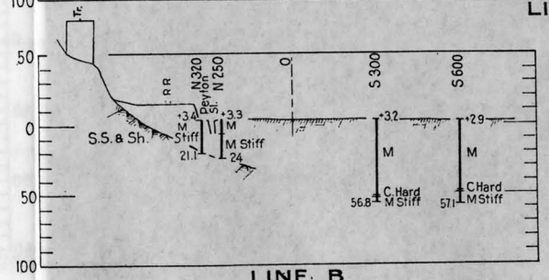
LINE E 87°-30'



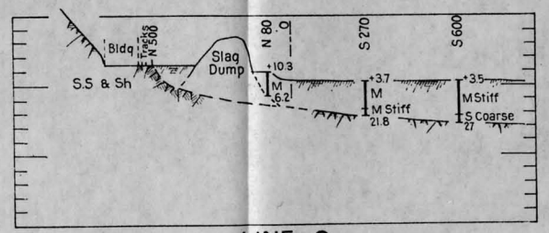
LINE E 100°



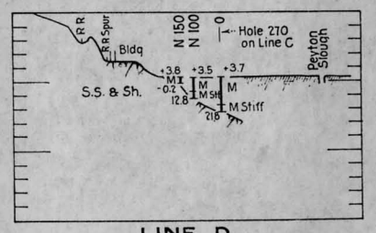
LINE A



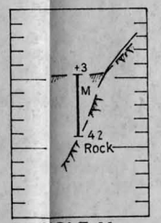
LINE B



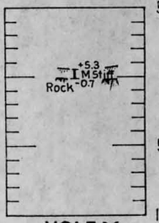
LINE C



LINE D



HOLE X



HOLE Y

NOTE: For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station O.
See drill logs for details.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT DAMSITE
BORINGS

DRAWN H.U.W., R.McC. SUBMITTED Walter R. Young
CHECKED P.A.W. RECOMMENDED J. L. Savage

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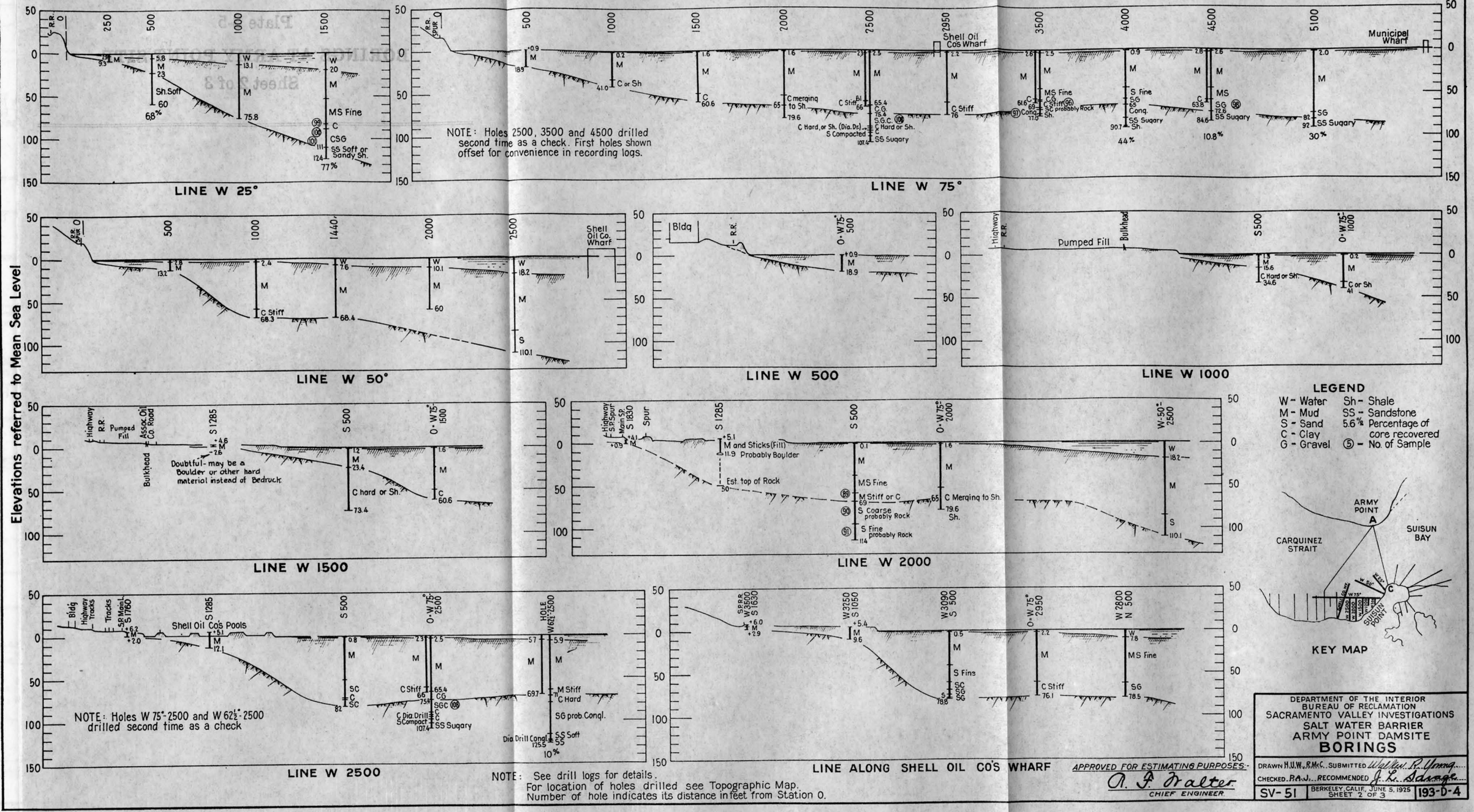
Plate 3-5

BORINGS AT ARMY POINT SITE

Sheet 2 of 3

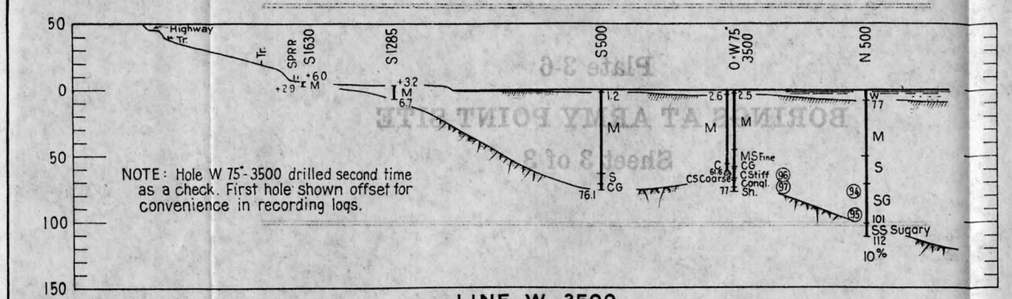


NOTE: See drill logs for details.
For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station 0.

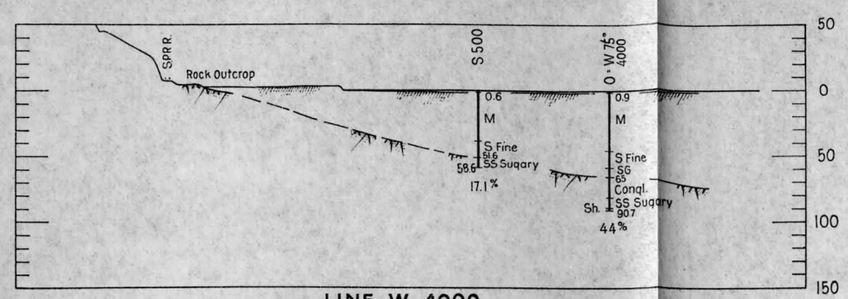
Plate 3-6

BORINGS AT ARMY POINT SITE

Sheet 3 of 3



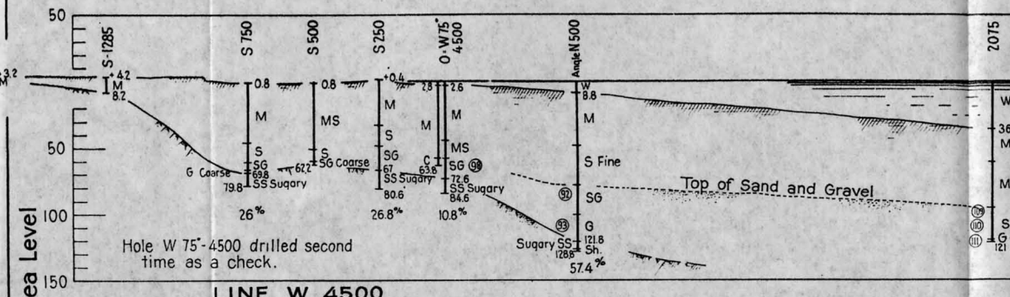
LINE W 3500



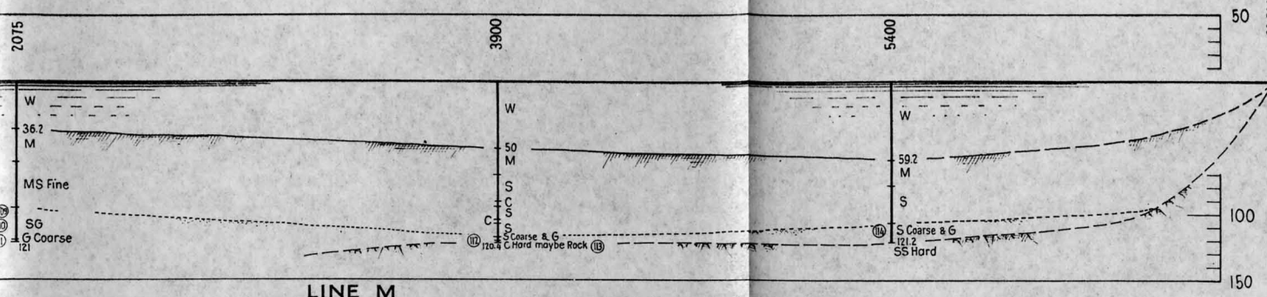
LINE W 4000

LEGEND

W - Water
M - Mud
S - Sand
C - Clay
G - Gravel
Sh. - Shale
SS - Sandstone
5.6% - Percentage of core recovered
⑤ - No. of Sample



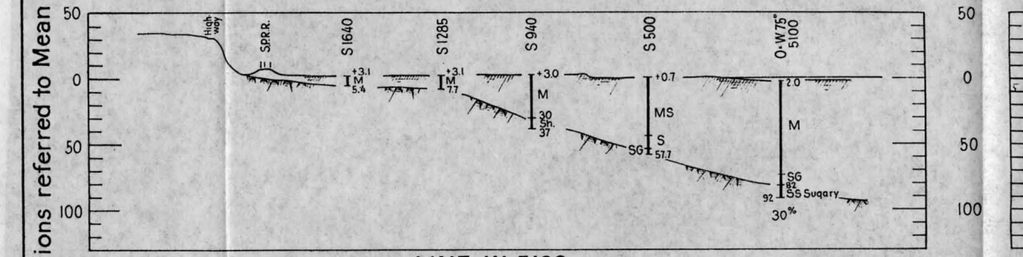
LINE W 4500



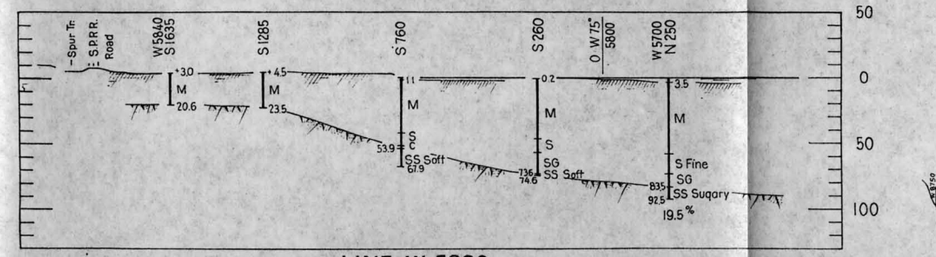
LINE M

Line M is a continuation of Line W 4500, angling about 35° Northerly at Hole N 500

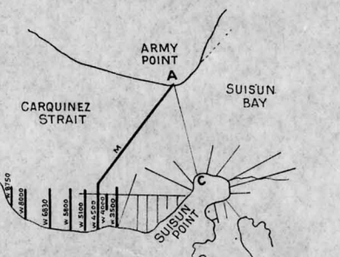
Elevations referred to Mean Sea Level



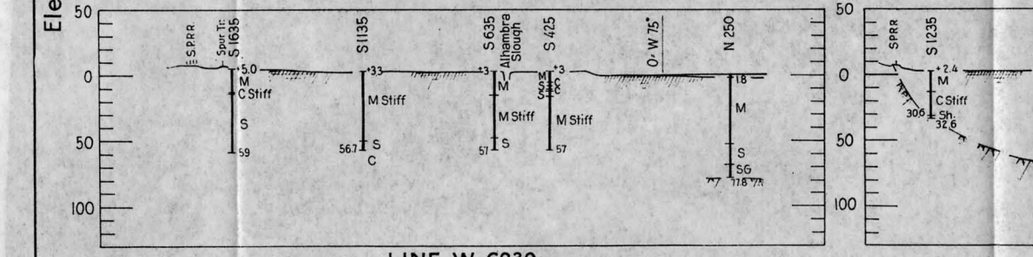
LINE W 5100



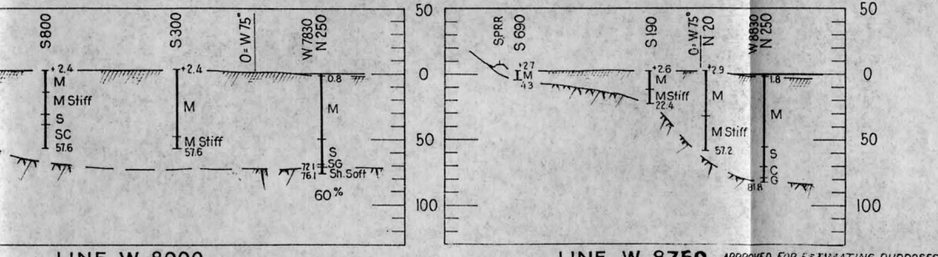
LINE W 5800



KEY MAP



LINE W 6830



LINE W 8000

LINE W 8750

NOTE: For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station 0
See drill logs for details.

APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT DAMSITE
BORINGS

DRAWN H.U.W., R.McC., SUBMITTED Wesley R. Young
CHECKED P.A.J. RECOMMENDED J. L. Savage

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Plate 3-7

TOPOGRAPHY AND LAYOUT OF DRILLING AT DILLON POINT SITE

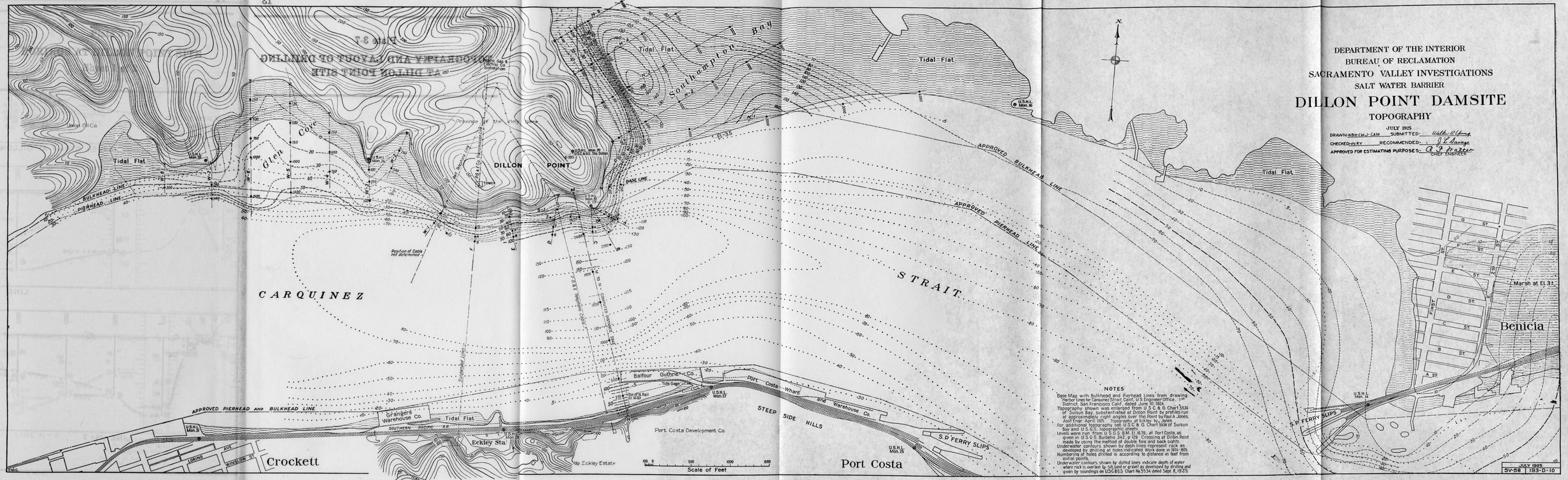
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT DAMSITE
TOPOGRAPHY
JULY 1925
DRAWN-NBH-CMJ-CAM SUBMITTED-
CHECKED-WVRY RECOMMENDED-
APPROVED FOR ESTIMATING PURPOSES-
CHIEF ENGINEER
NOTES
Base Map with Bulkhead and Pierhead Lines from drawing "Harbor lines for Carquinez Strait Calif." U.S. Engineer Office, 1st Distrct, San Francisco Calif. dated June 10, 1924.
Topography shown was enlarged from U.S.C.&G. Chart 5534 of Suisun Bay, substantiated at Dillon Point by profiles run at approximately right angles over the Point by Paul A. Jones, Asst Engr. April 1925. Topography at Eckley by J. Jones.
For additional topography see U.S.C.&G. Chart 5534 of Suisun Bay and U.S.G.S. Topographic Sheets.
Location of Cable from U.S.G.S. B.M. Tl. 8.79, at Port Costa as given in U.S.G.S. Bulletin 342, p 179. Crossing at Dillon Point made by using the method of double fore and back sights.
Underwater contours shown by dash lines represent rock as developed by drilling at holes indicated. Work done in 1924-1925.
Numbering of holes drilled is according to distance in feet from initial points.
Underwater contours shown by dotted lines indicate depth of water where rock is overlain by silt, sand or gravel as developed by drilling and given by soundings on U.S.C.&G.S. Chart No. 5534 dated Sept. 8, 1925.
Tidal Flat
Southampton Bay
Glen Cove
DILLON POINT
BASE LINE
BULKHEAD LINE
PIERHEAD LINE
APPROVED BULKHEAD LINE
APPROVED PIERHEAD LINE
CARQUINEZ
STRAIT
Position of Cable not determined
Balfour Guthrie & Co.
Tide Gage
Port Costa Wharf and Warehouse Co.
STEEP SIDE HILLS
S.P. FERRY SLIPS
Grangers Warehouse Co.
SOUTHERN PACIFIC R.R.
Eckley Sta.
Eckley Estate
Port Costa Development Co
Scale of Feet
Crockett
Port Costa
Benicia
Marsh at El. 3.5
JULY 1925
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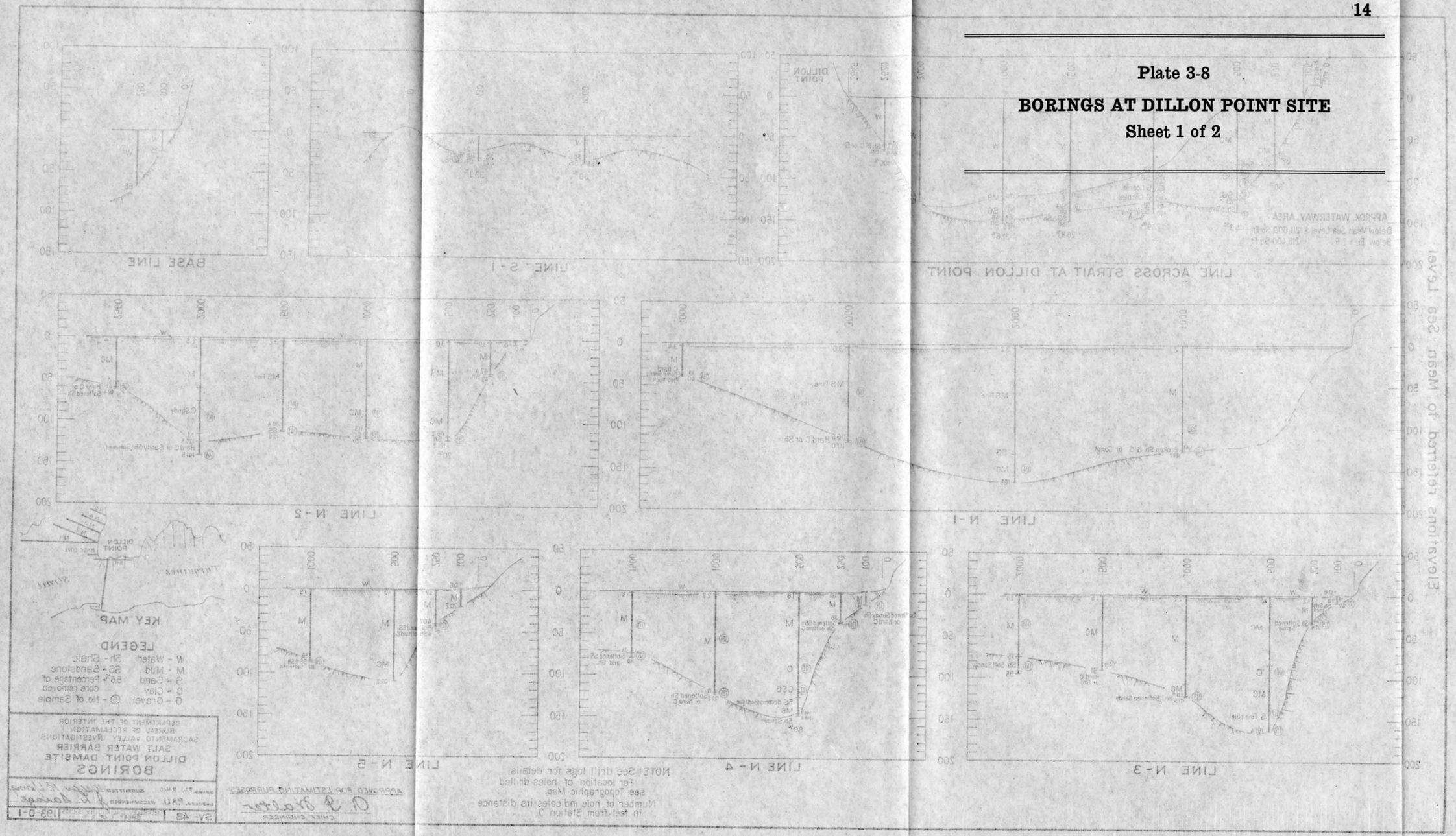
Plate 3-8

BORINGS AT DILLON POINT SITE

Sheet 1 of 2



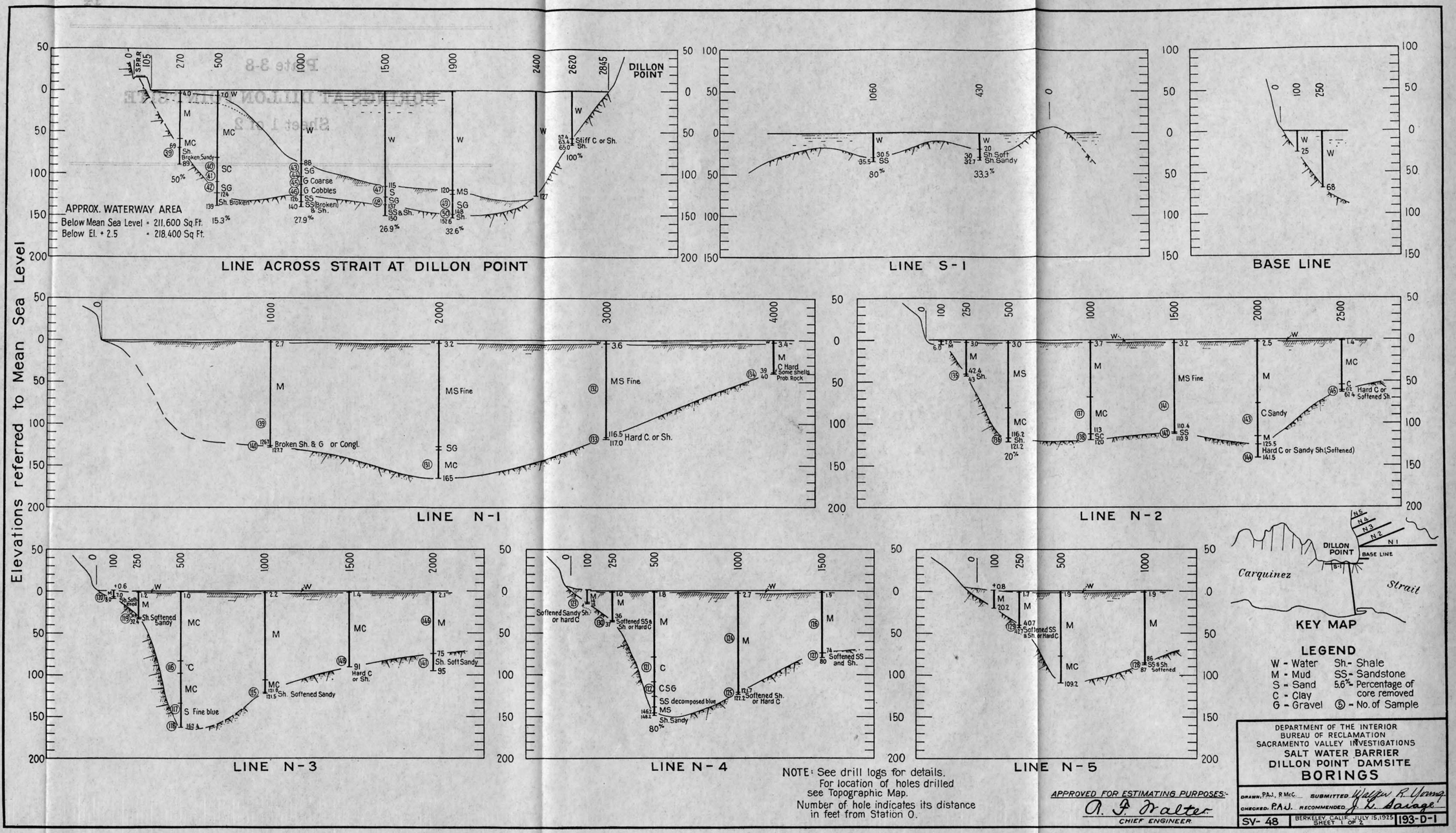
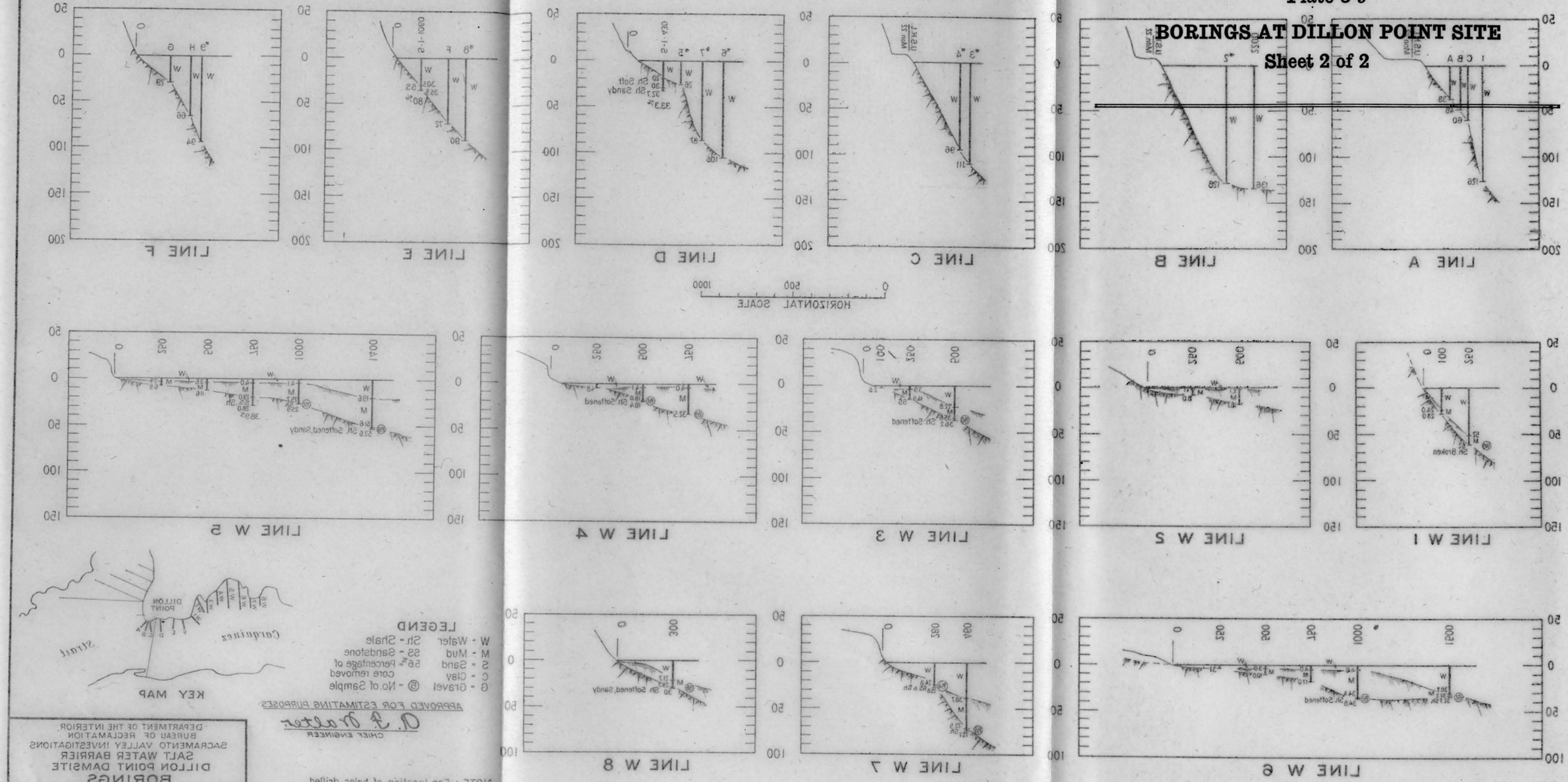

Elevations referred to Mean Sea Level
LINE ACROSS STRAIT AT DILLON POINT
DILLON POINT
APPROX. WATERWAY AREA
Below Mean Sea Level = 211,600 Sq.Ft.
Below El. + 2.5 = 218,400 Sq.Ft.
LINE S-1
BASE LINE
LINE N-1
LINE N-2
LINE N-3
LINE N-4
LINE N-5
KEY MAP
Carquinez
Strait
LEGEND
W - Water
M - Mud
S - Sand
C - Clay
G - Gravel
Sh.- Shale
SS- Sandstone
5.6%- Percentage of core removed
(5) - No. of Sample
NOTE: See drill logs for details.
For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station O.
APPROVED FOR ESTIMATING PURPOSES:-
A. F. Walter
CHIEF ENGINEER
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT DAMSITE
BORINGS
DRAWN: P.A.J., R.McC. SUBMITTED: Walter R. Young
CHECKED: P.A.J. RECOMMENDED: J. L. Savage
SV-48
BERKELEY, CALIF. JULY 15, 1925
SHEET 1 OF 2
193-D-1

Plate 3-9

BORINGS AT DILLON POINT SITE

Sheet 2 of 2



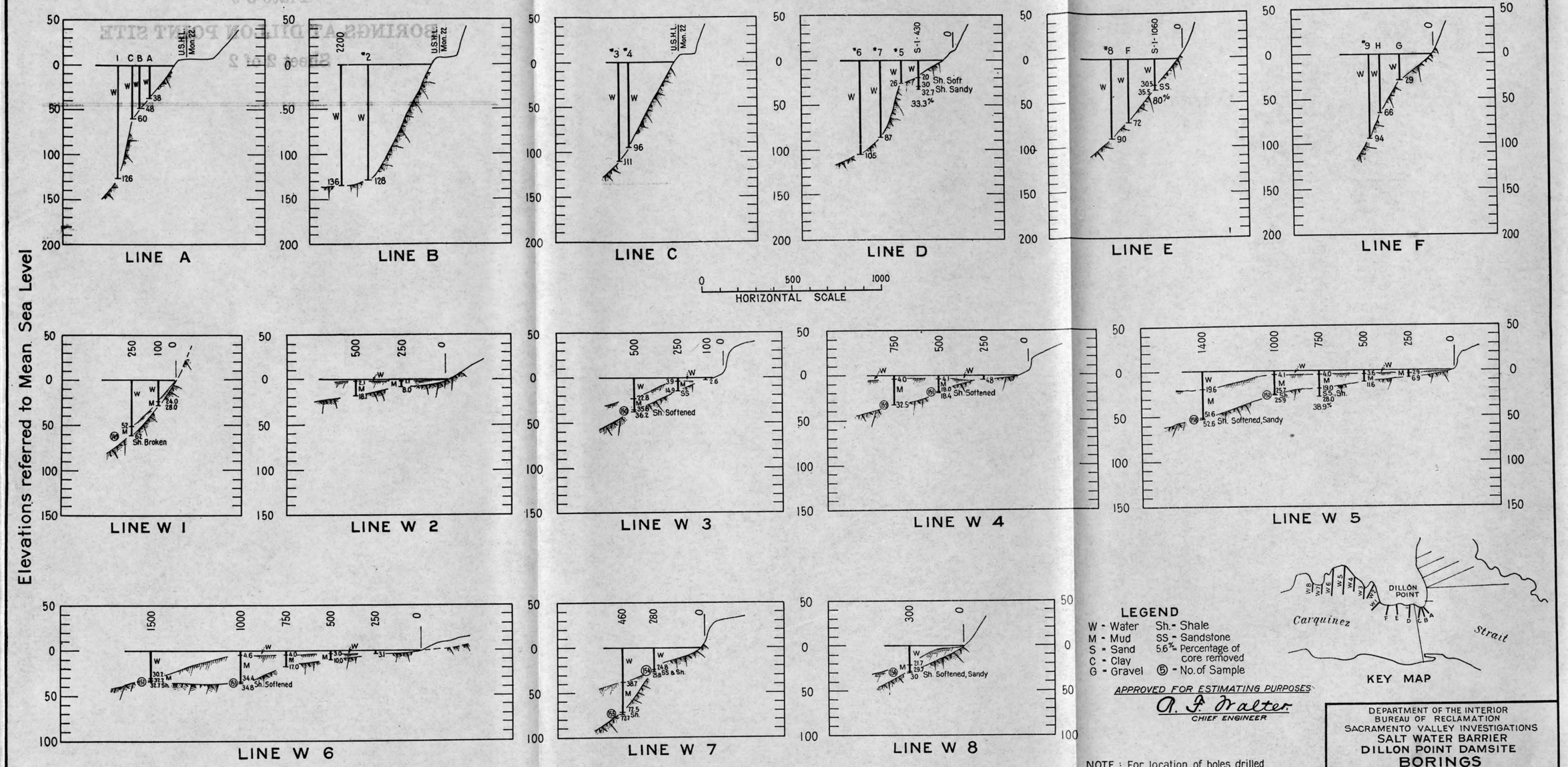
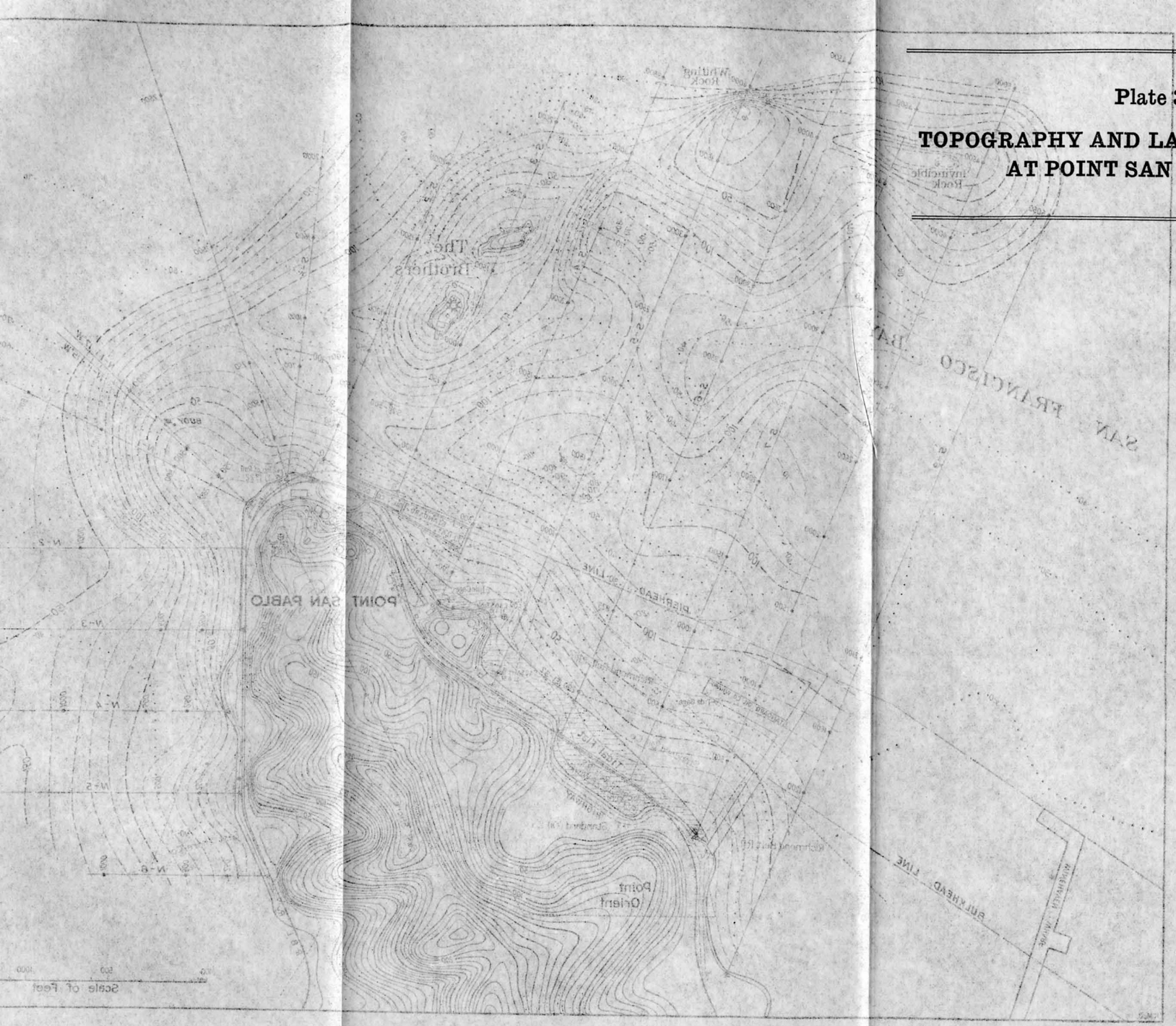
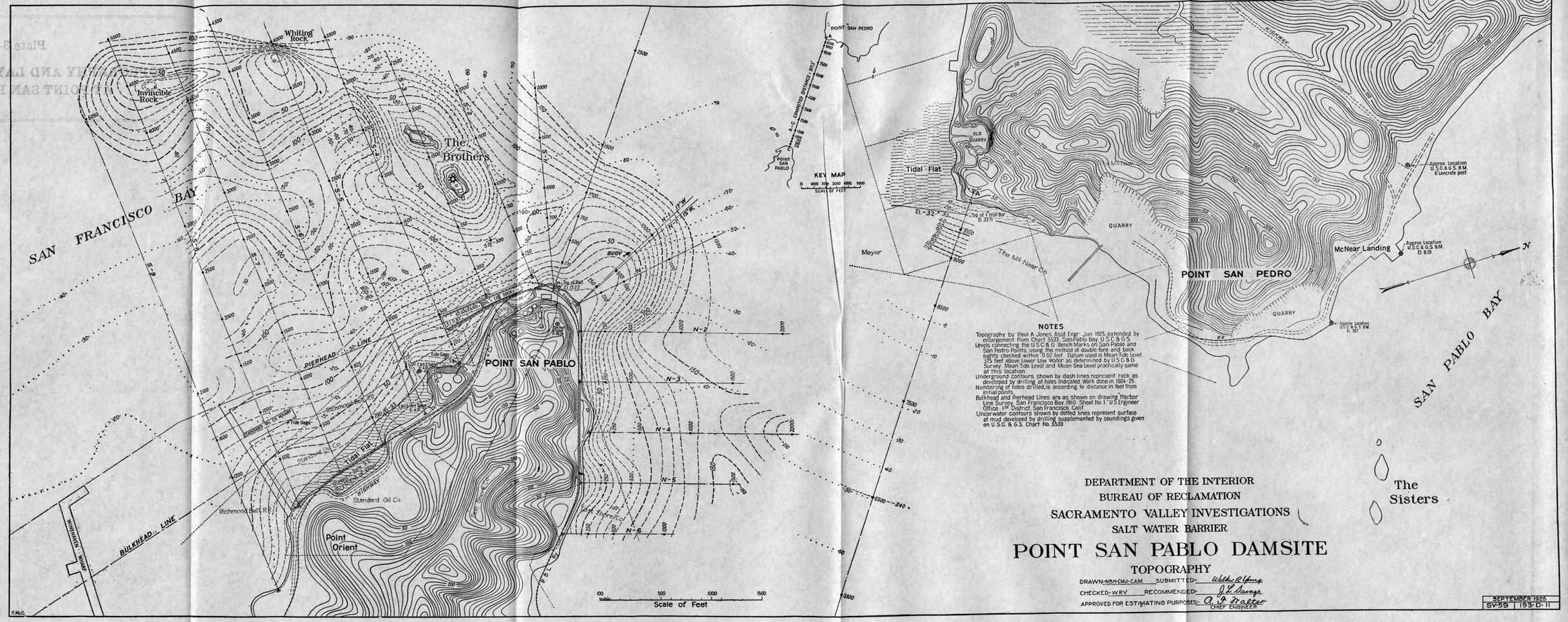

Elevations referred to Mean Sea Level
LINE A
LINE B
LINE C
LINE D
LINE E
LINE F
HORIZONTAL SCALE
0 500 1000
LINE W 1
LINE W 2
LINE W 3
LINE W 4
LINE W 5
LINE W 6
LINE W 7
LINE W 8
U.S.H.L. Mon. 22
Sh. Broken
Sh. Softened
Sh. Softr
Sh. Sandy
Sh. Softened, Sandy
Sh. Softened, Sandy
Sh. Softened
Sh. Softened
Sh. Softened, Sandy
Sh. Softened, Sandy
S-1-430
S-1-1060
80%
38.9%
33.3%
LEGEND
W - Water
M - Mud
S - Sand
C - Clay
G - Gravel
Sh. - Shale
SS - Sandstone
5.6% - Percentage of core removed
(5) - No. of Sample
APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER
NOTE: For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station 0.
See drill logs for details.
KEY MAP
DILLON POINT
Carquinez
Strait
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT DAMSITE
BORINGS
DRAWN: P.A.J., R.McC.
SUBMITTED: Walter R. Young
CHECKED: P.A.J.
RECOMMENDED: J. L. Savage
SV-49
BERKELEY, CALIF. JULY 15, 1925
SHEET 2 OF 2
193-D-2

Plate 3-10

TOPOGRAPHY AND LAYOUT OF DRILLING AT POINT SAN PABLO SITE





NOTES

Topography by Paul A Jones, Asst Engr Jan 1925, extended by enlargement from Chart 5533, San Pablo Bay, U.S.C.&G.S.
Levels connecting the U.S.C.&G.S. Bench Marks on San Pablo and San Pedro Points, using the method of double fore and back sights checked within 0.02 feet. Datum used is Mean Tide Level, 3.75 feet above Lower Low Water as determined by U.S.C.&G.S. Survey. Mean Tide Level and Mean Sea Level practically same at this location.
Underground contours shown by dash lines represent rock, as developed by drilling at holes indicated. Work done in 1924-25.
Numbering of holes drilled, is according to distance in feet from initial points.
Bulkhead and Pierhead Lines are as shown on drawing "Harbor Line Survey, San Francisco Bay, 1910. Sheet No 1" U.S. Engineer Office 1st District, San Francisco, Calif.
Underwater contours shown by dotted lines represent surface of mud developed by drilling, supplemented by soundings given on U.S.C.&G.S. Chart No. 5533

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

POINT SAN PABLO DAMSITE

TOPOGRAPHY

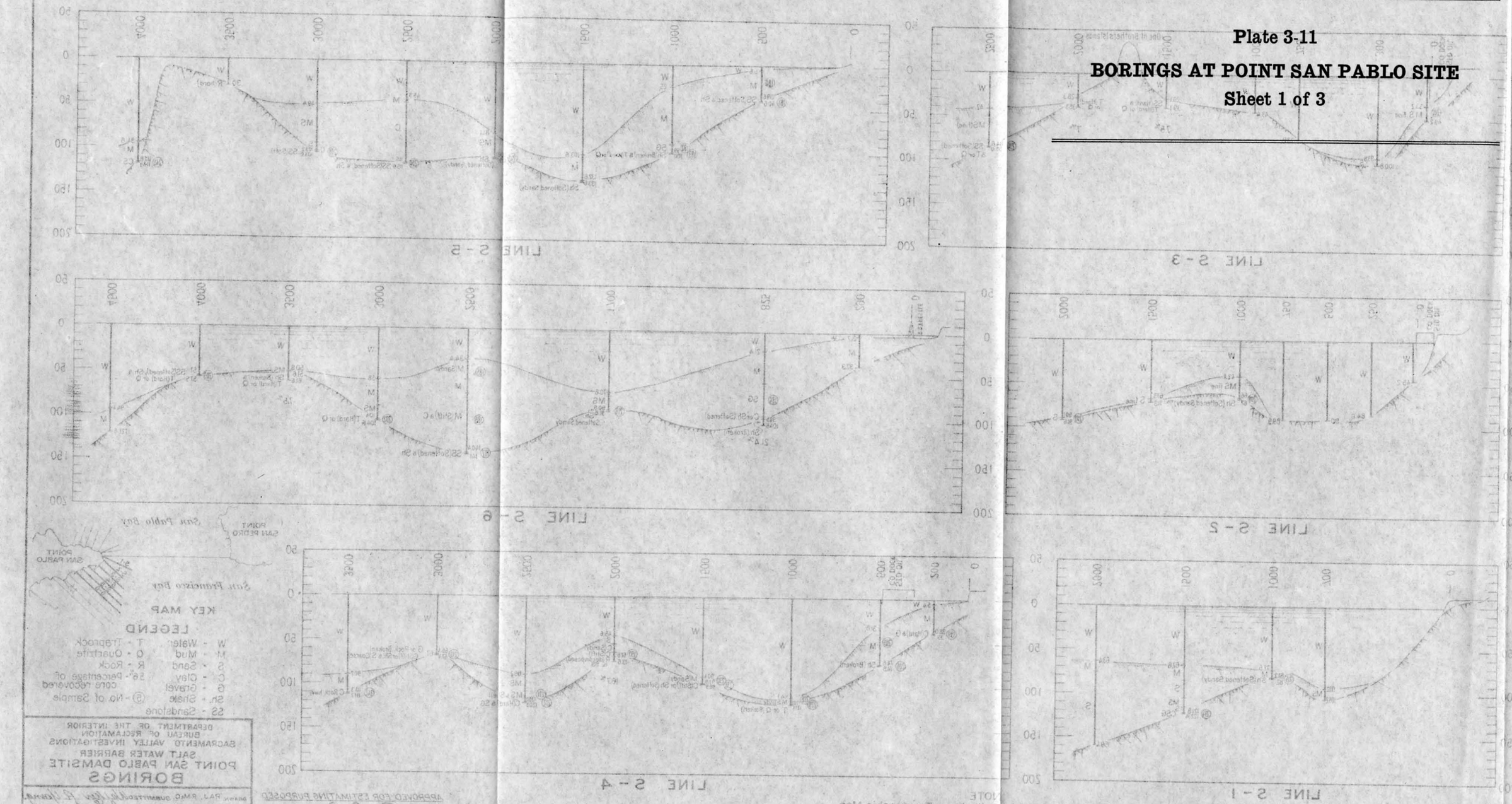
DRAWN-NBH-CMJ-CAM SUBMITTED- Walter R Young
CHECKED-WRY RECOMMENDED- J. L. Savage
APPROVED FOR ESTIMATING PURPOSES- A. J. Walter CHIEF ENGINEER

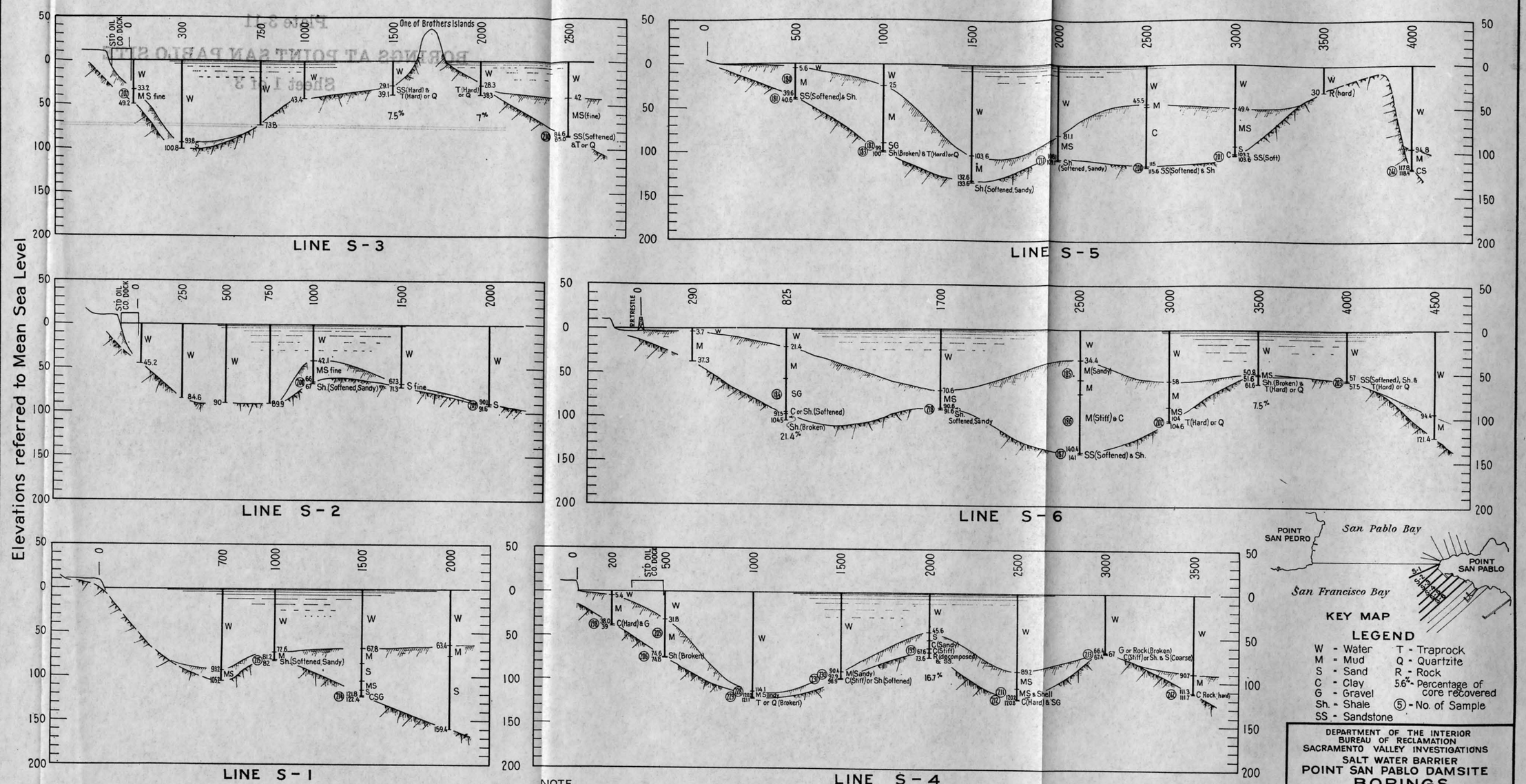
SEPTEMBER 1925
SV-59 | 193-D-11

Plate 3-11

BORINGS AT POINT SAN PABLO SITE

Sheet 1 of 3





NOTE
For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station 0.
See drill logs for details.

APPROVED FOR ESTIMATING PURPOSES:
A. P. Fralter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
POINT SAN PABLO DAMSITE
BORINGS

DRAWN: P.A.J., R.McC. SUBMITTED: Walter R. Young
CHECKED: P.A.J. RECOMMENDED: J. L. Savage

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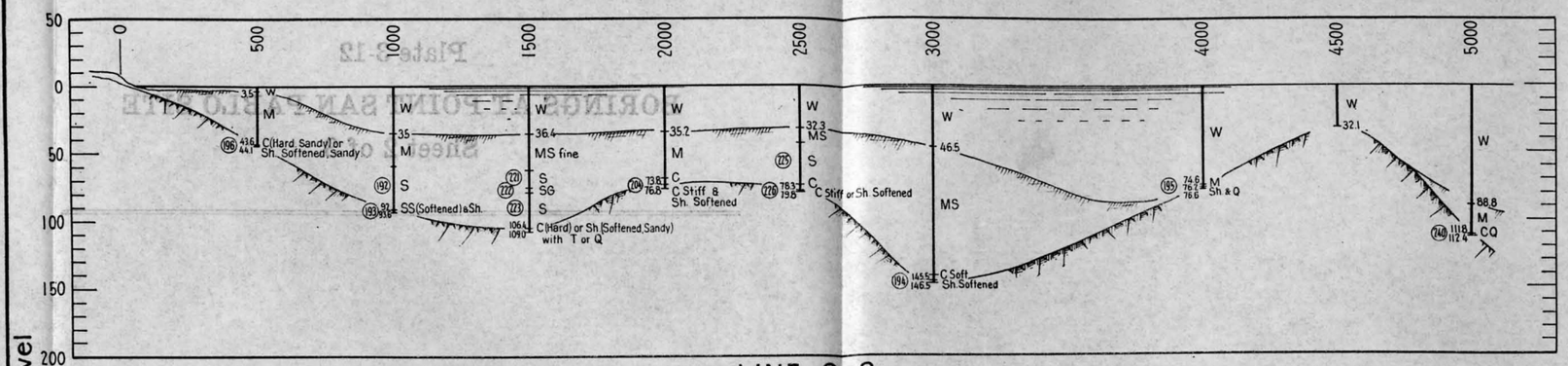
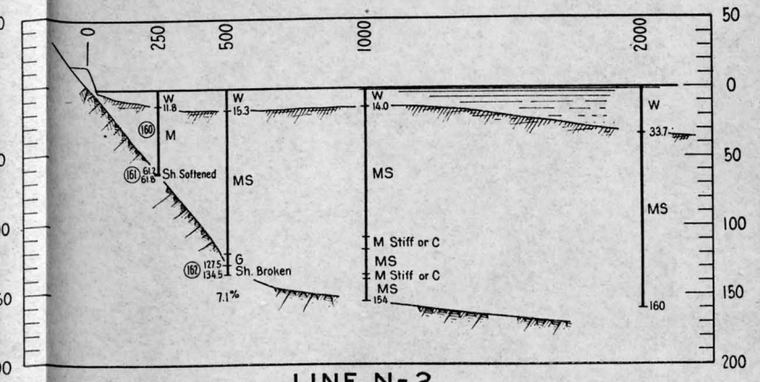
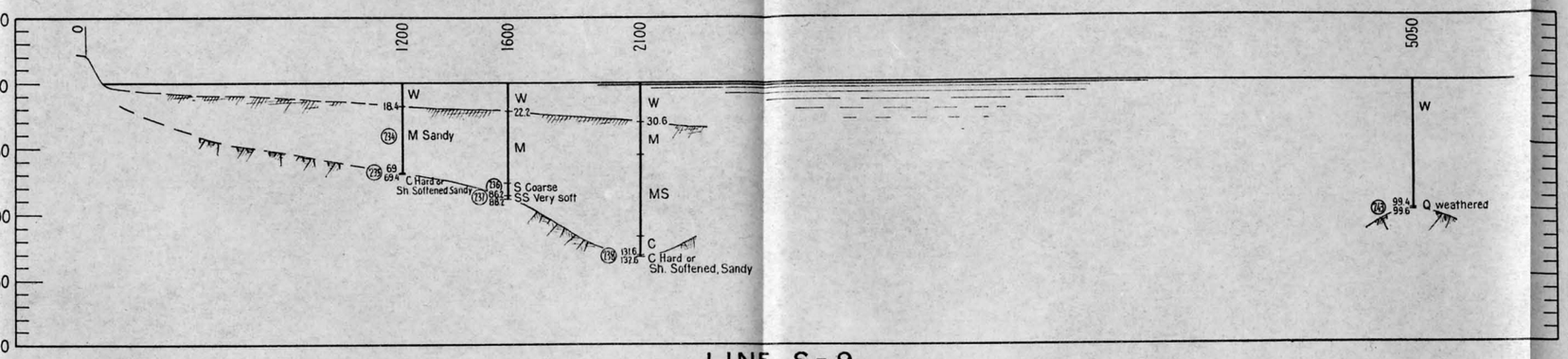
Plate 3-12

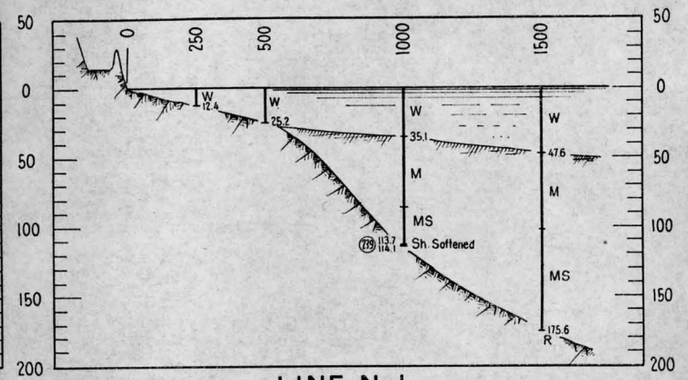
BORINGS AT POINT SAN PABLO SITE

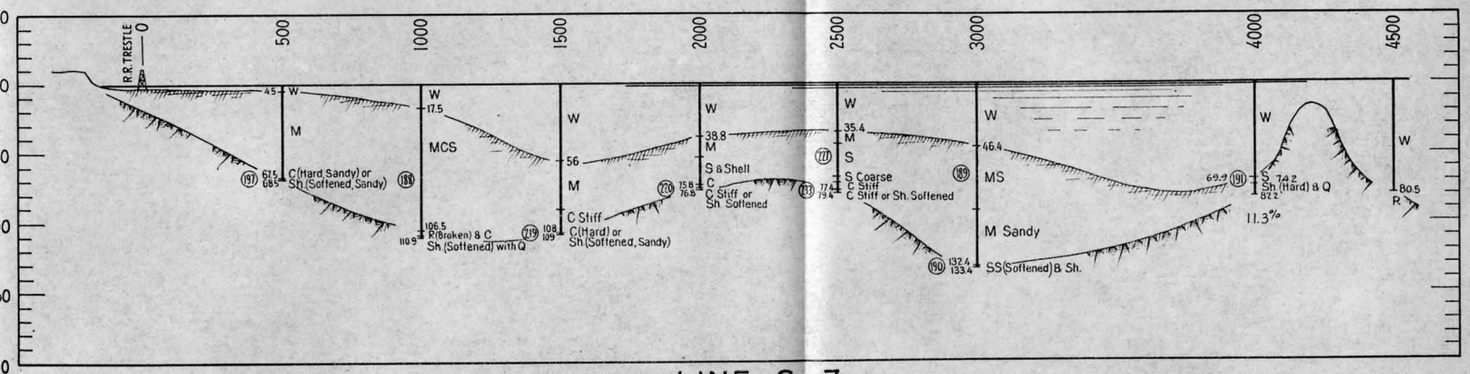
Sheet 2 of 3

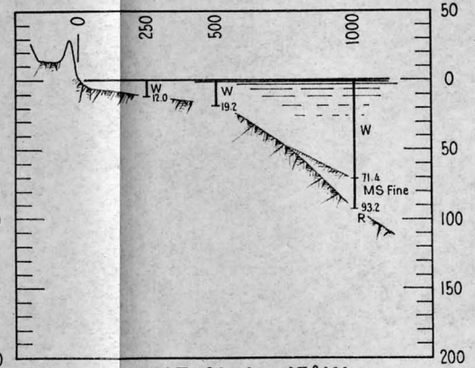








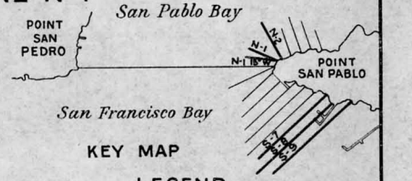




Hole 1000 is located on Line N-1 17° W

APPROVED FOR ESTIMATING PURPOSES

R. P. Walter
CHIEF ENGINEER



KEY MAP

LEGEND

W - Water
M - Mud
S - Sand
C - Clay
G - Gravel
Sh - Shale
SS - Sandstone
T - Traprock
Q - Quartzite
R - Rock
5.6% - Percentage of core recovered
(5) - No. of Sample

NOTE
For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station 0.
See drill logs for details.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
POINT SAN PABLO DAMSITE
BORINGS

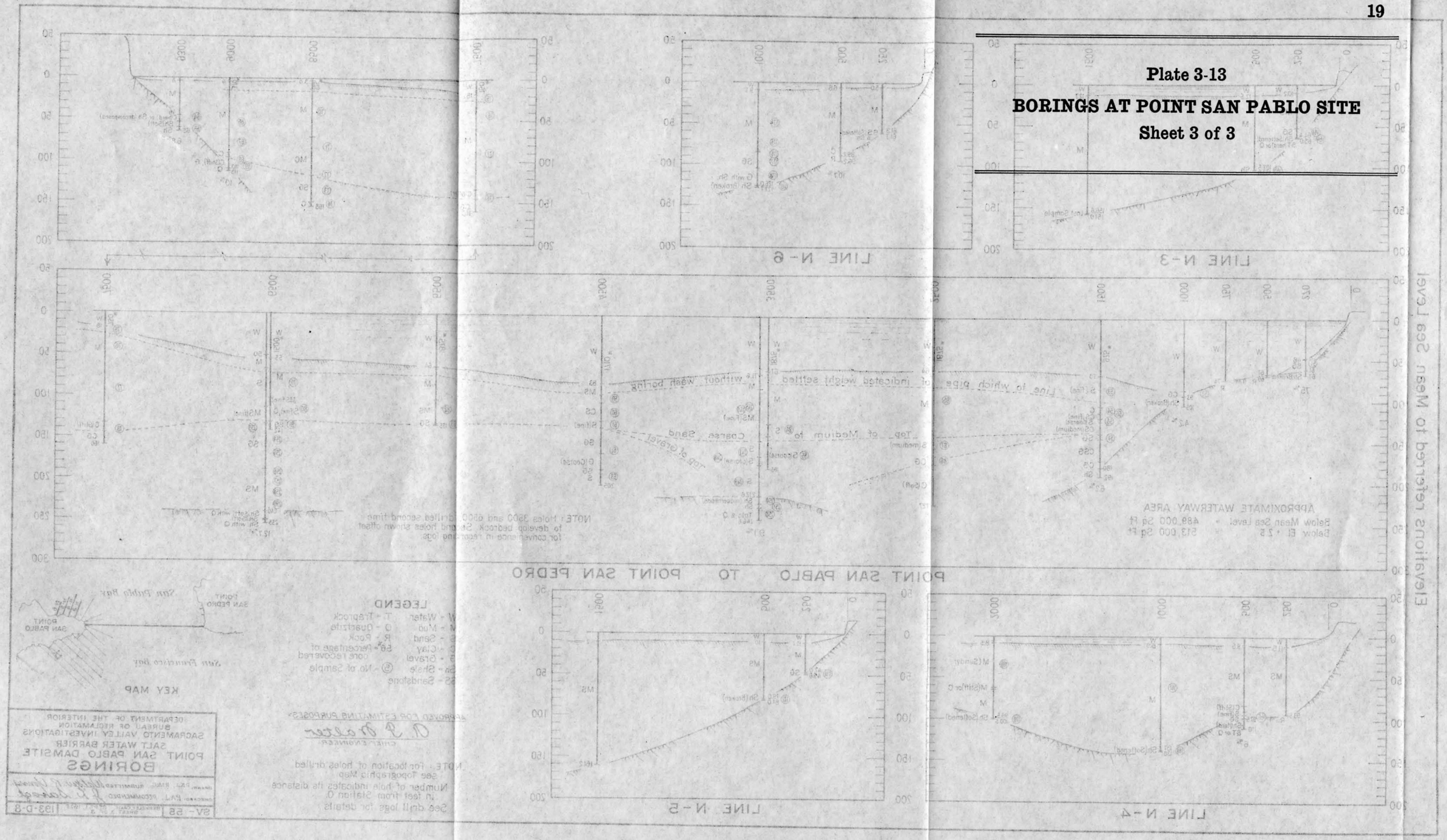
DRAWN: P.A.J., R.McC. SUBMITTED: Walter R. Young
CHECKED: P.A.J. RECOMMENDED: J. D. Savage

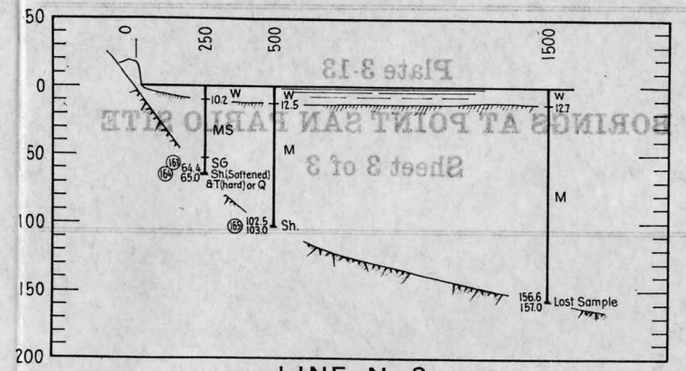
SV-54 | BERKELEY, CALIF. SEPT. 1, 1925 SHEET 2 OF 3 | 193-D-7

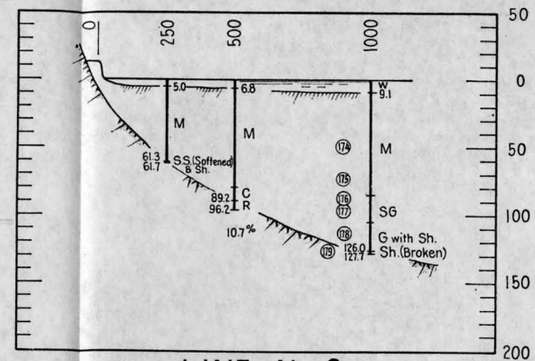
Plate 3-13

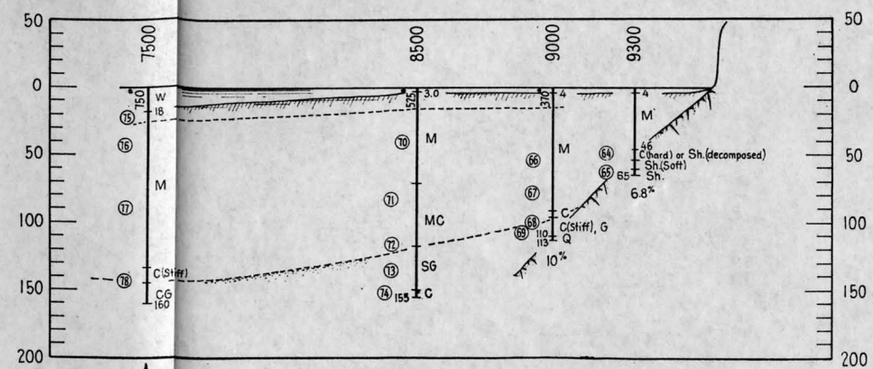
BORINGS AT POINT SAN PABLO SITE

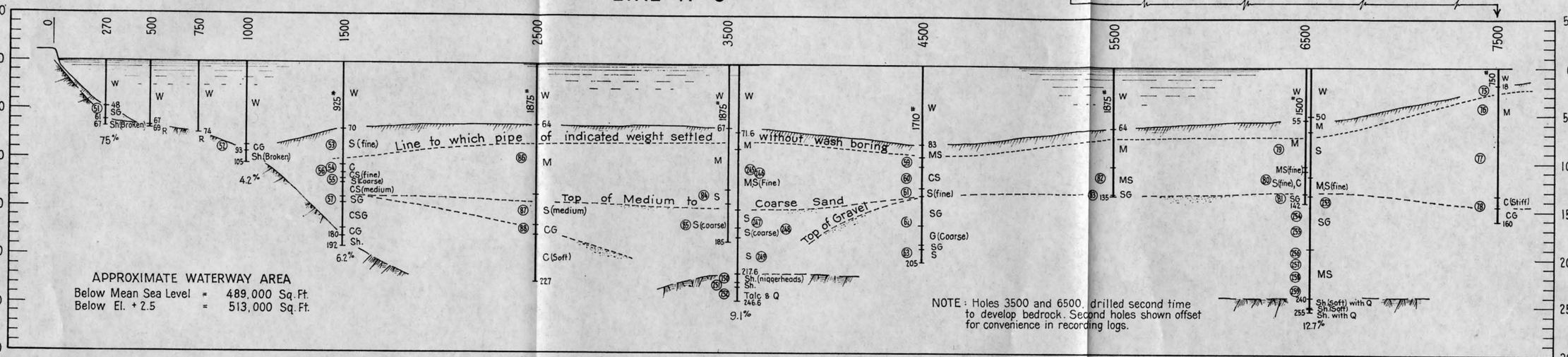
Sheet 3 of 3





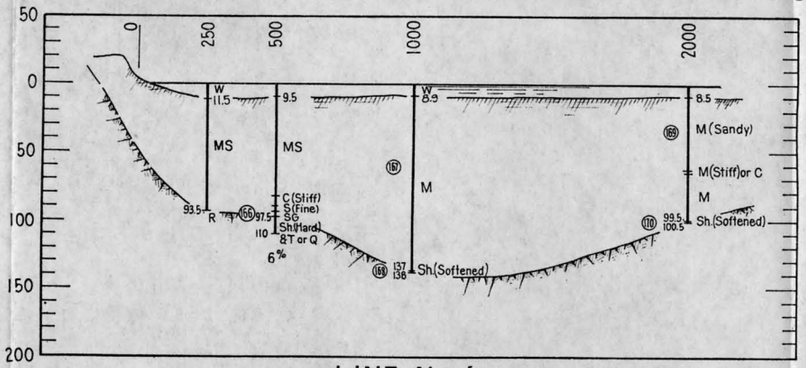


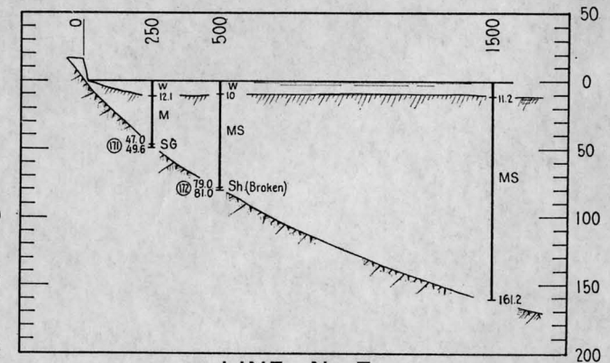




NOTE: Holes 3500 and 6500, drilled second time to develop bedrock. Second holes shown offset for convenience in recording logs.

POINT SAN PABLO TO POINT SAN PEDRO



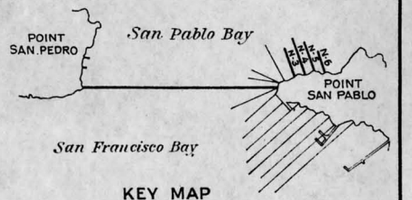


LEGEND

W - Water
M - Mud
S - Sand
C - Clay
G - Gravel
Sh - Shale
SS - Sandstone
T - Traprock
Q - Quartzite
R - Rock
56% - Percentage of core recovered
(5) - No. of Sample

APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER.

NOTE: For location of holes drilled see Topographic Map.
Number of hole indicates its distance in feet from Station 0.
See drill logs for details.



KEY MAP

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
POINT SAN PABLO DAMSITE
BORINGS

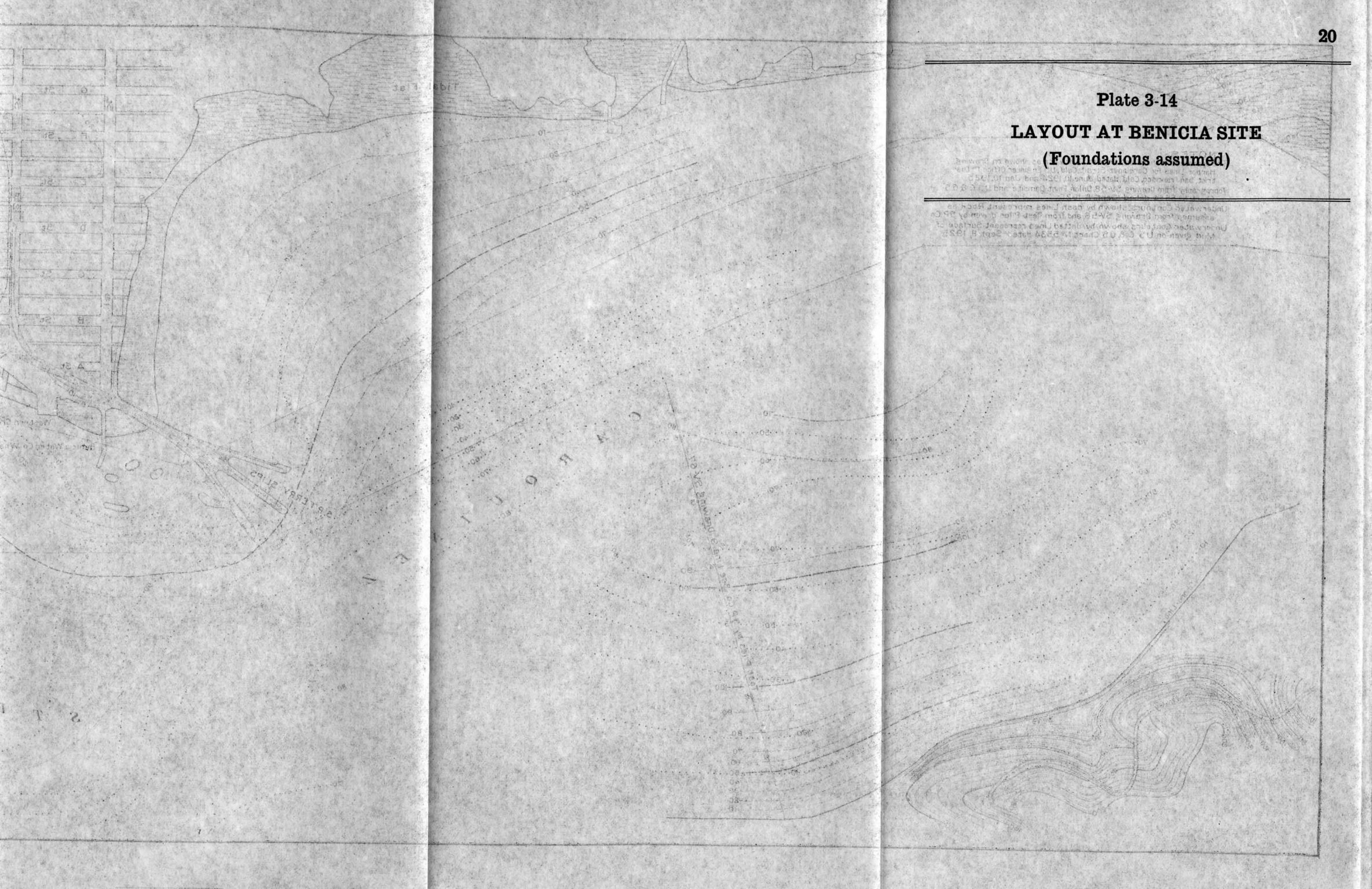
DRAWN: P.A.J., R.McC. SUBMITTED: Walter R. Young
CHECKED: P.A.J. RECOMMENDED: J. L. Savage

SV-55 | BERKELEY, CALIF. SEPT. 1, 1925 SHEET 3 OF 3 | 193-D-8

Plate 3-14

LAYOUT AT BENICIA SITE

(Foundations assumed)



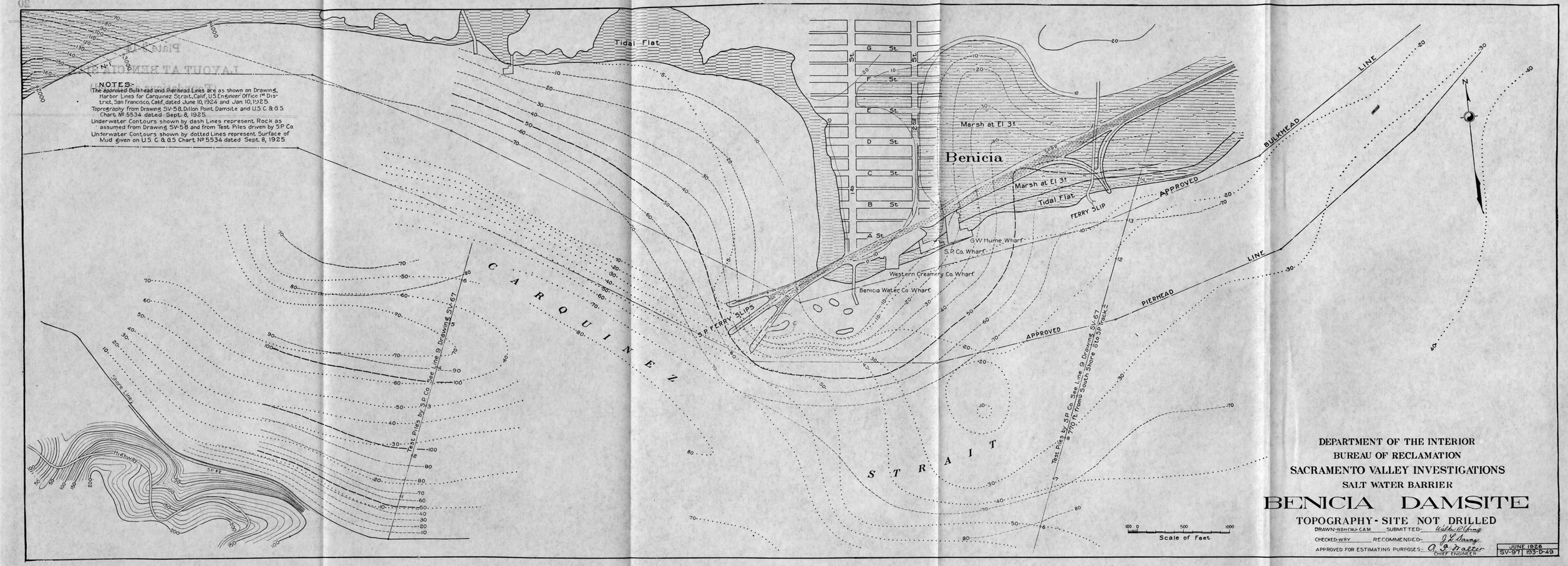
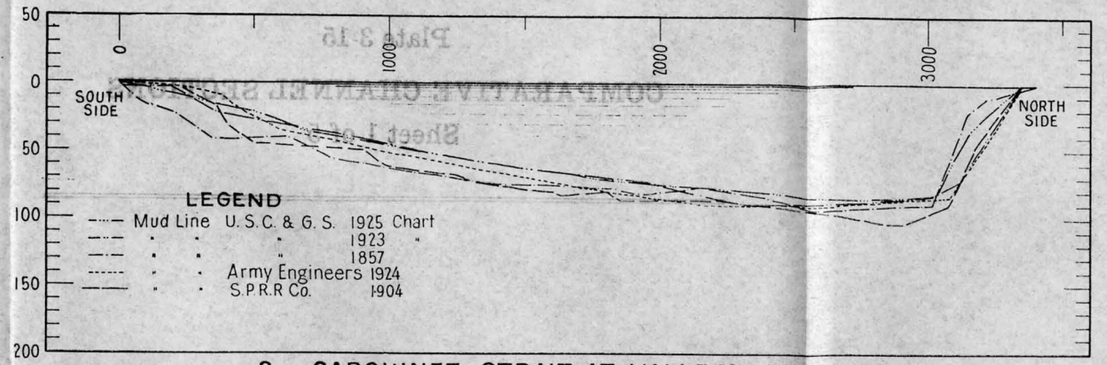

NOTES:-
The approved Bulkhead and Pierhead Lines are as shown on Drawing, Harbor Lines for Carquinez Strait, Calif, U.S. Engineer Office 1st District, San Francisco, Calif, dated June 10, 1924 and Jan 10, 1925.
Topography from Drawing SV-58, Dillon Point Damsite and U.S. C. & G.S. Chart No 5534 dated Sept. 8, 1925.
Underwater Contours shown by dash Lines represent Rock as assumed from Drawing SV-58 and from Test Piles driven by S.P. Co.
Underwater Contours shown by dotted Lines represent Surface of Mud given on U.S. C. & G.S. Chart No 5534 dated Sept. 8, 1925
Tidal Flat
Benicia
Marsh at El 3±
Tidal Flat
FERRY SLIP
G.W. Hume Wharf
S.P. Co. Wharf
Western Creamery Co. Wharf
Benicia Water Co. Wharf
S.P. FERRY SLIPS
APPROVED
BULKHEAD
LINE
PIERHEAD
LINE
APPROVED
C A R Q U I N E Z
S T R A I T
Test Piles by S.P. Co. See Line 9 Drawing SV-67
Test Piles by S.P. Co. See Line 9 Drawing SV-67 & 770 ft. from South Shore S.P. Track
Shore Line
Highway
Scale of Feet
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
BENICIA DAMSITE
TOPOGRAPHY - SITE NOT DRILLED
DRAWN-NBH CMJ-CAM
SUBMITTED-
CHECKED-WRY
RECOMMENDED-
APPROVED FOR ESTIMATING PURPOSES-
CHIEF ENGINEER
JUNE 1926
SV-97
93-D-49

Plate 3-15

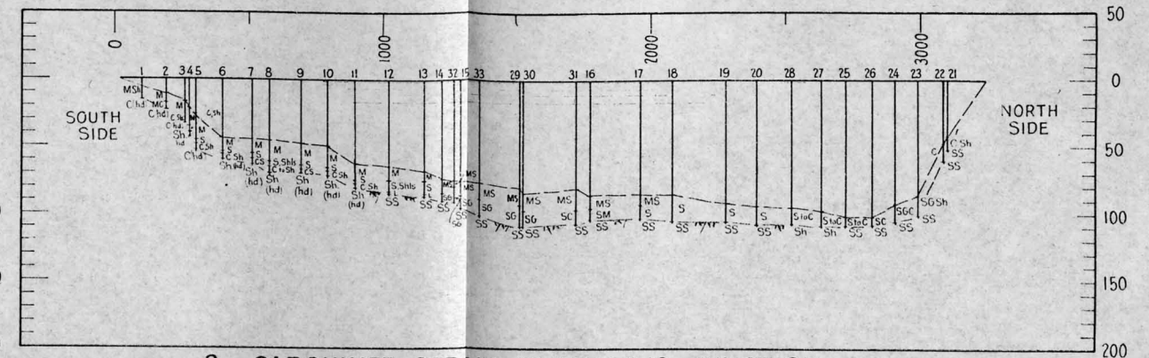
COMPARATIVE CHANNEL SECTIONS

Sheet 1 of 5

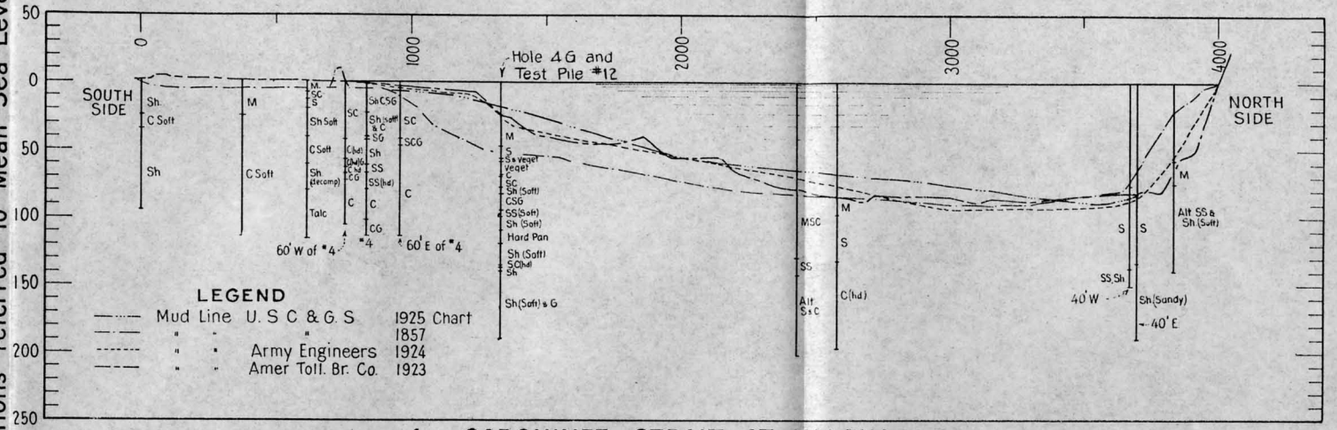
Elevations referred to Mean Sea Level



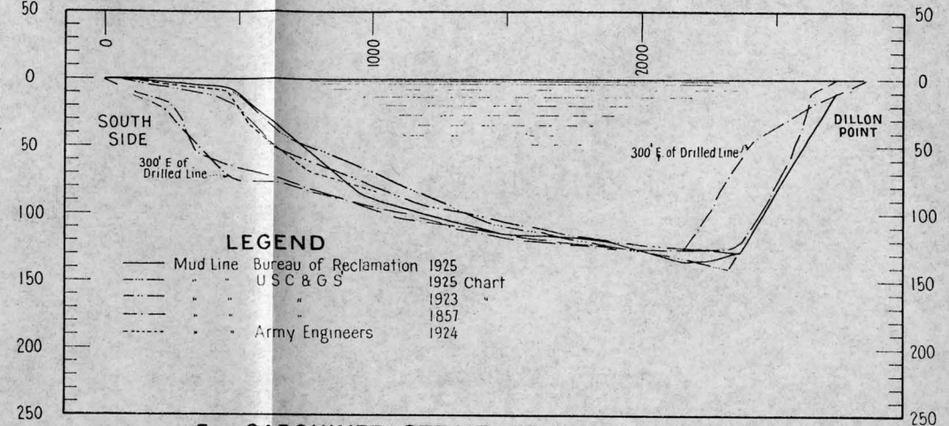
2 CARQUINEZ STRAIT AT VALLEJO JUNCTION



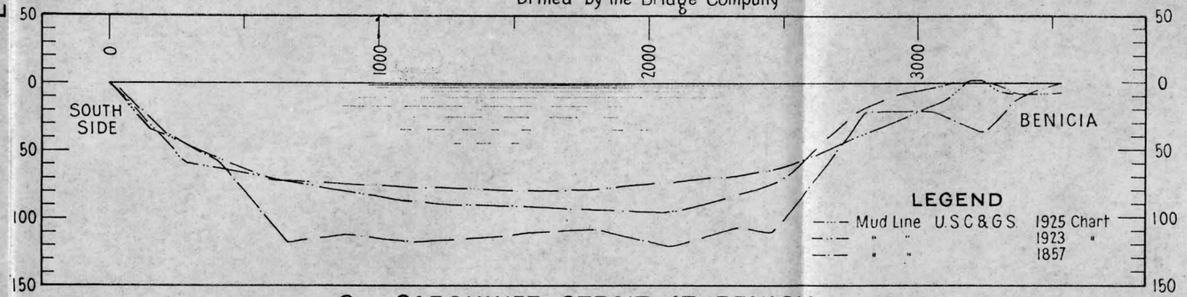
3 CARQUINEZ STRAIT AT VALLEJO JUNCTION
Drilled by Southern Pacific Company



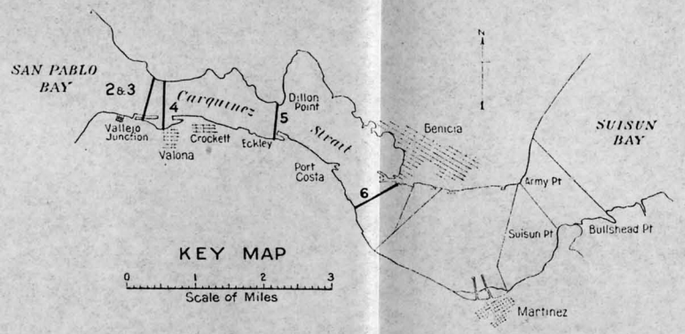
4 CARQUINEZ STRAIT AT VALONA
American Toll Bridge Site
Drilled by the Bridge Company



5 CARQUINEZ STRAIT AT DILLON POINT
(See Drawings SV-48 and SV-58)



6 CARQUINEZ STRAIT AT BENICIA



KEY MAP

LEGEND

M = Mud
S = Sand
C = Clay
G = Gravel
Sh = Shale
SS = Sandstone
L = Loam

APPROVED FOR ESTIMATING PURPOSES.
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
COMPARATIVE CHANNEL SECTIONS
SAN PABLO AND SUISUN BAYS

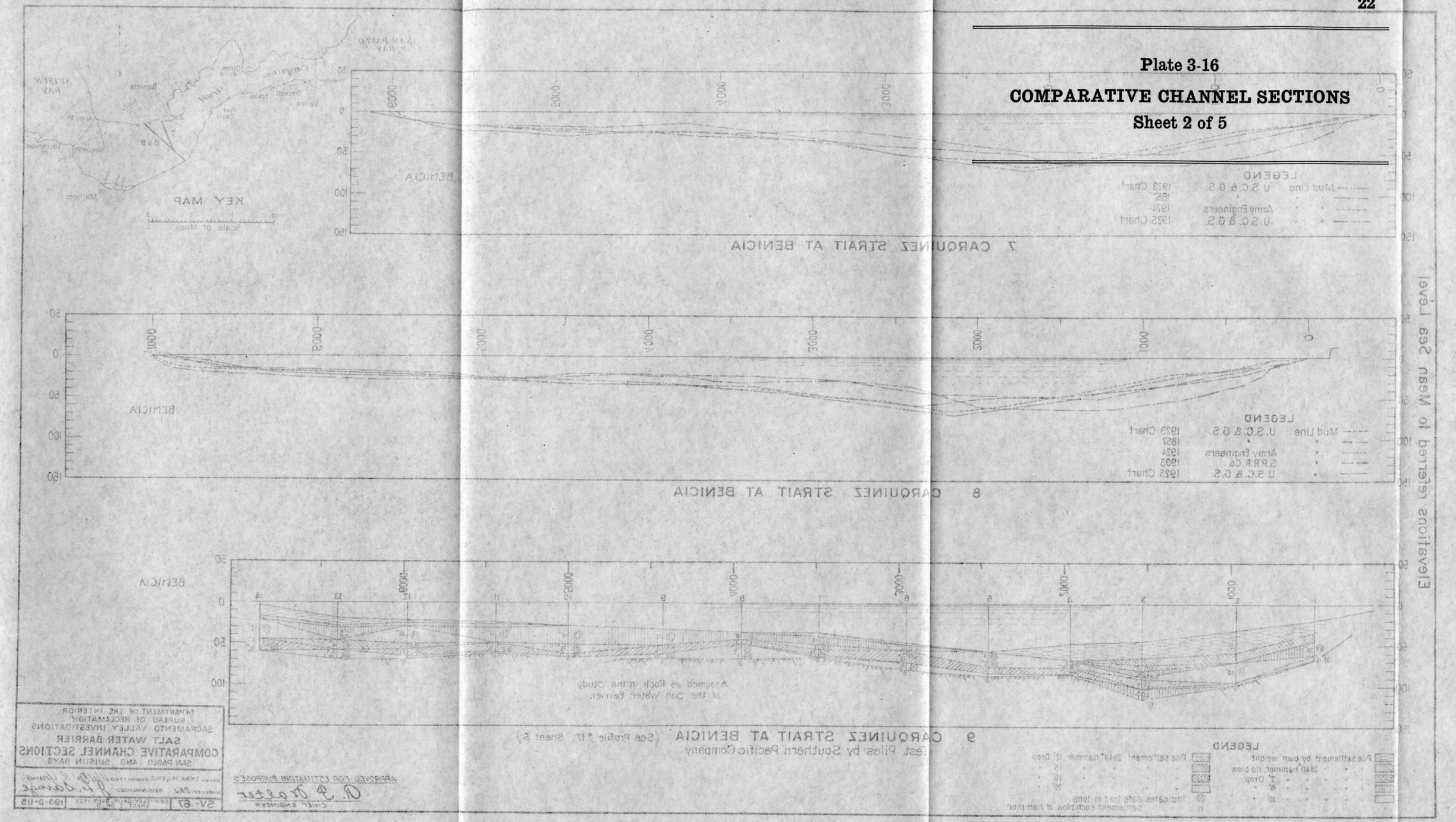
DRAWN G.W.McK., P.A.J., R.McC. SUBMITTED Walker R. Young
CHECKED P.A.J. RECOMMENDED J. L. Savage

SV-66 | BERKELEY CALIF. SEPT. 1925 SHEET 1 OF 5 | 193-D-114

Plate 3-16

COMPARATIVE CHANNEL SECTIONS

Sheet 2 of 5



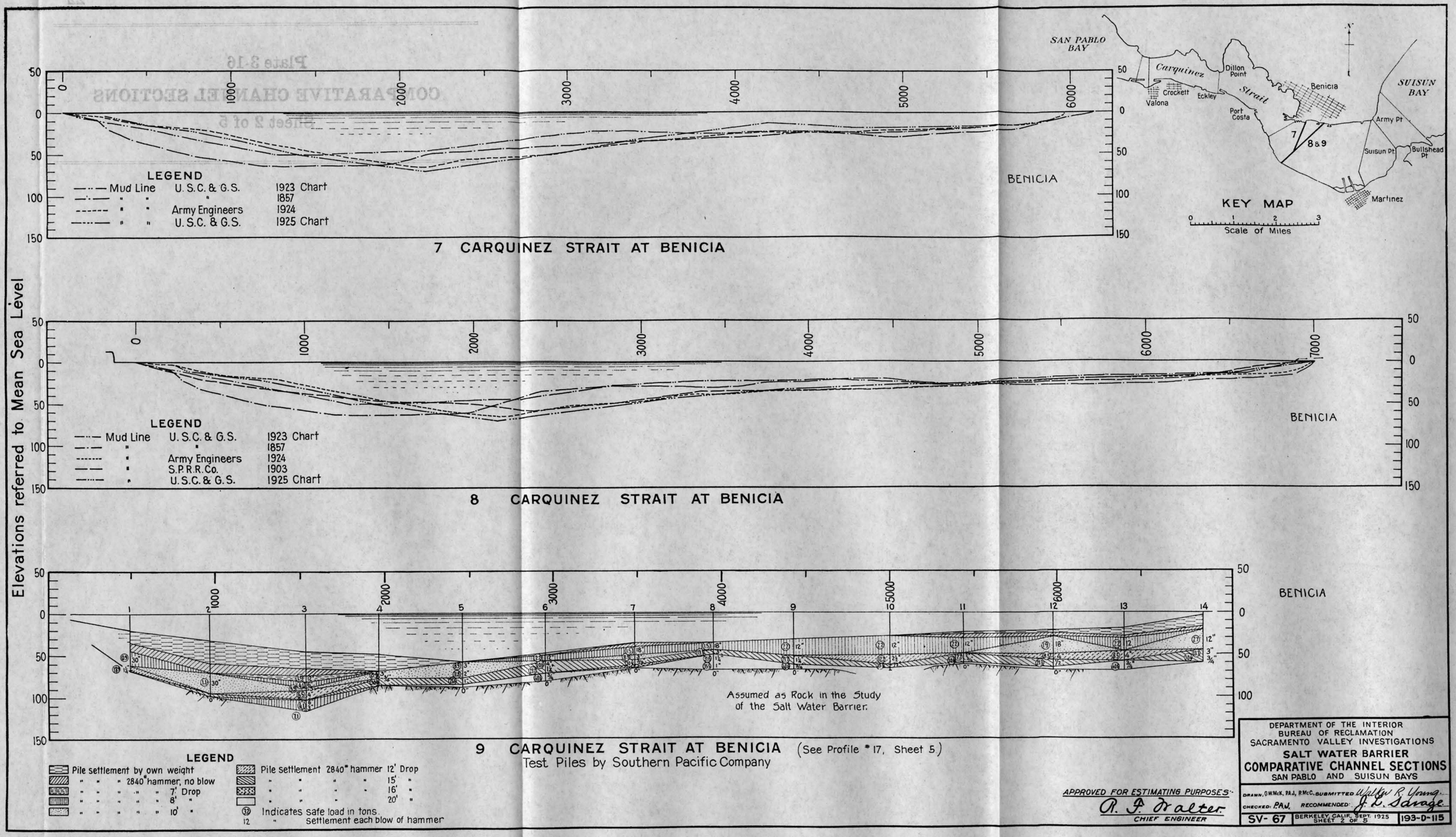
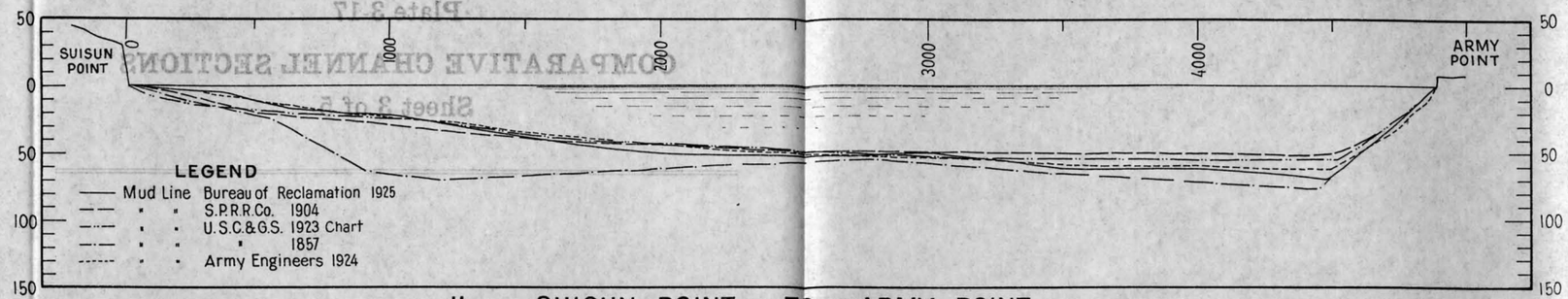

Elevations referred to Mean Sea Level
LEGEND
Mud Line U.S.C. & G.S. 1923 Chart
" " " 1857
" " Army Engineers 1924
" " U.S.C. & G.S. 1925 Chart
BENICIA
7 CARQUINEZ STRAIT AT BENICIA
LEGEND
Mud Line U.S.C. & G.S. 1923 Chart
" " " 1857
" " Army Engineers 1924
" " S.P.R.R.Co. 1903
" " U.S.C. & G.S. 1925 Chart
BENICIA
8 CARQUINEZ STRAIT AT BENICIA
BENICIA
Assumed as Rock in the Study of the Salt Water Barrier.
9 CARQUINEZ STRAIT AT BENICIA (See Profile # 17, Sheet 5.)
Test Piles by Southern Pacific Company
LEGEND
Pile settlement by own weight
" " " 2840# hammer, no blow
" " " " " 7' Drop
" " " " " 8' "
" " " " " 10' "
Pile settlement 2840# hammer 12' Drop
" " " " 15' "
" " " " 16' "
" " " " 20' "
Indicates safe load in tons.
12 " settlement each blow of hammer
SAN PABLO BAY
Carquinez Strait
Dillon Point
Crockett
Valona
Eckley
Port Costa
Benicia
SUISUN BAY
Army Pt
Suisun Pt
Bullshead Pt
Martinez
KEY MAP
Scale of Miles
APPROVED FOR ESTIMATING PURPOSES
R. F. Walter
CHIEF ENGINEER
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
COMPARATIVE CHANNEL SECTIONS
SAN PABLO AND SUISUN BAYS
DRAWN: G.W.McK. P.A.J. R.McC. SUBMITTED: Wesley R. Young
CHECKED: P.A.N. RECOMMENDED: J. L. Savage
SV-67
BERKELEY, CALIF. SEPT. 1925
SHEET 2 OF 5
193-D-115

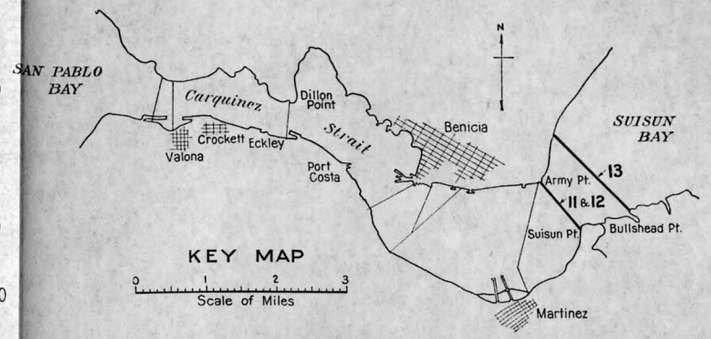
Plate 3-17

COMPARATIVE CHANNEL SECTIONS

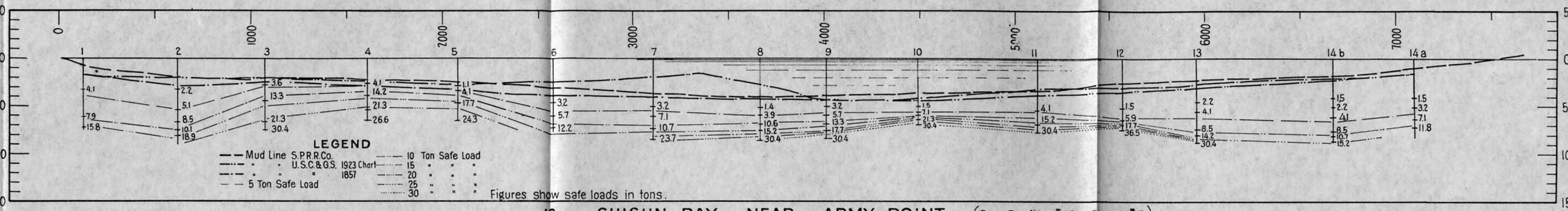
Sheet 3 of 5



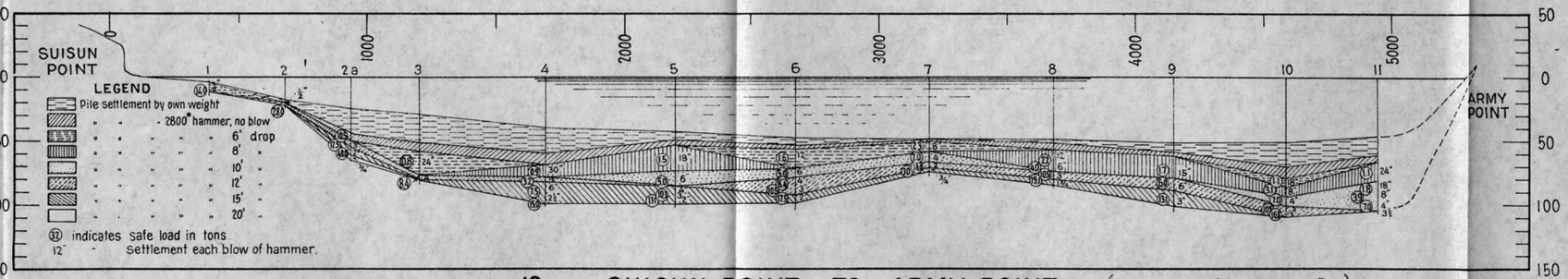
11 SUISUN POINT TO ARMY POINT
(See Drawings SV-50 and SV-57)



Elevations referred to Mean Sea Level



13 SUISUN BAY NEAR ARMY POINT (See Profile #15, Sheet #5)



12 SUISUN POINT TO ARMY POINT (See Profile #16, Sheet #5)
Test Piles by Southern Pacific Company

APPROVED FOR ESTIMATING PURPOSES:-
A. F. Walter
CHIEF ENGINEER.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
COMPARATIVE CHANNEL SECTIONS
SAN PABLO AND SUISUN BAYS

DRAWN G.W.McK., P.A.J., R.McC. SUBMITTED Walter R. Young
CHECKED P.A.J. RECOMMENDED J. L. Savage

SV-68 | BERKELEY, CALIF., SEPT. 1925 SHEET 3 OF 5 | 193-D-116

Plate 3-18

COMPARATIVE CHANNEL SECTIONS

Sheet 4 of 5

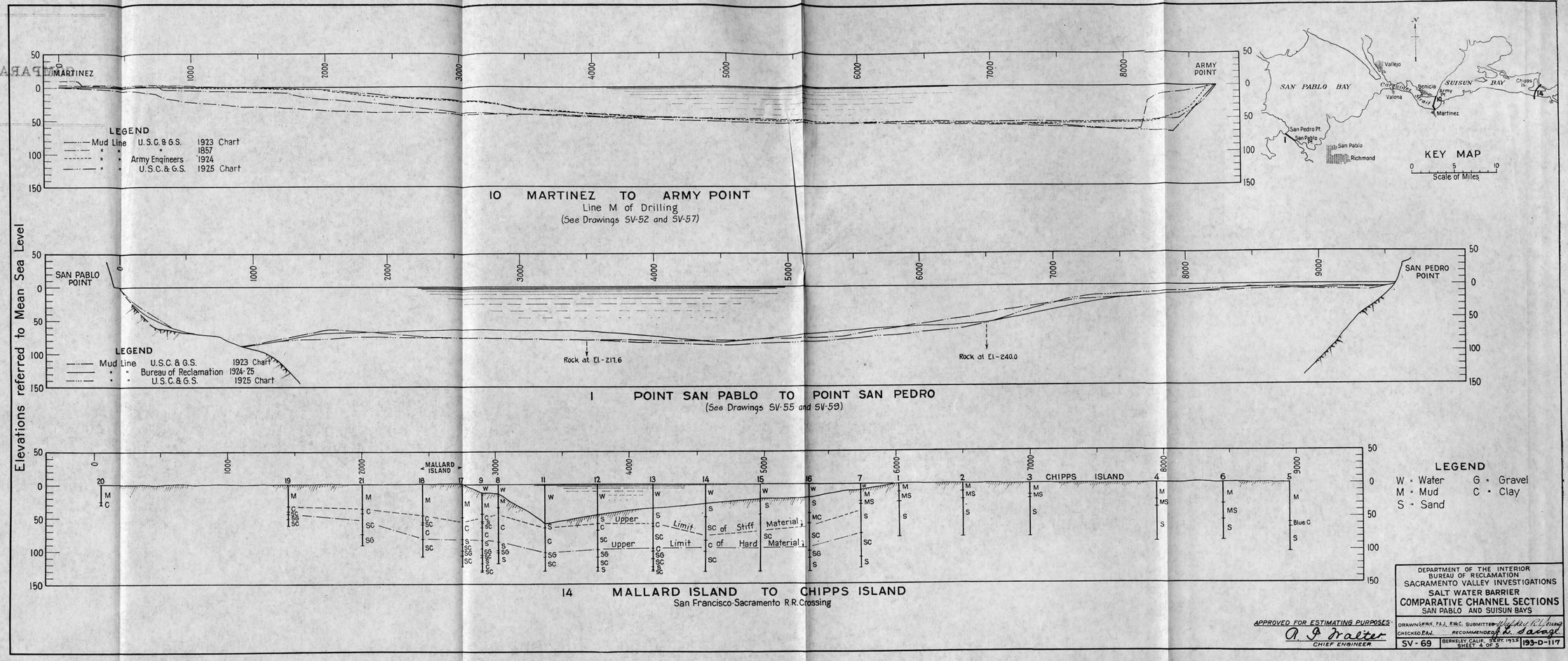
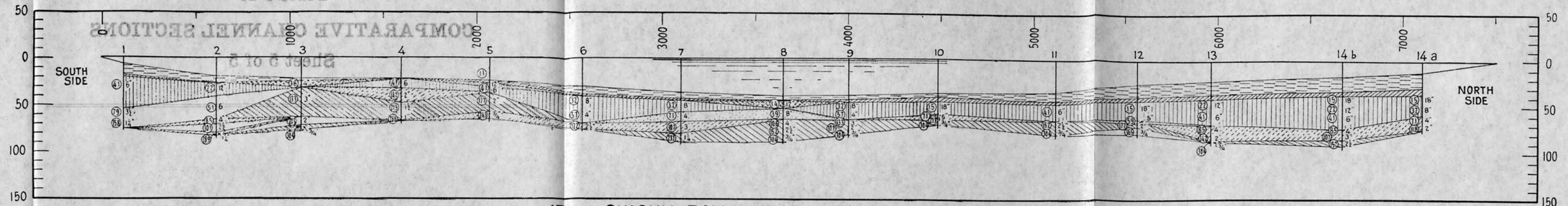

Elevations referred to Mean Sea Level
MARTINEZ
ARMY POINT
LEGEND
Mud Line U.S.C.&G.S. 1923 Chart
" " 1857
" " Army Engineers 1924
" " U.S.C.&G.S. 1925 Chart
10 MARTINEZ TO ARMY POINT
Line M of Drilling
(See Drawings SV-52 and SV-57)
SAN PABLO POINT
SAN PEDRO POINT
LEGEND
Mud Line U.S.C.&G.S. 1923 Chart
" " Bureau of Reclamation 1924-25
" " U.S.C.&G.S. 1925 Chart
Rock at El-217.6
Rock at El-240.0
1 POINT SAN PABLO TO POINT SAN PEDRO
(See Drawings SV-55 and SV-59)
MALLARD ISLAND
CHIPPS ISLAND
Upper Limit of Stiff Material
Upper Limit of Hard Material
14 MALLARD ISLAND TO CHIPPS ISLAND
San Francisco-Sacramento R.R. Crossing
KEY MAP
SAN PABLO BAY
SUISUN BAY
Vallejo
Benicia
Valona
Martinez
Chipps Is.
San Pedro Pt.
San Pablo
Richmond
Scale of Miles
LEGEND
W - Water
M - Mud
S - Sand
G - Gravel
C - Clay
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
COMPARATIVE CHANNEL SECTIONS
SAN PABLO AND SUISUN BAYS
APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER
SV-69
BERKELEY CALIF. SEPT. 1928
SHEET 4 OF 5
193-D-117

Plate 3-19

COMPARATIVE CHANNEL SECTIONS

Sheet 5 of 5

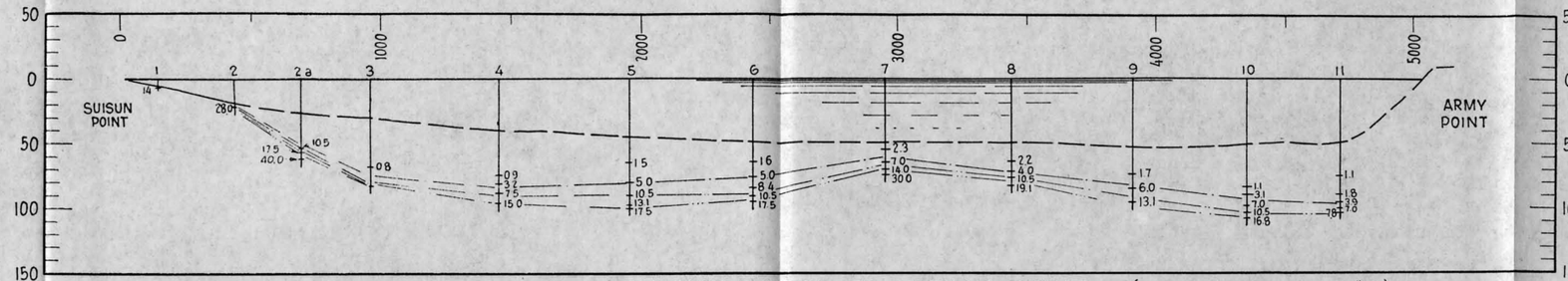
Elevations referred to Mean Sea Level



15 SUISUN BAY NEAR ARMY POINT (See Profile "13, Sheet "3)
Test Piles by Southern Pacific Co.

LEGEND

- Pile settlement by own weight
- " " " 2840" hammer no blow
- " " " " 4' Drop
- " " " " 5' "
- " " " " 8' "
- Pile settlement 2840" hammer 10' Drop
- " " " " 12' "
- " " " " 15' "
- " " " " 18' "
- (22) Indicates safe load in tons
- 12' " Settlement each blow of hammer



16 SUISUN POINT TO ARMY POINT (See Profile "12, Sheet "3)
Test Piles by Southern Pacific Co.

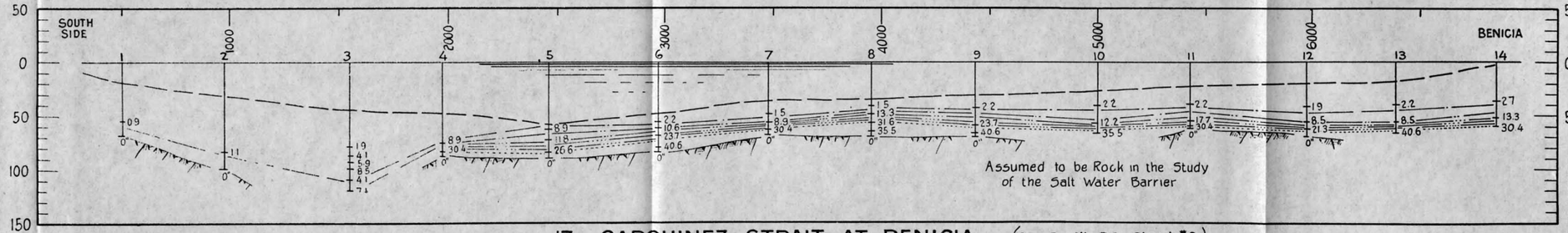
LEGEND

- Mud Line S.P.R.R. Co
- 5 Ton Safe Load
- 10 " " "
- 15 " " "
- 20 Ton Safe Load
- 25 " " "
- 30 " " "

Figures show safe load in tons

KEY MAP

0 1 2 3
Scale of Miles



Assumed to be Rock in the Study of the Salt Water Barrier

17 CARQUINEZ STRAIT AT BENICIA (See Profile "9 Sheet "2)
Test Piles by Southern Pacific Co.

APPROVED FOR ESTIMATING PURPOSES:-
R. P. Walter
CHIEF ENGINEER

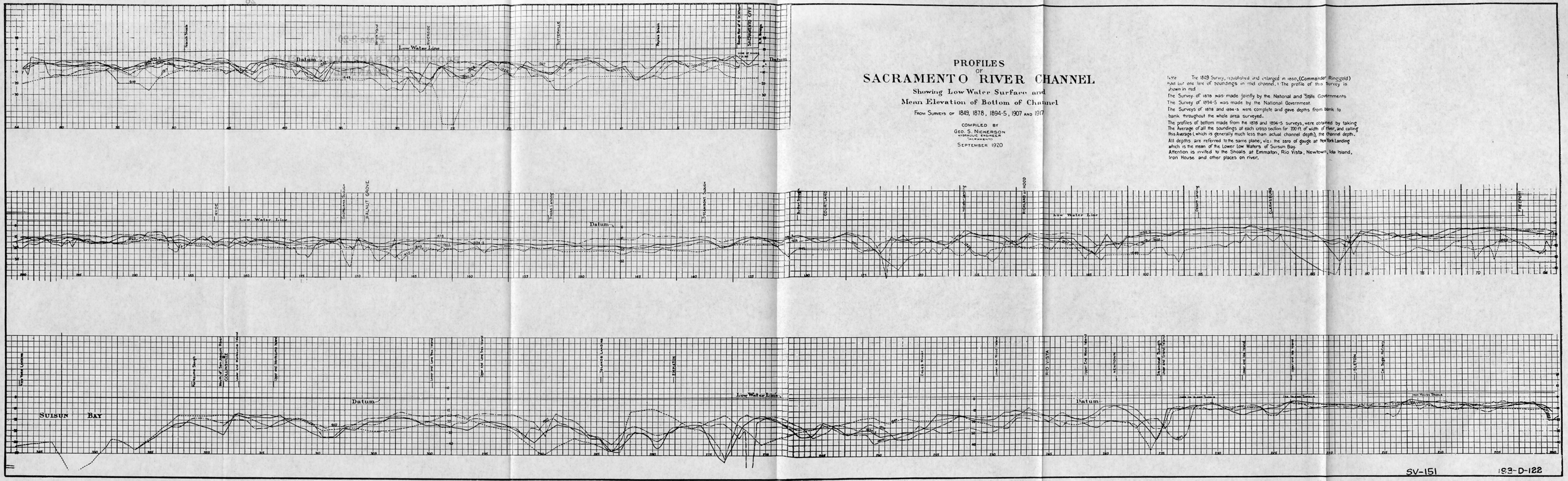
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
COMPARATIVE CHANNEL SECTIONS
SAN PABLO AND SUISUN BAYS

DRAWN: P.A.J., R.McC. SUBMITTED Walter P. Young
CHECKED: P.A.J. RECOMMENDED J. R. Savage

SV-70	BERKELEY, CALIF. SEPT. 1925 SHEET 5 OF 5	193-D-118

Plate 3-20

PROFILES OF SACRAMENTO RIVER CHANNEL



PROFILES OF SACRAMENTO RIVER CHANNEL

Showing Low Water Surface and Mean Elevation of Bottom of Channel

FROM SURVEYS OF 1849, 1878, 1894-5, 1907 AND 1917

COMPILED BY
GEO. S. NICHERSON
HYDRAULIC ENGINEER

SEPTEMBER 1920

Note: The 1849 Survey, republished and enlarged in 1880, (Commander Ringgold) had but one line of soundings in mid channel. The profile of this Survey is shown in red.

The Survey of 1878 was made jointly by the National and State Governments.

The Survey of 1894-5 was made by the National Government.

The Surveys of 1878 and 1894-5 were complete and gave depths from bank to bank throughout the whole area surveyed.

The profiles of bottom made from the 1878 and 1894-5 surveys, were obtained by taking The Average of all the soundings at each cross section for 200 ft of width of river, and calling this Average (which is generally much less than actual channel depth), the channel depth.

All depths are referred to the same plane, viz: the zero of gauge at New York Landing which is the mean of the Lower Low Waters of Suisun Bay.

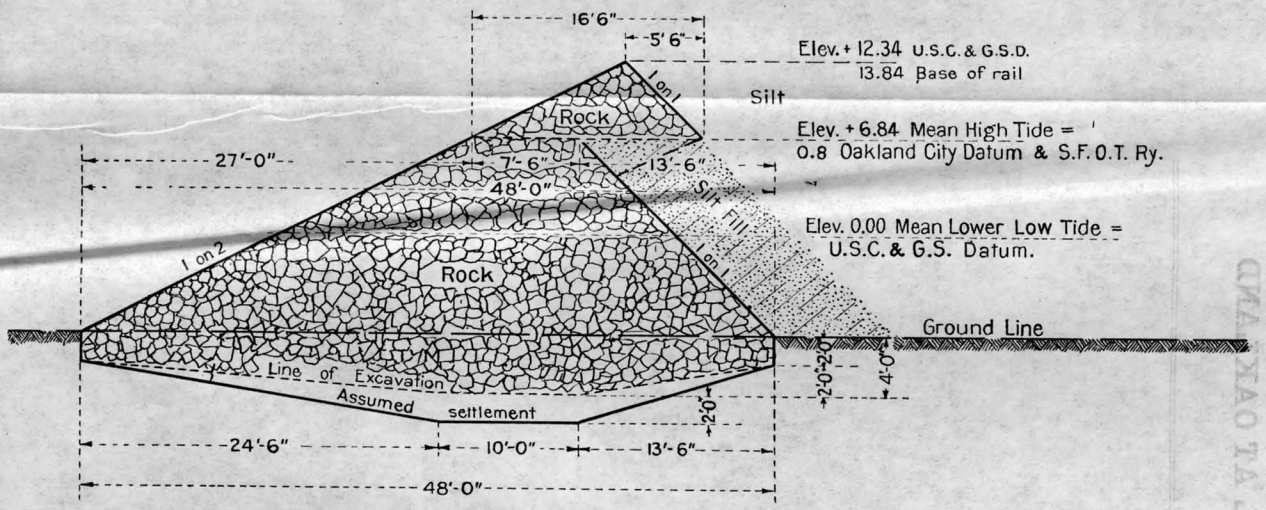
Attention is invited to the Shoals at Emmaton, Rio Vista, Newtown, Ida Island, Iron House and other places on river.

SV-151

183-D-122

Plate 3-21

THEORETICAL CROSS SECTION OF KEY SYSTEM PIER FILL AT OAKLAND



Note : Quantities for typical sections
23.4 cu. yds. rock
5.7 " " excavation.

S. F.-O. TERMINAL RYS. Maint. of Way & Bldgs. Dept.	
References	ALTERNATE PLAN FOR SEA WALL FOR PIER FILL
	Appgoved (sgd) Edward M. Boggs Asst to Gen. Mgr.
Oakland, Cal. 2-26-13	Scale 1" = 10' J.T.M. 9444-D

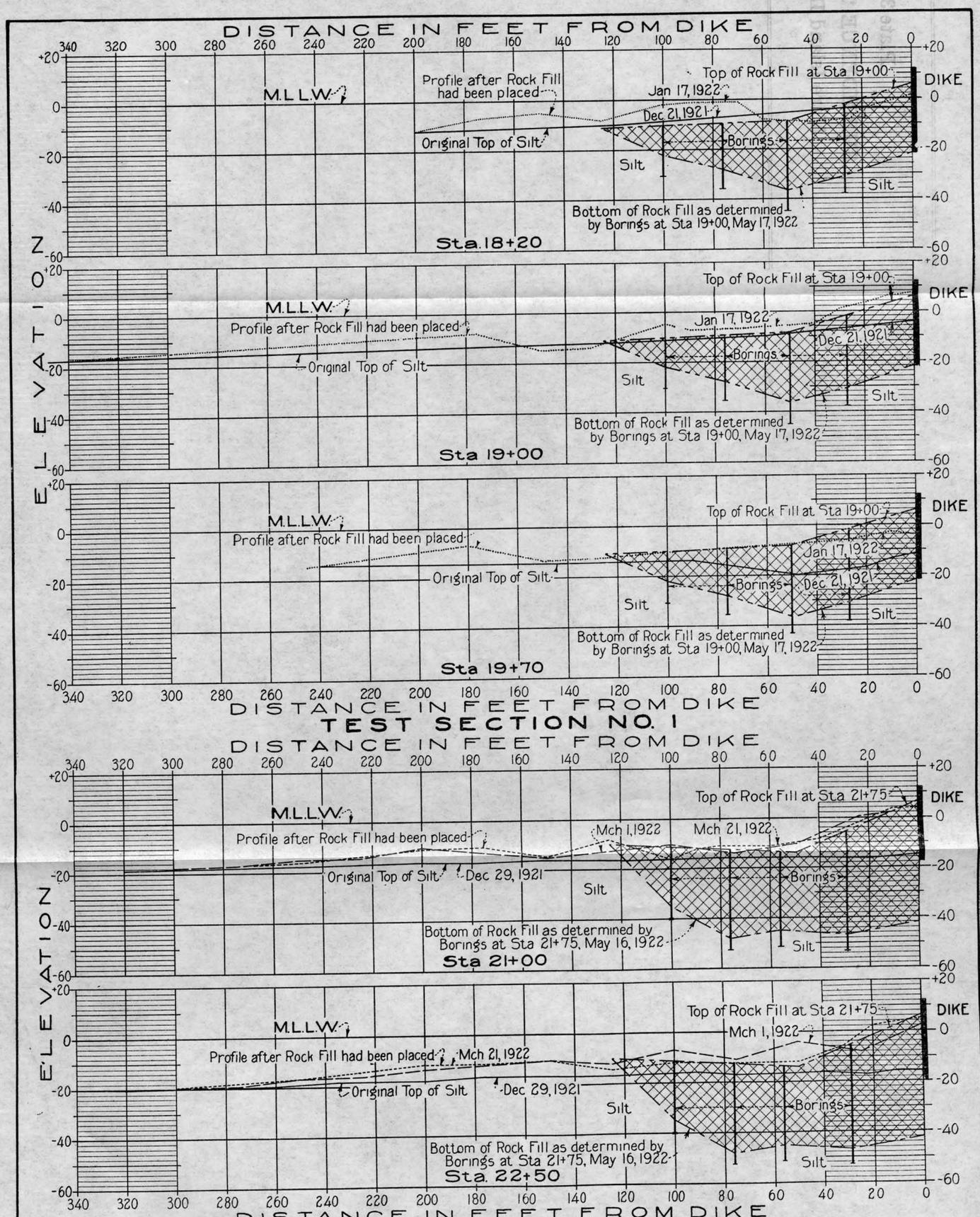
Theoretical cross-section of Key System pier fill at Oakland

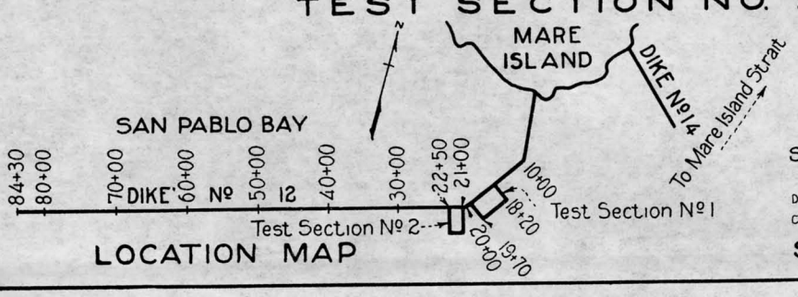
PLATE 3-21

Plate 3-22

SUBSIDENCE TEST DATA

Mare Island Dike No. 12





APPROVED FOR ESTIMATING PURPOSES
R. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SUBSIDENCE TEST DATA-DIKE Nº 12
AT MARE ISLAND NAVY YARD

Drawn W.R.Y.-C.A.M. Submitted W. R. Young
Checked Approved J. L. Savage

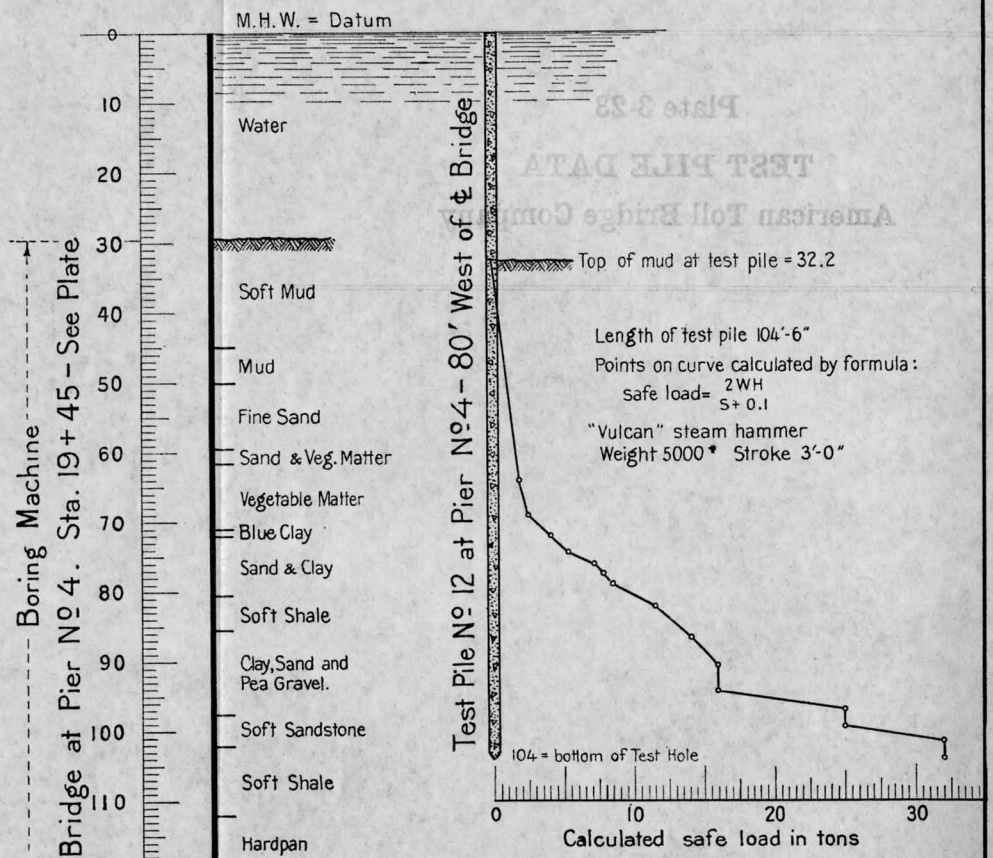
SV-153 Ellensburg, Wash June 1927 193-D-108

PLATE 3-22

Plate 3-23

TEST PILE DATA

American Toll Bridge Company



TEST DATA

Date driven July 3, 1923.

Started loading with rails Aug. 30 "
Levels taken daily at 8 a.m and 5 p.m.
No settlement during loading to Sept. 8.
Between Sept. 8-15 levels once daily.
From Sept. 15 to Oct. 6 levels once weekly.
Total measured settlement to Oct. 6 = 0.001 ft.
Probable actual settlement 0.003 ft.
Total weight steel rails 25 tons

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

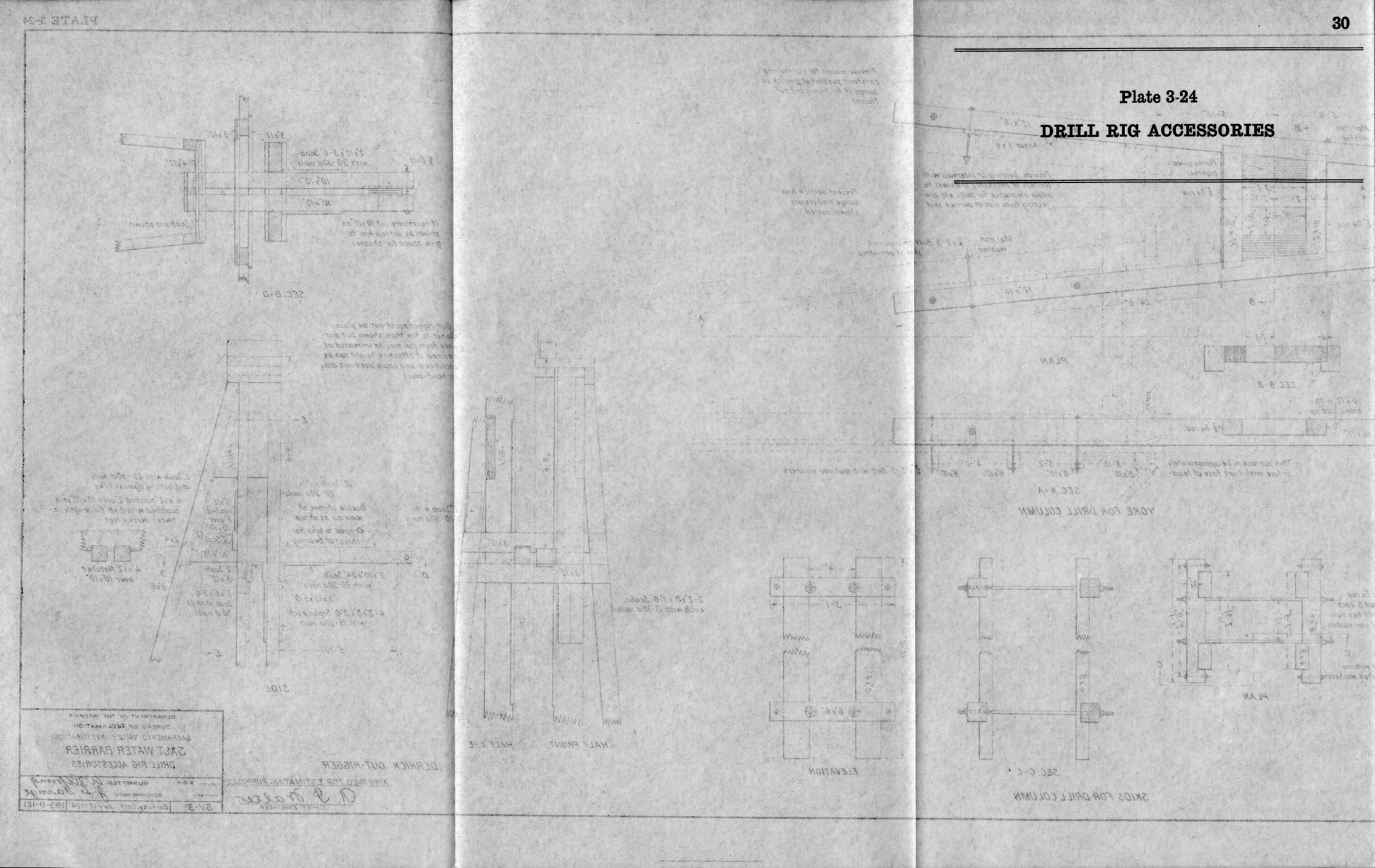
TEST PILE DATA

Compiled from records of American Toll Bridge Co.

SV-154	JAN. 22, 1927	193-D-123

Plate 3-24

DRILL RIG ACCESSORIES



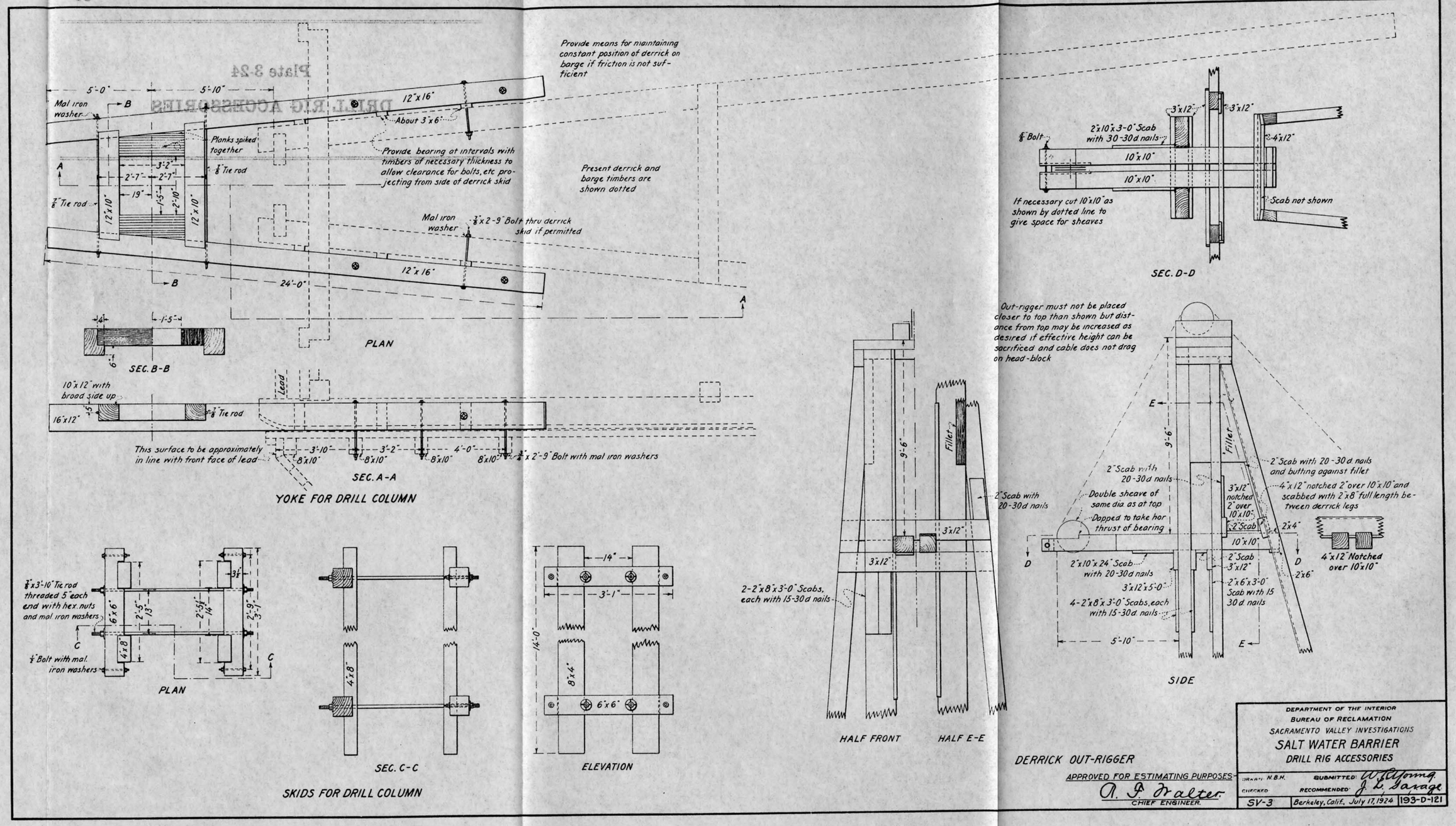
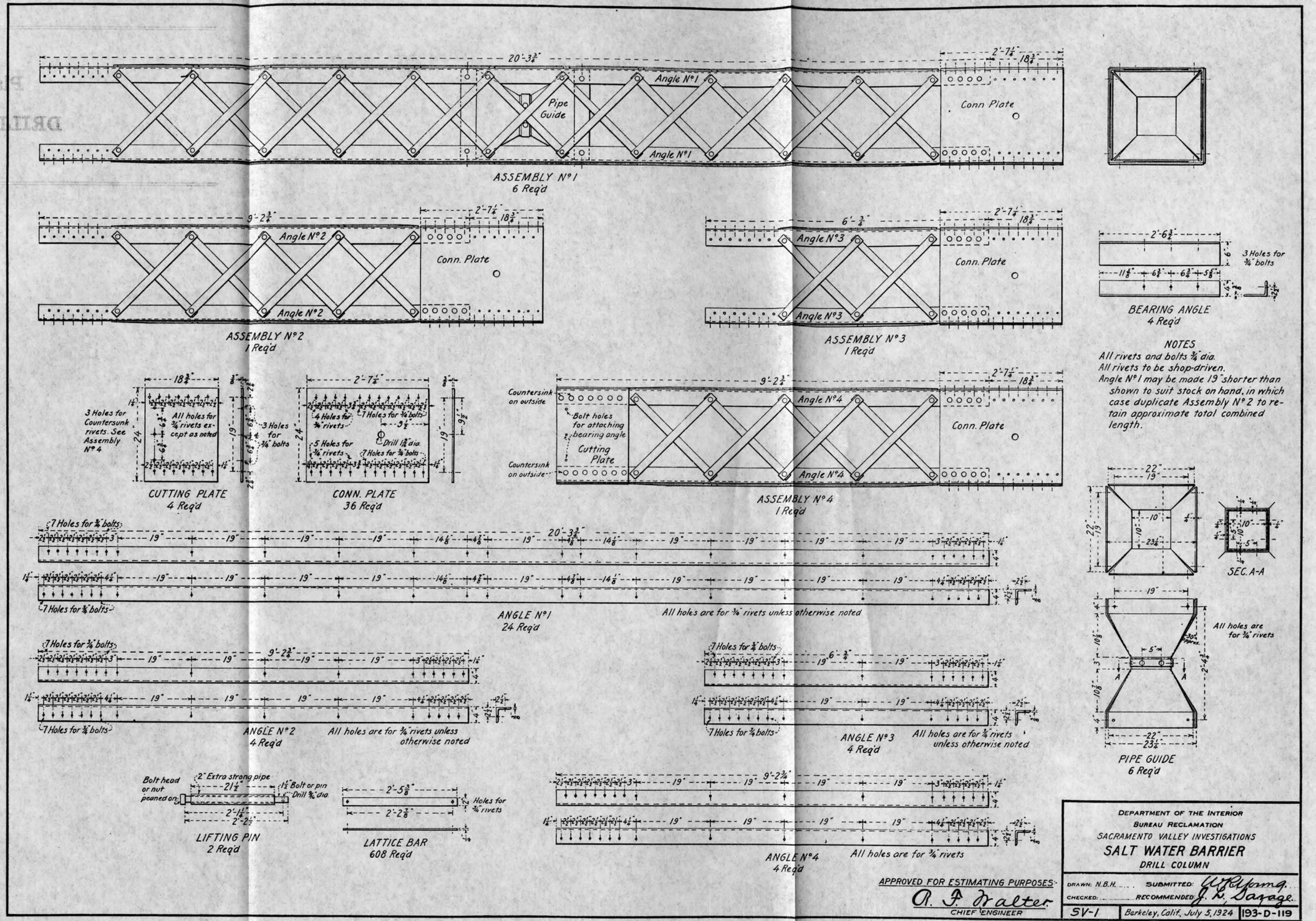

Provide means for maintaining constant position of derrick on barge if friction is not sufficient
5'-0"
5'-10"
Mal iron washer
B
12"x16"
About 3"x6"
Planks spiked together
Provide bearing at intervals with timbers of necessary thickness to allow clearance for bolts, etc projecting from side of derrick skid
3'-2"
2'-7"
2'-7"
19"
1'-5"
2'-10"
7/8" Tie rod
12"x10"
12"x10"
A
Present derrick and barge timbers are shown dotted
Mal iron washer
3/4"x2'-9" Bolt thru derrick skid if permitted
12"x16"
24'-0"
PLAN
1'-5"
SEC. B-B
10"x12" with broad side up
16"x12"
Lead
This surface to be approximately in line with front face of lead
3'-10"
3'-2"
4'-0"
8"x10"
8"x10"
8"x10"
8"x10"
3/4"x2'-9" Bolt with mal iron washers
SEC. A-A
YOKE FOR DRILL COLUMN
7/8"x3'-10" Tie rod threaded 5" each end with hex. nuts and mal. iron washers
6"x6"
4"x8"
2'-5"
13"
2'-5"
14"
2'-9"
3'-1"
3'-1"
C
3/4" Bolt with mal. iron washers
PLAN
4"x8"
SEC. C-C
14"
3'-1"
14'-0"
8"x4"
6"x6"
ELEVATION
SKIDS FOR DRILL COLUMN
9'-6"
Fillet
2" Scab with 20-30d nails
3"x12"
3"x12"
2"x10"x24" Scab with 20-30d nails
3"x12"x5'-0"
4-2"x8"x3'-0" Scabs, each with 15-30d nails
2-2"x8"x3'-0" Scabs, each with 15-30d nails
HALF FRONT
HALF E-E
Out-rigger must not be placed closer to top than shown but distance from top may be increased as desired if effective height can be sacrificed and cable does not drag on head-block
E
9'-6"
Fillet
2" Scab with 20-30d nails
Double sheave of same dia. as at top
Dapped to take hor thrust of bearing
D
2"x10"x24" Scab with 20-30d nails
3"x12"x5'-0"
4-2"x8"x3'-0" Scabs, each with 15-30d nails
5'-10"
2" Scab with 20-30d nails and butting against fillet
4"x12" notched 2" over 10"x10" and scabbed with 2"x8" full length between derrick legs
3"x12" notched 2" over 10"x10"
2" Scab
2"x4"
10"x10"
2" Scab
3"x12"
2"x6"x3'-0" Scab with 15 30d nails
D
2"x6"
E
SIDE
4"x12" Notched over 10"x10"
7/8" Bolt
2"x10"x3'-0" Scab with 30-30d nails
3"x12"
3"x12"
4"x12"
10"x10"
10"x10"
If necessary cut 10"x10" as shown by dotted line to give space for sheaves
Scab not shown
SEC. D-D
DERRICK OUT-RIGGER
APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DRILL RIG ACCESSORIES
DRAWN: N.B.H.
CHECKED
SUBMITTED: W. H. Young
RECOMMENDED: J. L. Savage
SV-3
Berkeley, Calif., July 17, 1924
193-D-121

Plate 3-25

DRILL COLUMN


ASSEMBLY Nº 1
6 Req'd
Angle Nº 1
Pipe Guide
Conn Plate
ASSEMBLY Nº 2
1 Req'd
Angle Nº 2
Conn. Plate
ASSEMBLY Nº 3
1 Req'd
Angle Nº 3
Conn. Plate
BEARING ANGLE
4 Req'd
3 Holes for ¾" bolts
NOTES
All rivets and bolts ¾" dia.
All rivets to be shop-driven.
Angle Nº 1 may be made 19" shorter than shown to suit stock on hand, in which case duplicate Assembly Nº 2 to retain approximate total combined length.
CUTTING PLATE
4 Req'd
3 Holes for Countersunk rivets. See Assembly Nº 4
All holes for ¾" rivets except as noted
3 Holes for ¾" bolts
CONN. PLATE
36 Req'd
4 Holes for ¾" rivets
7 Holes for ¾" bolts
5 Holes for ¾" rivets
Drill 1¼" dia.
ASSEMBLY Nº 4
1 Req'd
Countersink on outside
Bolt holes for attaching bearing angle
Cutting Plate
Angle Nº 4
Conn. Plate
SEC. A-A
ANGLE Nº 1
24 Req'd
All holes are for ¾" rivets unless otherwise noted
ANGLE Nº 2
4 Req'd
ANGLE Nº 3
4 Req'd
PIPE GUIDE
6 Req'd
All holes are for ¾" rivets
LIFTING PIN
2 Req'd
Bolt head or nut peened on
2" Extra strong pipe
1½" Bolt or pin
Drill ¾" dia.
LATTICE BAR
608 Req'd
Holes for ¾" rivets
ANGLE Nº 4
4 Req'd
APPROVED FOR ESTIMATING PURPOSES
R. F. Walter
CHIEF ENGINEER
DEPARTMENT OF THE INTERIOR
BUREAU RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DRILL COLUMN
DRAWN: N.B.H.
SUBMITTED:
CHECKED:
RECOMMENDED:
SV-1
Berkeley, Calif. July 5, 1924
193-D-119

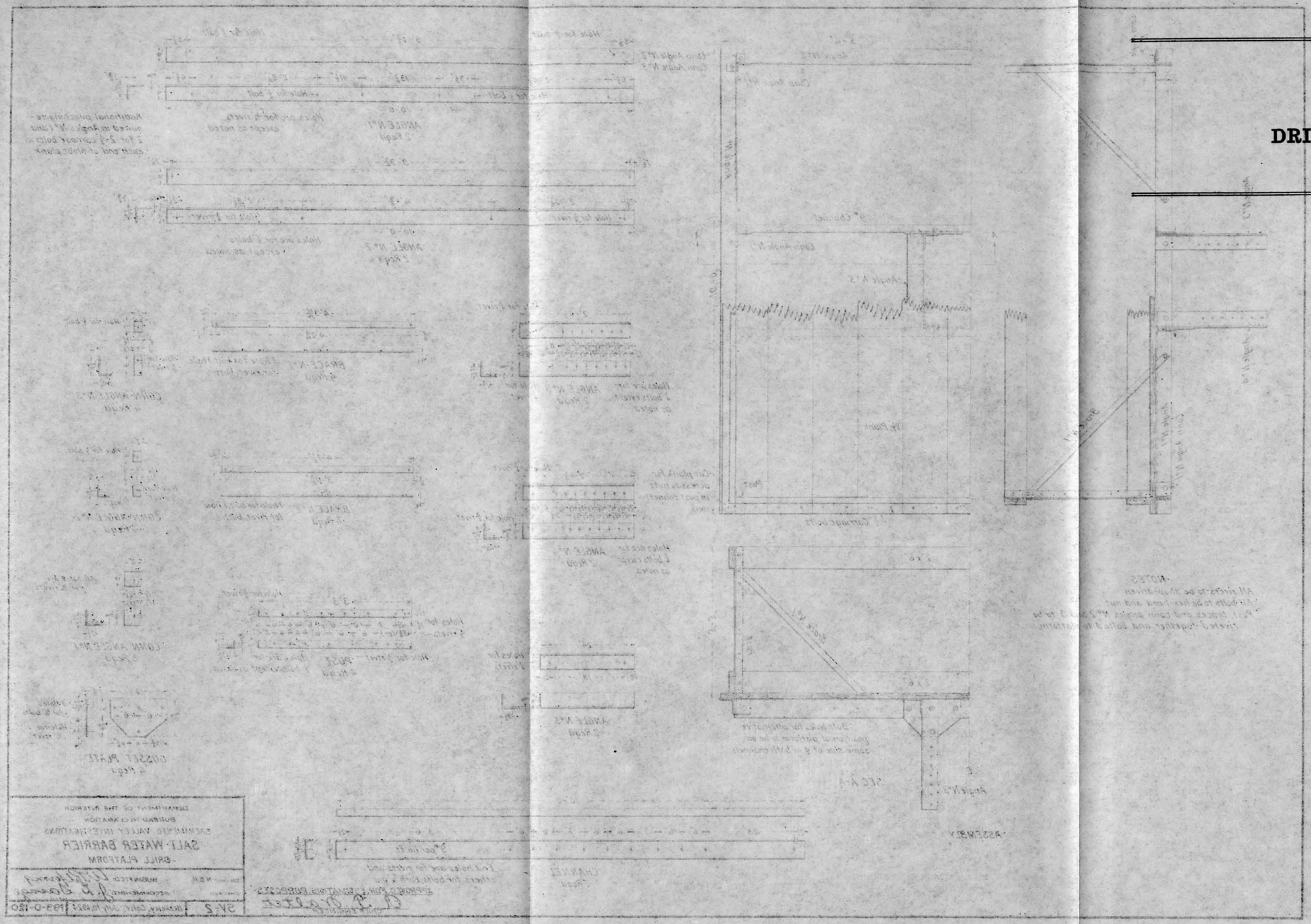


Plate 3-26

DRILL PLATFORM

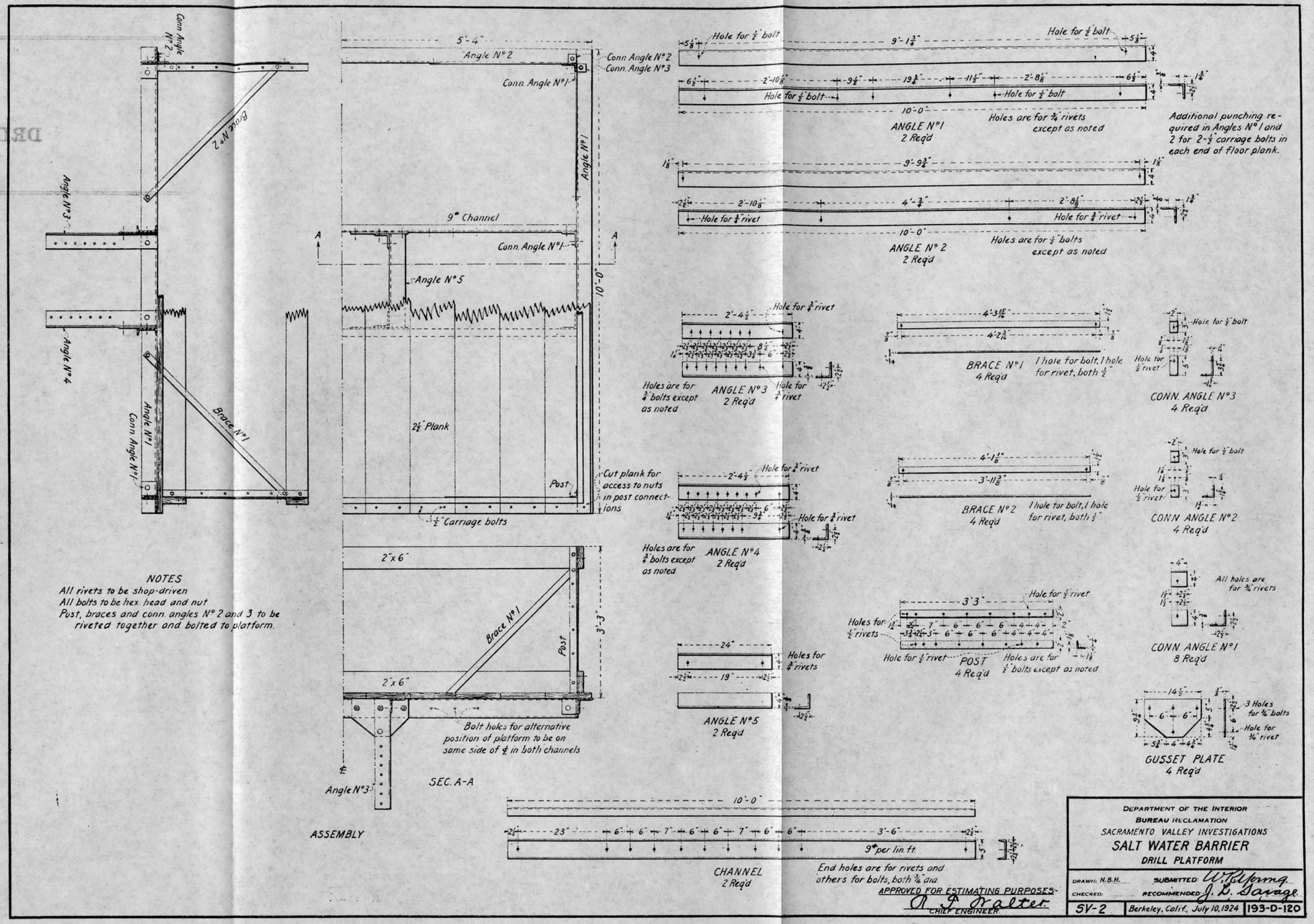
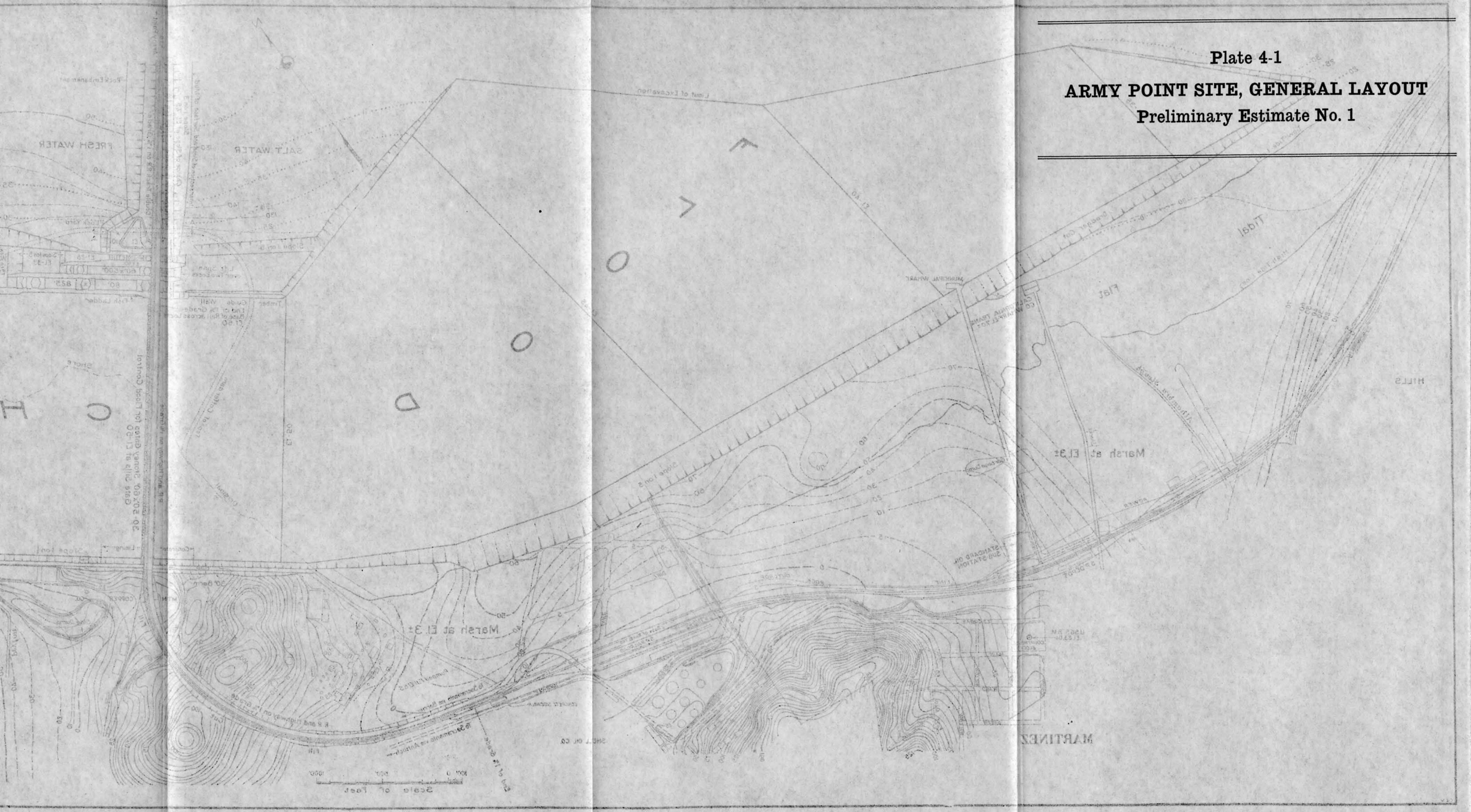
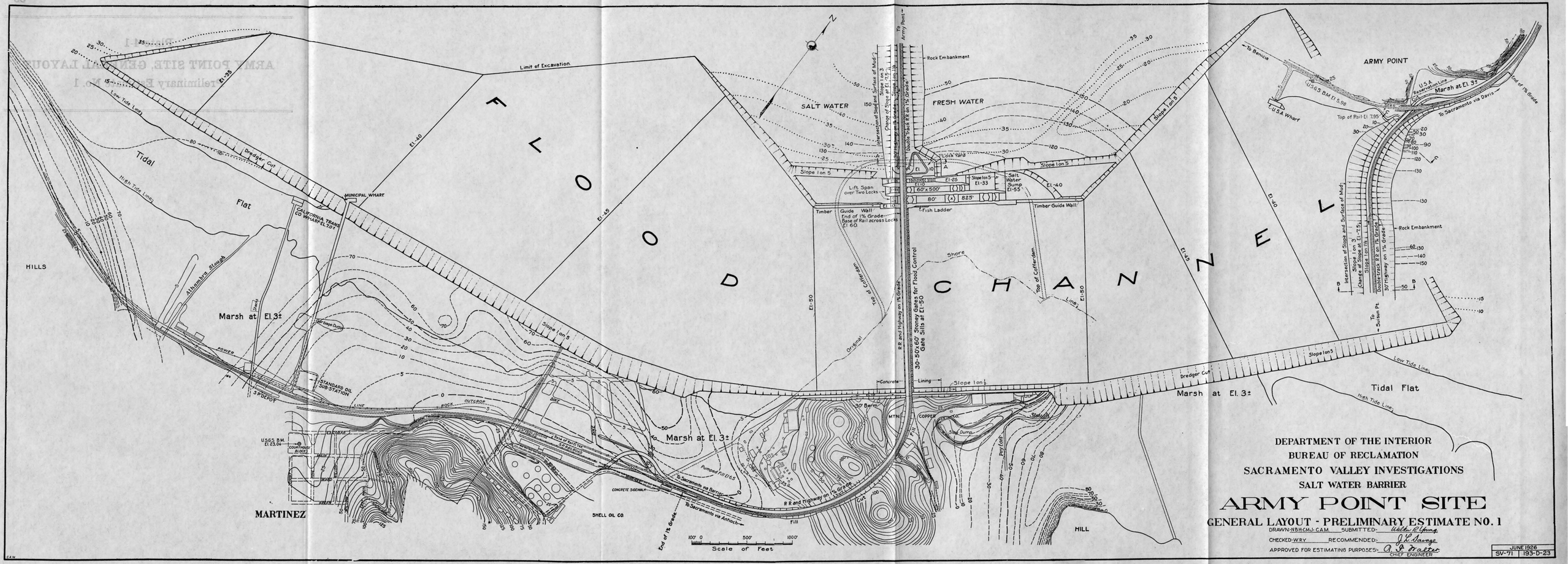

Conn. Angle N° 2
Brace N° 2
Angle N° 3
Angle N° 4
Angle N° 1
Conn. Angle N° 1
Brace N° 1
5'-4"
Angle N° 2
Conn. Angle N° 2
Conn. Angle N° 3
Conn. Angle N° 1
Angle N° 1
9" Channel
Conn. Angle N° 1
Angle N° 5
10'-0"
2½" Plank
Post
Cut plank for access to nuts in post connections
½" Carriage bolts
2"x6"
Brace N° 1
Post
3'-3"
2"x6"
Bolt holes for alternative position of platform to be on same side of ℄ in both channels
Angle N° 3
SEC. A-A
ASSEMBLY
NOTES
All rivets to be shop-driven
All bolts to be hex. head and nut
Post, braces and conn. angles N° 2 and 3 to be riveted together and bolted to platform.
Hole for ½" bolt
9'-1¾"
Hole for ½" bolt
Hole for ½" bolt
Hole for ½" bolt
10'-0"
Holes are for ⅞" rivets except as noted
ANGLE N° 1
2 Req'd
Additional punching required in Angles N° 1 and 2 for 2-½" carriage bolts in each end of floor plank.
9'-9¾"
Hole for ¾" rivet
Hole for ¾" rivet
10'-0"
Holes are for ½" bolts except as noted
ANGLE N° 2
2 Req'd
Hole for ¾" rivet
Holes are for ¾" bolts except as noted
ANGLE N° 3
2 Req'd
Hole for ¾" rivet
BRACE N° 1
4 Req'd
1 hole for bolt, 1 hole for rivet, both ½"
Hole for ½" bolt
Hole for ½" rivet
CONN. ANGLE N° 3
4 Req'd
Hole for ¾" rivet
Hole for ¾" rivet
ANGLE N° 4
2 Req'd
Holes are for ¾" bolts except as noted
BRACE N° 2
4 Req'd
1 hole for bolt, 1 hole for rivet, both ½"
Hole for ½" bolt
Hole for ½" rivet
CONN. ANGLE N° 2
4 Req'd
Holes for ¾" rivets
ANGLE N° 5
2 Req'd
Hole for ½" rivet
Holes for ½" rivets
Hole for ½" rivet
POST
4 Req'd
Holes are for ½" bolts except as noted
All holes are for ⅞" rivets
CONN. ANGLE N° 1
8 Req'd
3 Holes for ⅞" bolts
Hole for ⅞" rivet
GUSSET PLATE
4 Req'd
10'-0"
23"
6"
6"
7"
6"
6"
7"
6"
6"
3'-6"
9# per lin. ft.
CHANNEL
2 Req'd
End holes are for rivets and others for bolts, both ⅞" dia.
APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER
DEPARTMENT OF THE INTERIOR
BUREAU RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DRILL PLATFORM
DRAWN: N.B.H.
CHECKED:
SUBMITTED: W. Polhemus
RECOMMENDED: J. B. Savage
5V-2
Berkeley, Calif., July 10, 1924
193-D-120

Plate 4-1

ARMY POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 1





DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

ARMY POINT SITE

GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 1

DRAWN-NBH CMJ-CAM SUBMITTED- Walter A. Young
CHECKED-WRY RECOMMENDED- J. L. Savage
APPROVED FOR ESTIMATING PURPOSES- A. P. Foster CHIEF ENGINEER

JUNE 1926
SV-71 193-D-23

Plate 4-2

ELEVATION AND SECTION
Preliminary Estimate No. 1

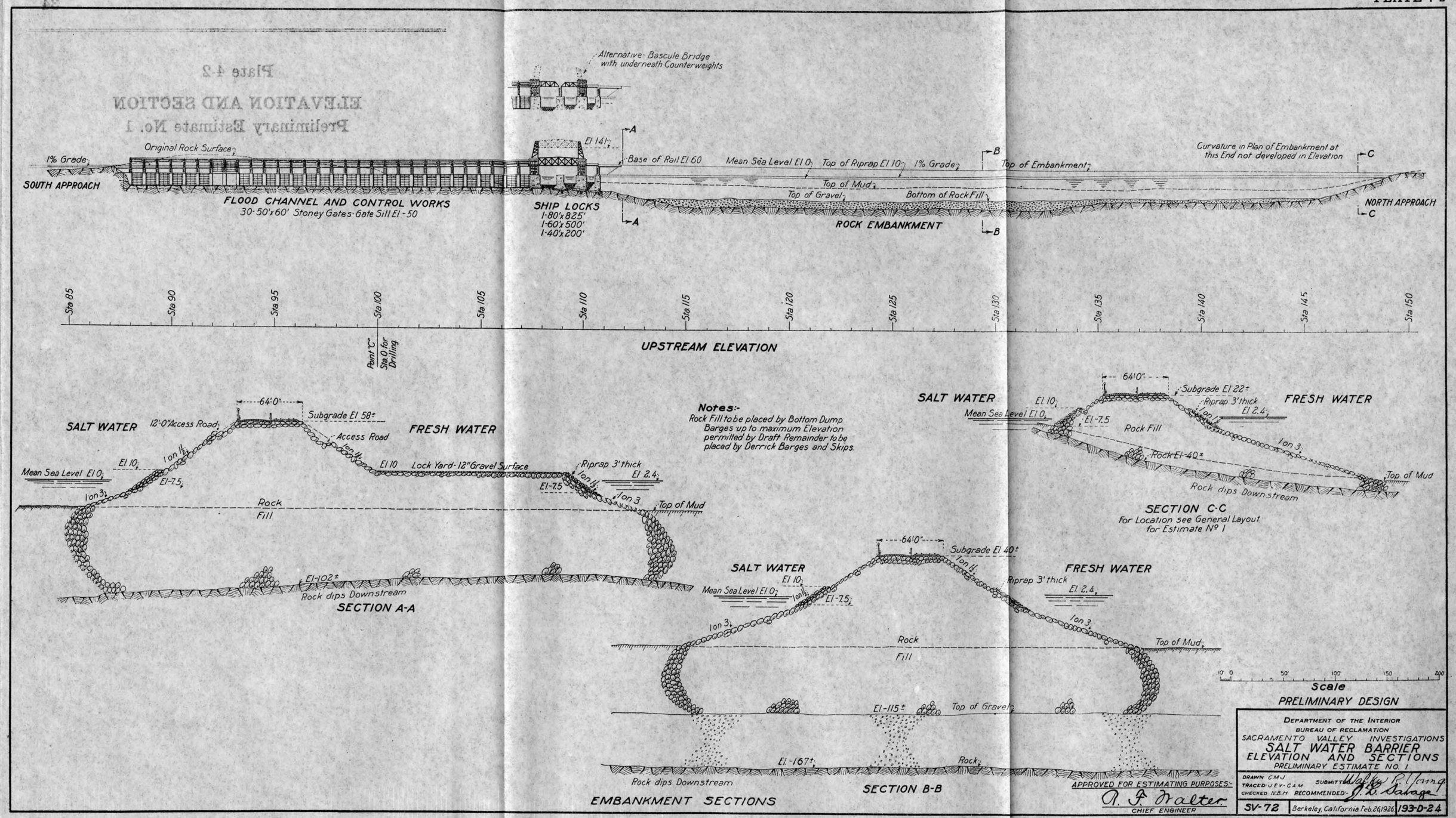
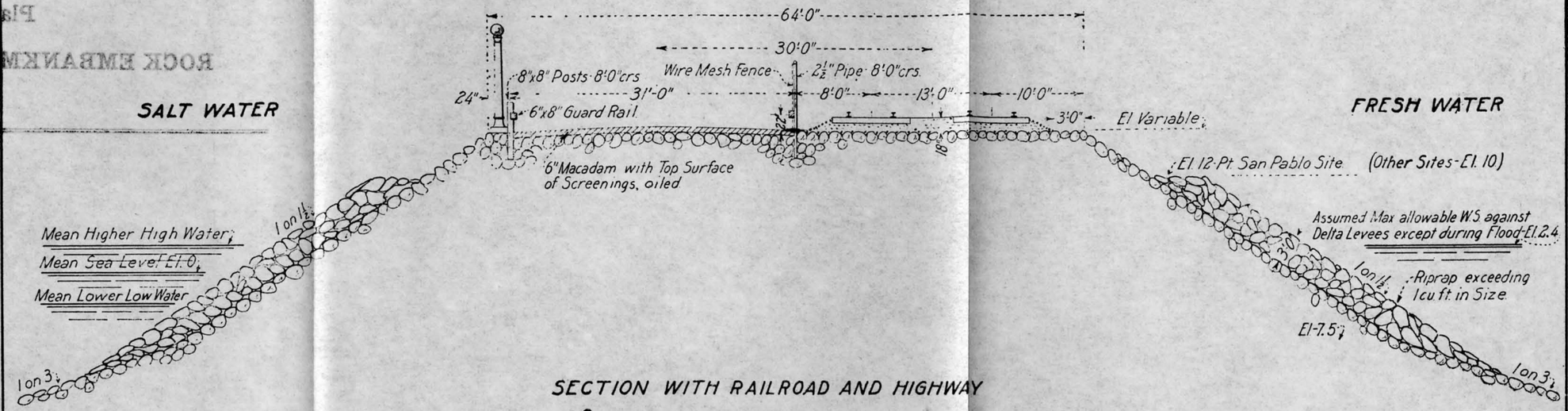
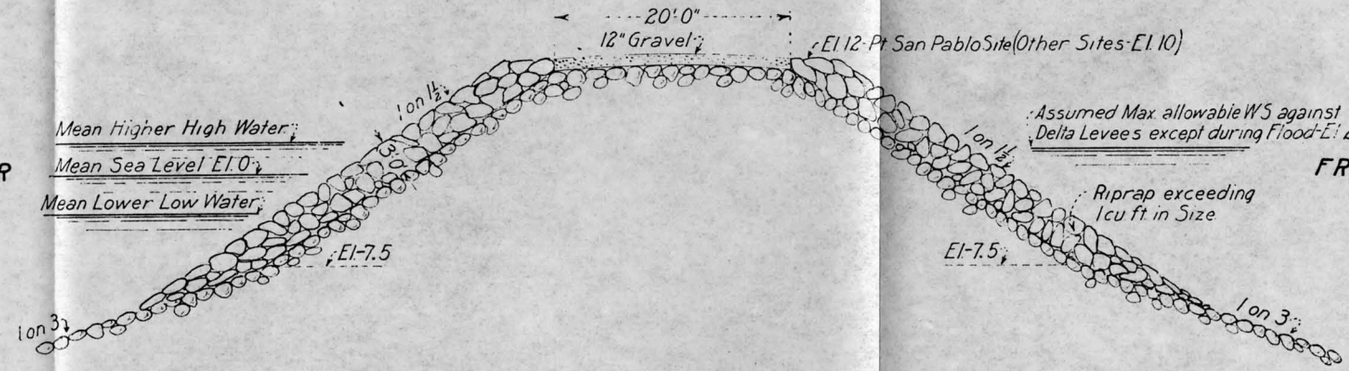

Alternative Bascule Bridge with underneath Counterweights
El 141
A
Original Rock Surface
1% Grade
SOUTH APPROACH
FLOOD CHANNEL AND CONTROL WORKS
30-50'x60' Stoney Gates-Gate Sill El -50
SHIP LOCKS
1-80'x825'
1-60'x500'
1-40'x200'
Base of Rail El 60
Mean Sea Level El 0
Top of Riprap El 10
1% Grade
B
Top of Embankment
Top of Mud
Top of Gravel
Bottom of Rock Fill
ROCK EMBANKMENT
Curvature in Plan of Embankment at this End not developed in Elevation
C
NORTH APPROACH
Sta 85
Sta 90
Sta 95
Sta 100
Sta 105
Sta 110
Sta 115
Sta 120
Sta 125
Sta 130
Sta 135
Sta 140
Sta 145
Sta 150
Point "C" Sta 0 for Drilling
UPSTREAM ELEVATION
SALT WATER
FRESH WATER
64'0"
12'-0" Access Road
Subgrade El 58±
Access Road
1 on 1½
El 10
Mean Sea Level El 0
El -7.5
1 on 3
Lock Yard-12" Gravel Surface
Riprap 3' thick
El 2.4
Rock Fill
Top of Mud
El -102±
Rock dips Downstream
SECTION A-A
Notes:-
Rock Fill to be placed by Bottom Dump Barges up to maximum Elevation permitted by Draft Remainder to be placed by Derrick Barges and Skips.
Subgrade El 22±
Rock Fill
Rock El -40±
Rock dips Downstream
SECTION C-C
For Location see General Layout for Estimate Nº 1
Subgrade El 40±
Rock
El -115±
El -167±
SECTION B-B
EMBANKMENT SECTIONS
Scale
PRELIMINARY DESIGN
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO. 1
DRAWN CMJ
TRACED UEV-CAM
CHECKED N.B.H
SUBMITTED
RECOMMENDED
APPROVED FOR ESTIMATING PURPOSES:
CHIEF ENGINEER
SV-72
Berkeley, California Feb. 26, 1926
193-D-24

Plate 4-3

ROCK EMBANKMENT, TOP DETAILS



SECTION WITH RAILROAD AND HIGHWAY



SECTION WITHOUT RAILROAD OR HIGHWAY

12' 0 5' 10' 15' 20'

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:-

R. F. Walter

CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR.
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

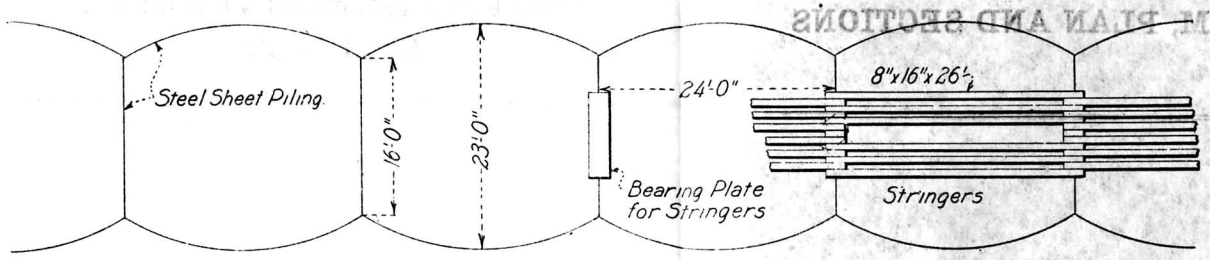
SALT WATER BARRIER
ROCK EMBANKMENT
TOP DETAILS

DRAWN: E.M.J. JEV. CAN. SUBMITTED: W. P. Fleming
CHECKED: N.B.H. RECOMMENDED: J. L. Savage

SV-73 | Berkeley, Calif. 2-26-'26 | 193-D-25

Plate 4-4

MAIN COFFERDAM, PLAN AND SECTIONS



PLAN-SHEET PILING IN PLACE

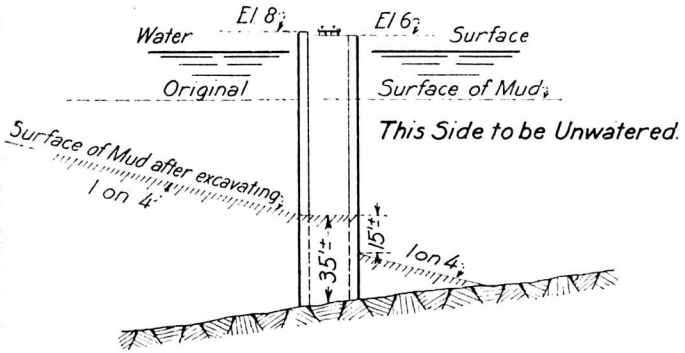
0 5' 10' 20' 30' 40' 50'

Scale

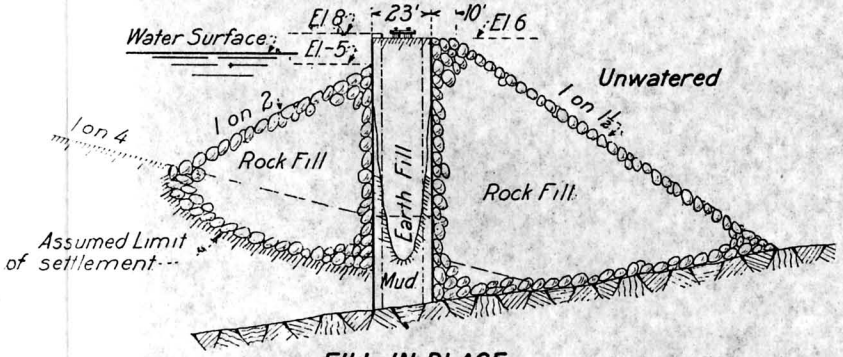
Notes:-

Excavation to proceed along successive Panels of Sheet Piling and be closely followed by Rock Fill to minimize length of unsupported Pile Section.

Where Mud does not over lie Rock, the Type of Cofferdam is modified as described in Text.



PILING IN PLACE AND EXCAVATION COMPLETED



FILL IN PLACE

SECTIONS

0 10' 50' 100' 150'

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
MAIN COFFERDAM
PLAN AND SECTIONS

DRAWN: C.M.J. JEY-CAM SUBMITTED: [illegible]
CHECKED: N.D.H. RECOMMENDED: [illegible]

SV-74 | Berkeley, Calif. Mch 4, 1926. | 193-D-26

APPROVED FOR ESTIMATING PURPOSES:-

R. F. Walter
CHIEF ENGINEER.

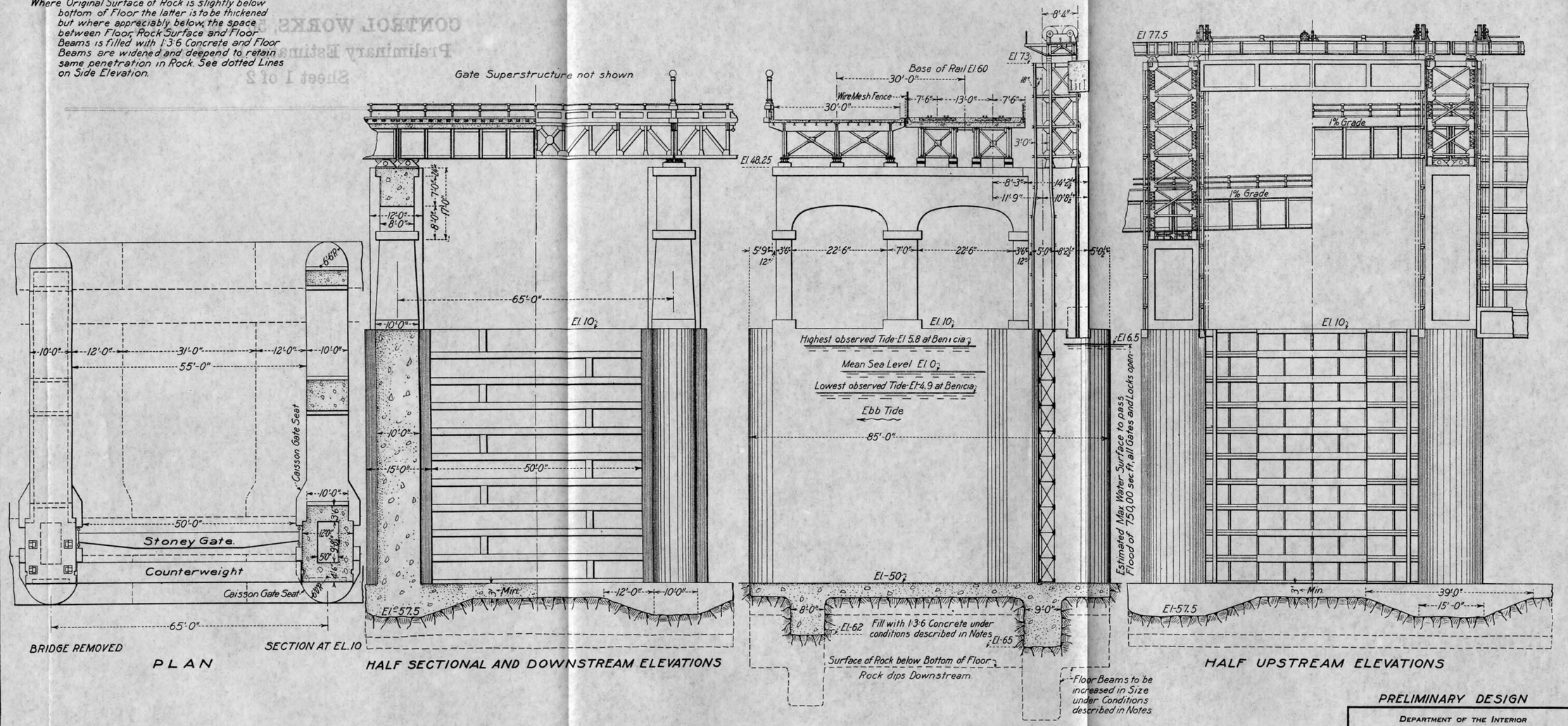
Plate 4-5

CONTROL WORKS, 50′ x 60′ GATE
Preliminary Estimates 1, 3, 4 and 7
Sheet 1 of 2

Notes:-

Reinforcing Steel not shown In Salt Water, same to be 12" from Surface of Concrete.

Where Original Surface of Rock is slightly below bottom of Floor the latter is to be thickened but where appreciably below, the space between Floor, Rock Surface and Floor Beams is filled with 1:3:6 Concrete and Floor Beams are widened and deepend to retain same penetration in Rock. See dotted Lines on Side Elevation.



PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS- 50'x60' GATE
PRELIMINARY ESTIMATES NOS 1,3,4 AND 7

DRAWN: C.M.J. L.T.F. C.A.M. SUBMITTED: W. F. Kelming
CHECKED: N.B.H. RECOMMENDED: J. L. Savage

APPROVED FOR ESTIMATING PURPOSES:
R. F. Walter
CHIEF ENGINEER

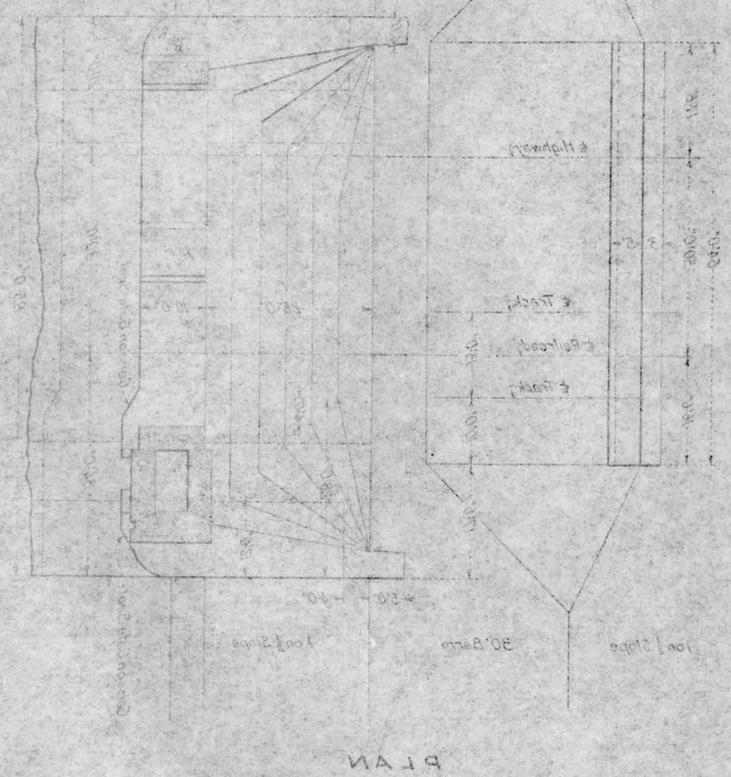
SV-75 | Berkeley, California, Feb. 20, 1926 Sheet 1 of 2 | 193-D-27

Plate 4-6

CONTROL WORKS, 50′ x 60′ GATE

Preliminary Estimates 1, 3, 4 and 7

Sheet 2 of 2

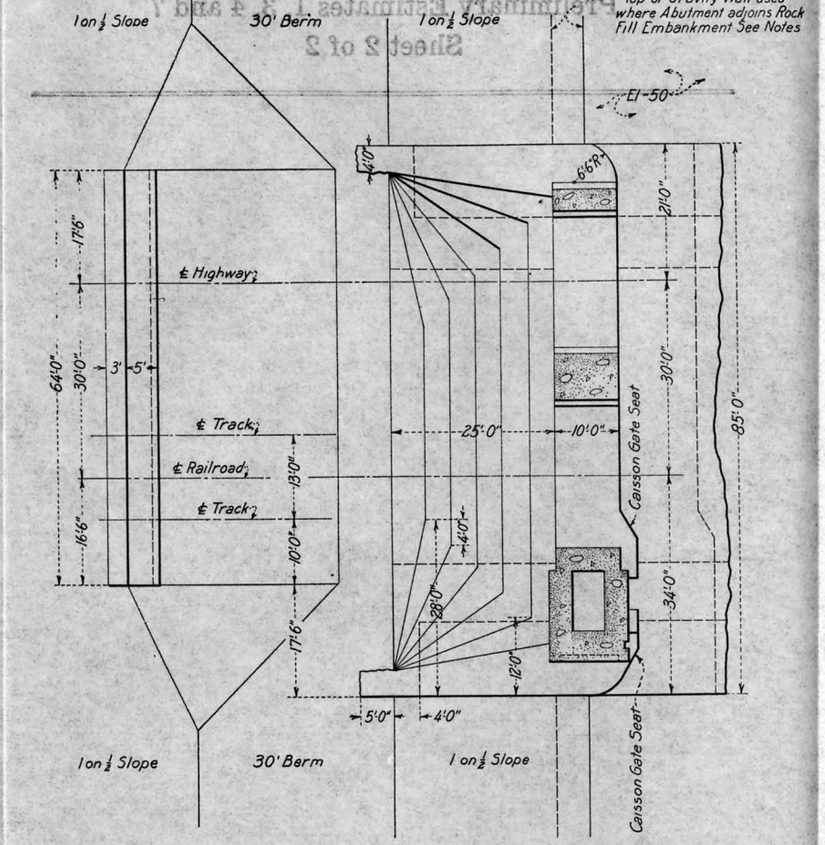


Notes:-

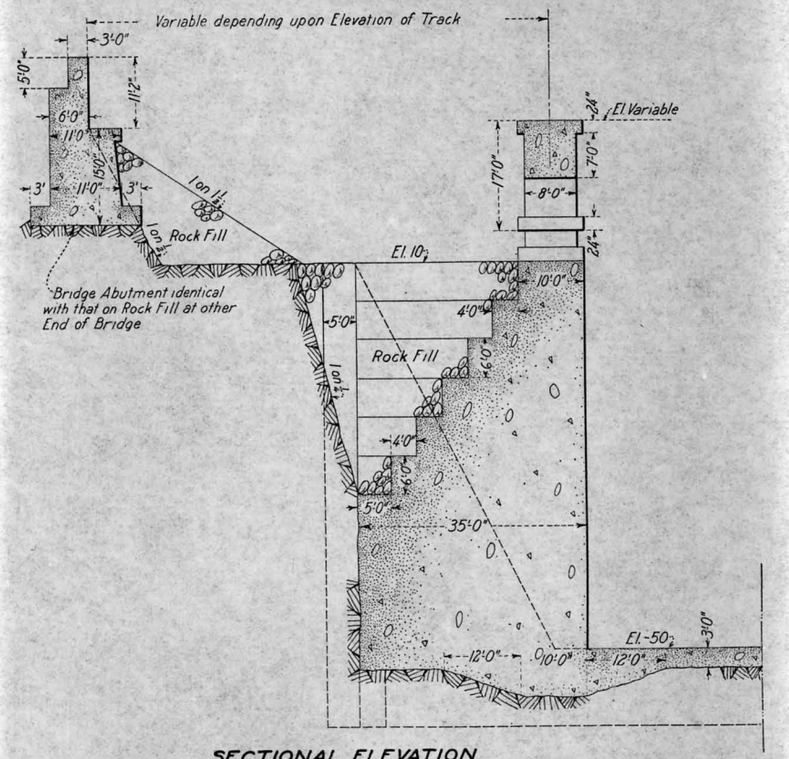
Abutment Pier shown on this Drawing is to be used adjacent to Side of Rock Cut for Flood Channel with 50' Stoney Gates. The Abutment for 70' Gates is of the same Type.

In Cases where Rock Fill Embankment adjoins Control Works, Gravity Walls extend Upstream and Downstream from Ends of Abutment shown on this Drawing with Tops flush with Surface of Fill and terminate where Surface of Fill reaches El-50 or El-70. The Slope Lining is then omitted and the Abutment Wings are replaced by Cutoffs.

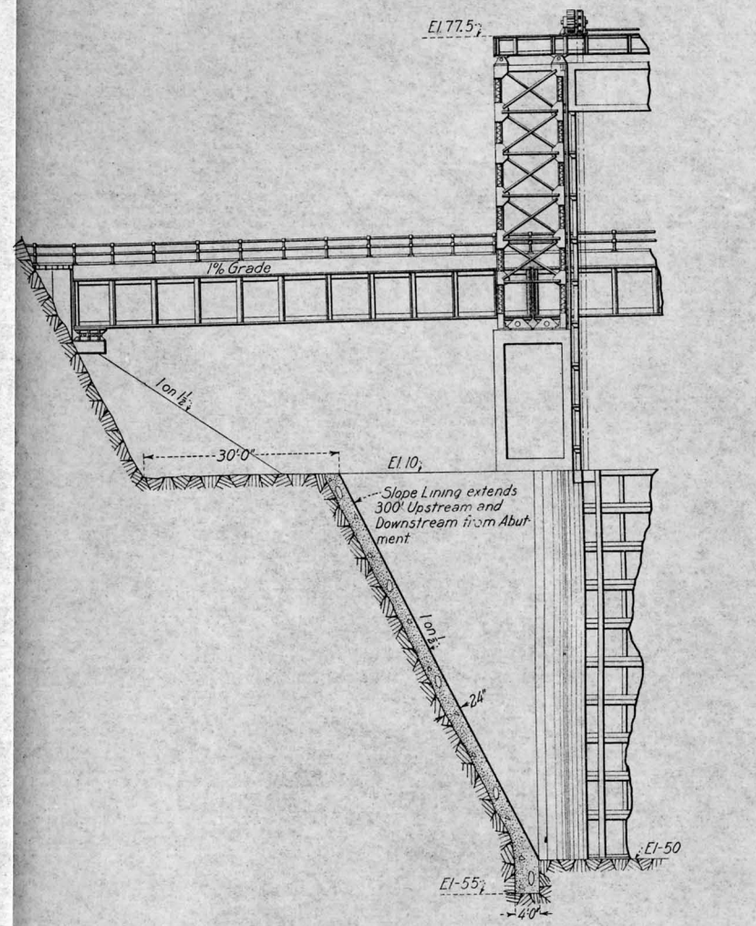
Reinforcing Steel not shown. In Salt Water: Same to be 12" from Surface of Concrete.



PLAN



SECTIONAL ELEVATION



UPSTREAM ELEVATION

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS-50'x60' GATE
PRELIMINARY ESTIMATES NOS 1, 3, 4 AND 7

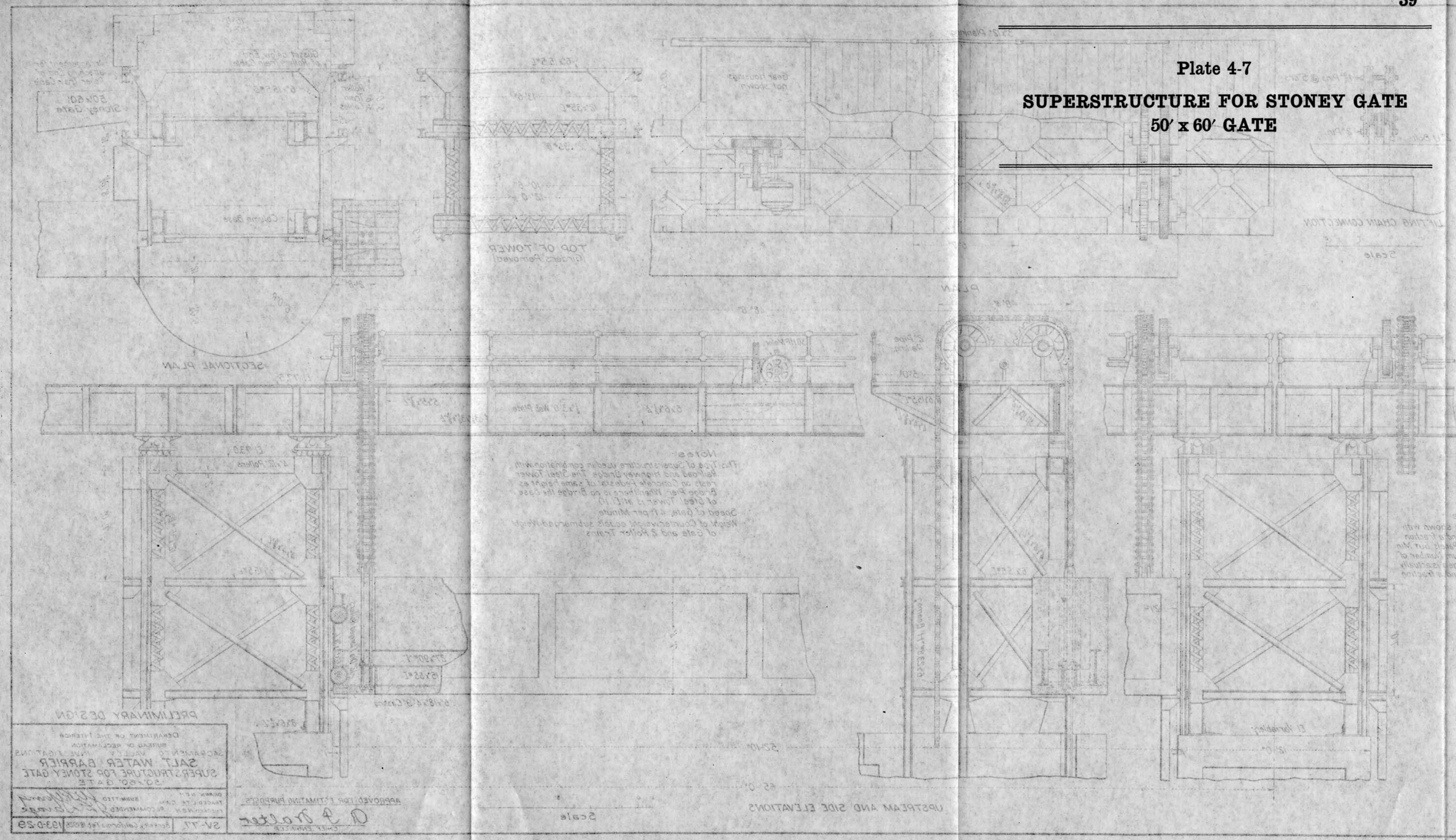
DRAWN CMJ-JEK-CAM SUBMITTED
CHECKED NBH RECOMMENDED

APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

SV-76 | Berkeley California Feb 26, 1926 Sheet 2 of 2 | 193-D-28

Plate 4-7

SUPERSTRUCTURE FOR STONEY GATE
50′ x 60′ GATE



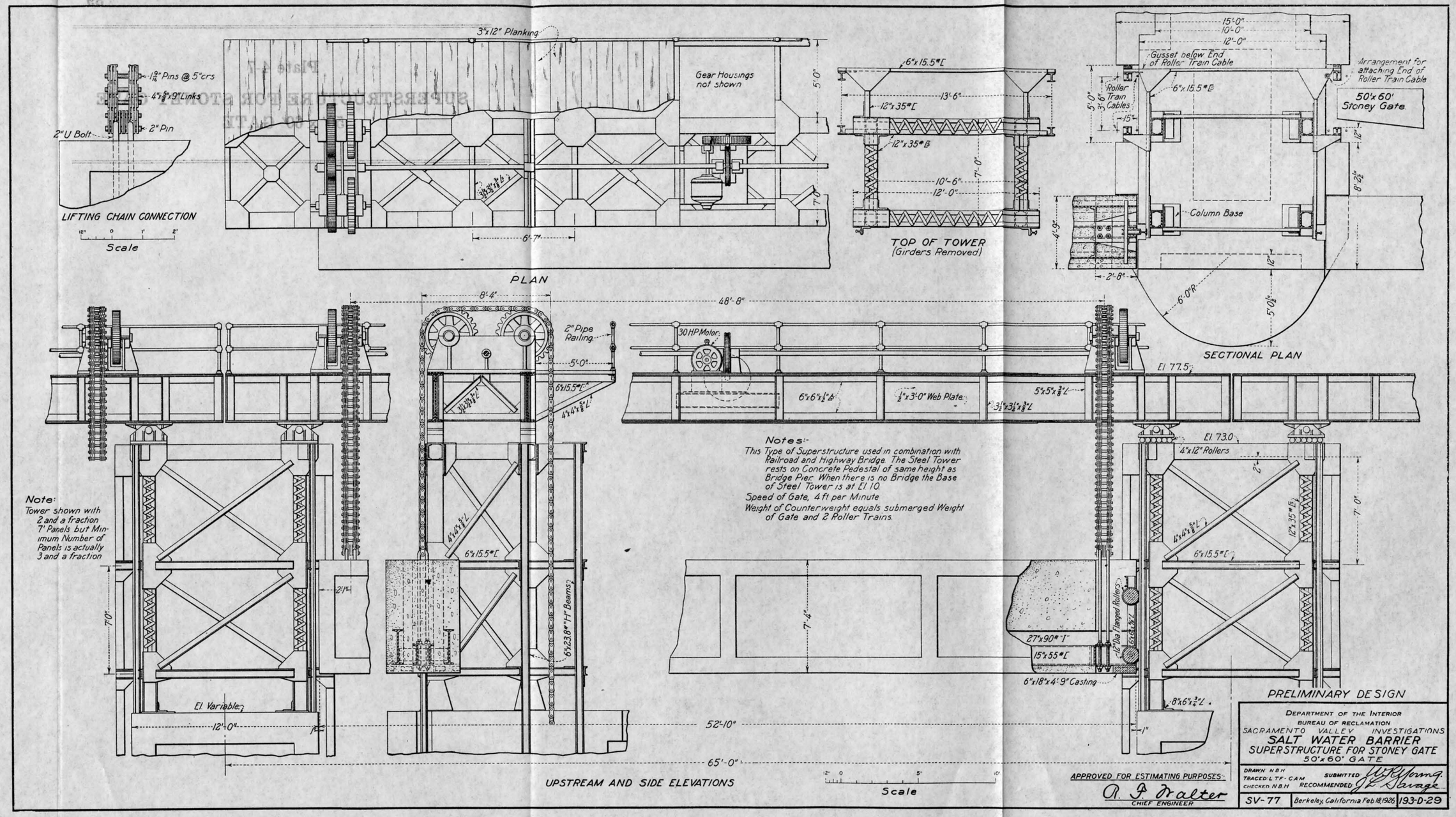
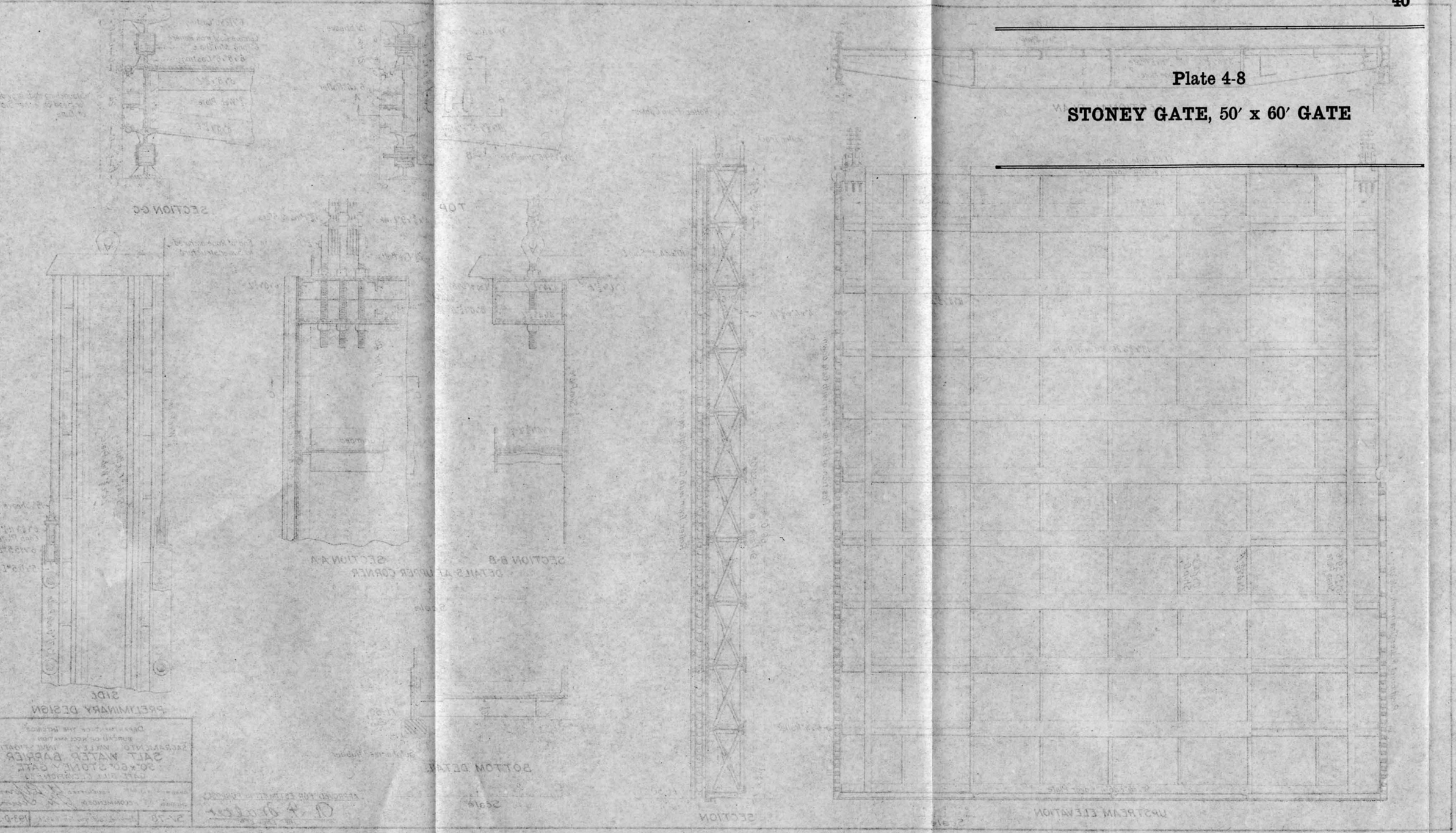

LIFTING CHAIN CONNECTION
1 9/16" Pins @ 5" crs
4" x 5/8" x 9" Links
2" Pin
2" U Bolt
Scale
3" x 12" Planking
Gear Housings not shown
5'-0"
7'-0"
6'-7"
PLAN
6" x 15.5#[
12" x 35#[
13'-6"
12" x 35#[
10'-6"
12'-0"
7'-0"
TOP OF TOWER
(Girders Removed)
15'-0"
10'-0"
12'-0"
Gusset below End of Roller Train Cable
Arrangement for attaching End of Roller Train Cable
50' x 60' Stoney Gate
Roller Train Cables
6" x 15.5#[
5'-0"
3'-6"
15"
12"
8'-2 1/2"
Column Base
4'-9"
2'-8"
12"
6'-0" R
5'-0 1/2"
SECTIONAL PLAN
8'-4"
48'-8"
2" Pipe Railing
5'-0"
6" x 15.5#[
4" x 4" x 5/8" L
30 HP Motor
6" x 6" x 1/2" [
1/2" x 3'-0" Web Plate
5" x 5" x 3/8" L
3 1/2" x 3 1/2" x 3/8" L
El 77.5
El 73.0
4" x 12" Rollers
2"
12" x 35#[
7'-0"
4" x 4" x 5/8" L
6" x 15.5#[
Note:
Tower shown with 2 and a fraction 7' Panels but Minimum Number of Panels is actually 3 and a fraction
7'-0"
2'-1"
4" x 4" x 5/8" L
6" x 15.5#[
6" x 23.8# "H" Beams
Notes:-
This Type of Superstructure used in combination with Railroad and Highway Bridge. The Steel Tower rests on Concrete Pedestal of same height as Bridge Pier. When there is no Bridge the Base of Steel Tower is at El 10.
Speed of Gate, 4 ft per Minute
Weight of Counterweight equals submerged Weight of Gate and 2 Roller Trains.
7'-4"
27" x 90#"I"
15" x 55#[
16" Dia Flanged Rollers
6" x 6" x 3/4" L
6" x 18" x 4'-9" Casting
8" x 6" x 3/4" L
El Variable
12'-0"
1"
52'-10"
65'-0"
1"
UPSTREAM AND SIDE ELEVATIONS
Scale
APPROVED FOR ESTIMATING PURPOSES:-
A. P. Walter
CHIEF ENGINEER
PRELIMINARY DESIGN
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SUPERSTRUCTURE FOR STONEY GATE
50' x 60' GATE
DRAWN N.B.H.
TRACED L.T.F. - C.A.M.
CHECKED N.B.H.
SUBMITTED
RECOMMENDED
SV-77
Berkeley, California Feb 18 1926
193-D-29

Plate 4-8

STONEY GATE, 50′ x 60′ GATE



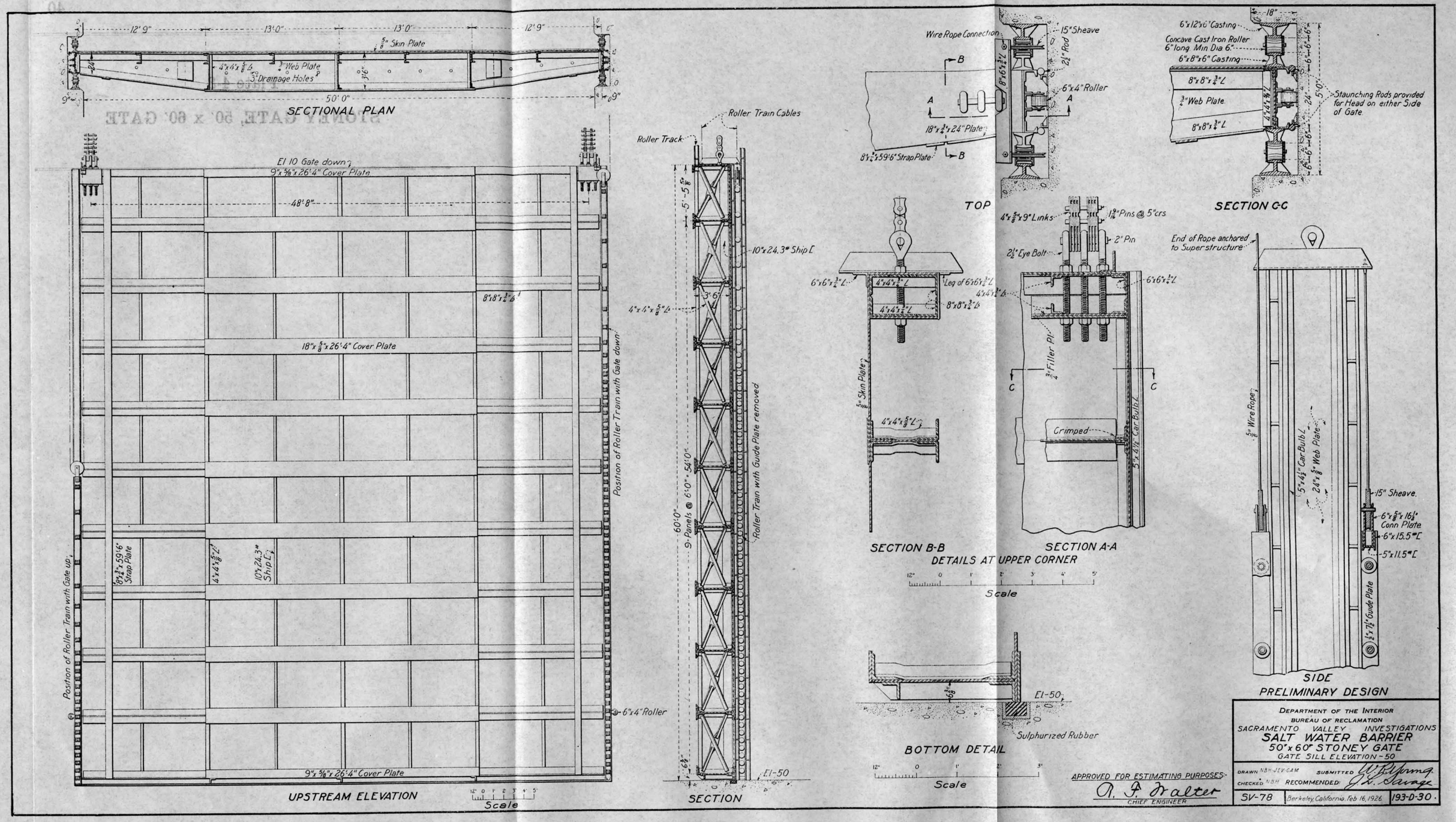
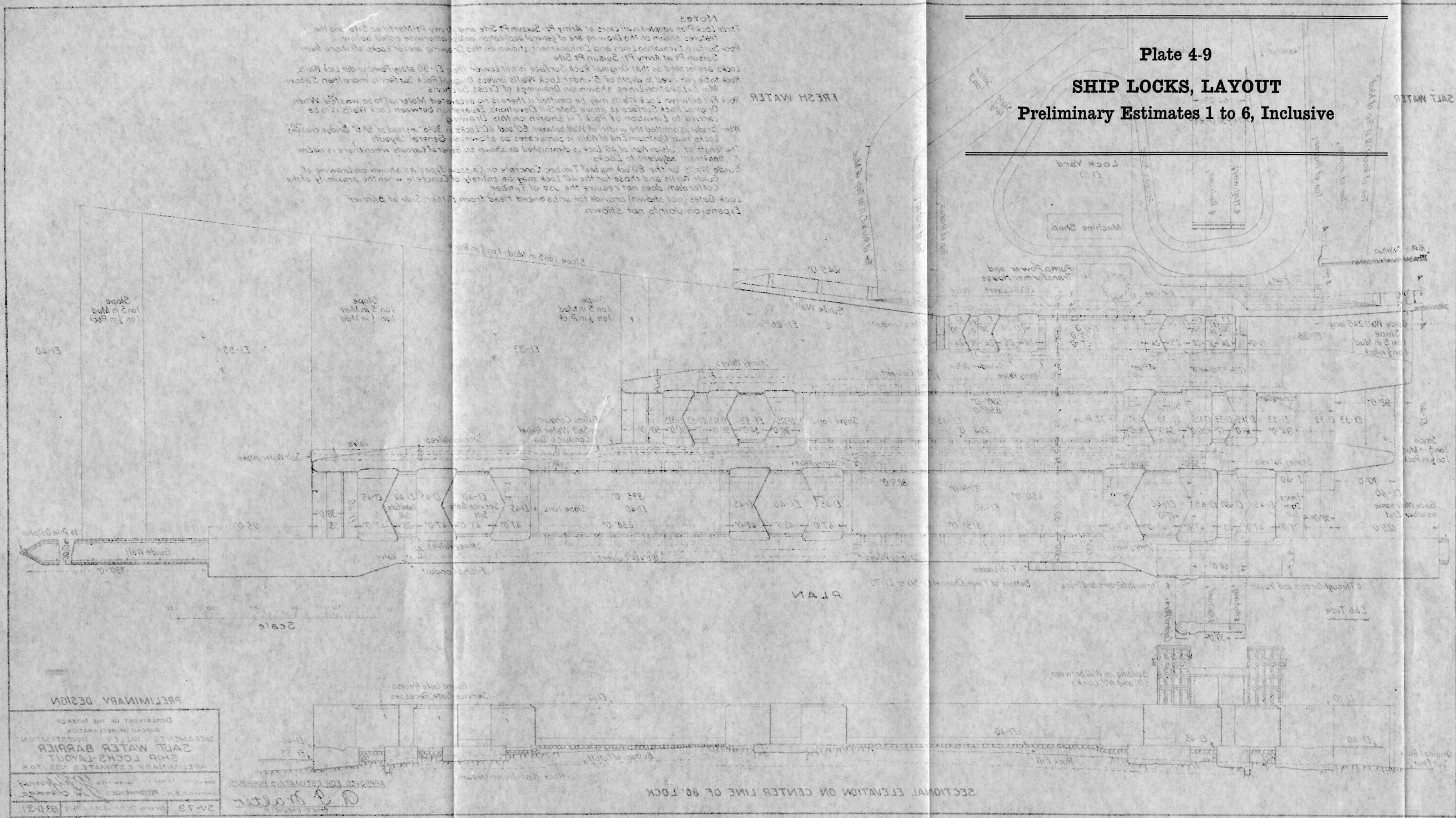

SECTIONAL PLAN
12'-9"
13'-0"
13'-0"
12'-9"
5/8" Skin Plate
4"x4"x5/8" L
3/4" Web Plate
3" Drainage Holes
50'-0"
9"
UPSTREAM ELEVATION
El 10 Gate down
9"x5/8"x26'-4" Cover Plate
48'-8"
8"x8"x3/4" L
18"x5/8"x26'-4" Cover Plate
Position of Roller Train with Gate down
Position of Roller Train with Gate up
8"x3/4"x59'-6" Strap Plate
4"x4"x5/8" L
10"x24.3# Ship C
6"x4" Roller
9"x5/8"x26'-4" Cover Plate
Scale
SECTION
Roller Train Cables
Roller Track
10"x24.3# Ship C
4"x4"x5/8" L
3'-6"
60'-0"
9-Panels @ 6'-0" = 54'-0"
Roller Train with Guide Plate removed
El-50
TOP
Wire Rope Connection
15" Sheave
2 1/2" Rod
6"x4" Roller
18"x3/4"x24" Plate
8"x3/4"x59'-6" Strap Plate
SECTION B-B
6"x6"x3/4" L
4"x4"x3/8" L
Leg of 6"x6"x3/4" L
4"x4"x3/8" L
8"x8"x3/4" L
5/8" Skin Plate
4"x4"x5/8" L
SECTION A-A
4"x5/8"x9" Links
1 9/16" Pins @ 5" crs
2" Pin
2 1/2" Eye Bolt
6"x6"x3/4" L
4"x4"x3/8" L
3/4" Filler Pl
Crimped
5"x4 1/2" Car Bulb L
DETAILS AT UPPER CORNER
Scale
BOTTOM DETAIL
El-50
Sulphurized Rubber
Scale
SECTION C-C
18"
6"x12"x6" Casting
Concave Cast Iron Roller 6" long Min Dia 6"
6"x8"x6" Casting
8"x8"x3/4" L
3/4" Web Plate
8"x8"x3/4" L
Staunching Rods provided for Head on either Side of Gate
SIDE
PRELIMINARY DESIGN
End of Rope anchored to Superstructure
5/8" Wire Rope
5"x4 1/2" Car Bulb L
24"x5/8" Web Plate
15" Sheave
6"x5/8"x16 1/2" Conn Plate
6"x15.5# C
5"x11.5# C
1/2"x7 1/2" Guide Plate
APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
50' x 60' STONEY GATE
GATE SILL ELEVATION - 50
DRAWN N.B.H. JEV. CAM
CHECKED N.B.H.
SUBMITTED
RECOMMENDED
SV-78
Berkeley, California, Feb 16, 1926
193-D-30

Plate 4-9

SHIP LOCKS, LAYOUT

Preliminary Estimates 1 to 6, Inclusive



Notes:-

Three Lock Plan adopted in all cases at Army Pt-Suisun Pt Site and Army Pt-Martinez Site and the Features shown on this Drawing are of general application unless otherwise noted below

Rock Surface, Excavation Lines and Embankment shown on this Drawing are for Locks offshore from Suisun Pt at Army Pt-Suisun Pt Site.

Locks are located so that Original Rock Surface is not Lower than El-90 at any Point under Lock Walls

Rock to be removed to depth of 5' under Lock Walls unless Original Rock Surface is more than 5' above Min Excavation Lines shown on Drawings of Cross Sections

Rock Fill between Lock Walls may be omitted if there is no excavated Material to be wasted When Original Rock Surface is above Gate Sill Elevations, Excavation between Lock Walls is to be carried to Elevation of Rock Fill shown on this Drawing

When Bridge is omitted the width of Wall between 60' and 40' Locks is 30'-8" instead of 51'-6" Bridge crosses Locks near Upstream End of Walls in some cases as shown on General Layouts

The length of Outside Wall of 40' Lock is diminished as shown on General Layouts when there is no Embankment adjacent to Locks

Guide Walls for the 80' lock may be of Timber, Concrete or Caisson Types as shown on Drawing of Guide Walls and those for the 40' Lock may be entirely of Concrete when the proximity of the Cofferdam does not require the use of Timber

Lock Gates (not shown) provide for unbalanced Head from Either Side of Barrier

Expansion Joints not shown

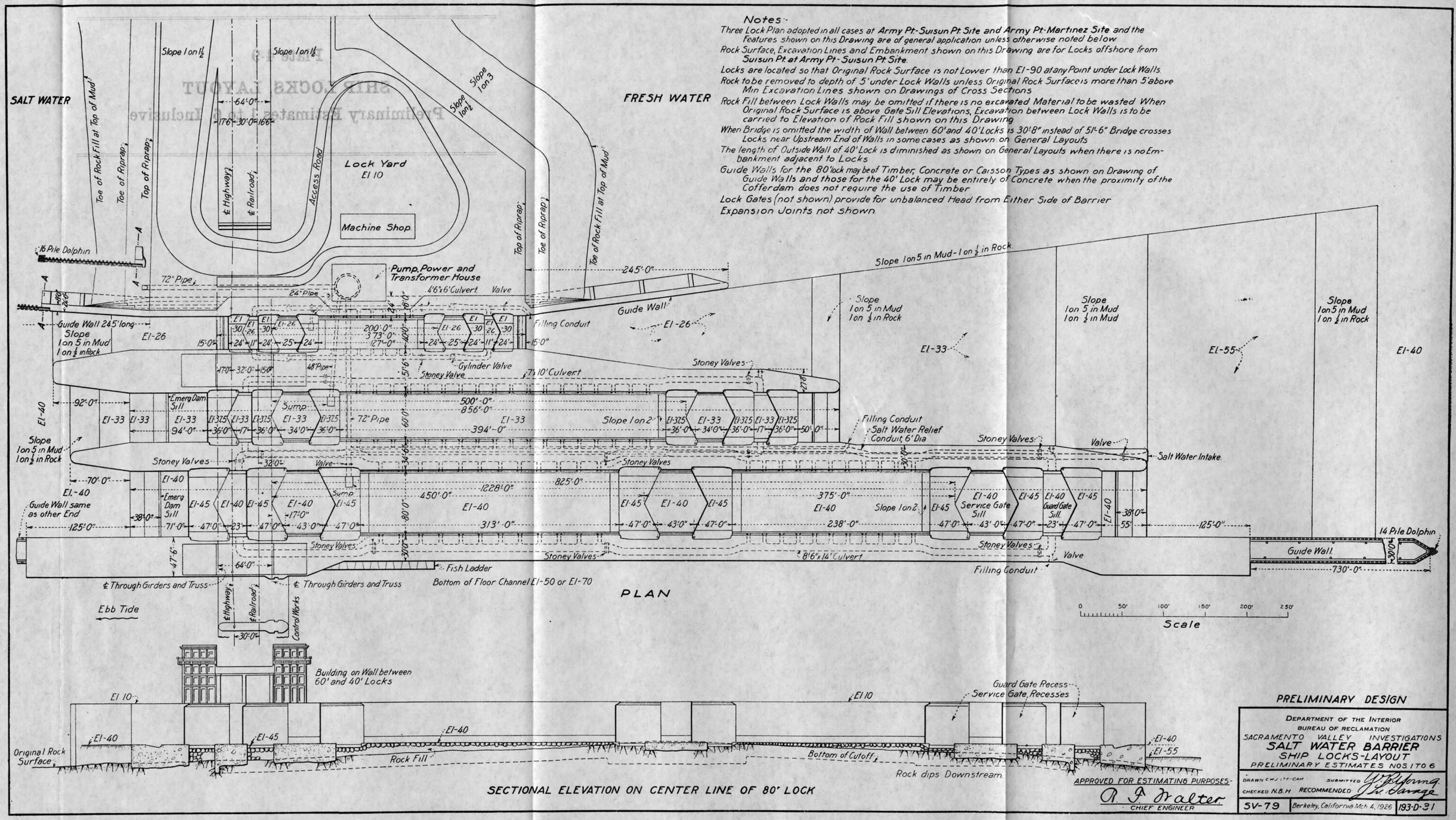
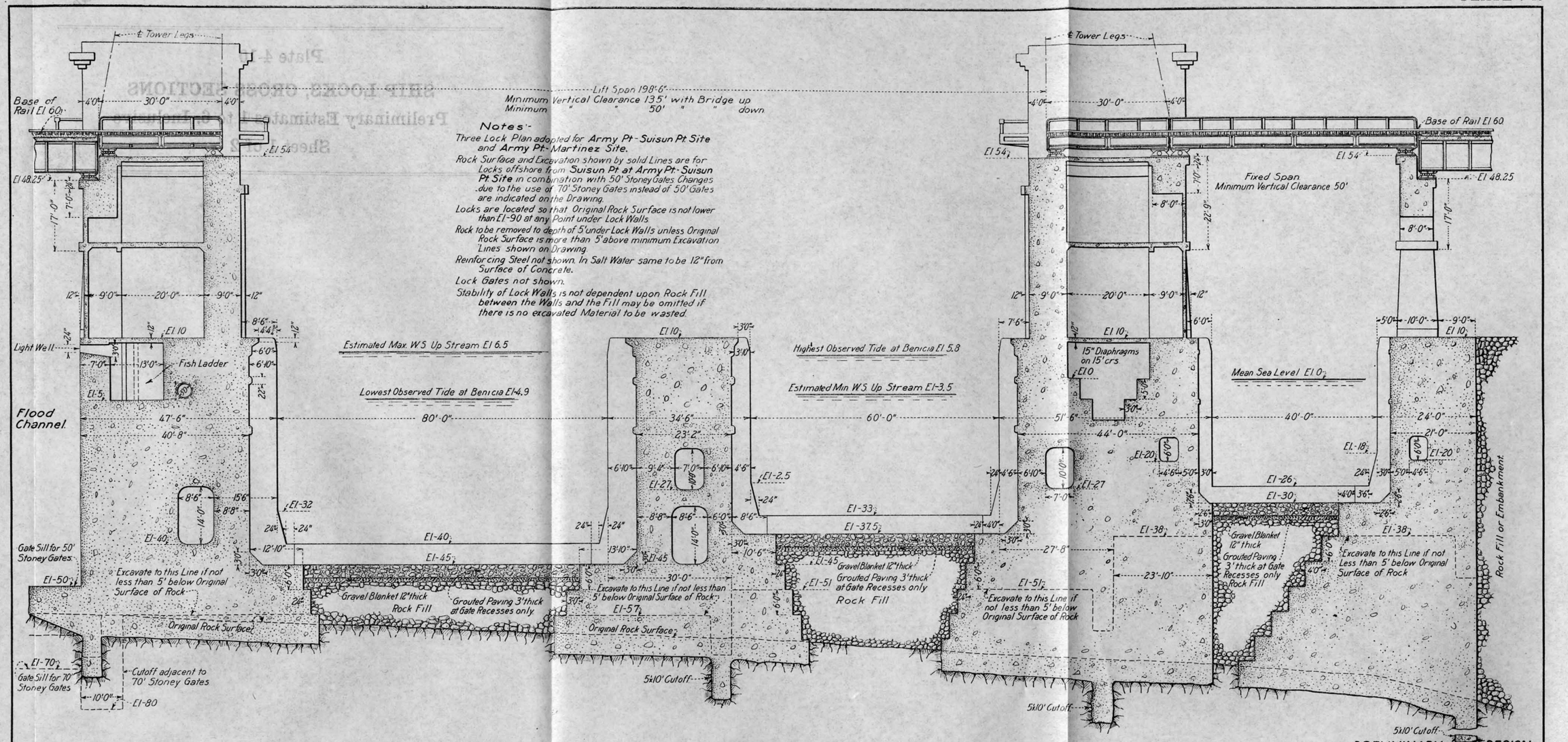


Plate 4-10

SHIP LOCKS, CROSS SECTIONS

Preliminary Estimates 1 to 6, Inclusive

Sheet 1 of 2



SECTION AT BRIDGE AND GATE RECESSES

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS - CROSS SECTIONS
PRELIMINARY ESTIMATES NOS. 1 TO 6

DRAWN: CMJ-LTF-CAM SUBMITTED: J. L. Savage
CHECKED: N.B.H. RECOMMENDED: J. L. Savage

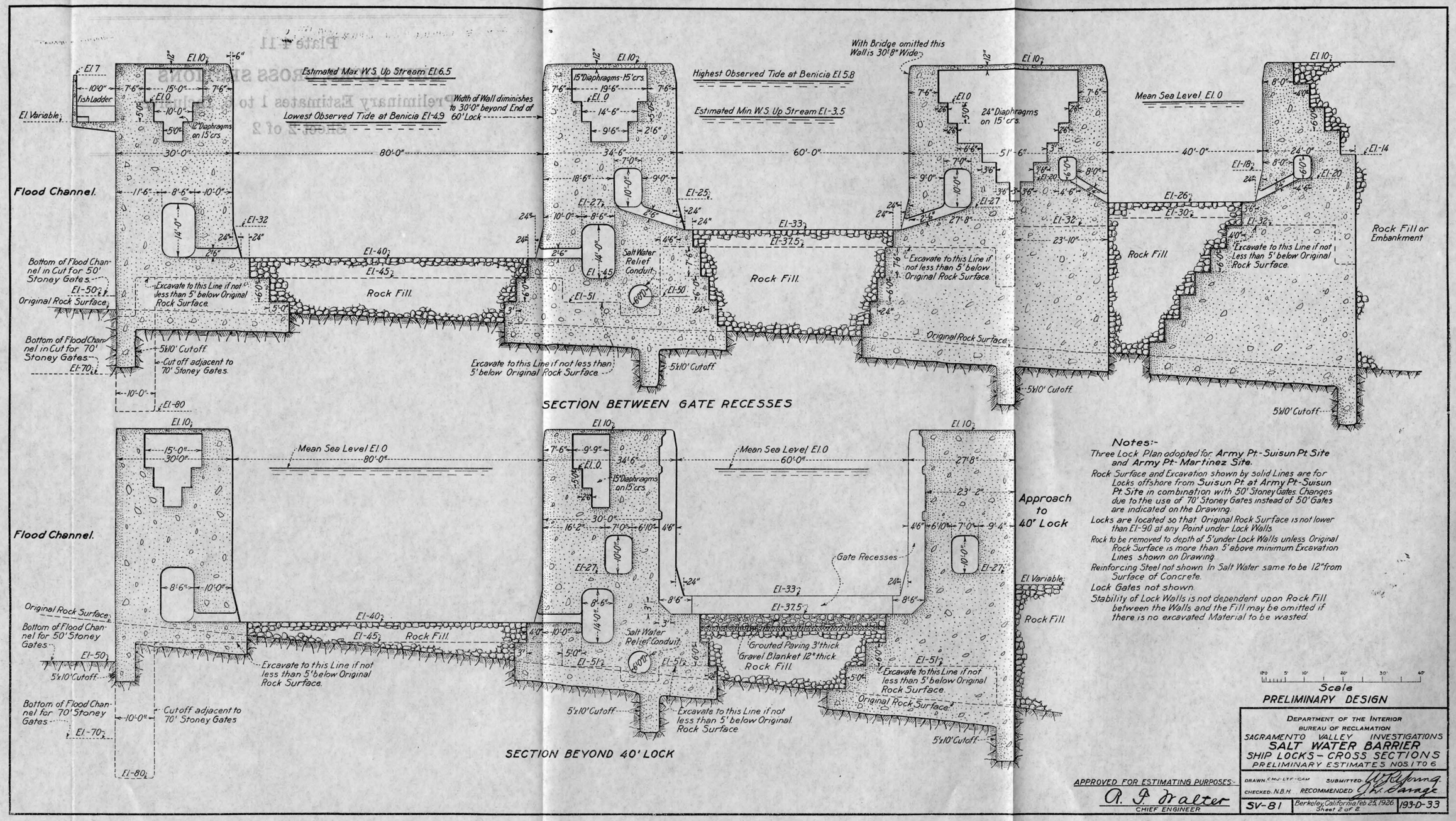
SV-80 | Berkeley, California, Feb. 24, 1926. Sheet 1 of 2 | 193-D-32

Plate 4-11

SHIP LOCKS, CROSS SECTIONS

Preliminary Estimates 1 to 6, Inclusive

Sheet 2 of 2



Notes:-

Three Lock Plan adopted for Army Pt-Suisun Pt Site and Army Pt-Martinez Site.

Rock Surface and Excavation shown by solid Lines are for Locks offshore from Suisun Pt at Army Pt-Suisun Pt Site in combination with 50' Stoney Gates. Changes due to the use of 70' Stoney Gates instead of 50' Gates are indicated on the Drawing.

Locks are located so that Original Rock Surface is not lower than El-90 at any Point under Lock Walls.

Rock to be removed to depth of 5' under Lock Walls unless Original Rock Surface is more than 5' above minimum Excavation Lines shown on Drawing.

Reinforcing Steel not shown. In Salt Water same to be 12" from Surface of Concrete.

Lock Gates not shown.

Stability of Lock Walls is not dependent upon Rock Fill between the Walls and the Fill may be omitted if there is no excavated Material to be wasted.

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS – CROSS SECTIONS
PRELIMINARY ESTIMATES NOS. 1 TO 6

DRAWN: C.M.J.-L.T.F.-C.A.M. SUBMITTED: W. H. Lyons
CHECKED: N.B.H. RECOMMENDED: J. H. Savage

APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

SV-81 | Berkeley, California Feb. 25, 1926. Sheet 2 of 2. | 193-D-33

Plate 4-12

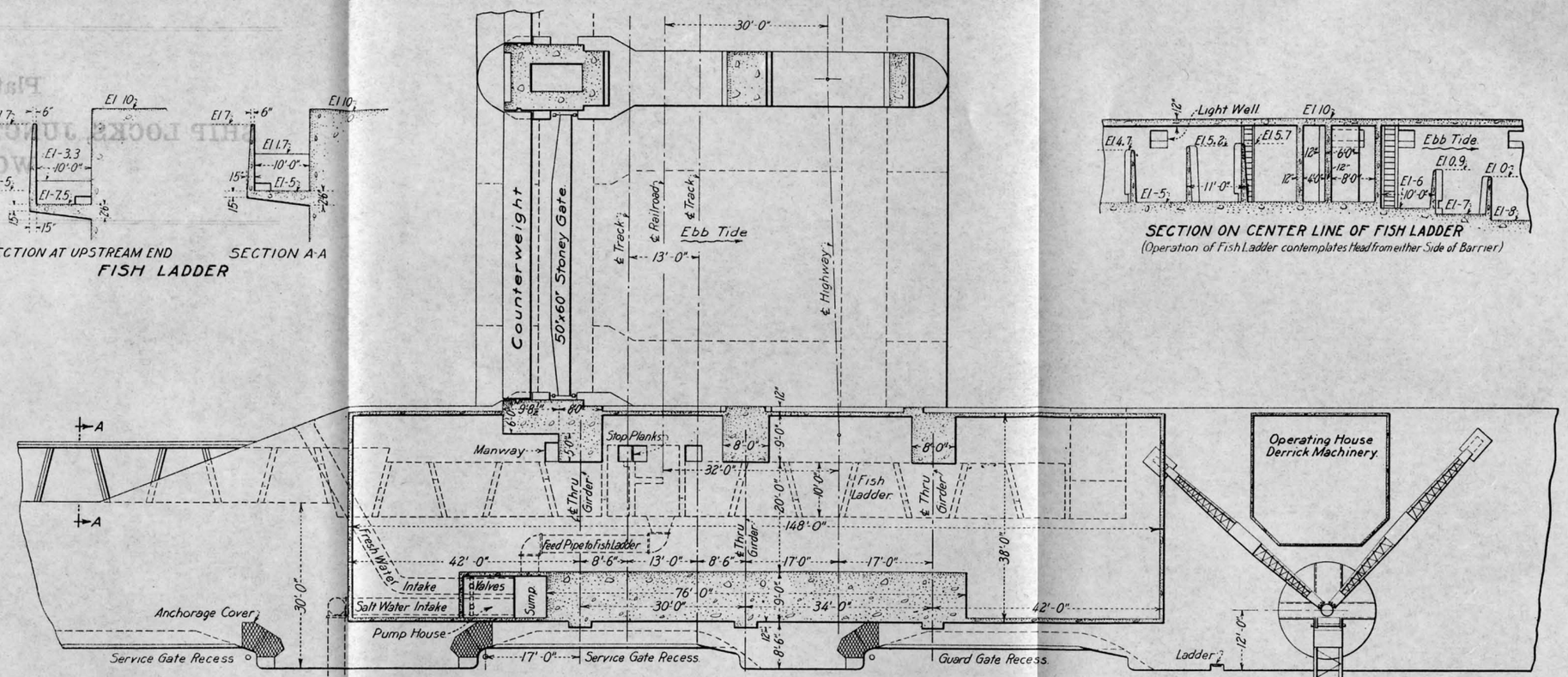
SHIP LOCKS, JUNCTION WITH CONTROL WORKS

Notes:-

This Drawing shows Junction of Control Works for 50' Stoney Gates and 80' Lock when Bridge is near Downstream End of Lock Wall. With Control Works for either 50' or 70' Stoney Gates adjoining 80' or 110' Lock and Bridge near either End of Lock Wall, the arrangement is substantially the same. Reinforcing Steel not shown. In Salt Water same to be 12" from Surface of Concrete

SECTION AT UPSTREAM END SECTION A-A

FISH LADDER



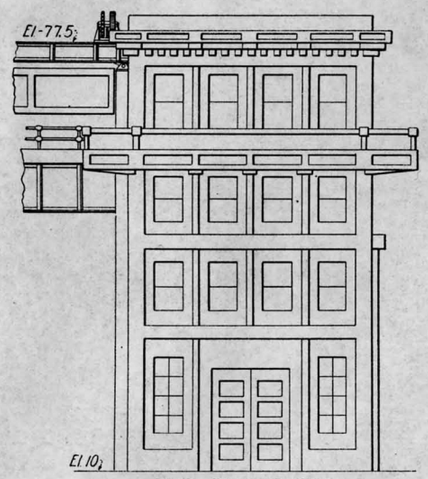
SECTIONAL PLAN

SECTION ON CENTER LINE OF FISH LADDER

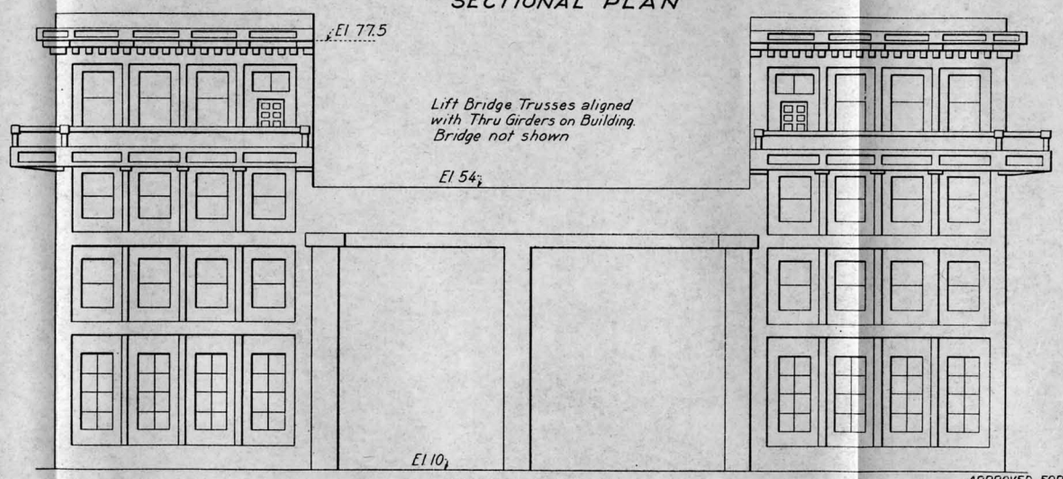
(Operation of Fish Ladder contemplates Head from either Side of Barrier)

Boom

Length	100 ft
Capacity	
Main Blocks	150,000 lbs.
Auxiliary Blocks	34,000 "



END ELEVATION



SIDE ELEVATION

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS
JUNCTION WITH CONTROL WORKS

DRAWN: N.B.H.-L.T.F.C.M. SUBMITTED: W. H. Young
CHECKED: N.B.H. RECOMMENDED: J. H. Savage

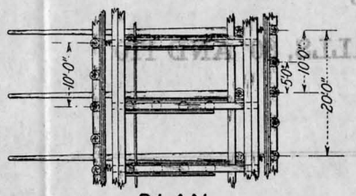
APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

SV-82 | Berkeley, California Feb. 23, 1926 | 193-D-34

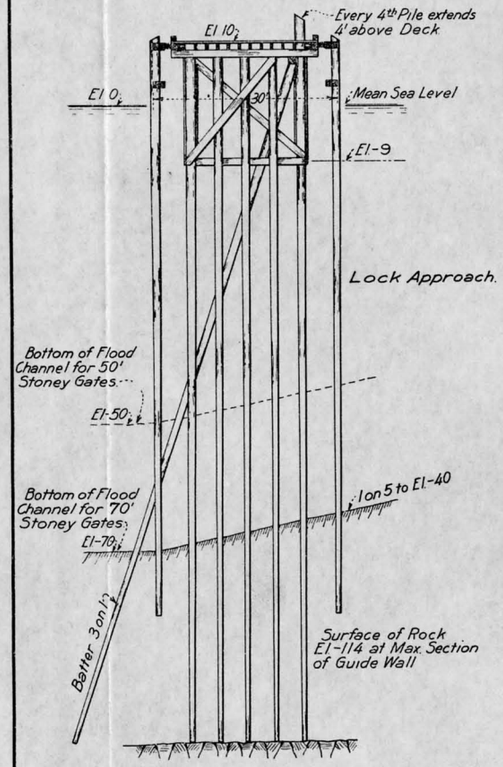
Plate 4-13

SHIP LOCKS, GUIDE WALLS, 80′ AND 110′ LOCKS

Notes:-
Guide Walls shown on this Drawing to be used with either the 80' Lock or the 110' Lock
Top of Wall is at El. 12 at Pt San Pablo Site and at El. 10 at other Sites.
Reinforcing Steel not shown. In Salt Water, same to be 12" from Surface of Concrete

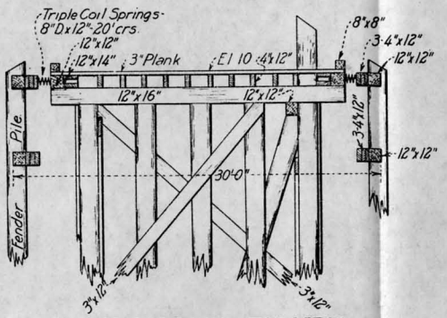


PLAN
(Floor and Stringers removed)



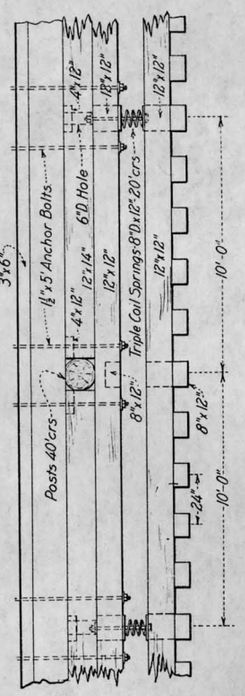
TIMBER GUIDE WALL
TYPICAL SECTION

Scale

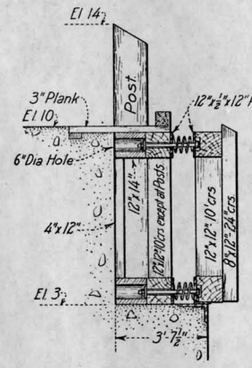


TIMBER GUIDE WALL-TOP DETAIL

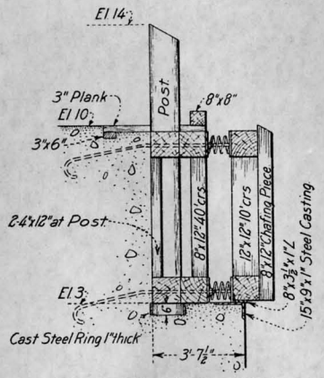
Scale



PLAN
(Plank and Guard Timber Removed)



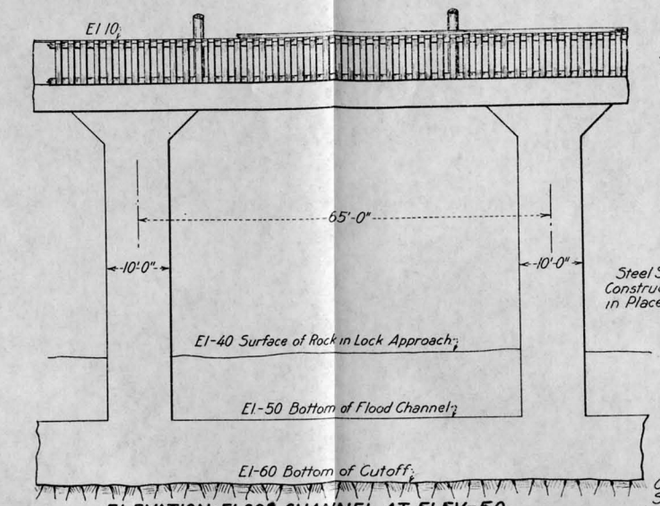
SECTION AT COIL SPRINGS



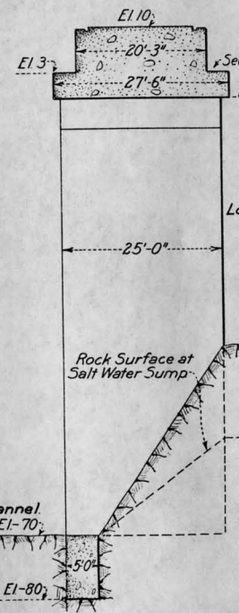
SECTION AT MOORING POST

FENDER DETAILS
(For Concrete and Caisson Type Guide Walls)

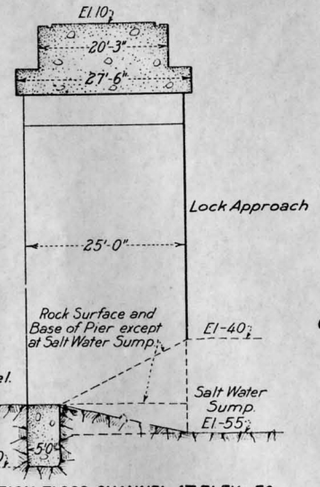
Scale



ELEVATION-FLOOD CHANNEL AT ELEV.-50
50' STONEY GATES

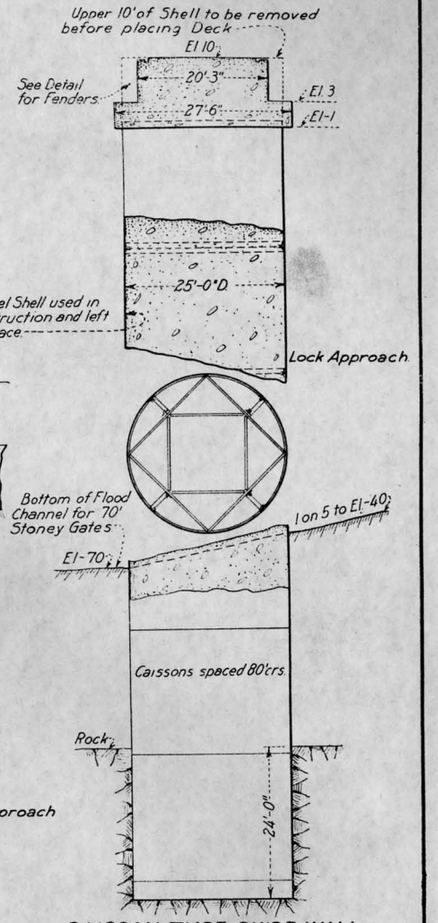


SECTION-FLOOD CHANNEL AT ELEV.-70
70' STONEY GATES



SECTION-FLOOD CHANNEL AT ELEV.-50
50' STONEY GATES

CONCRETE GUIDE WALL



CAISSON TYPE GUIDE WALL
TYPICAL SECTION

Scale

APPROVED FOR ESTIMATING PURPOSES:-
A. F. Walter
CHIEF ENGINEER

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS
GUIDE WALLS-80' AND 110' LOCKS

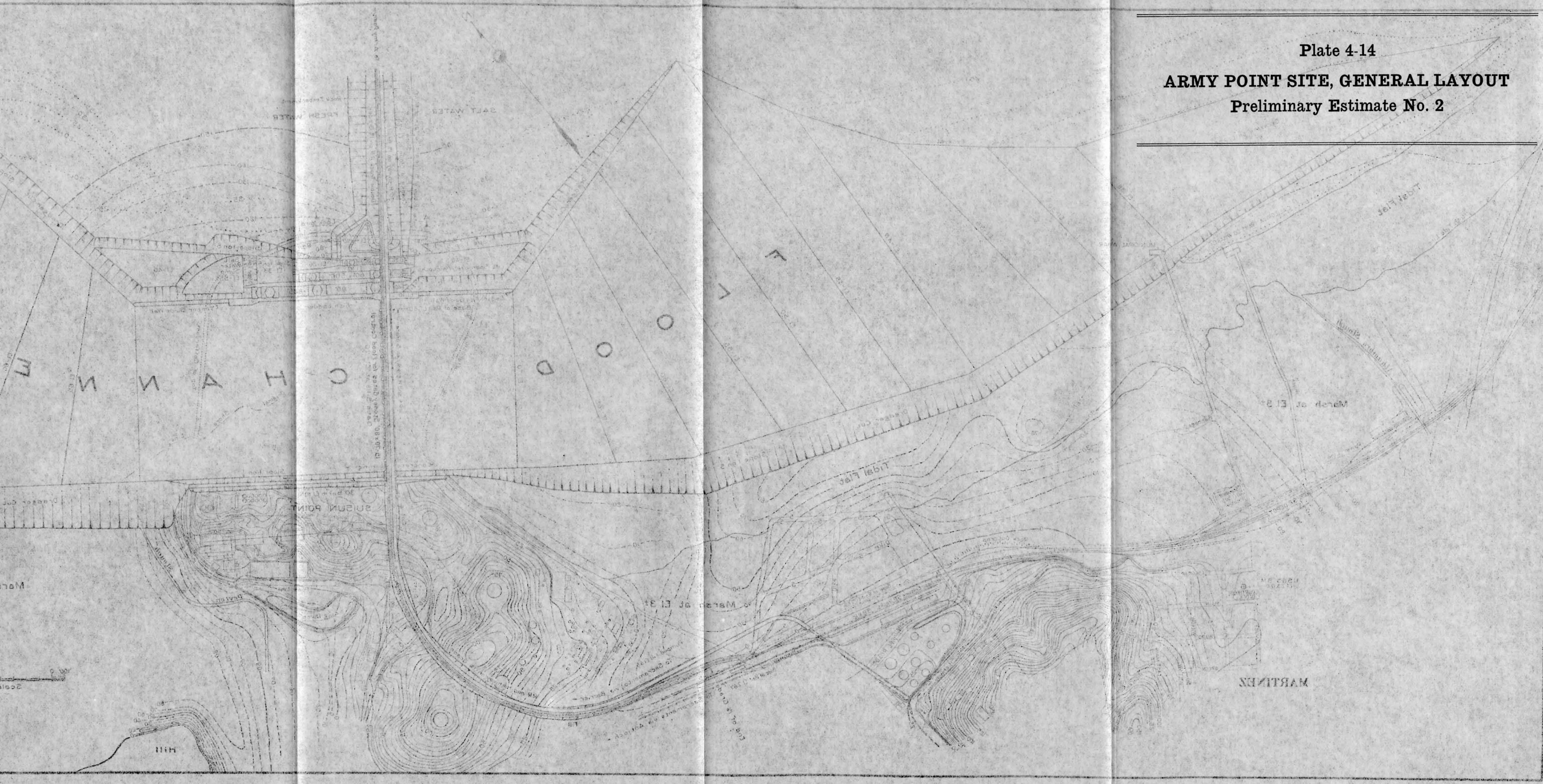
DRAWN CH/LTF-CAM SUBMITTED J. L. Strong
CHECKED N.B.H. RECOMMENDED J. L. Savage

SV-83 | Berkeley, California Feb 27, 1926 | 133-D-35

Plate 4-14

ARMY POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 2



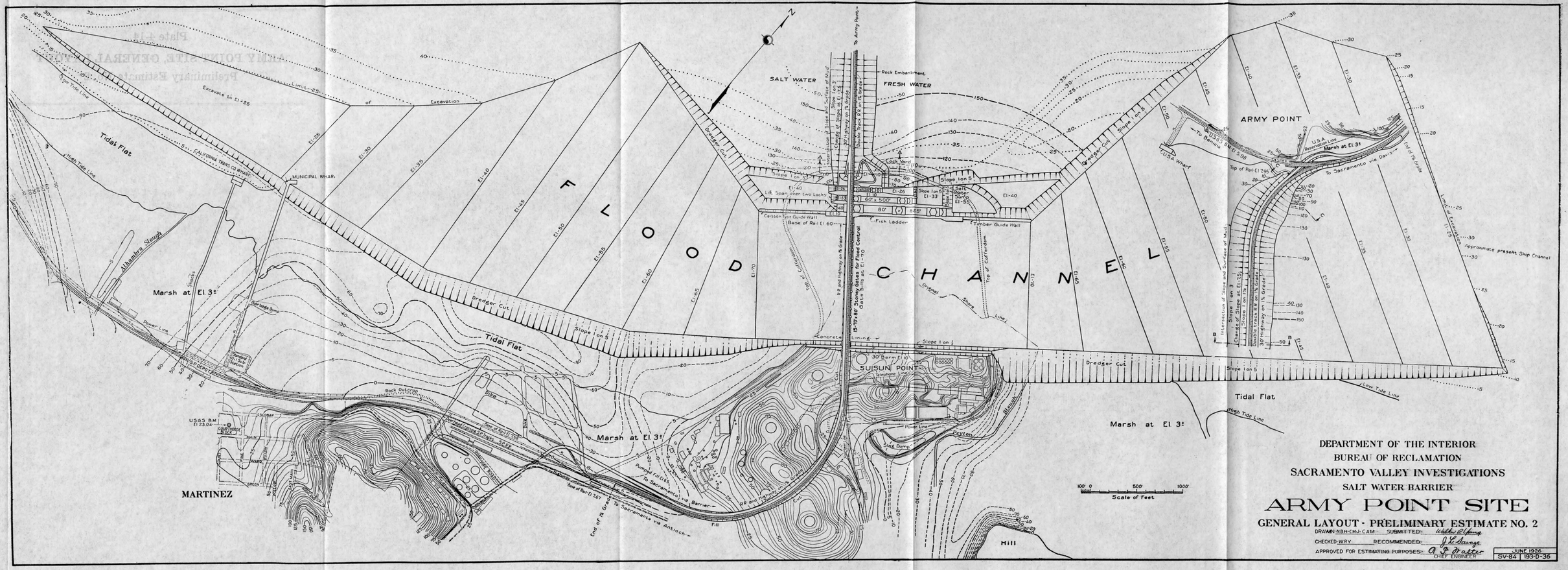

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE
GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 2
DRAWN NBH-CMJ-CAM SUBMITTED:
CHECKED WRY RECOMMENDED:
APPROVED FOR ESTIMATING PURPOSES:
CHIEF ENGINEER
JUNE 1926
SV-84 193-D-36
FLOOD CHANNEL
SALT WATER
FRESH WATER
ARMY POINT
SUISUN POINT
MARTINEZ
Tidal Flat
Marsh at El 3±
Alhambra Slough
Dredger Cut
Hill
Scale of Feet
Approximate present Ship Channel
To Sacramento via Davis
To Sacramento via Antioch
To Barrier
Rock Embankment
Lock Wall
Lift Span over Two Locks
Fish Ladder
Timber Guide Wall
Concrete Lining
Excavation
Limit of Excavation
Low Tide Line
High Tide Line
MUNICIPAL WHARF
CALIFORNIA TRANS CO WHARF
U.S.A. wharf
Power Line
Dike
Fill
Pumping Plant
Slag Dump
Portland Cement Plant

Plate 4-15

ELEVATION AND SECTIONS

Preliminary Estimate No. 2

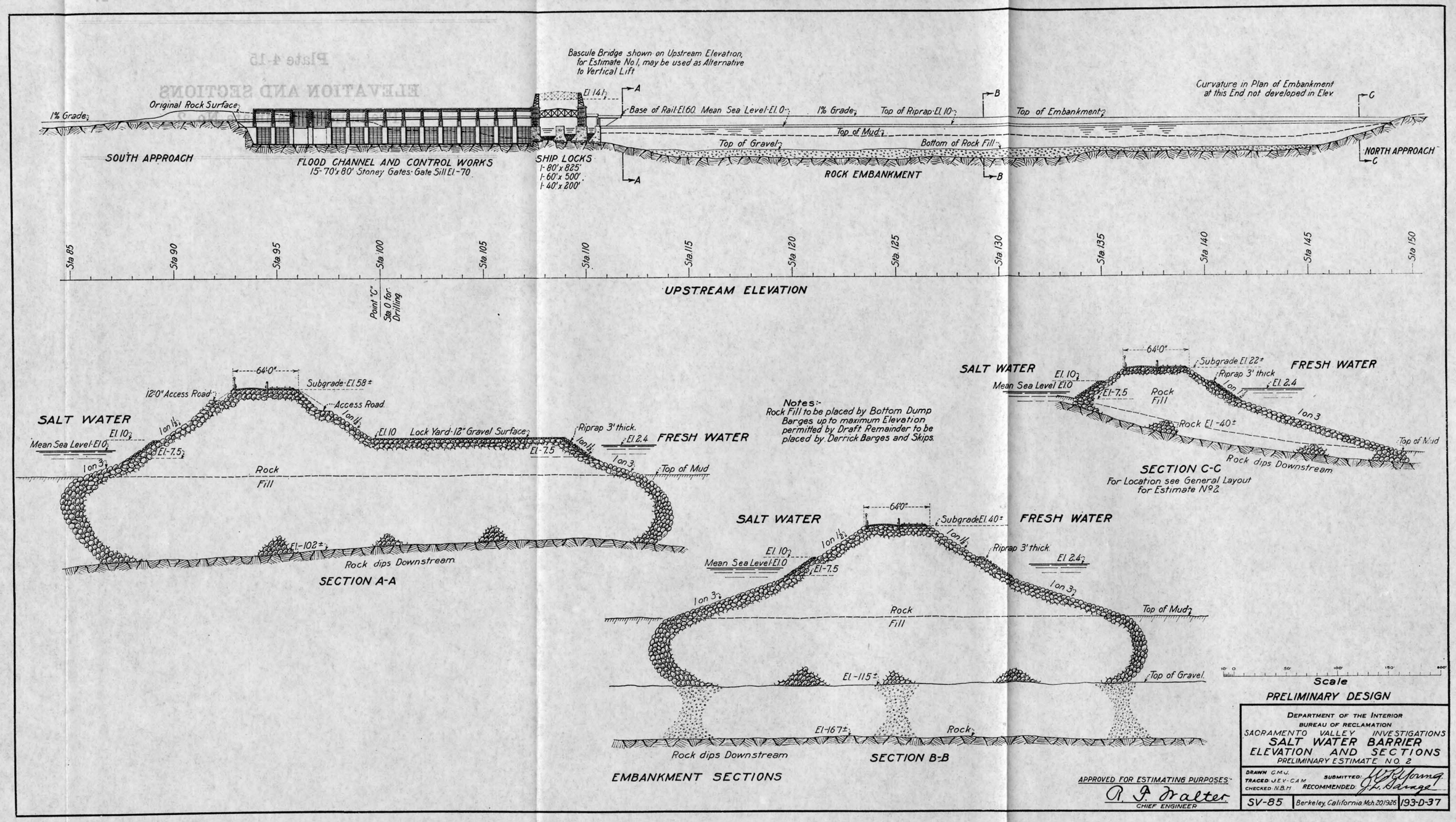

Bascule Bridge shown on Upstream Elevation, for Estimate No.1, may be used as Alternative to Vertical Lift
Curvature in Plan of Embankment at this End not developed in Elev.
1% Grade
Original Rock Surface
El 14
Base of Rail El 60. Mean Sea Level El 0
1% Grade
Top of Riprap El 10
Top of Embankment
Top of Mud
Top of Gravel
Bottom of Rock Fill
SOUTH APPROACH
FLOOD CHANNEL AND CONTROL WORKS
15-70'x 80' Stoney Gates Gate Sill El -70
SHIP LOCKS
1-80'x 825'
1-60'x 500'
1-40'x 200'
ROCK EMBANKMENT
NORTH APPROACH
Sta 85
Sta 90
Sta 95
Sta 100
Sta 105
Sta 110
Sta 115
Sta 120
Sta 125
Sta 130
Sta 135
Sta 140
Sta 145
Sta 150
Point "C" Sta 0 for Drilling
UPSTREAM ELEVATION
64'0"
Subgrade El 58±
12'0" Access Road
Access Road
SALT WATER
El 10
Mean Sea Level El 0
El -7.5
1 on 1½
1 on 3
El 10
Lock Yard 12" Gravel Surface
Riprap 3' thick
El 2.4
FRESH WATER
Rock Fill
Top of Mud
El -102±
Rock dips Downstream
SECTION A-A
Notes:-
Rock Fill to be placed by Bottom Dump Barges up to maximum Elevation permitted by Draft. Remainder to be placed by Derrick Barges and Skips.
SALT WATER
El 10
Mean Sea Level El 0
El -7.5
Rock Fill
Subgrade El 22±
Riprap 3' thick
El 2.4
FRESH WATER
1 on 3
Rock El -40±
Top of Mud
Rock dips Downstream
SECTION C-C
For Location see General Layout for Estimate No 2
SALT WATER
Subgrade El 40±
FRESH WATER
El 10
Mean Sea Level El 0
El -7.5
Riprap 3' thick
El 2.4
Rock Fill
Top of Mud
El -115±
Top of Gravel
El -167±
Rock
Rock dips Downstream
SECTION B-B
EMBANKMENT SECTIONS
Scale
PRELIMINARY DESIGN
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 2
DRAWN G.M.J.
TRACED J.E.V.-C.A.M.
CHECKED N.B.H.
SUBMITTED:
RECOMMENDED:
APPROVED FOR ESTIMATING PURPOSES:
R. F. Walter
CHIEF ENGINEER
SV-85
Berkeley, California Mch 20 1926
193-D-37

Plate 4-16

CONTROL WORKS, 70′ x 80′ GATE

Preliminary Estimates 2, 4, 6, 9, 14 and 16

Plate 4-16

CONTROL WORKS, 70' x 80' GATE

Preliminary Estimates 2, 4, 6, 9, 14 and 16

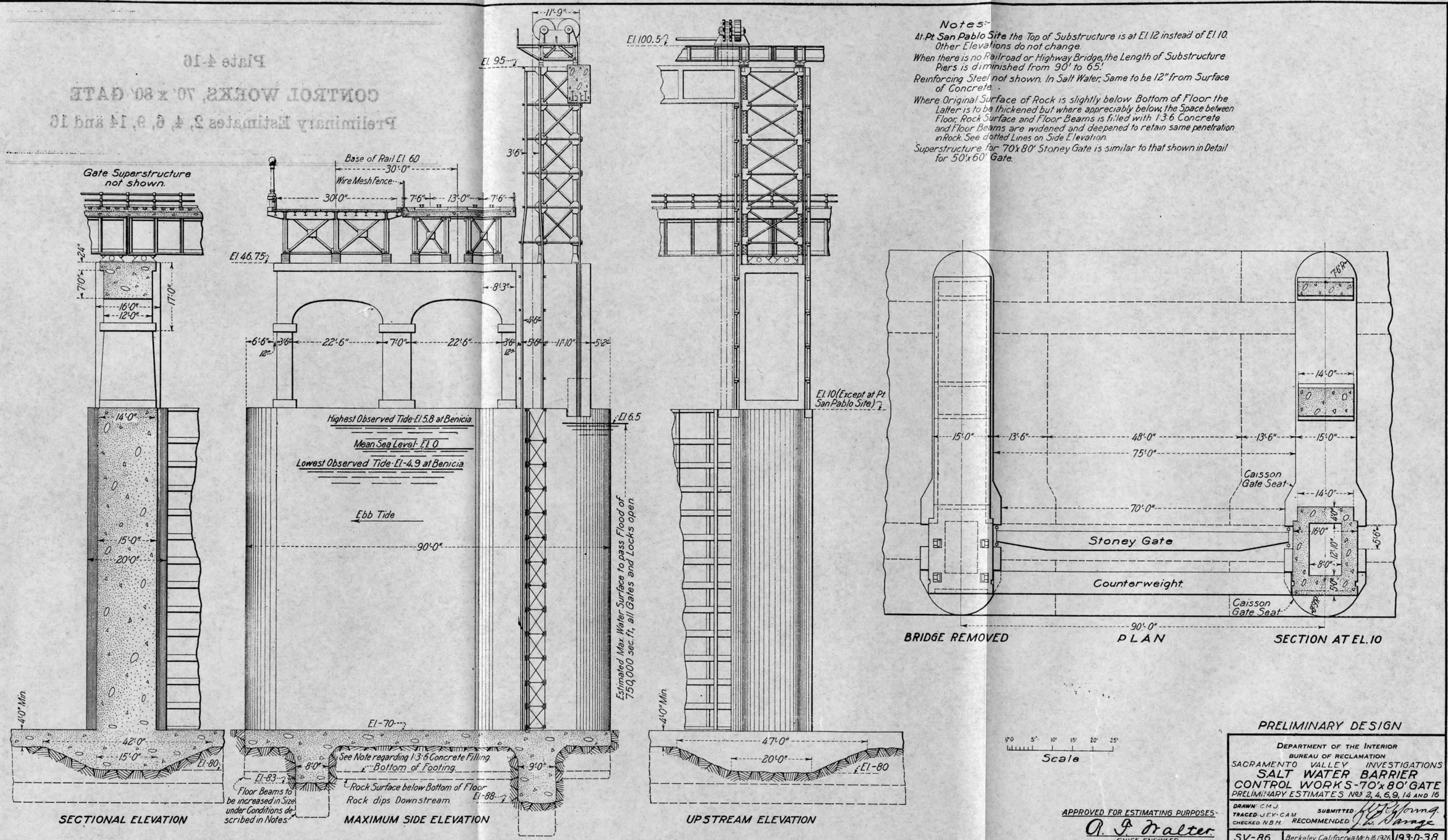
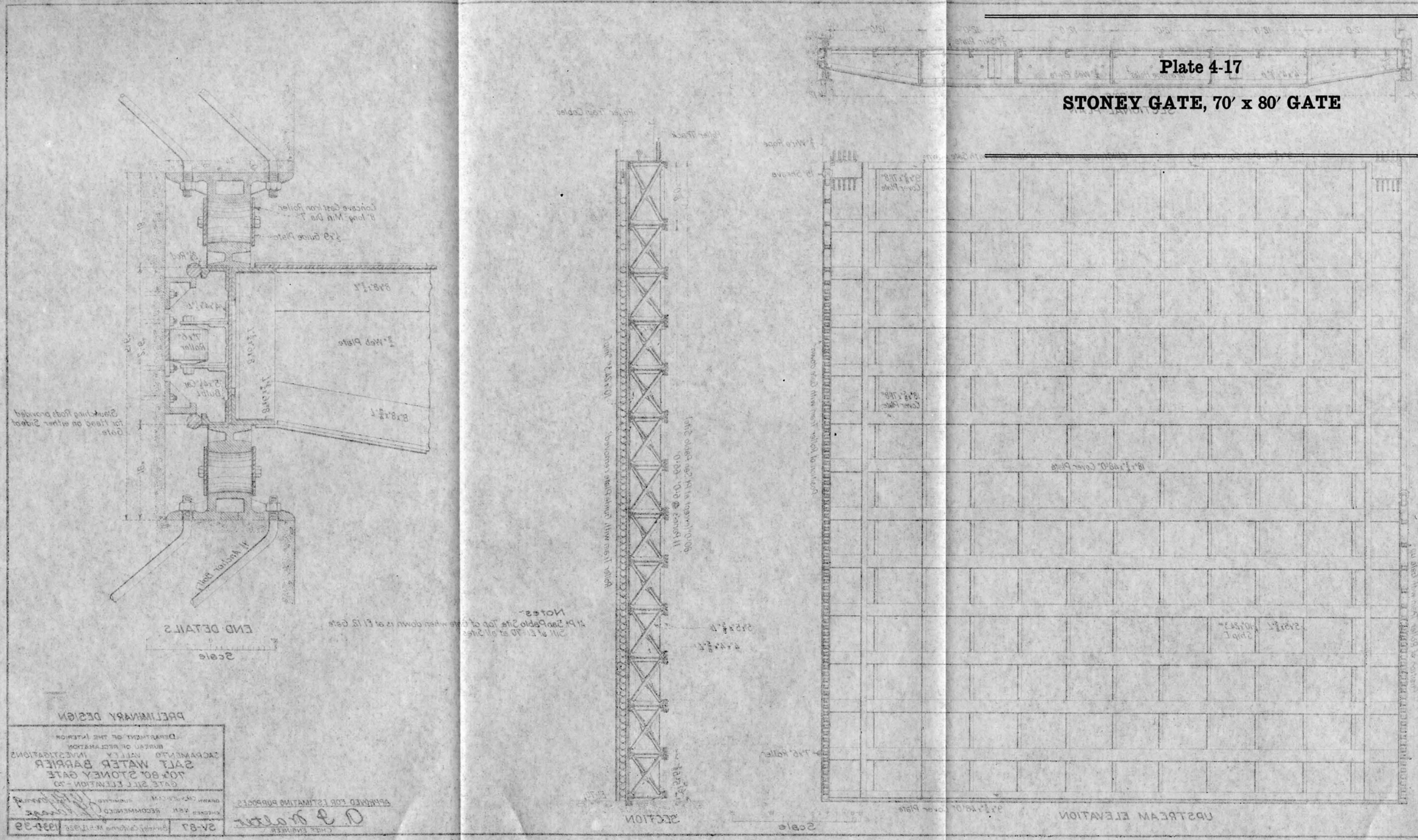
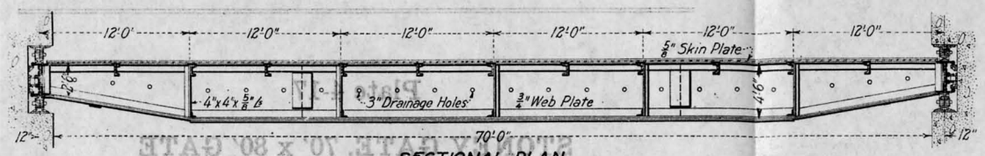


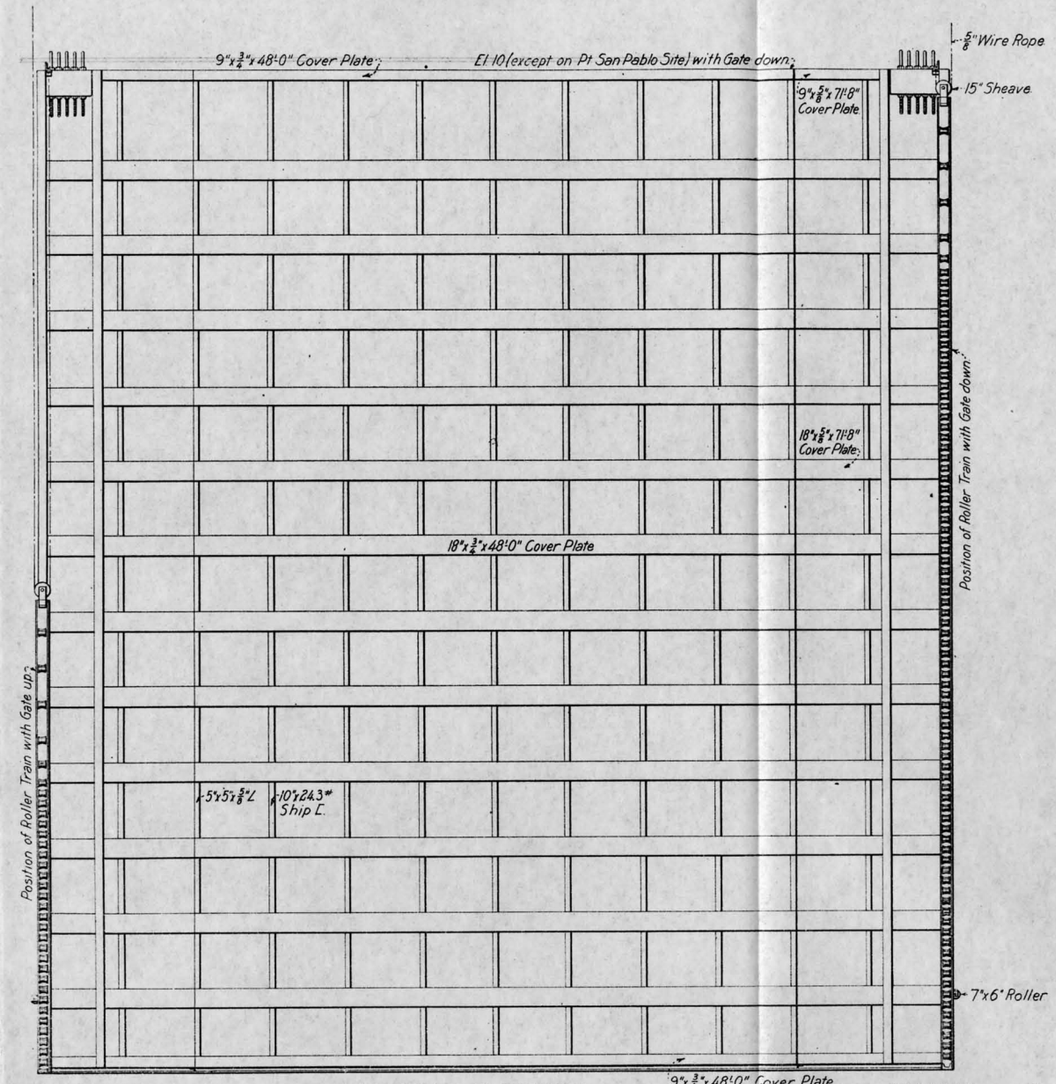
Plate 4-17

STONEY GATE, 70′ x 80′ GATE



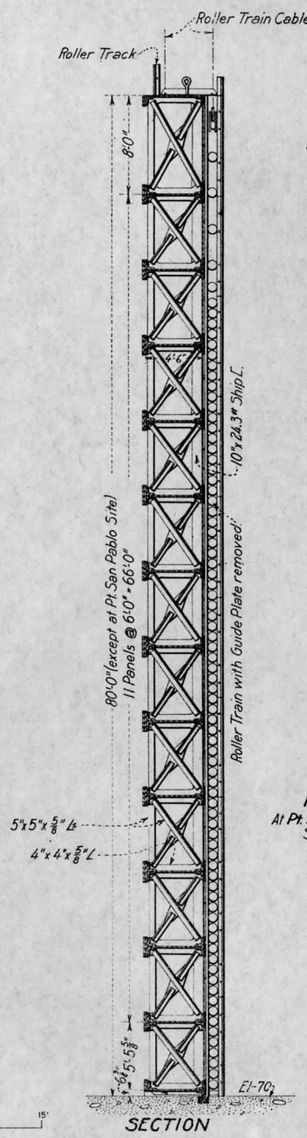


SECTIONAL PLAN



UPSTREAM ELEVATION

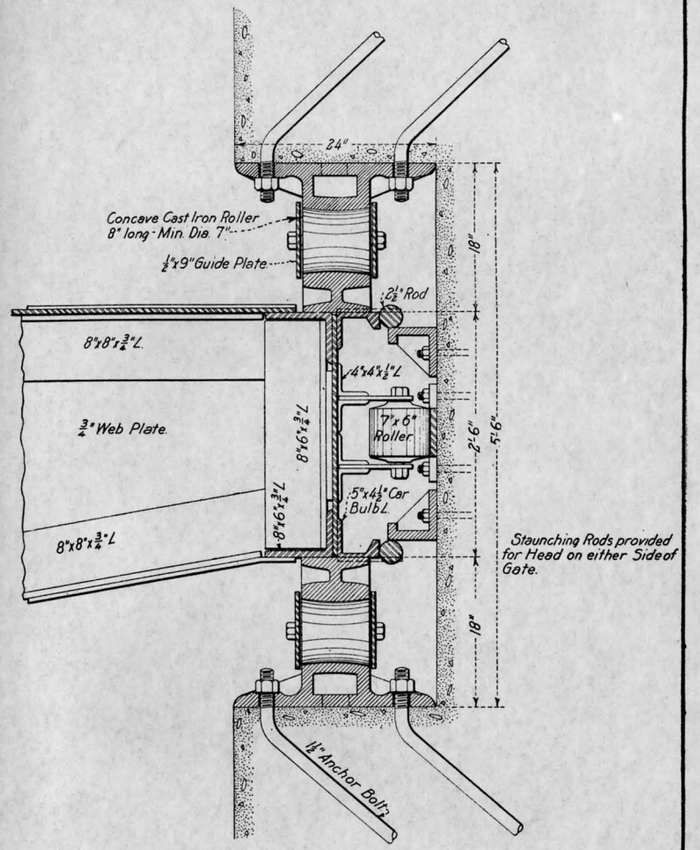
Scale



SECTION

Notes:-

At Pt. San Pablo Site, Top of Gate when down is at El. 12. Gate Sill at El.-70 at all Sites.



END DETAILS

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
70'x 80' STONEY GATE
GATE SILL ELEVATION -70

DRAWN C.M.J. JEV. C.A.M. SUBMITTED
CHECKED N.B.H. RECOMMENDED

APPROVED FOR ESTIMATING PURPOSES:-
A. P. Walter
CHIEF ENGINEER.

SV-87 | Berkeley, California Mch. 13, 1926. | 1930-D-39

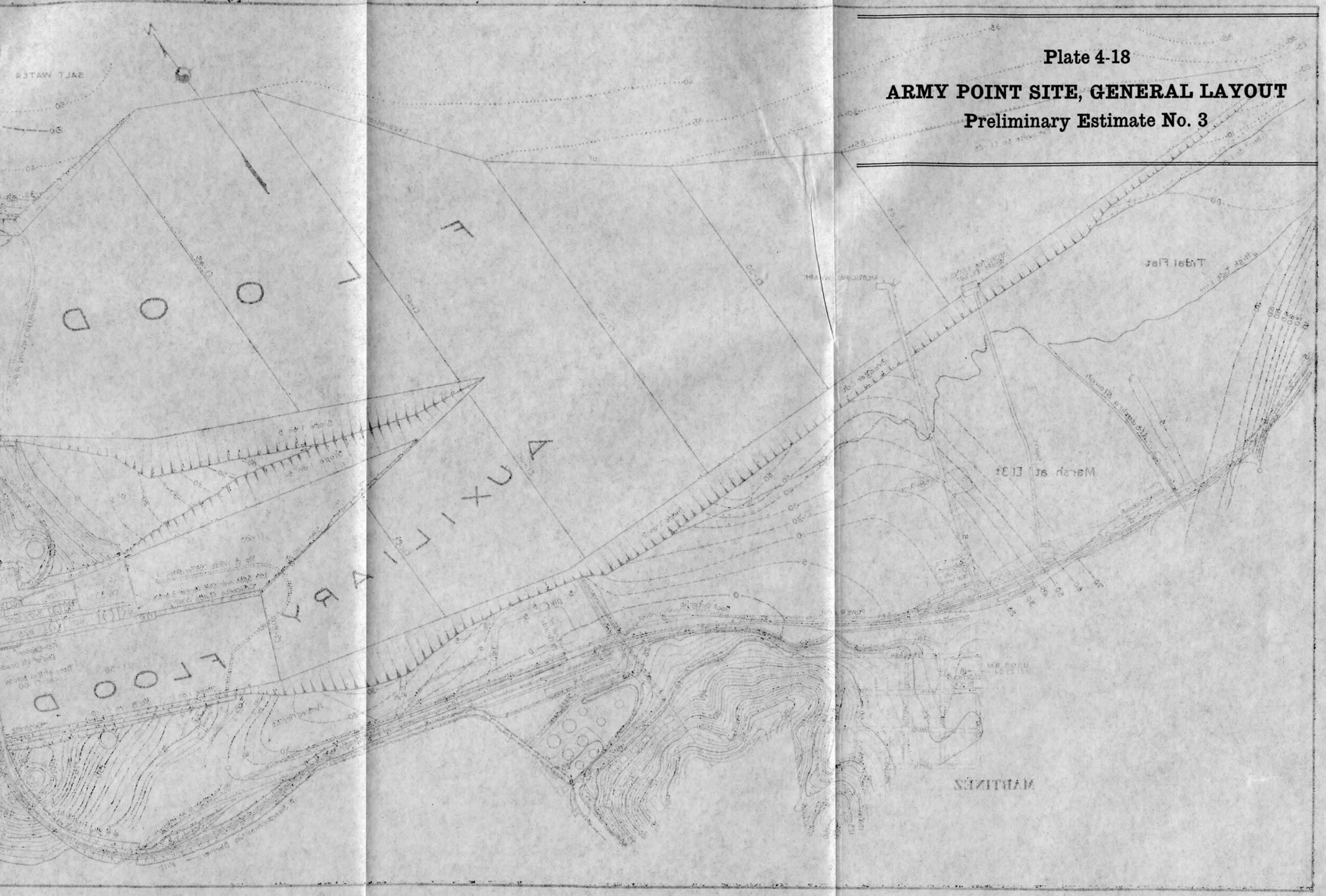


Plate 4-18

ARMY POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 3

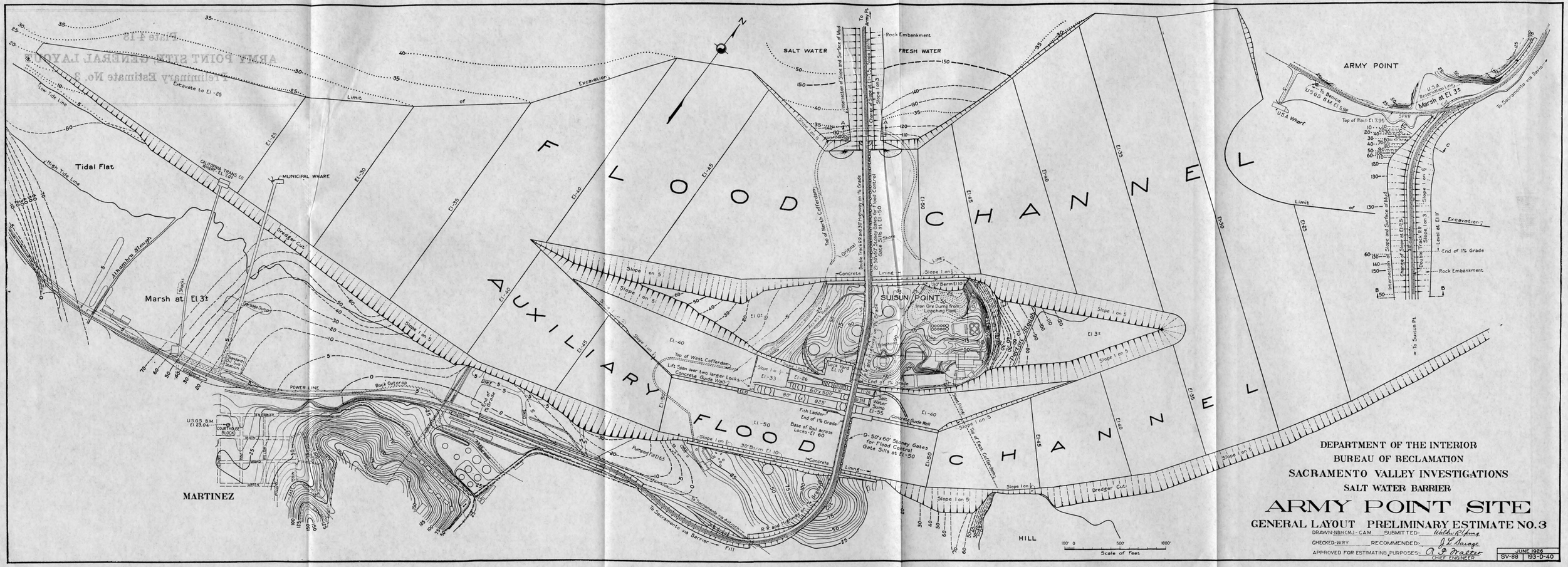
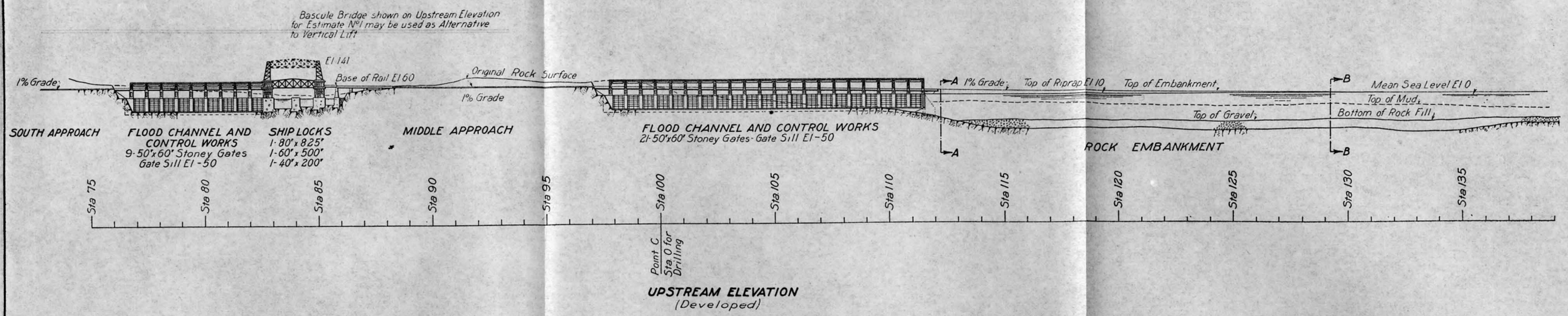

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE
GENERAL LAYOUT PRELIMINARY ESTIMATE NO. 3
DRAWN-NBH(MJ-CAM SUBMITTED:
CHECKED-WRY RECOMMENDED:
APPROVED FOR ESTIMATING PURPOSES: CHIEF ENGINEER
JUNE 1926
SV-88 193-D-40
AUXILIARY FLOOD CHANNEL
FLOOD CHANNEL
SALT WATER
FRESH WATER
Rock Embankment
Excavation
Limit of
Excavate to El -25
Low Tide Line
High Tide Line
Tidal Flat
Marsh at El 3±
Alhambra Slough
MUNICIPAL WHARF
CALIFORNIA TRANS CO WHARF EL 12±
Dredger Cut
POWER LINE
Rock Outcrop
MARTINEZ
SUISUN POINT
Iron Ore Dump from Leaching Plant
Top of North Cofferdam
Top of West Cofferdam
Lift Span over two larger Locks
Concrete Guide Wall
Fish Ladder
End of 1% Grade
Base of Rail across Locks - El 60
9-50'x60' Sluice Gates for Flood Control
Gate Sills at El -50
Concrete Lining
Slope 1 on 5
Slope 1 on 3
Pumping Plant
To Sacramento via Antioch
To Sacramento via Barrier
To Sacramento via Stevens
To Suisun Pt.
HILL
Scale of Feet
ARMY POINT
U.S. Wharf
Top of Rail El 7.95
Marsh at El 3±
Level at El 1±
Rock Embankment
Double Track
Concrete Lining

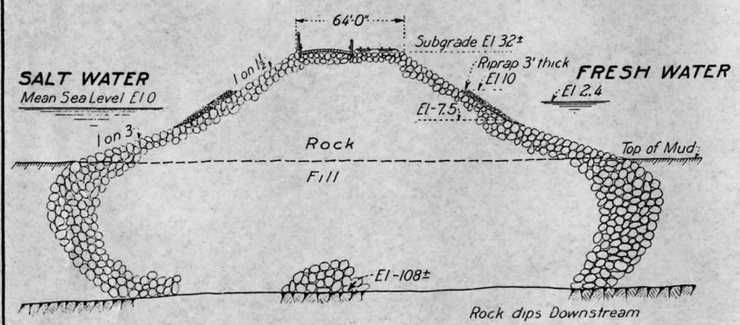
Plate 4-19

ELEVATION AND SECTIONS

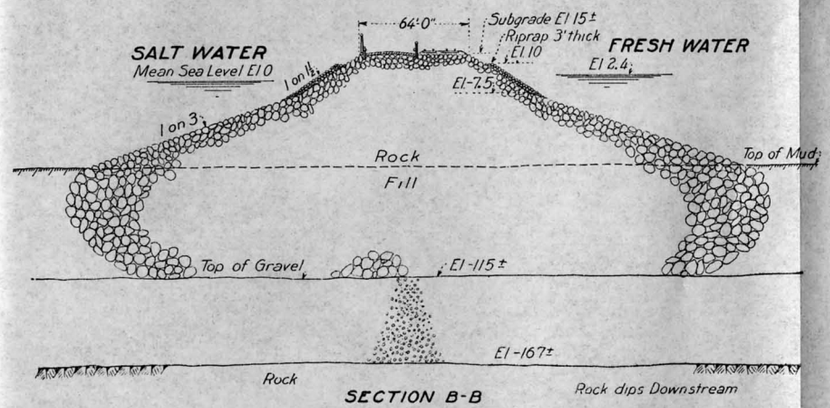
Preliminary Estimate No. 3



UPSTREAM ELEVATION
(Developed)



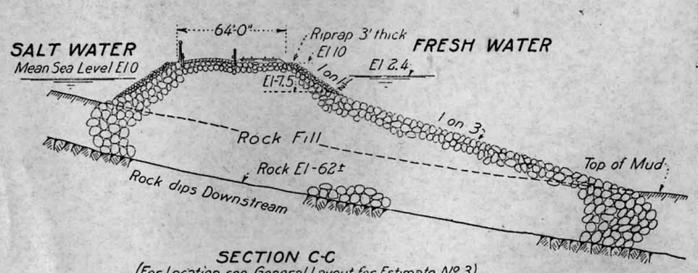
SECTION A-A



SECTION B-B

EMBANKMENT SECTIONS

0 10' 20' 30' 40' 50' 60' 70' 80' 90' 100'
Scale



SECTION C-C
(For Location see General Layout for Estimate Nº 3)

Notes:-
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft Remainder to be placed by Derrick Barges and Skips

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:-
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 3

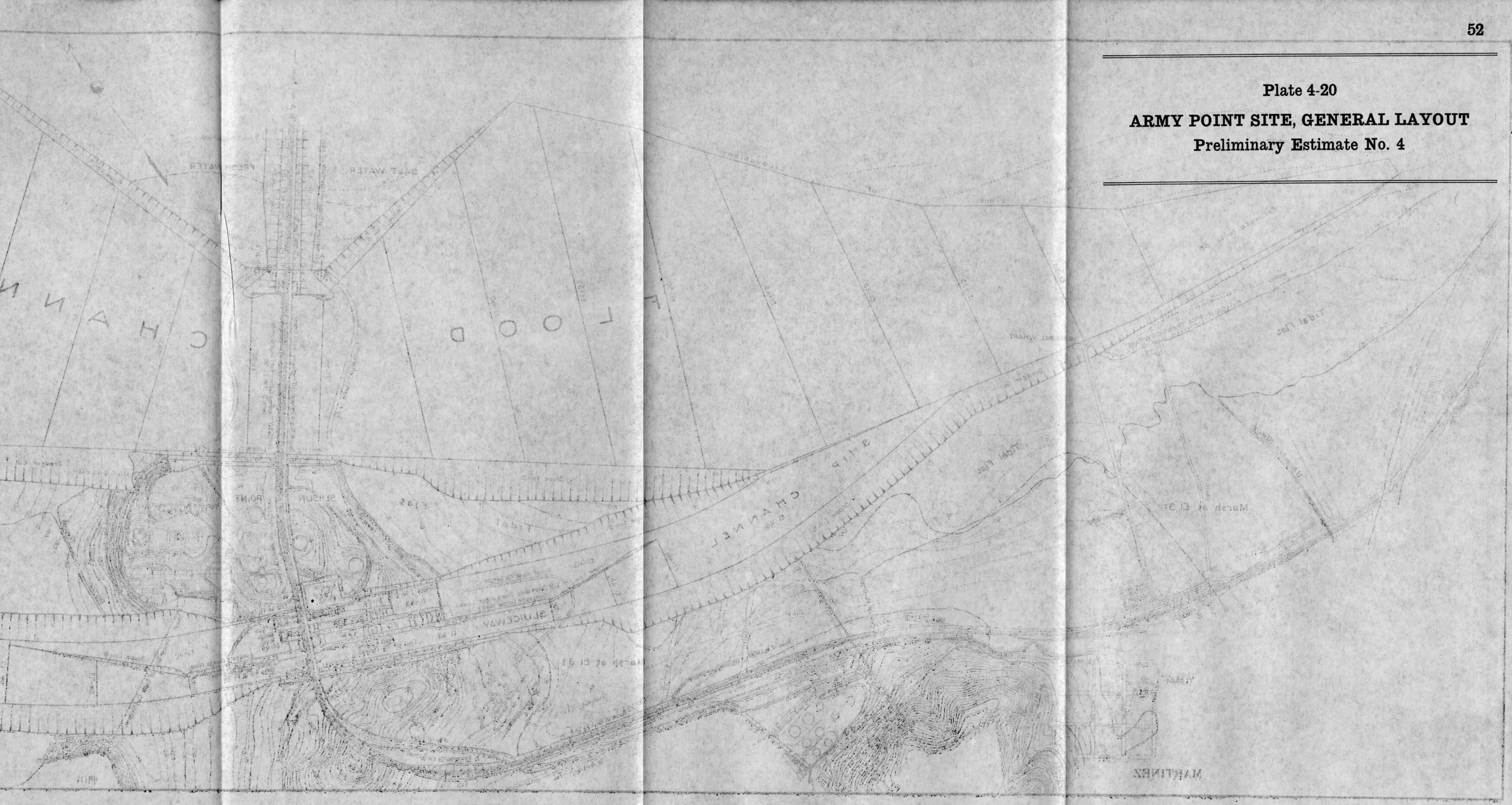
DRAWN C.M.J.-C.A.M. SUBMITTED W. H. Young
CHECKED N.B.H. RECOMMENDED J. L. Savage

SV-89 | Ellensburg, Wash June 2, 1926 | 193-D-41

Plate 4-20

ARMY POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 4



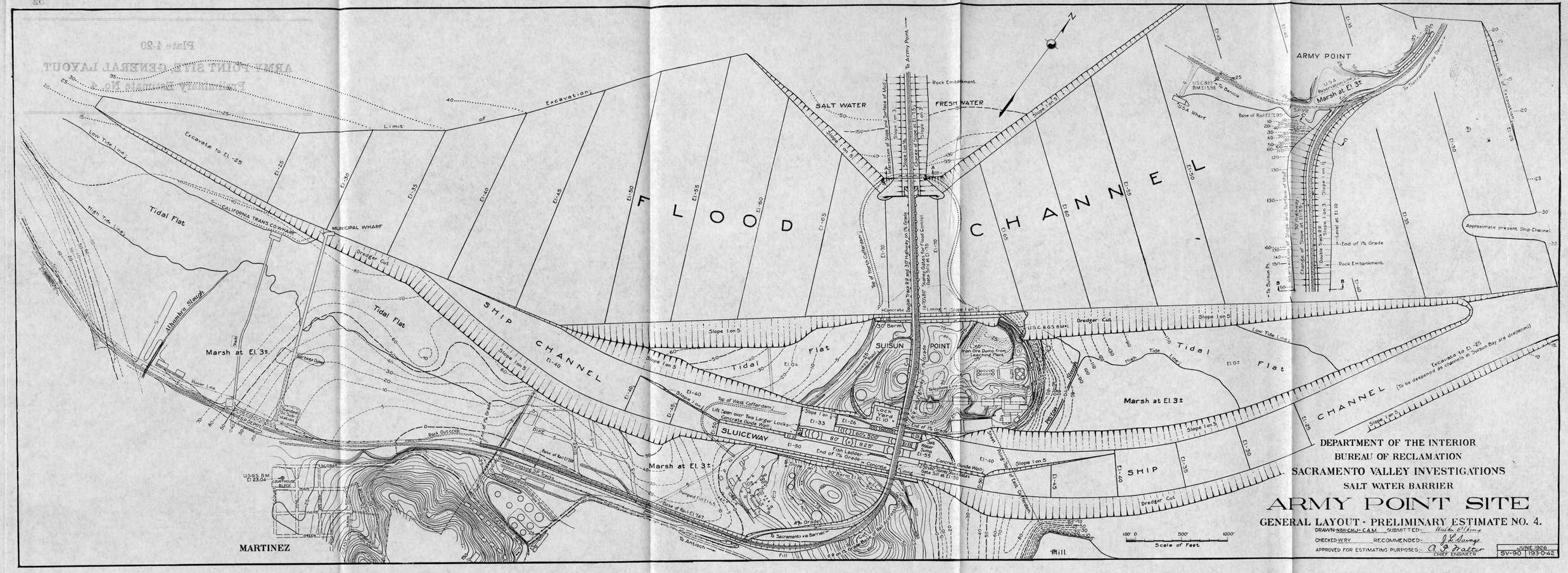
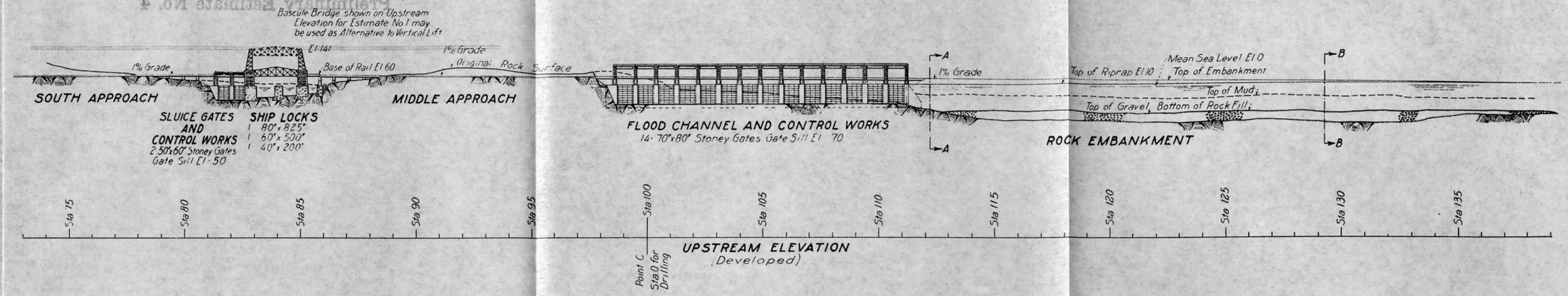
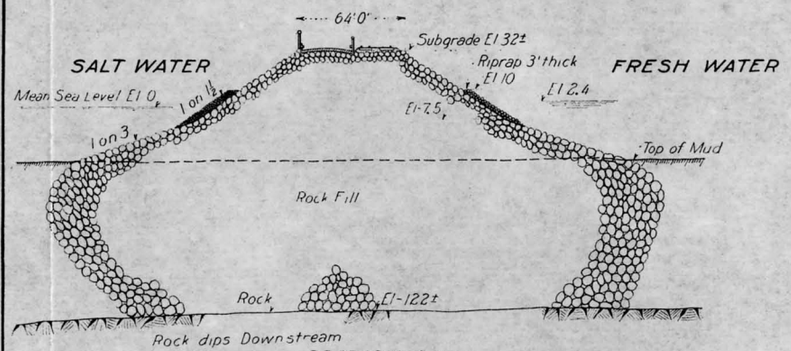

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE
GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 4.
DRAWN-NSN-CMJ-CAM. SUBMITTED-
CHECKED-WRY RECOMMENDED-
APPROVED FOR ESTIMATING PURPOSES- CHIEF ENGINEER
JUNE 1926
SV-90 193-D-42
FLOOD CHANNEL
SHIP CHANNEL
SALT WATER
FRESH WATER
ARMY POINT
SUISUN POINT
SLUICEWAY
MARTINEZ
MUNICIPAL WHARF
CALIFORNIA TRANS CO WHARF
Tidal Flat
Marsh at El. 3±
Excavate to El. -25
Limit of Excavation
Approximate present Ship Channel
Excavate to El. -25 (To be deepened as channels in Suisun Bay are deepened)
Scale of Feet

Plate 4-21

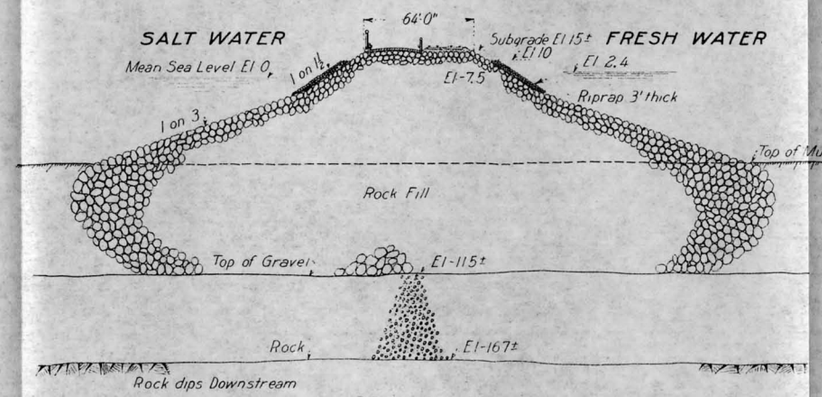
ELEVATION AND SECTIONS

Preliminary Estimate No. 4





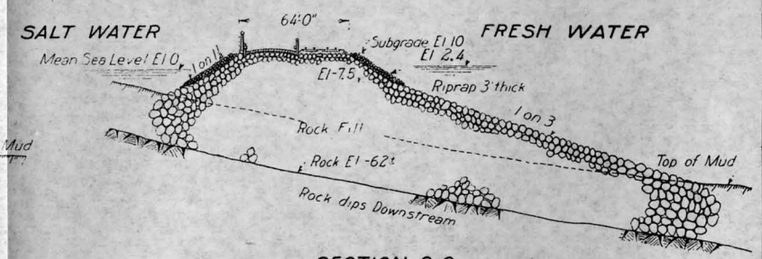
SECTION A-A



SECTION B-B

EMBANKMENT SECTIONS

0 10' 50' 100'
Scale



SECTION C-C

(For location see General Layout for Estimate No 4)

Notes:-

Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft
Remainder to be placed by Derrick Barges and Skips

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:-
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 4

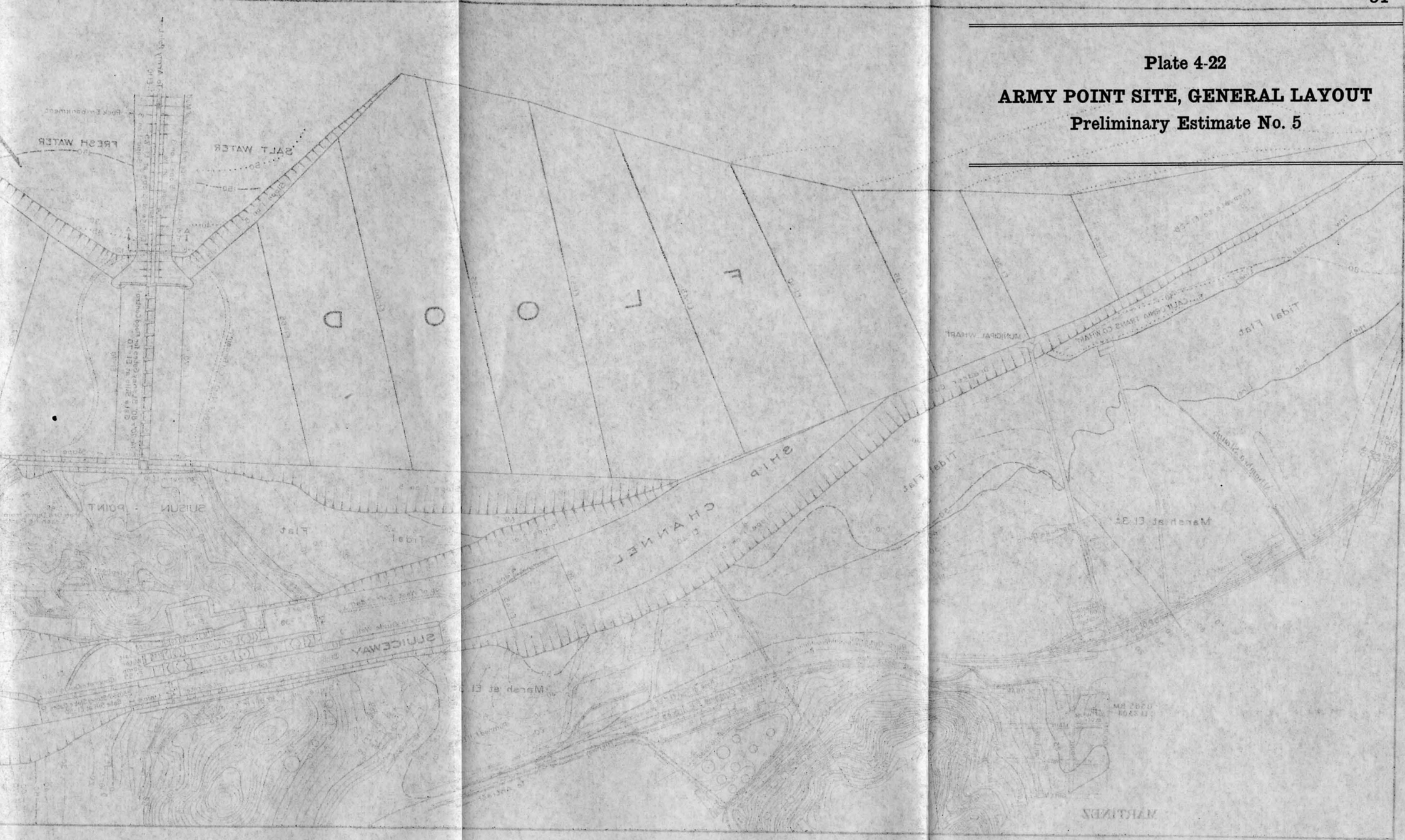
DRAWN C.M.J.-C.A.M. SUBMITTED W. G. Herring
CHECKED N.B.H. RECOMMENDED J. L. Savage

SV-91 | Ellensburg, Wash June 2, 1926 | 193-D-43

Plate 4-22

ARMY POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 5



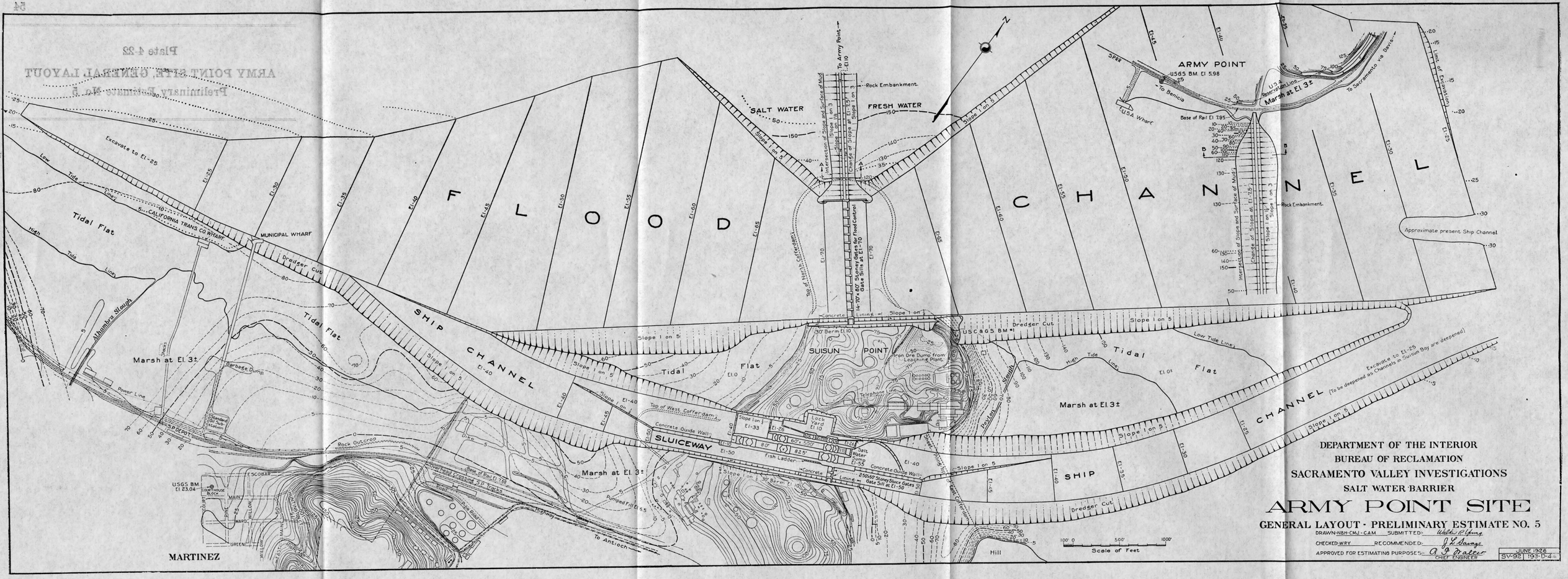
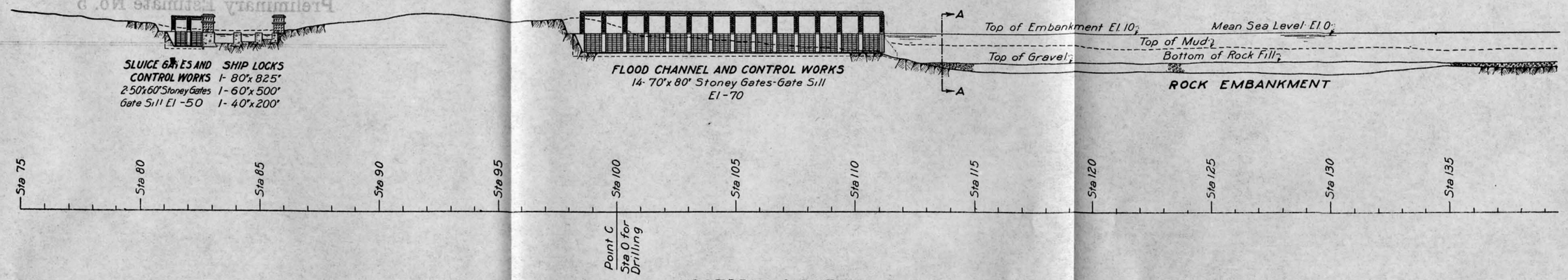

ARMY POINT
SALT WATER
FRESH WATER
FLOOD CHANNEL
SHIP CHANNEL
SUISUN POINT
SLUICEWAY
Tidal Flat
Marsh at El 3±
MUNICIPAL WHARF
CALIFORNIA TRANS CO WHARF
U.S.A. Wharf
To Benicia
To Sacramento via Davis
Approximate present Ship Channel
Excavate to El-25
Dredger Cut
Rock Embankment
Concrete Guide Wall
Fish Ladder
Lock Yard El 10
Salt Water Pump El-25
Fresh Water Pump El-25
Telephone Line
Power Line
Rock Outcrop
Highway Crossing 3 Tracks
To Antioch
MARTINEZ
Hill
Scale of Feet
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE
GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 5
DRAWN-NBH-CMJ-CAM SUBMITTED:
CHECKED-WRY RECOMMENDED:
APPROVED FOR ESTIMATING PURPOSES:
CHIEF ENGINEER
JUNE 1926
SV-92 193-D-4

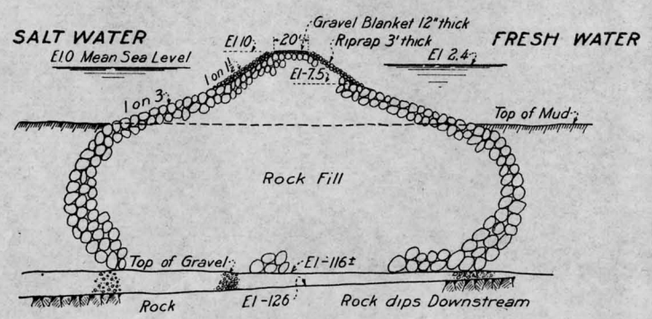
Plate 4-23

ELEVATION AND SECTIONS

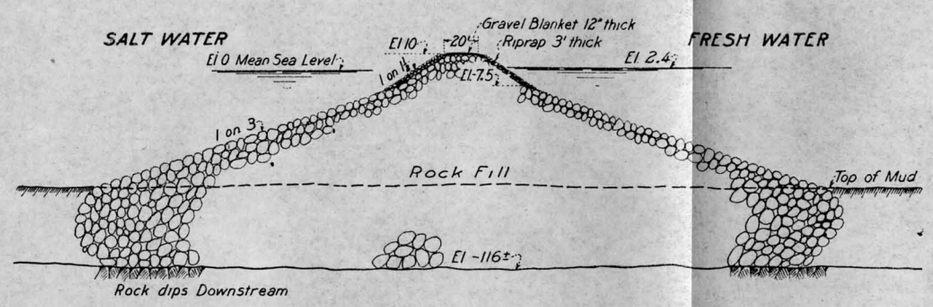
Preliminary Estimate No. 5



UPSTREAM ELEVATION
(Developed)



SECTION A-A



SECTION B-B
(For Location see General Layout for Estimate Nº 5)

EMBANKMENT SECTIONS

Notes:-
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft Remainder to be placed by Derrick Barges and Skips

0 10 20' 30' 40' 50 60' 70' 80' 90' 100'
Scale

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO. 5

DRAWN C.M.J. C.A.M. SUBMITTED W. K. Spring
CHECKED N.B.H. RECOMMENDED J. L. Savage

SV-93 | Ellensburg, Wash. June 10, 1926 | 193-D-45

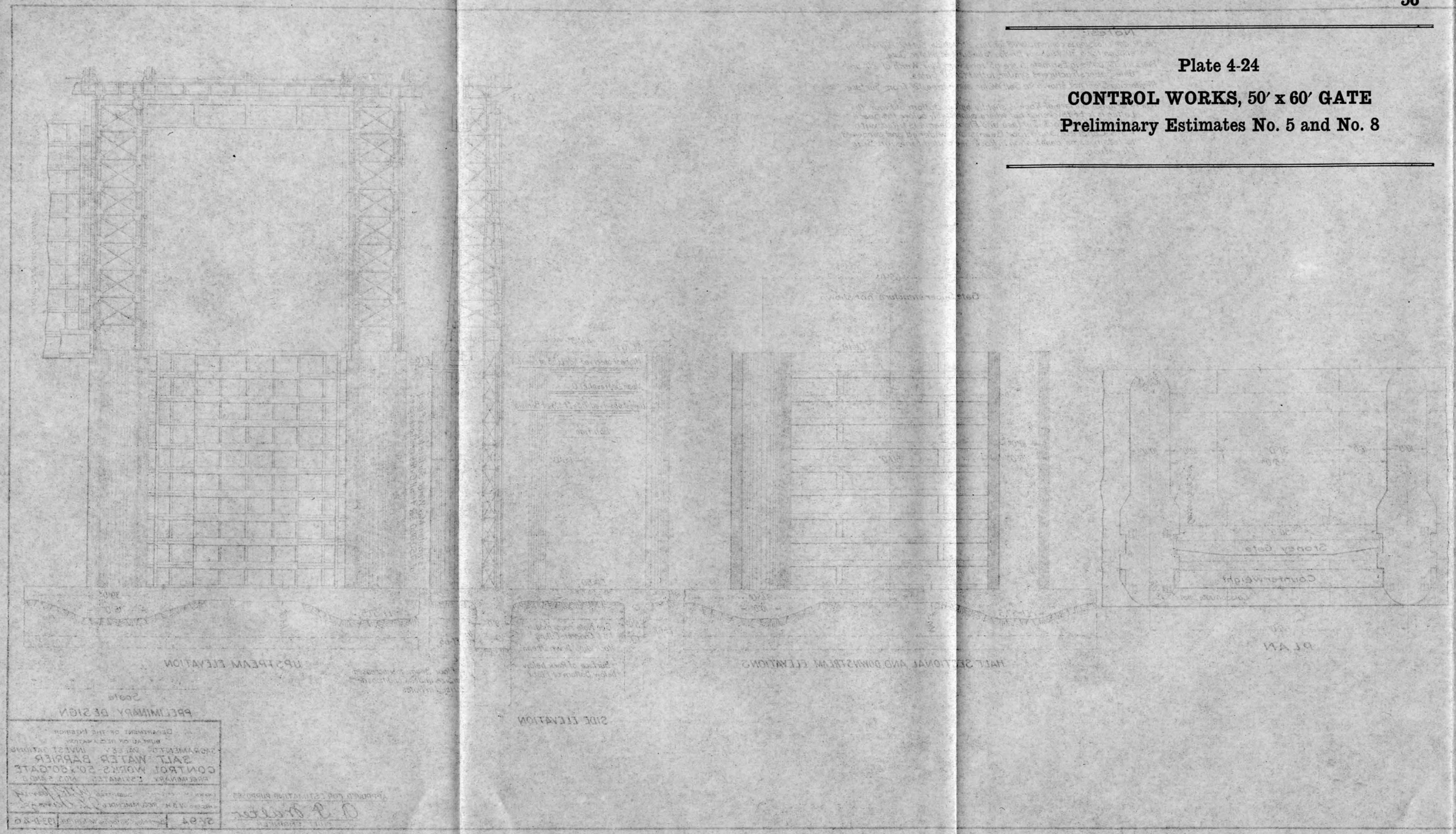


Plate 4-24

CONTROL WORKS, 50′ x 60′ GATE

Preliminary Estimates No. 5 and No. 8

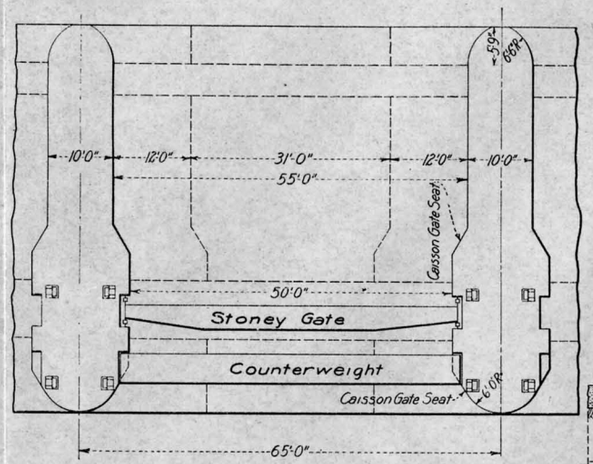
Notes:-

No Bridge Crossing is contemplated for this Structure but the Pier is long enough for a 30' Highway Bridge to be built at a later Date.

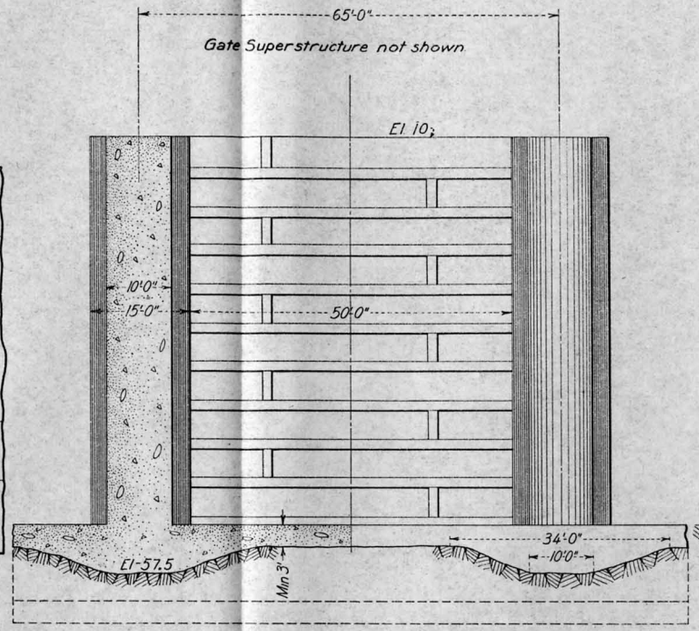
Piers for 70' Gates in Estimate 5 are 65' long with Max. Width of 20' and Gate Superstructure is similar to that for 50' Gates.

Reinforcing Steel not shown. In Salt Water same to be 12" from Surface of Concrete.

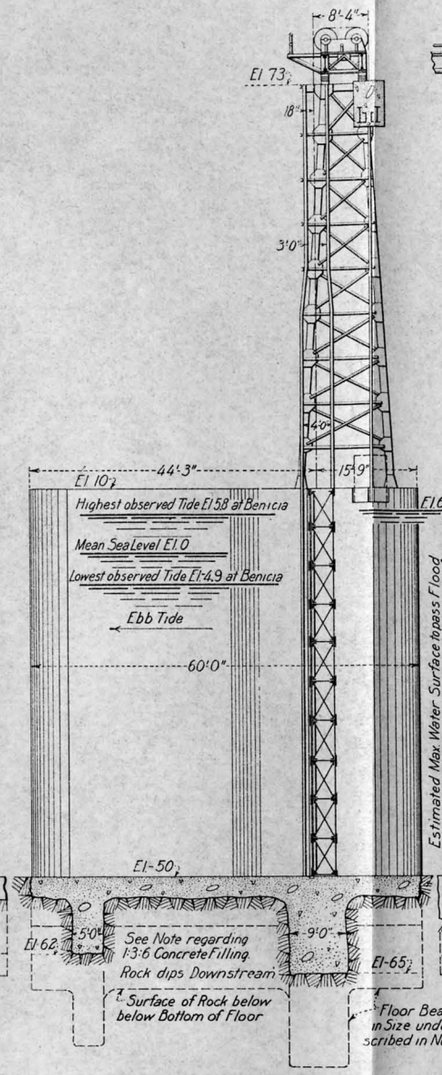
Where Original Surface of Rock is slightly below Bottom of Floor the Latter is to be thickened but where appreciably below, the Space between Floor, Rock Surface and Floor Beams is filled with 1:3:6 Concrete and Floor Beams are widened and deepened to retain same penetration in Rock. See dotted Lines on Side Elevation.



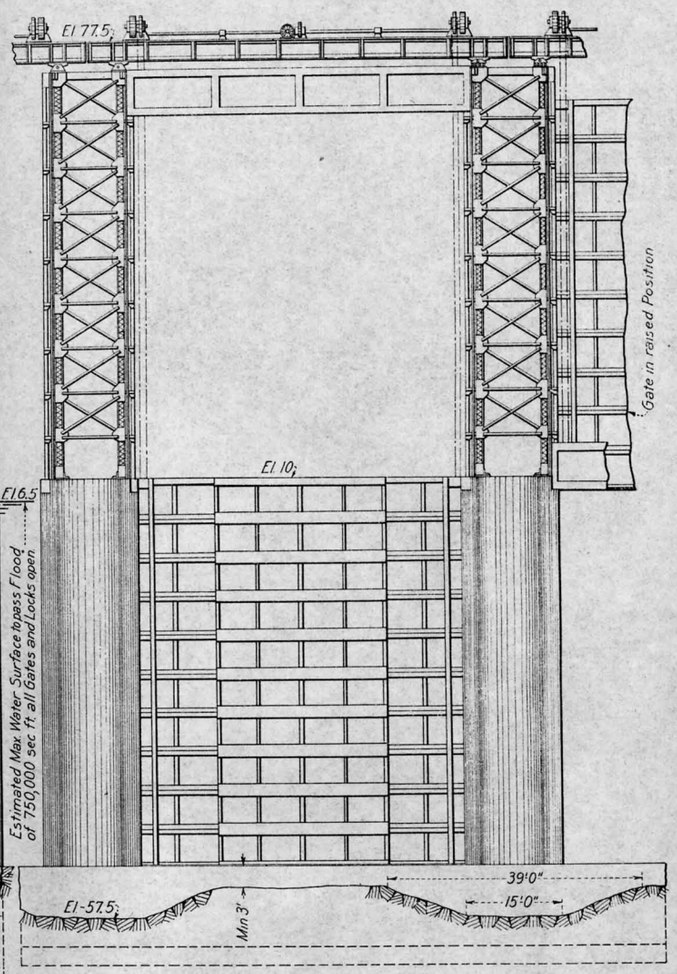
PLAN



HALF SECTIONAL AND DOWNSTREAM ELEVATIONS



SIDE ELEVATION



UPSTREAM ELEVATION

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES-
A. P. Walter
CHIEF ENGINEER

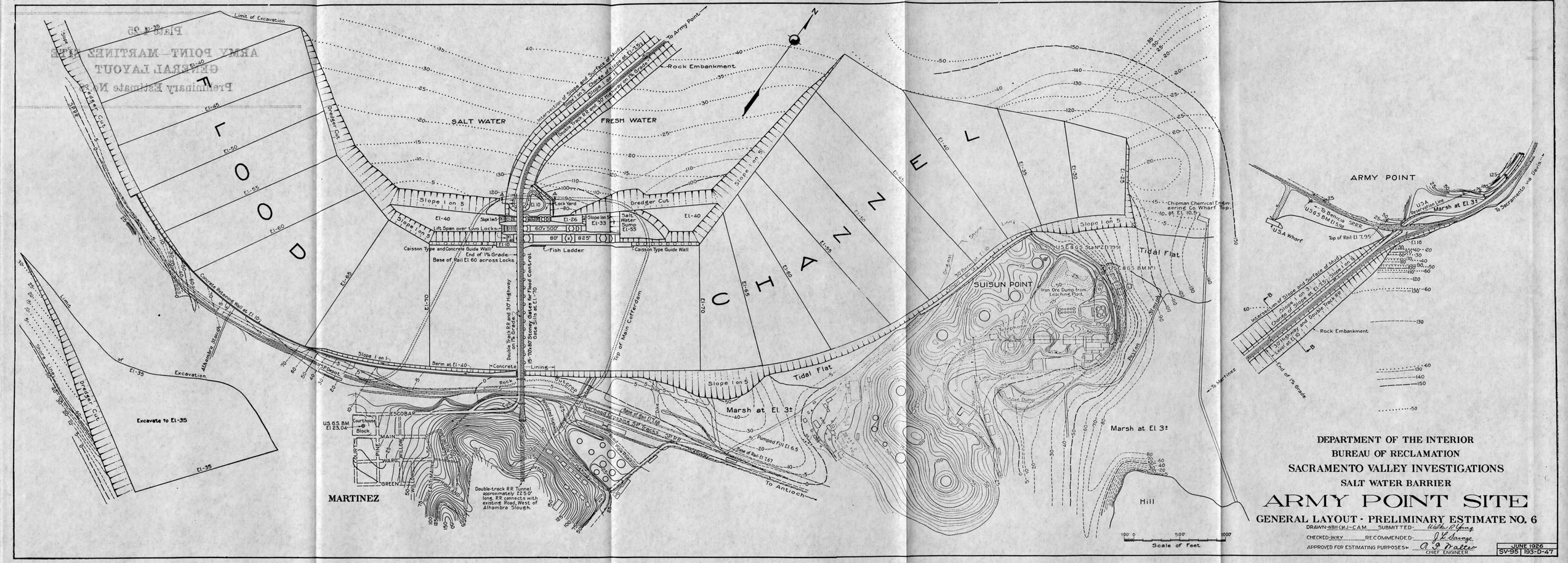
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS-50'x60' GATE
PRELIMINARY ESTIMATES NOS. 5 AND 8

DRAWN: CMJ-JEV-CAM SUBMITTED: W. H. Young
CHECKED: N.B.H RECOMMENDED: J. L. Savage

SV-94 | Berkeley, California Mch 19, 1926 | 193-D-46

Plate 4-25

ARMY POINT—MARTINEZ SITE
GENERAL LAYOUT
Preliminary Estimate No. 6



DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

ARMY POINT SITE

GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 6

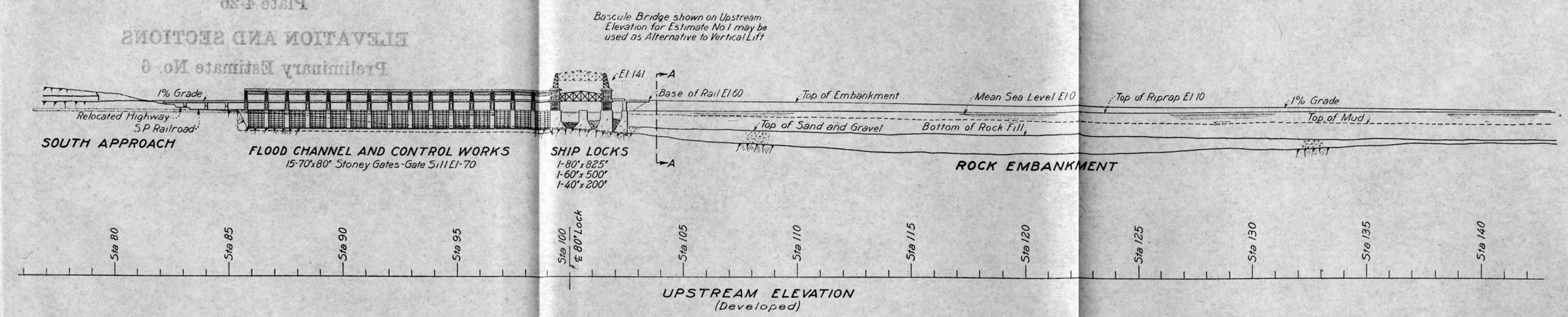
DRAWN-NBH CMJ-CAM SUBMITTED- Walter P. Chung
CHECKED-WRY RECOMMENDED- J. L. Savage
APPROVED FOR ESTIMATING PURPOSES- A. P. Drake CHIEF ENGINEER

JUNE 1926
SV-95 | 193-D-47

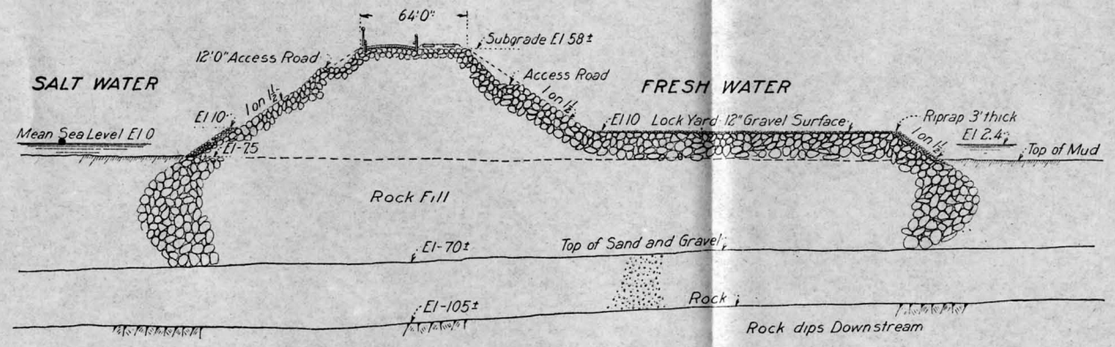
Plate 4-26

ELEVATION AND SECTIONS

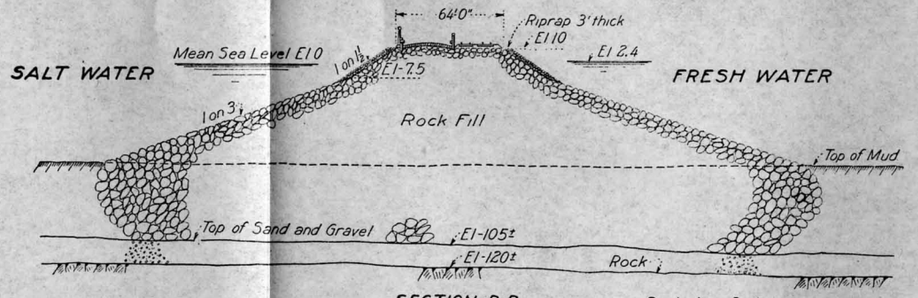
Preliminary Estimate No. 6



UPSTREAM ELEVATION
(Developed)



SECTION A-A



SECTION B-B
For Location see General Layout for Estimate No 6

Rock dips Downstream

EMBANKMENT SECTIONS

Notes:-
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft
Remainder to be placed by Derrick Barges and Skips

0 10 50 100'
Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 6

DRAWN C.M.J. C.A.M. SUBMITTED
CHECKED N.B.H. RECOMMENDED

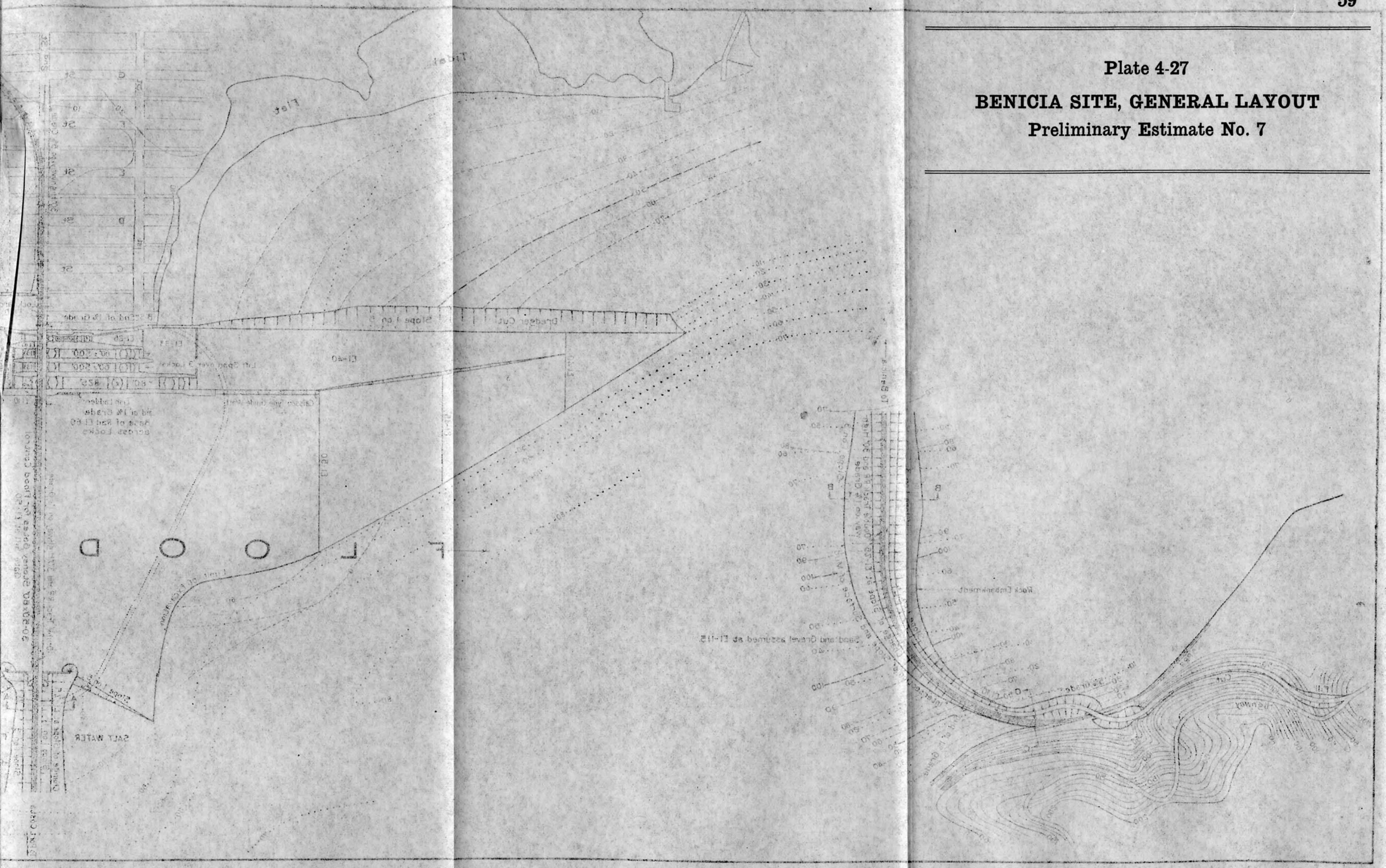
APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

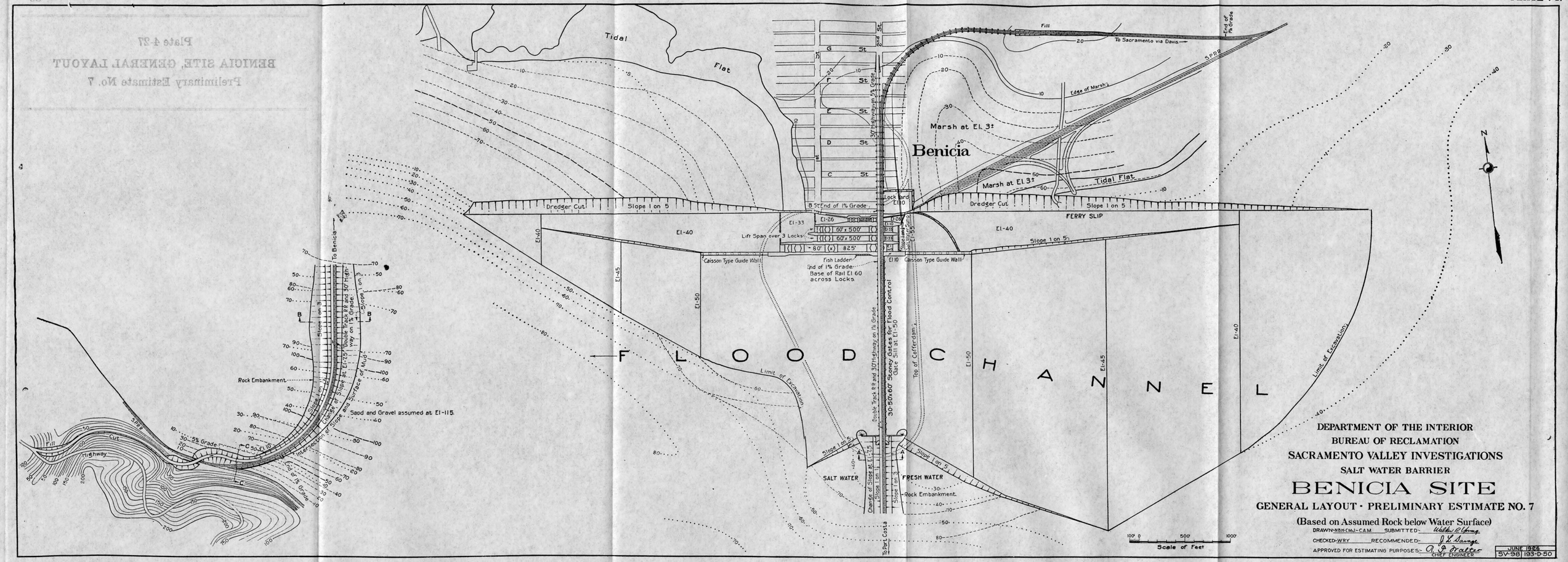
SV-96 | Ellensburg Wash. June 16, 1926 | 193-D-48

Plate 4-27

BENICIA SITE, GENERAL LAYOUT

Preliminary Estimate No. 7





DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

BENICIA SITE

GENERAL LAYOUT · PRELIMINARY ESTIMATE NO. 7

(Based on Assumed Rock below Water Surface)

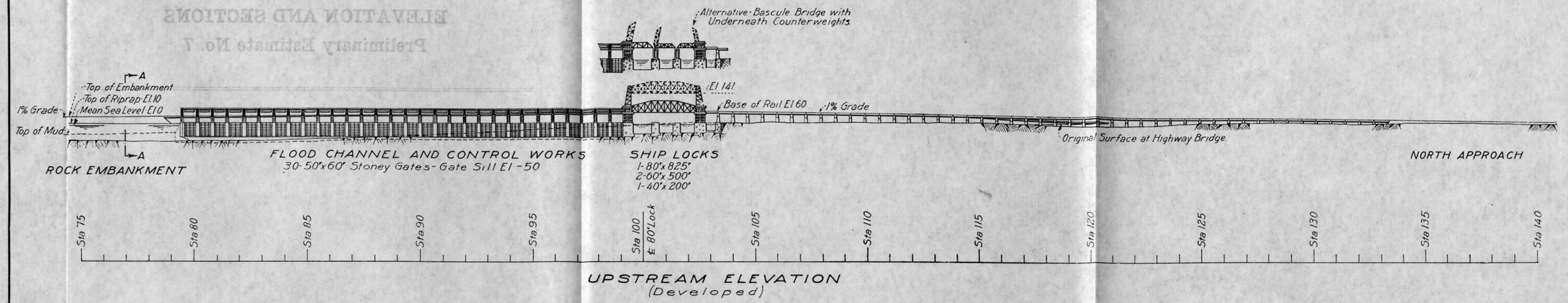
DRAWN-NBH-CMJ-CAM SUBMITTED- Walker R. Young
CHECKED-WRY RECOMMENDED- J. L. Savage
APPROVED FOR ESTIMATING PURPOSES- A. D. Marston CHIEF ENGINEER

JUNE 1926
SV-98 193-D-50

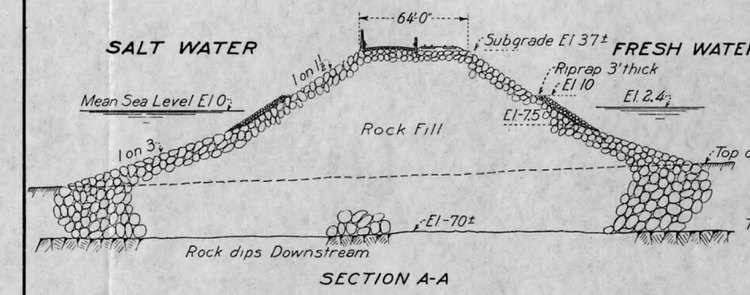
Plate 4-28

ELEVATION AND SECTIONS

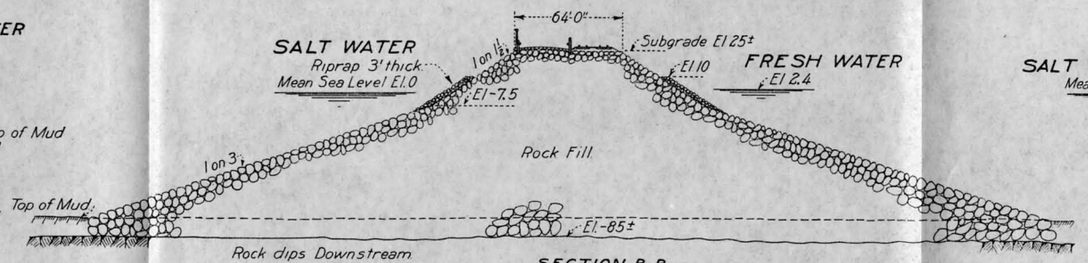
Preliminary Estimate No. 7



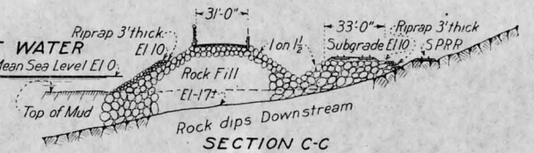
UPSTREAM ELEVATION
(Developed)



SECTION A-A



SECTION B-B
For location see General Layout for Estimate No 7



SECTION C-C
For location see General Layout for Estimate No 7

EMBANKMENT SECTIONS

0 10' 20' 30' 40' 50' 60' 70' 80' 90' 100'
Scale

Notes:-
This Site not drilled
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by Draft Remainder to be placed by Derrick Barges and Skips.

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:-
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 7

DRAWN C.M.J.-C.A.M. SUBMITTED W. H. Lyons
CHECKED N.B.H. RECOMMENDED J. L. Savage

SV-99 Ellensburg Wash. June 23, 1926 193-D-51

Plate 4-29

SHIP LOCKS, 4-LOCK PLAN

Notes:-

Four Lock Plan adopted in all cases at Benicia and Dillon Point Sites. This Drawing shows Layout for Estimate No. 11 but its Features are generally applicable to Estimates Nos. 7 to 13.

Rock Embankment is provided between Locks and Control Works in some cases.

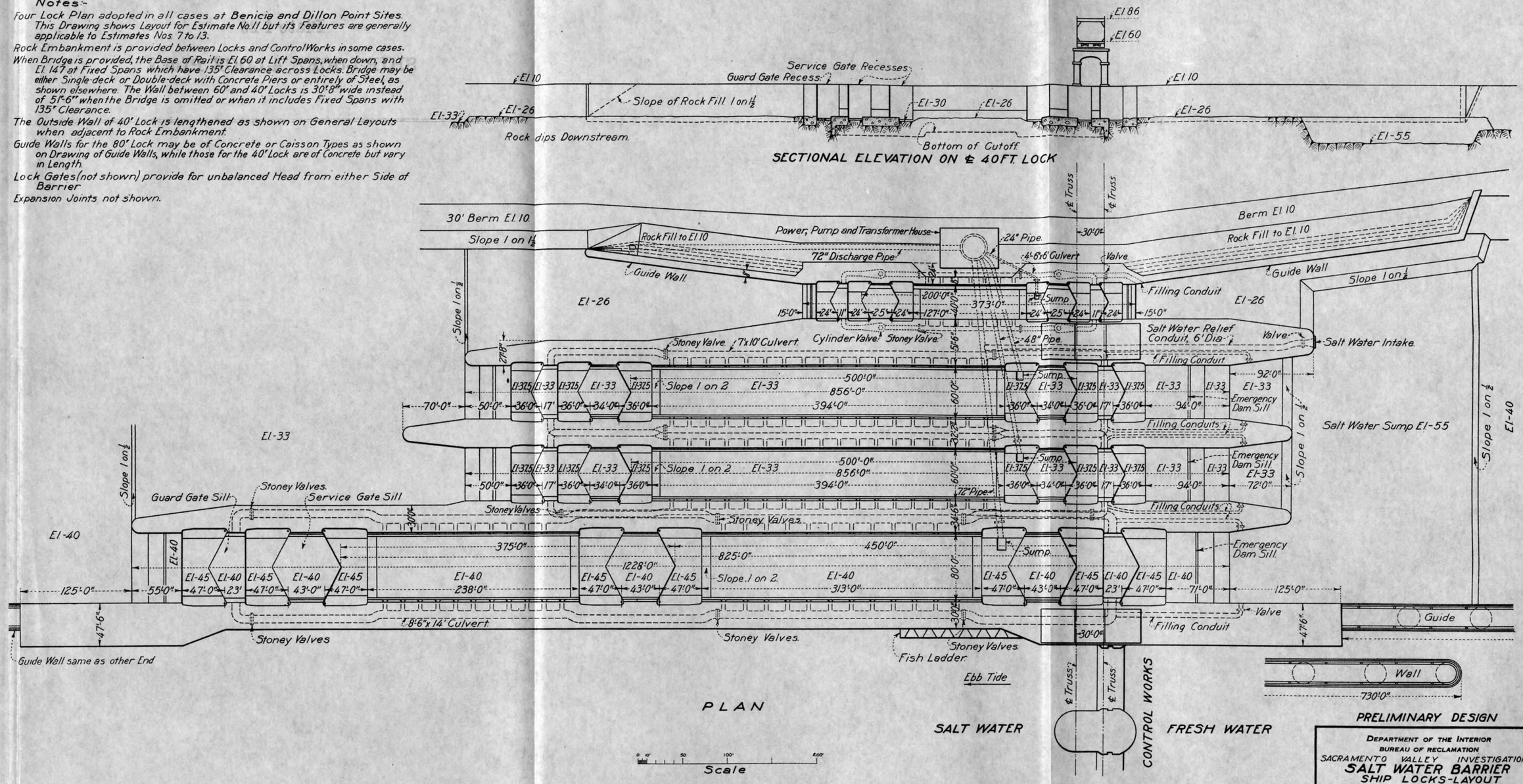
When Bridge is provided, the Base of Rail is El. 60 at Lift Spans, when down, and El. 147 at Fixed Spans which have 135' Clearance across Locks. Bridge may be either Single-deck or Double-deck with Concrete Piers or entirely of Steel, as shown elsewhere. The Wall between 60' and 40' Locks is 30'-8" wide instead of 51'-6" when the Bridge is omitted or when it includes Fixed Spans with 135' Clearance.

The Outside Wall of 40' Lock is lengthened as shown on General Layouts when adjacent to Rock Embankment.

Guide Walls for the 80' Lock may be of Concrete or Caisson Types as shown on Drawing of Guide Walls, while those for the 40' Lock are of Concrete but vary in Length.

Lock Gates (not shown) provide for unbalanced Head from either Side of Barrier.

Expansion Joints not shown.



PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES-
A. F. Walter
CHIEF ENGINEER

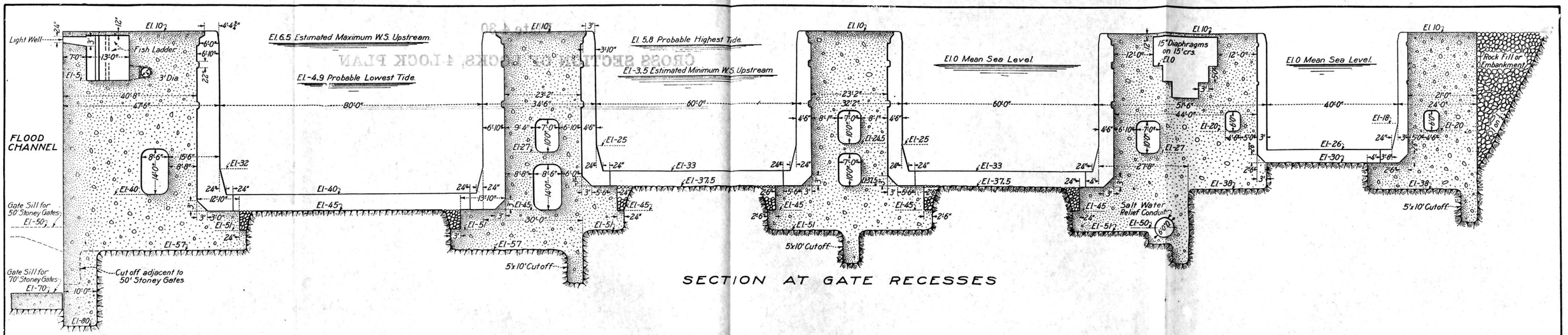
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS-LAYOUT
PRELIMINARY ESTIMATES NOS. 7 TO 13

DRAWN: C.M.J.-C.A.M. SUBMITTED: W. H. Lyons
CHECKED: N.B.H. RECOMMENDED: J. L. Savage

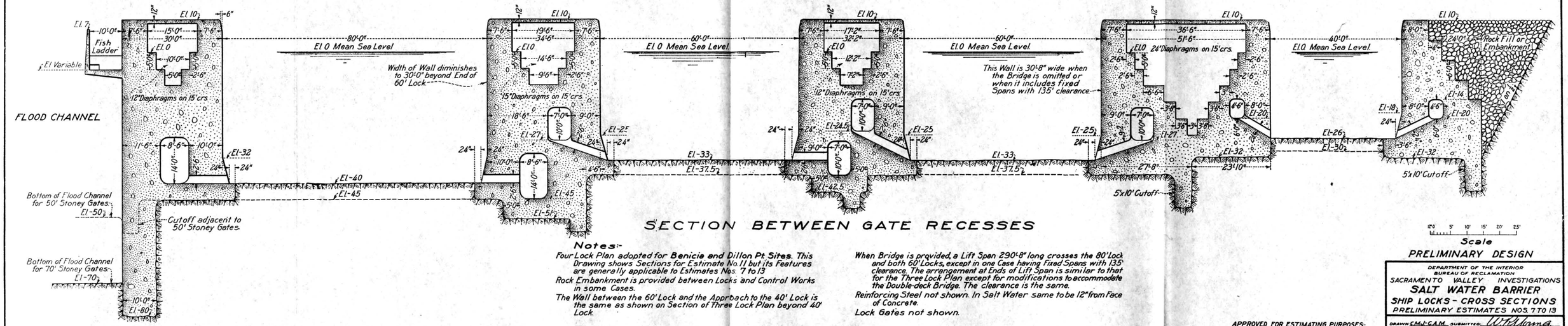
SV-100 | Ellensburg Wash. July 13, 1926 | 193-D-52

Plate 4-30

CROSS SECTION OF LOCKS, 4-LOCK PLAN



SECTION AT GATE RECESSES



SECTION BETWEEN GATE RECESSES

Notes:-

Four Lock Plan adopted for **Benicia and Dillon Pt. Sites.** This Drawing shows Sections for Estimate No. 11 but its Features are generally applicable to Estimates Nos. 7 to 13

Rock Embankment is provided between Locks and Control Works in some Cases.

The Wall between the 60' Lock and the Approach to the 40' Lock is the same as shown on Section of Three Lock Plan beyond 40' Lock.

When Bridge is provided, a Lift Span 290'-8" long crosses the 80' Lock and both 60' Locks, except in one Case having Fixed Spans with 135' clearance. The arrangement at Ends of Lift Span is similar to that for the Three Lock Plan except for modifications to accommodate the Double-deck Bridge. The clearance is the same.

Reinforcing Steel not shown. In Salt Water same to be 12" from Face of Concrete.

Lock Gates not shown.

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER

SHIP LOCKS - CROSS SECTIONS

PRELIMINARY ESTIMATES NOS. 7 TO 13

DRAWN: C.M.J.-C.A.M. SUBMITTED: W. H. Spaeng
CHECKED: N.B.H. RECOMMENDED: J. L. Savage

SV-101 | Ellensburg Wash. July 14, 1926 | 193-D-53

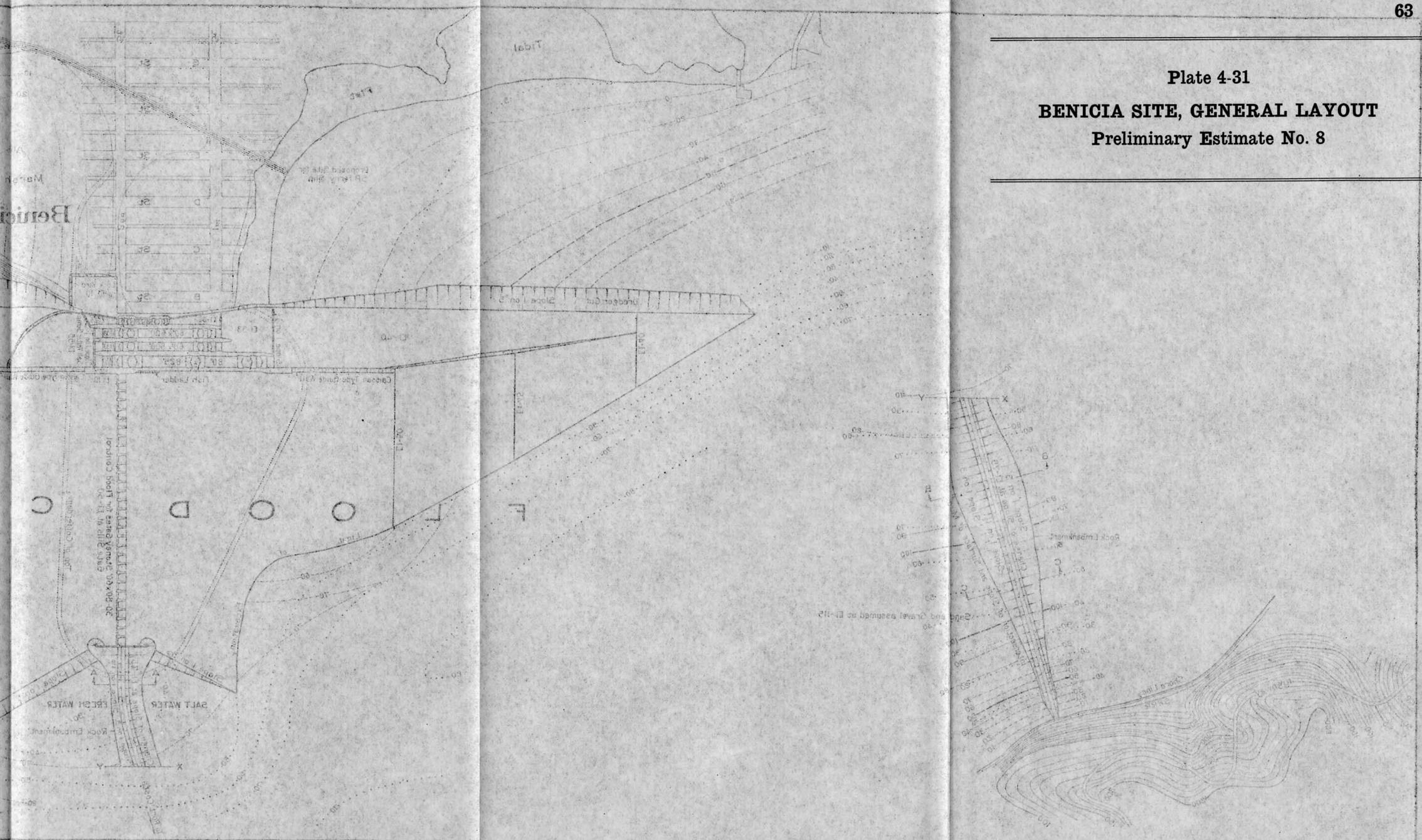
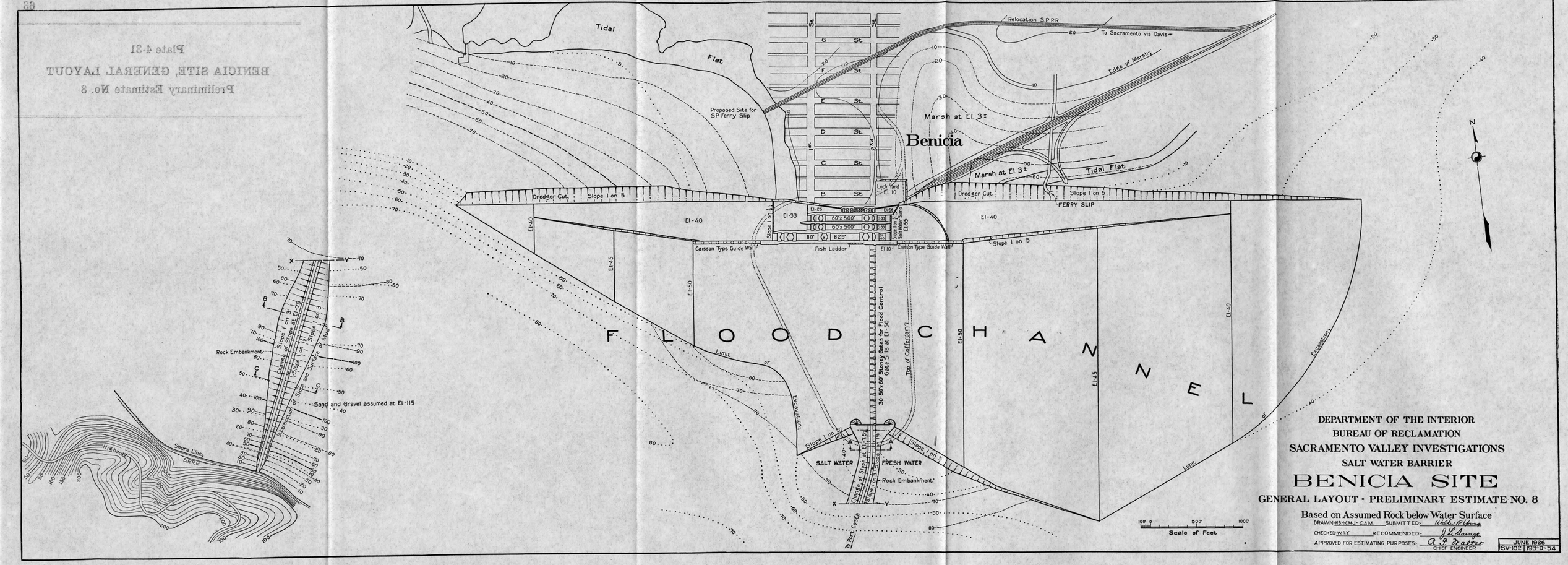


Plate 4-31

BENICIA SITE, GENERAL LAYOUT

Preliminary Estimate No. 8



DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER

BENICIA SITE

GENERAL LAYOUT · PRELIMINARY ESTIMATE NO. 8

Based on Assumed Rock below Water Surface

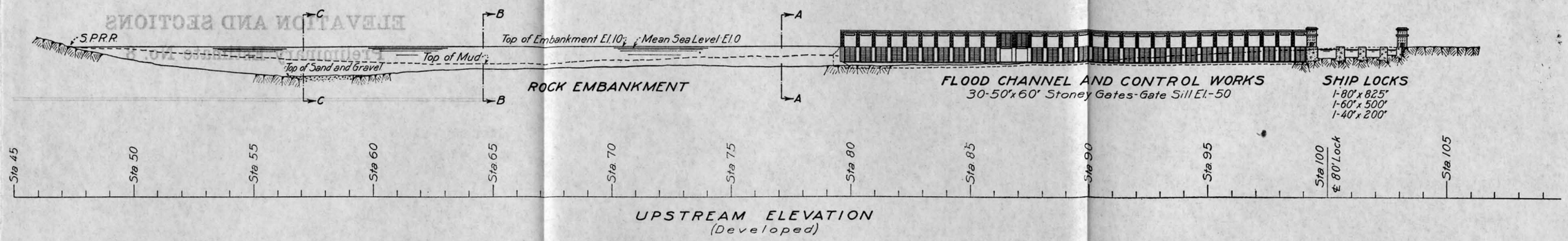
DRAWN-NBR/CMJ-CAM SUBMITTED- Walter R. Young
CHECKED-WRY RECOMMENDED- J. L. Savage
APPROVED FOR ESTIMATING PURPOSES- A. P. Davis, CHIEF ENGINEER

JUNE 1926
SV-102 | 193-D-54

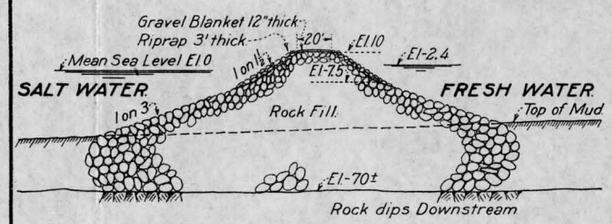
Plate 4-32

ELEVATION AND SECTIONS

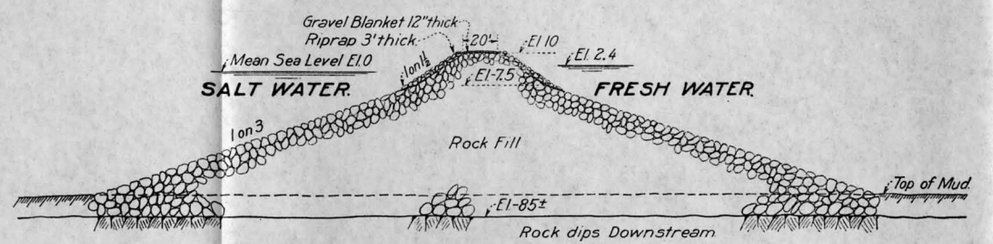
Preliminary Estimate No. 8



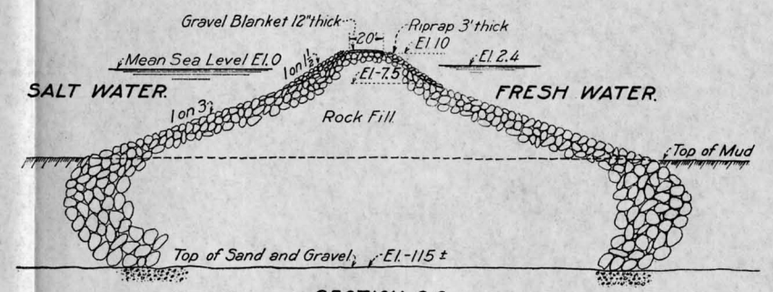
UPSTREAM ELEVATION
(Developed)



SECTION A-A



SECTION B-B



SECTION C-C

EMBANKMENT SECTIONS

0 10' 20' 30' 40' 50' 100'
Scale

Notes:-
This Site not drilled.
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft
Remainder to be placed by Derrick Barges and Skips.

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO. 8

APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER.

DRAWN. C.M.J.-C.A.M. SUBMITTED
CHECKED. N.B.H. RECOMMENDED

SV-103 | Ellensburg, Wash June 29, 1926 | 193-D-55

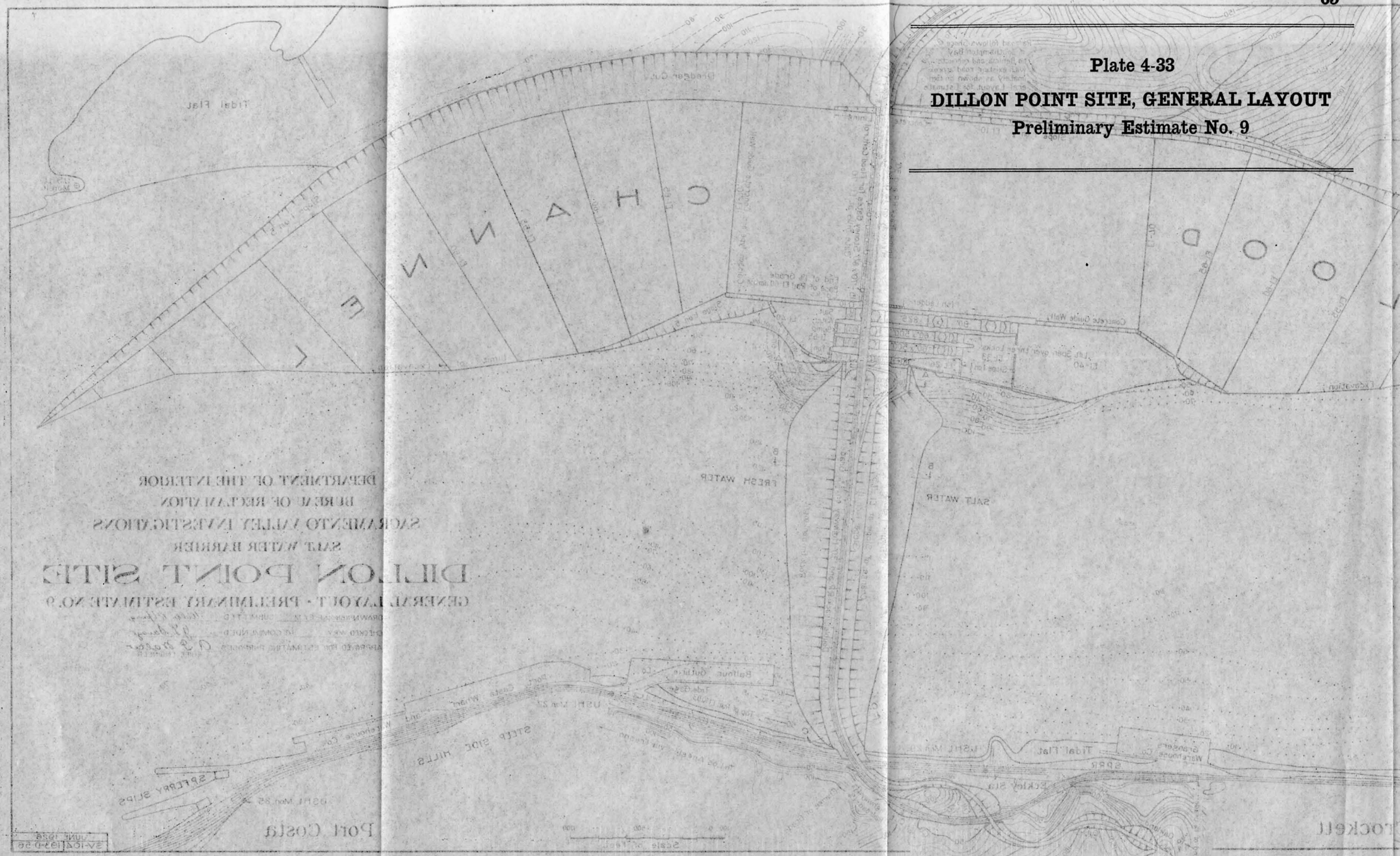


Plate 4-33

DILLON POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 9

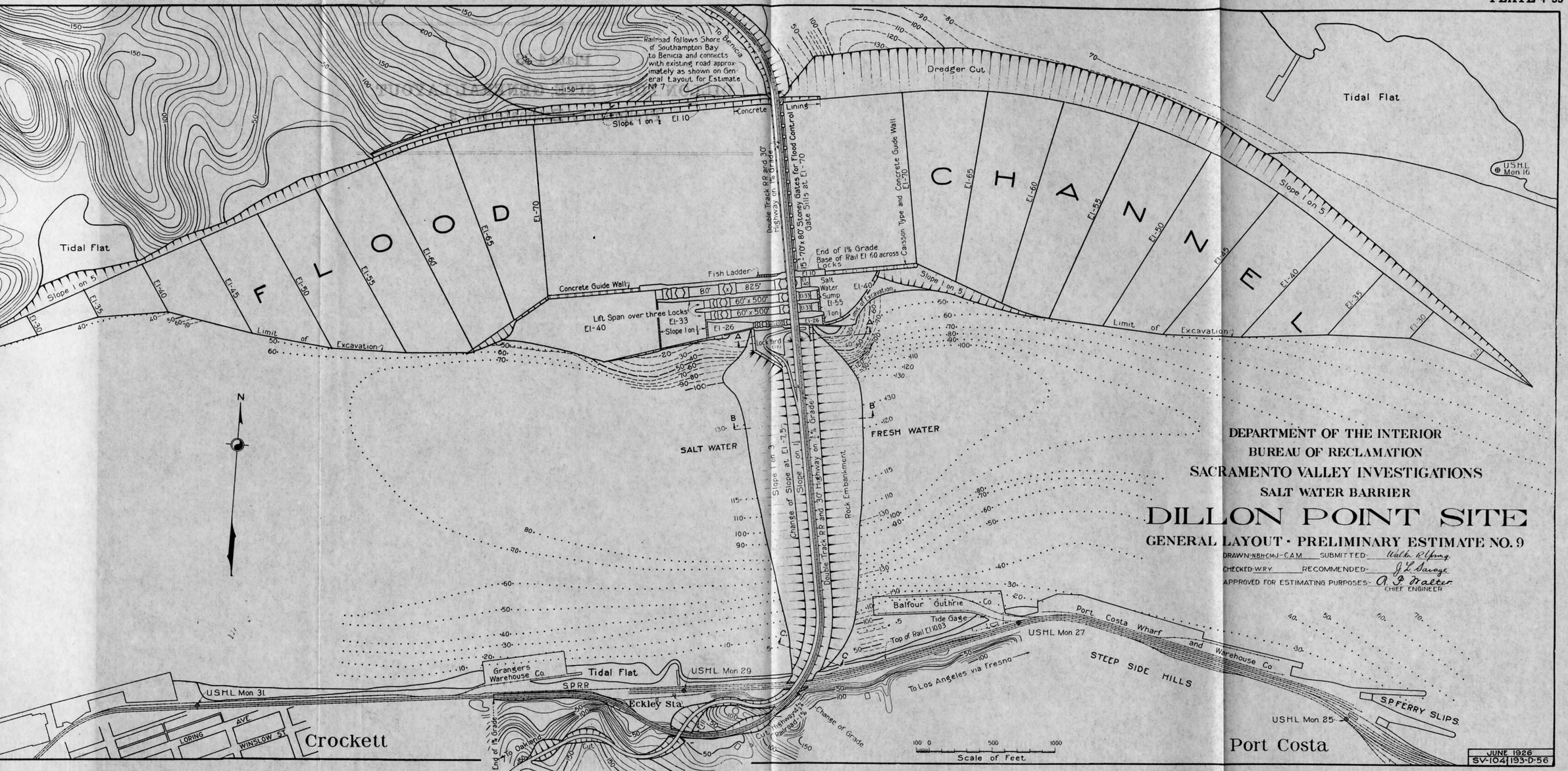
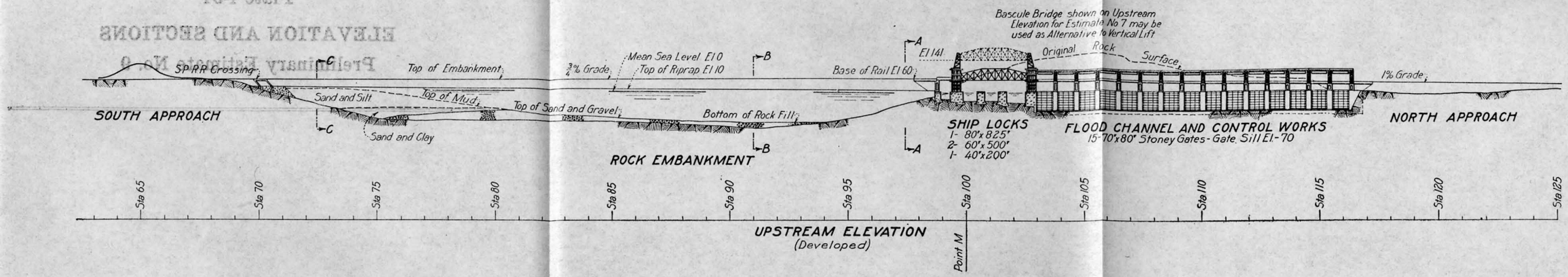
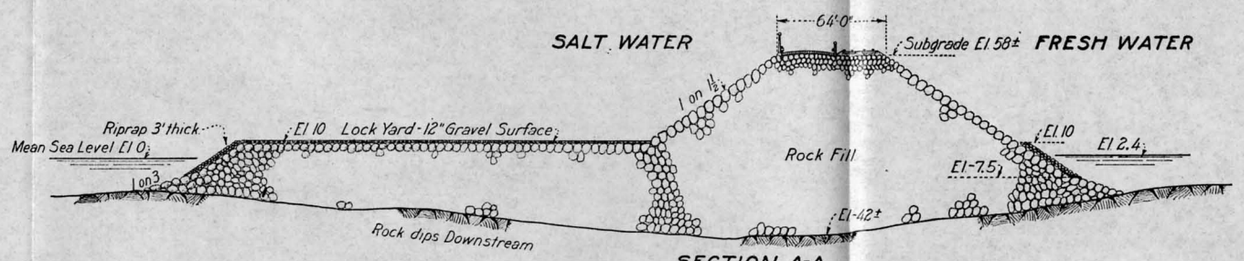

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT SITE
GENERAL LAYOUT · PRELIMINARY ESTIMATE NO. 9
DRAWN: NBH-CMJ-CAM SUBMITTED: Walter P. Young
CHECKED: WRY RECOMMENDED: J. L. Savage
APPROVED FOR ESTIMATING PURPOSES: A. F. Walter
CHIEF ENGINEER
JUNE 1926
SV-104 193-D-56
FLOOD CHANNEL
Tidal Flat
Dredger Cut
Railroad follows Shore of Southampton Bay to Benicia and connects with existing road approximately as shown on General Layout for Estimate No. 7
To Benicia
Slope 1 on 2 El 10
Concrete Lining
Double Track R.R. and 30' Highway on 2% Grade
15'-70' x 80' Stoney Gates for Flood Control Gate Sills at El -70
Caisson Type and Concrete Guide Wall El -70
End of 1% Grade Base of Rail El 60 across Locks
Slope 1 on 5
Limit of Excavation
Concrete Guide Wall
Fish Ladder
Lift Span over three Locks El -40
Salt Water Sump El -55
Slope 1 on 1
Lock Yard
SALT WATER
FRESH WATER
Change of Slope at El -7.5
Slope 1 on 3
Slope 1 on 1½
Rock Embankment
Balfour Guthrie Co
Tide Gage
Top of Rail El 10.03
Port Costa Wharf and Warehouse Co
USHL Mon 27
STEEP SIDE HILLS
To Los Angeles via Fresno
SP FERRY SLIPS
USHL Mon 25
Grangers Warehouse Co
USHL Mon 29
USHL Mon 31
SPRR
Eckley Sta
Crockett
Port Costa
LORING AVE
WINSLOW ST
To Oakland
End of 1% Grade
Cut
Highway & Railroad
Change of Grade
Scale of Feet
100 0 500 1000
N

Plate 4-34

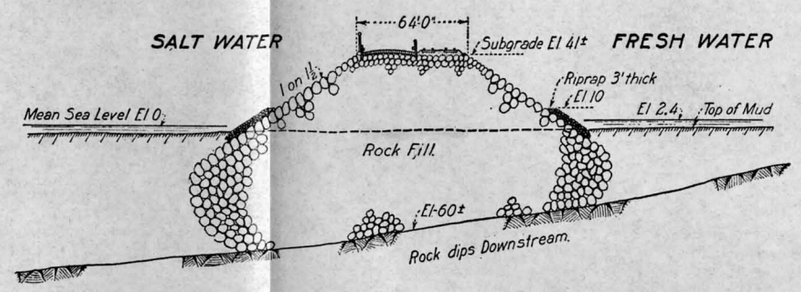
ELEVATION AND SECTIONS

Preliminary Estimate No. 9

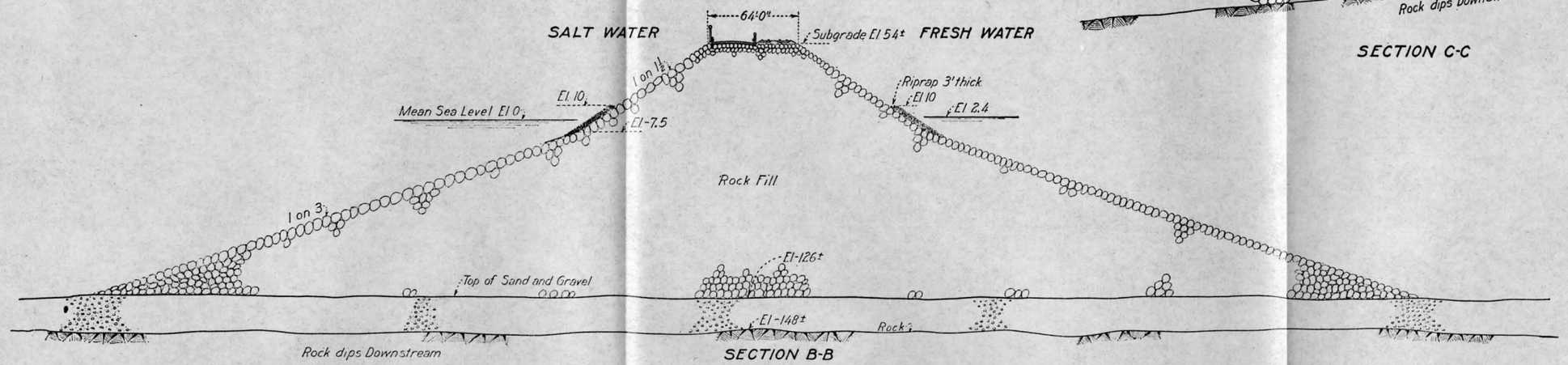




SECTION A-A



SECTION C-C



SECTION B-B

EMBANKMENT SECTIONS

Notes:-

Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft. Remainder to be placed by Derrick Barges and Skips.

0 10' 50' 100'
Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO. 9

DRAWN C.M.J. ABS-C.A.M. SUBMITTED U.R. Fleming
CHECKED N.B.H. RECOMMENDED J. L. Savage

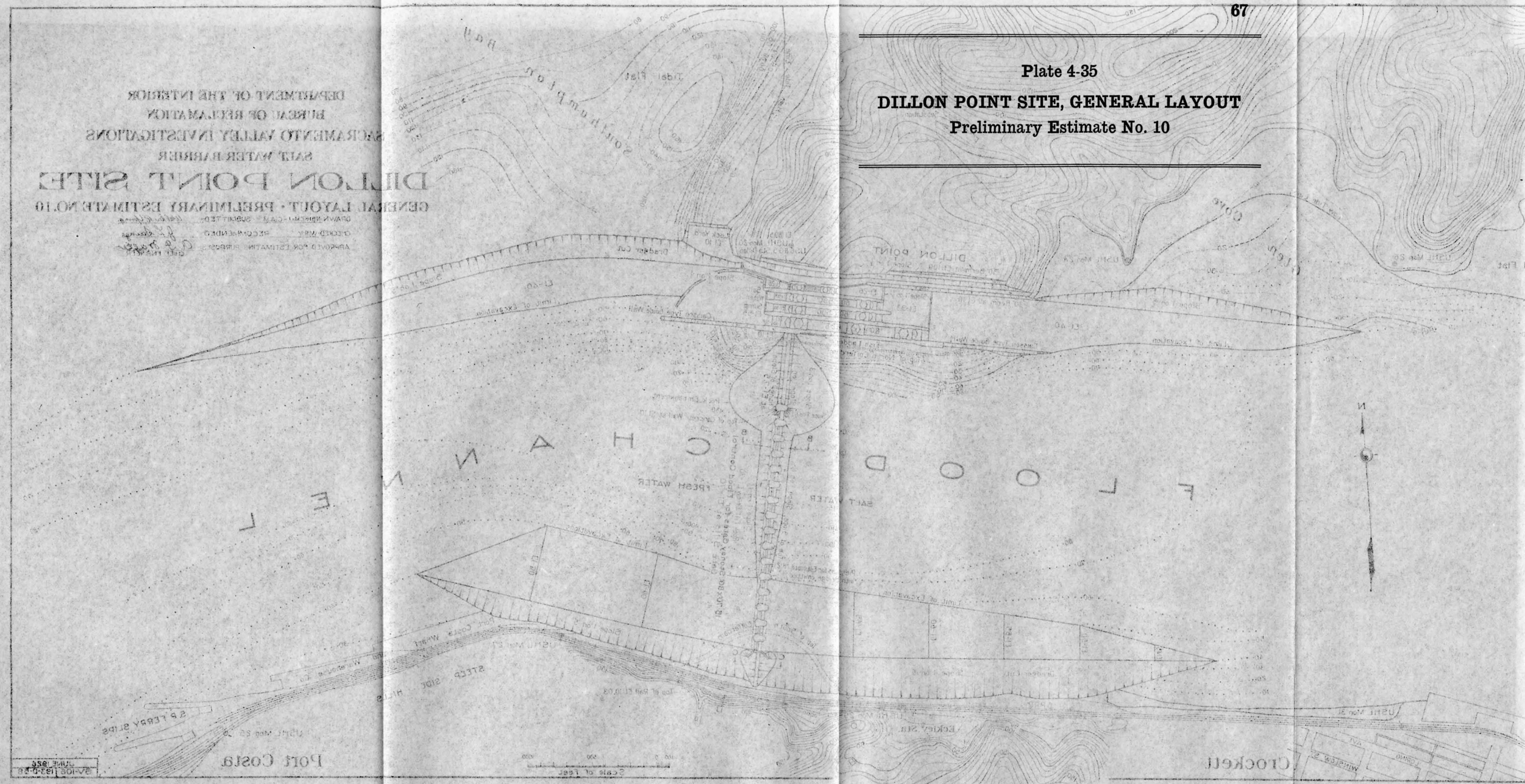
APPROVED FOR ENGINEERING PURPOSES:-
R. F. Walter
CHIEF ENGINEER

SV-105 | Ellensburg, Wash. June 30, 1926 | 193-D-57

Plate 4-35

DILLON POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 10



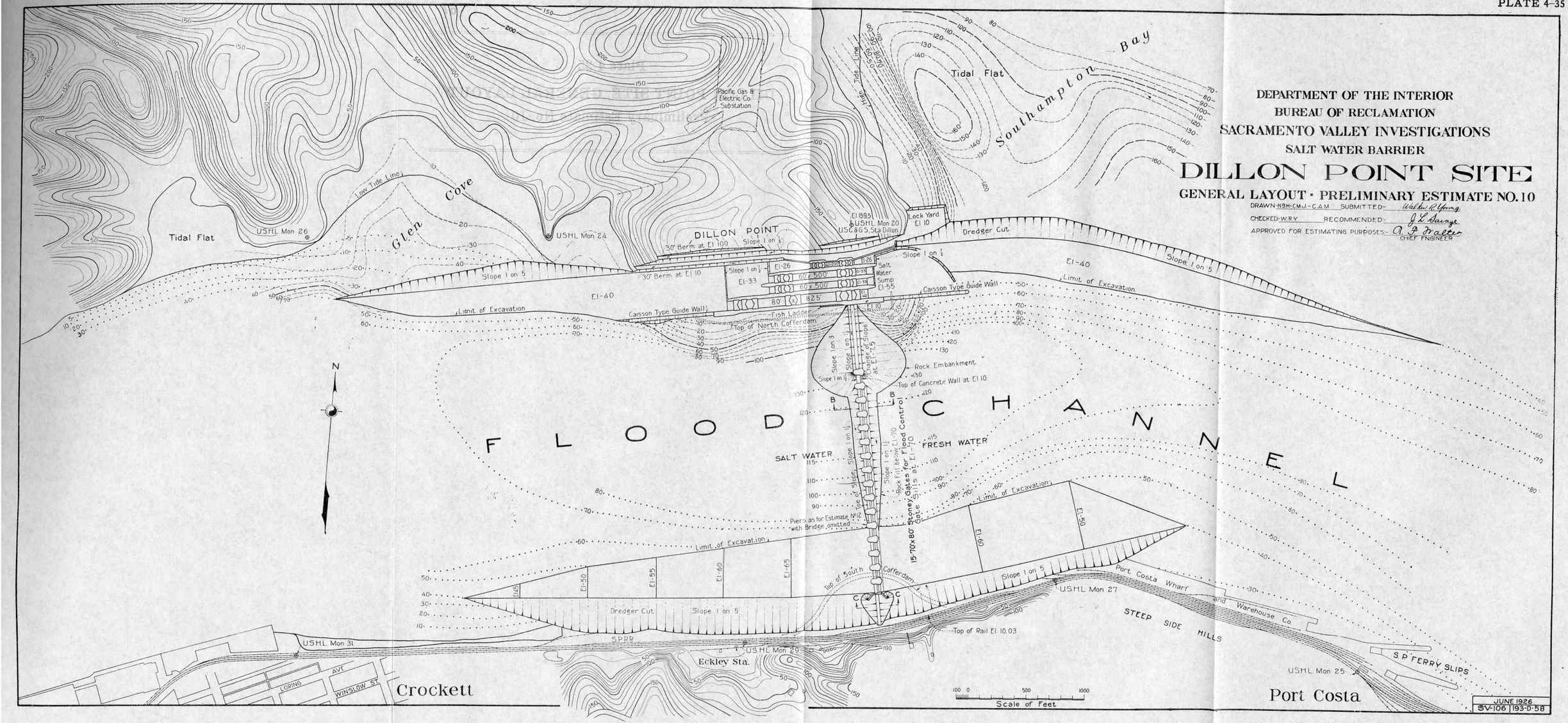
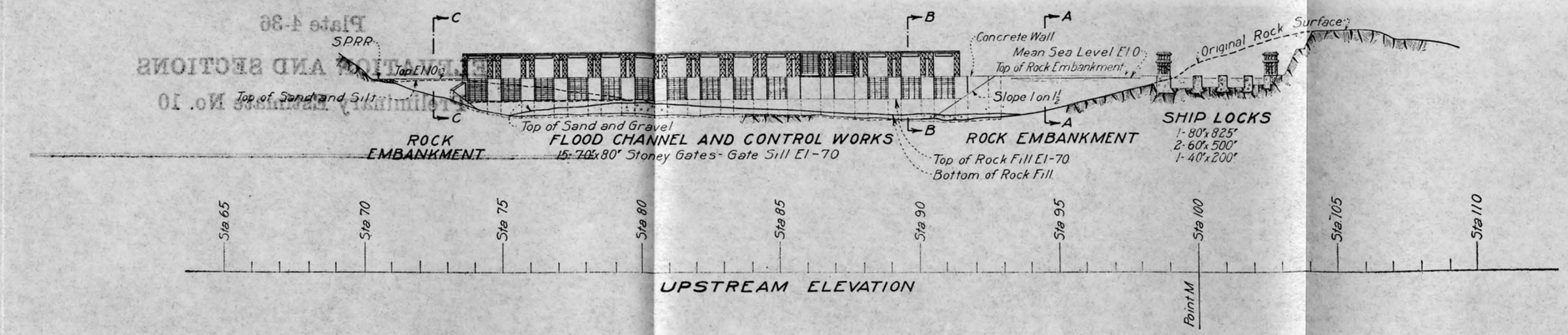

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT SITE
GENERAL LAYOUT · PRELIMINARY ESTIMATE NO. 10
DRAWN-NBH-CMJ-CAM SUBMITTED-
CHECKED-WRY RECOMMENDED-
APPROVED FOR ESTIMATING PURPOSES-
CHIEF ENGINEER
Southampton Bay
Tidal Flat
Glen Cove
Low Tide Line
High Tide Line
Pacific Gas & Electric Co. Substation
USHL Mon 26
USHL Mon 24
USHL Mon 20
USC&GS Sta Dillon
El 15.95
DILLON POINT
30' Berm at El 10.0
Slope 1 on 5
Slope 1 on 1½
Lock Yard El 10
Dredger Cut
El-40
Limit of Excavation
Caisson Type Guide Wall
Fish Ladder
Top of North Cofferdam
Salt Water Sump El-55
El-26
El-33
60' x 500'
80' x 425'
Rock Embankment
Top of Concrete Wall at El 10
Toe of Slope
Crest of Slope at El-7.5
Slope 1 on 3
Slope 1 on 1
FLOOD CHANNEL
SALT WATER
FRESH WATER
Rock Fill below El-70
15-70'x80' Stoney Gates for Flood Control
Gate Sills at El-70
Piers as for Estimate No. 12 with Bridge omitted
Top of South Cofferdam
El-45
El-50
El-55
El-60
El-65
El-70
Port Costa Wharf and Warehouse Co.
USHL Mon 27
STEEP SIDE HILLS
Top of Rail El 10.03
S.P.R.R.
USHL Mon 29
Eckley Sta.
USHL Mon 31
LORING AVE
WINSLOW ST
Crockett
USHL Mon 25
S.P. FERRY SLIPS
Port Costa
Scale of Feet
JUNE 1926
SV-106 193-D-58

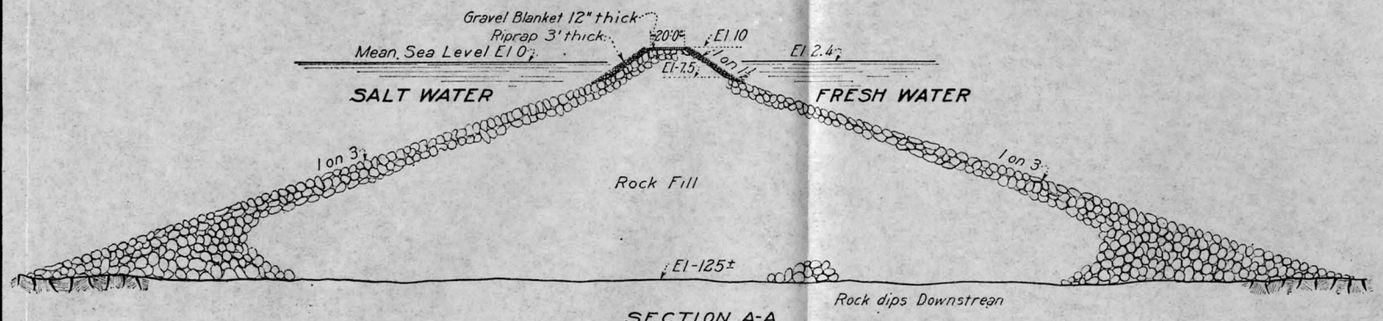
Plate 4-36

ELEVATION AND SECTIONS

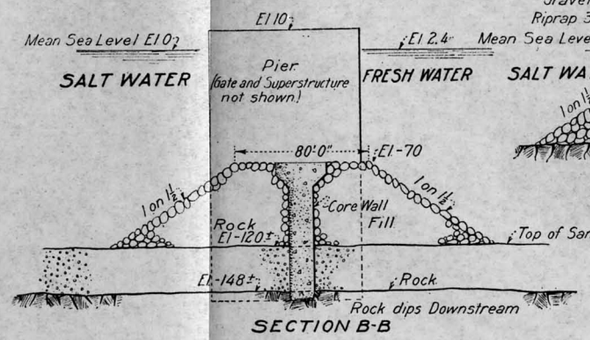
Preliminary Estimate No. 10



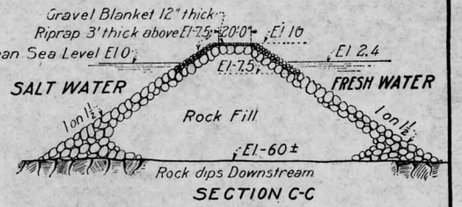
UPSTREAM ELEVATION



SECTION A-A



SECTION B-B



SECTION C-C

Notes:-

Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft. Remainder to be placed by Derrick Barges and Skips.

Section A-A shows Embankment placed in running Water.

Section B-B shows Rock Fill deposited around Core Wall under Stoney Gates where action of Current is negligable below El -70.

Section C-C shows Embankment placed inside South Cofferdam.

Control Works Piers are similar to Piers for Estimate No. 12 with Bridge omitted.

EMBANKMENT SECTIONS

0 10' 50' 100' 150'

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES

A. P. Walter

CHIEF ENGINEER.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO. 10

DRAWN: C.M.J.-C.A.M.-L.C.N. SUBMITTED: W. Spring
CHECKED: N.B.H. RECOMMENDED: J. R. Savage

SV-107 | Ellensburg, Wash. July 8, 1926 | 193-D-59

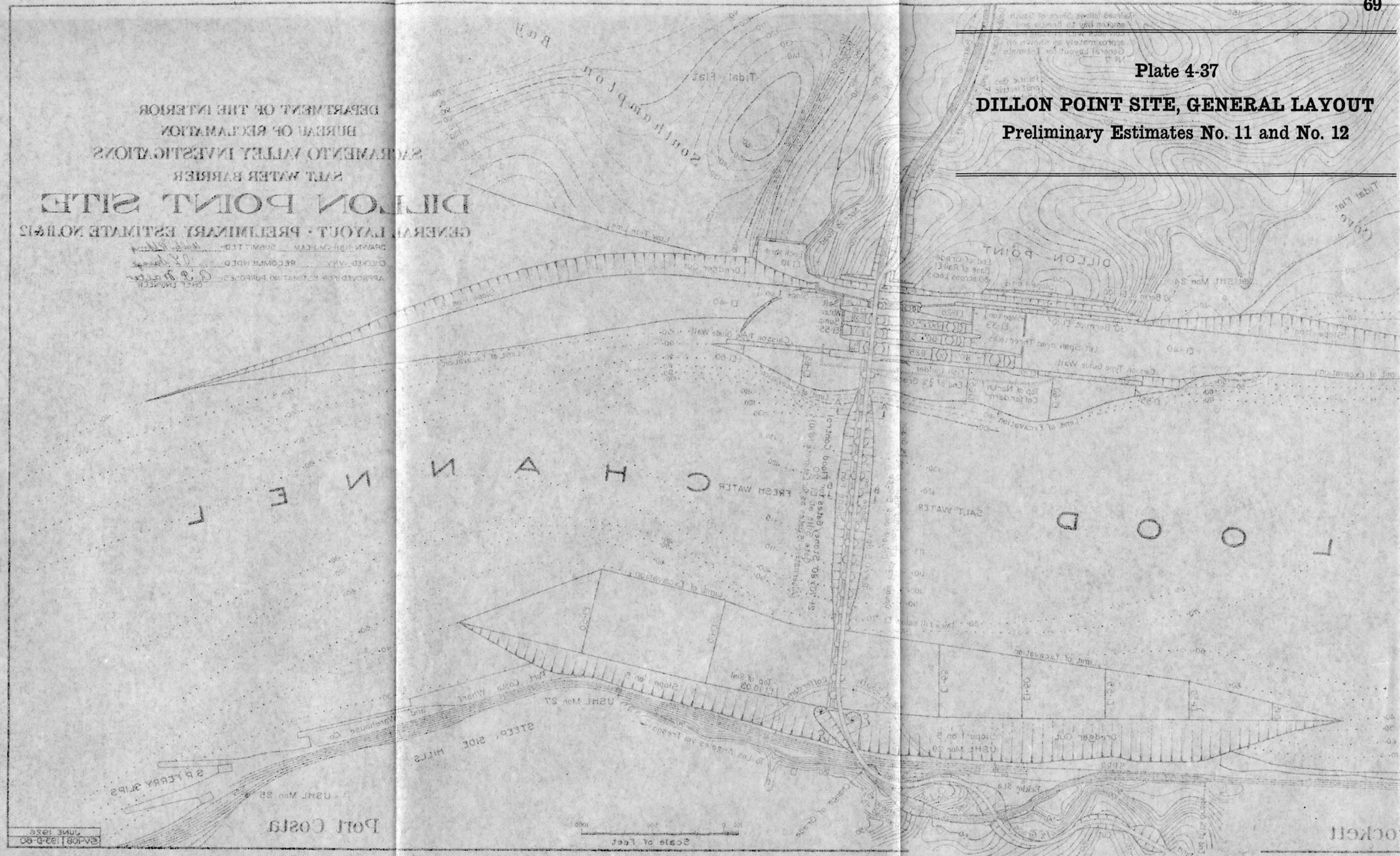


Plate 4-37

DILLON POINT SITE, GENERAL LAYOUT

Preliminary Estimates No. 11 and No. 12

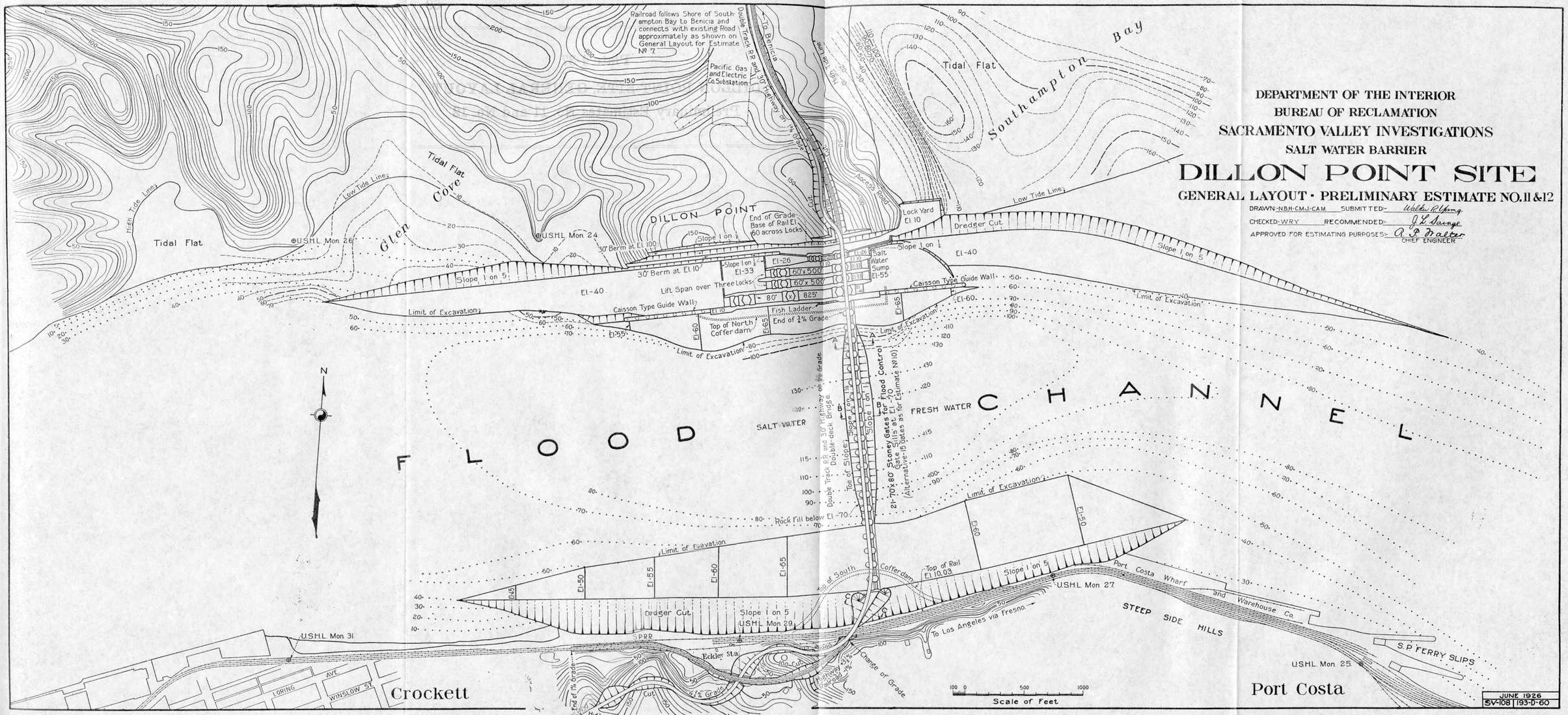
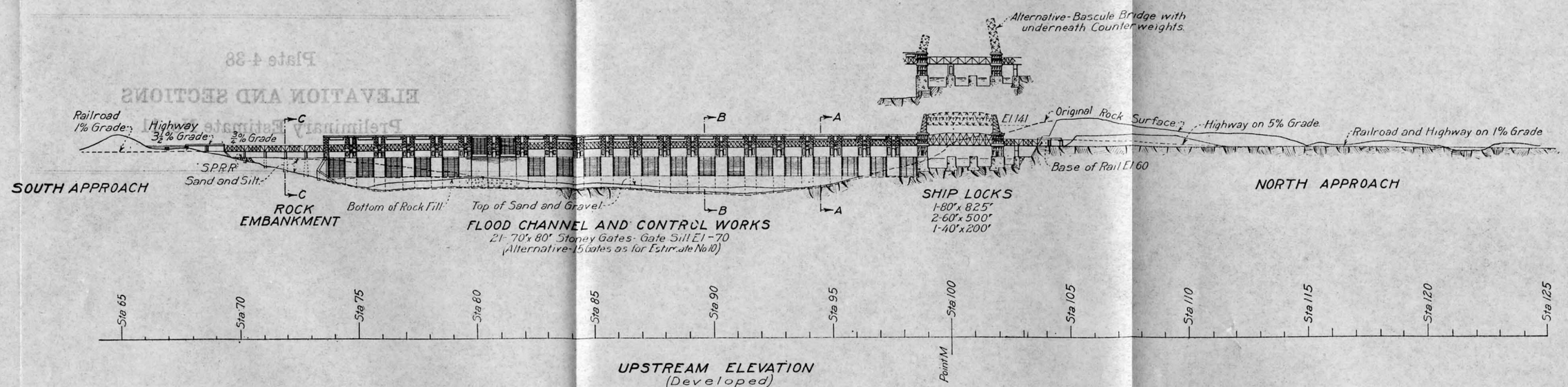

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT SITE
GENERAL LAYOUT · PRELIMINARY ESTIMATE NO. 11 & 12
DRAWN-NBH-CMJ-CAM SUBMITTED-
CHECKED-WRY RECOMMENDED-
APPROVED FOR ESTIMATING PURPOSES-
CHIEF ENGINEER
Railroad follows Shore of Southampton Bay to Benicia and connects with existing Road approximately as shown on General Layout for Estimate No. 7.
Pacific Gas and Electric Co. Substation
Double Track R.R. and 30' Highway on 1% Grade
To Benicia
Southampton Bay
Tidal Flat
Glen Cove
High Tide Line
Low Tide Line
DILLON POINT
End of Grade Base of Rail El. 60 across Locks
Lock Yard El. 10
Dredger Cut
Slope 1 on 5
USHL Mon 26
USHL Mon 24
30' Berm at El. 10
Slope 1 on 1½
El-26
El-33
El-40
El-55
El-60
El-65
60' x 500'
60' x 500'
80' x 825'
Lift Span over Three Locks
Salt Water Sump El-55
Caisson Type Guide Wall
Fish Ladder
End of 2½% Grade
Top of North Cofferdam
Limit of Excavation
Slope 1 on 1
Toe of Slope
Double Track R.R. and 30' Highway on 1% Grade
Double-deck Bridge
21-70' x 80' Stoney Gates for Flood Control
Gate Sills at El. -70
(Alternative-15 Gates as for Estimate No. 10)
Rock Fill below El. -70
FLOOD CHANNEL
SALT WATER
FRESH WATER
N
Top of South Cofferdam
Top of Rail El. 10.03
Port Costa Wharf and Warehouse Co.
USHL Mon 27
STEEP SIDE HILLS
To Los Angeles via Fresno
S.P. FERRY SLIPS
USHL Mon 25
USHL Mon 29
USHL Mon 31
PRR
Eddler Sta.
Change of Grade
End of 1% Grade
To Oakland
Highway
Cut
Fill
LORING AVE.
WINSLOW ST.
Crockett
Port Costa
Scale of Feet
100 0 500 1000
JUNE 1926
SV-108 193-D-60

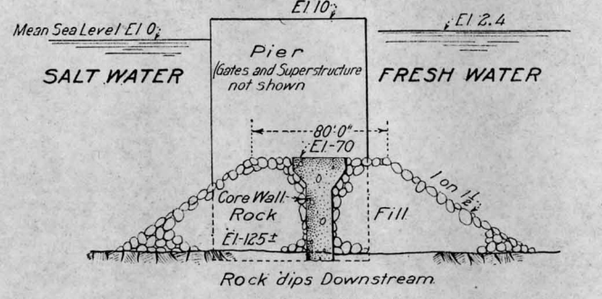
Plate 4-38

ELEVATION AND SECTIONS

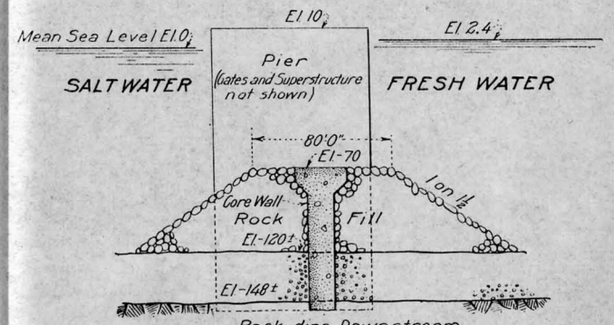
Preliminary Estimate No. 11



UPSTREAM ELEVATION
(Developed)

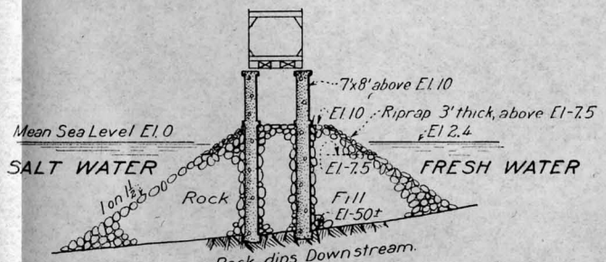


SECTION A-A



SECTION B-B

EMBANKMENT SECTIONS



SECTION C-C.

Notes:-

Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft. Remainder to be placed by Derrick Barges and Skips.

Sections A-A and B-B show Rock Fill deposited around Core Wall under Stoney Gates where action of Current is negligable below El-70.

Section C-C shows Embankment placed inside South Cofferdam

Alternative Estimate No 11 gives cost with only 15 Flood Gates, located as for Estimate No 10.

0 10 50' 100' 150'
Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 11

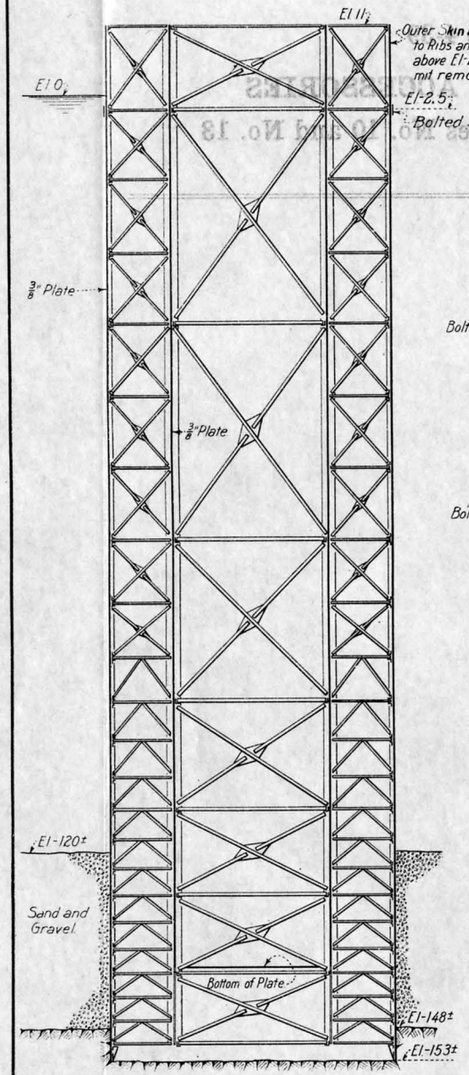
DRAWN: C.M.J. C.A.M.L.C.N. SUBMITTED: H. T. Herring
CHECKED: N.B.H. RECOMMENDED: J. D. Savage

SV-109 | Ellensburg, Wash July 12, 1926 | 193-D-61

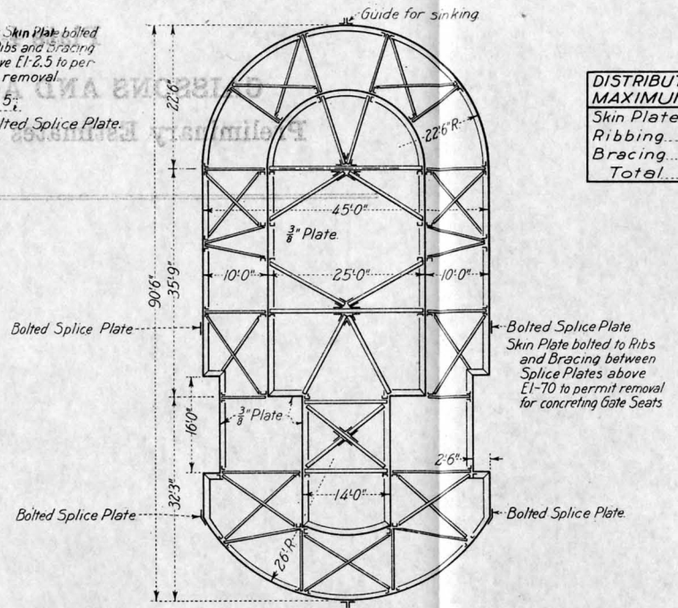
Plate 4-39

CAISSONS AND ACCESSORIES

Preliminary Estimates No. 10 and No. 13

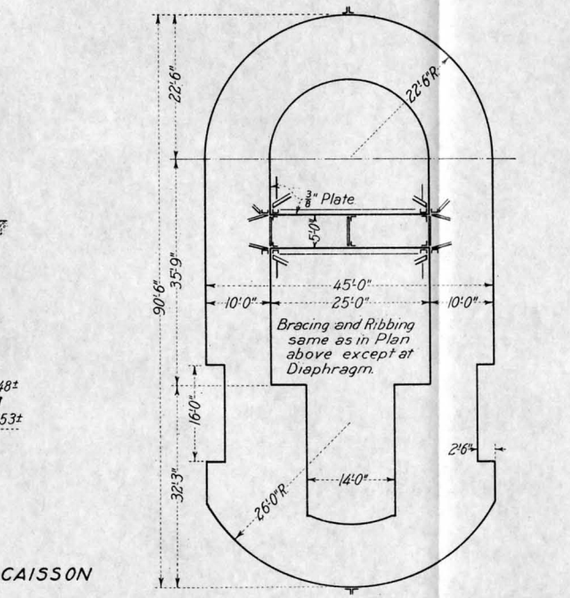


MAXIMUM SECTIONAL ELEVATION



PLAN

DISTRIBUTION OF WEIGHT IN MAXIMUM PIER CAISSON	
Skin Plates	510 tons
Ribbing	260 "
Bracing	85 "
Total	855 tons



SECTIONAL PLAN BELOW TOP OF DIAPHRAGM

PIER CAISSON

Notes:

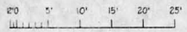
Pier Caissons differ slightly in Plan in the various Schemes, estimated. Plans on this Sheet show Requirements for Estimate No. 11.

Working Stress in Steel = 24,000 lbs. per sq. in.

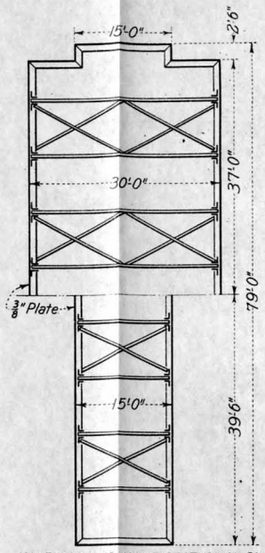
Weight of Maximum Pier Caisson in Air = 855 Tons. Maximum Weight to be supported by Traveler = 700 Tons.

Dredging to be carried on thru Wells provided by omitting Diagonal Bracing in Alternate Panels of Pier Caissons, Core Wall Caissons and Caisson Gate Frame.

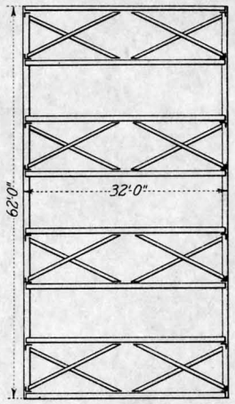
Over-size allowances for positional Errors, incidental to Caisson sinking, are deemed an unnecessary Refinement at this Stage of Design.



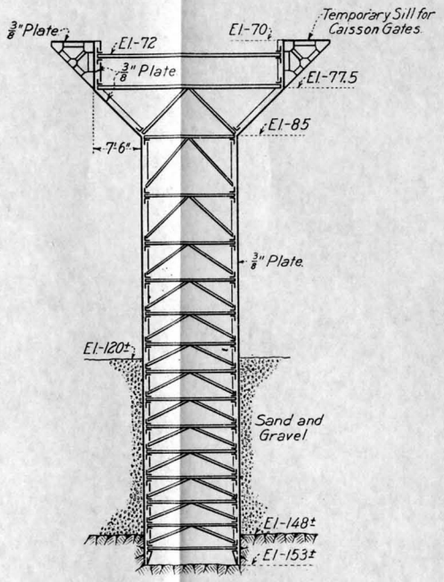
Scale



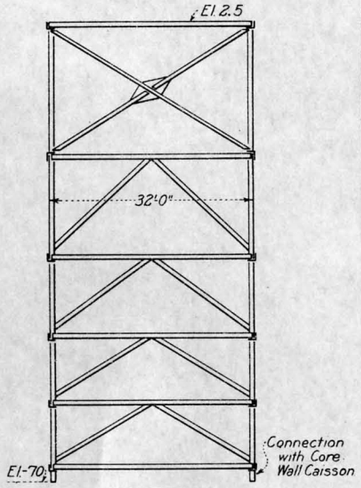
HALF TOP AND HALF SECTIONAL PLANS



PLAN



MAXIMUM SECTIONAL ELEVATION
CORE WALL CAISSON



SECTION
CAISSON GATE FRAME

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CAISSONS AND ACCESSORIES
PRELIMINARY ESTIMATES NOS 10 TO 13.

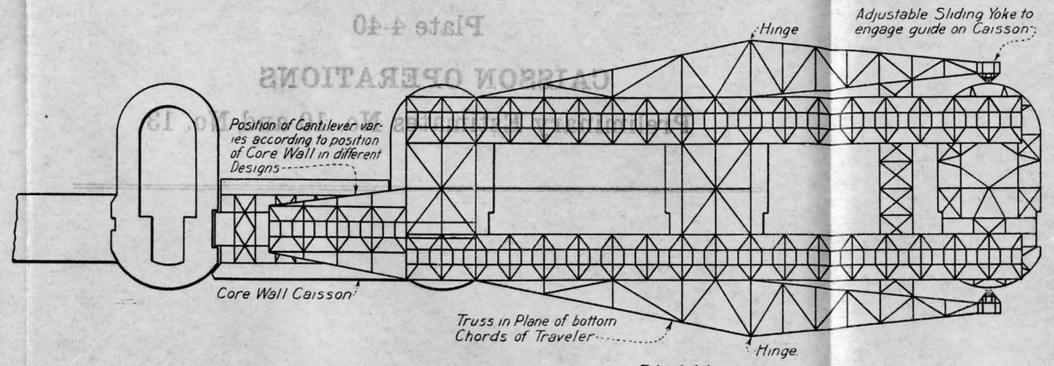
DRAWN: C.M.J.-C.A.M. SUBMITTED: W. H. Young
CHECKED: N.B.H. RECOMMENDED: J. L. Savage

SV-110 | Ellensburg Wash. July 27, 1926 | 193-D-62

Plate 4-40

CAISSON OPERATIONS

Preliminary Estimates No. 10 and No. 13



PLAN

Notes:-

Piers differ slightly in Plan in the various Schemes estimated, to meet Requirements of Superstructure. Piers on this Sheet adopted for Estimate No. 11.

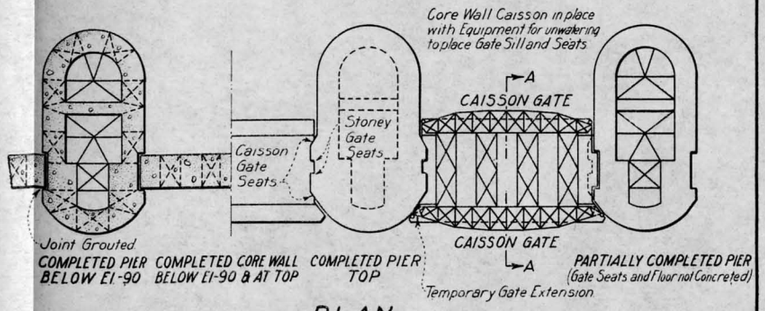
Flood Channel excavated to El-70 before Caissons are sunk

Bottom Sections of Caissons to be towed to Site on Barge and Caissons to be lowered by Traveler as successive Sections are added, until supporting Ground is reached

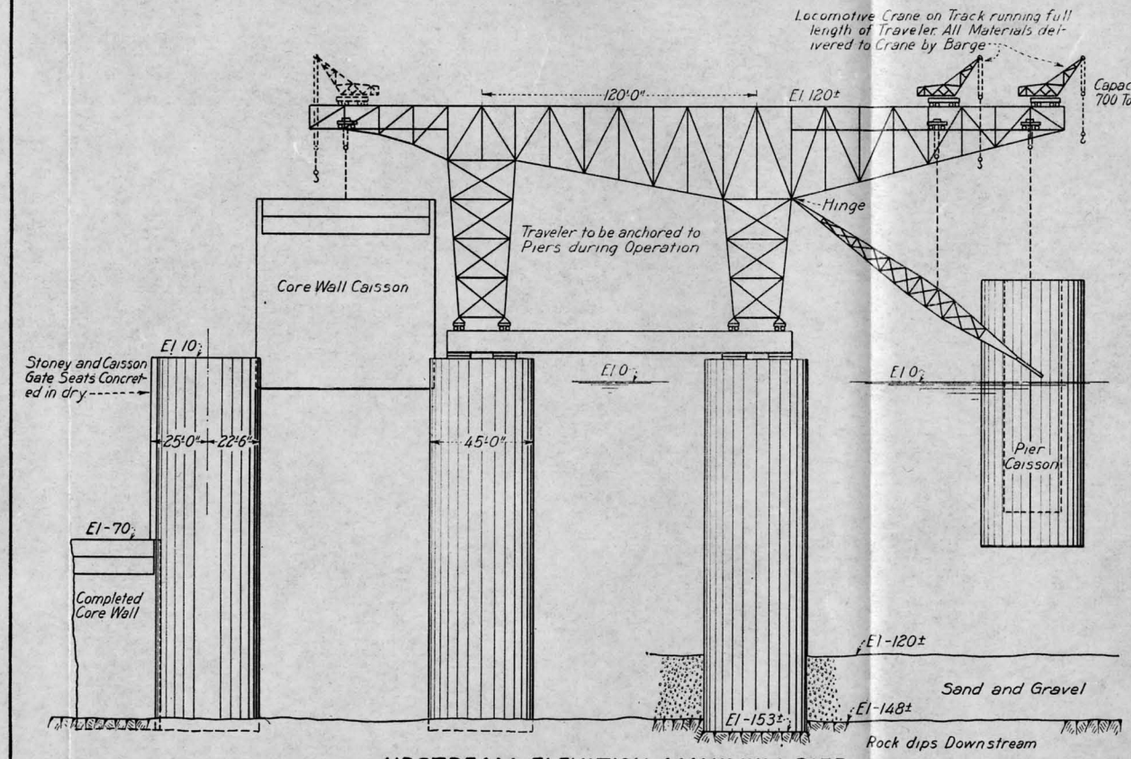
The movable Tremie Plant (not shown) is to replace the Locomotive Cranes in position above the Caissons during Concrete Operations.

Caissons assumed not recovered except Portions of Skin Plate of Pier Caissons at unwatered Areas and above El-2.5 and Horizontal Bracing at El 11.

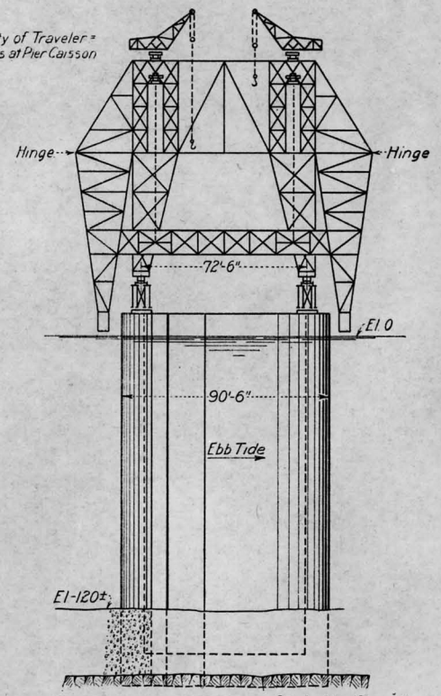
At this Stage of Design it is deemed sufficient to assume Caissons are sunk in Theoretical Positions.



PLAN

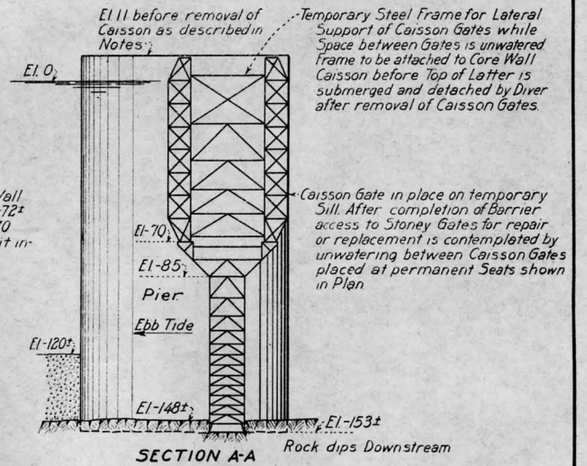


UPSTREAM ELEVATION-MAXIMUM PIER TRAVELER



FRONT

Concrete to be placed in Core Wall Caisson by Tremie up to El-72± and remainder below El-70 after unwatering, to permit installing Stoney Gate Sills.



SECTION A-A
CAISSON ASSEMBLY

0 10' 20' 30' 40' 50' 60' 70' 80' 90' 100'
Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CAISSON OPERATIONS
PRELIMINARY ESTIMATES NOS. 10 TO 13.

DRAWN C.M.J.-C.A.M. SUBMITTED: W. R. Young
CHECKED N.B.H. RECOMMENDED: J. L. Savage

APPROVED FOR ESTIMATING PURPOSES:-
A. P. Walter
CHIEF ENGINEER

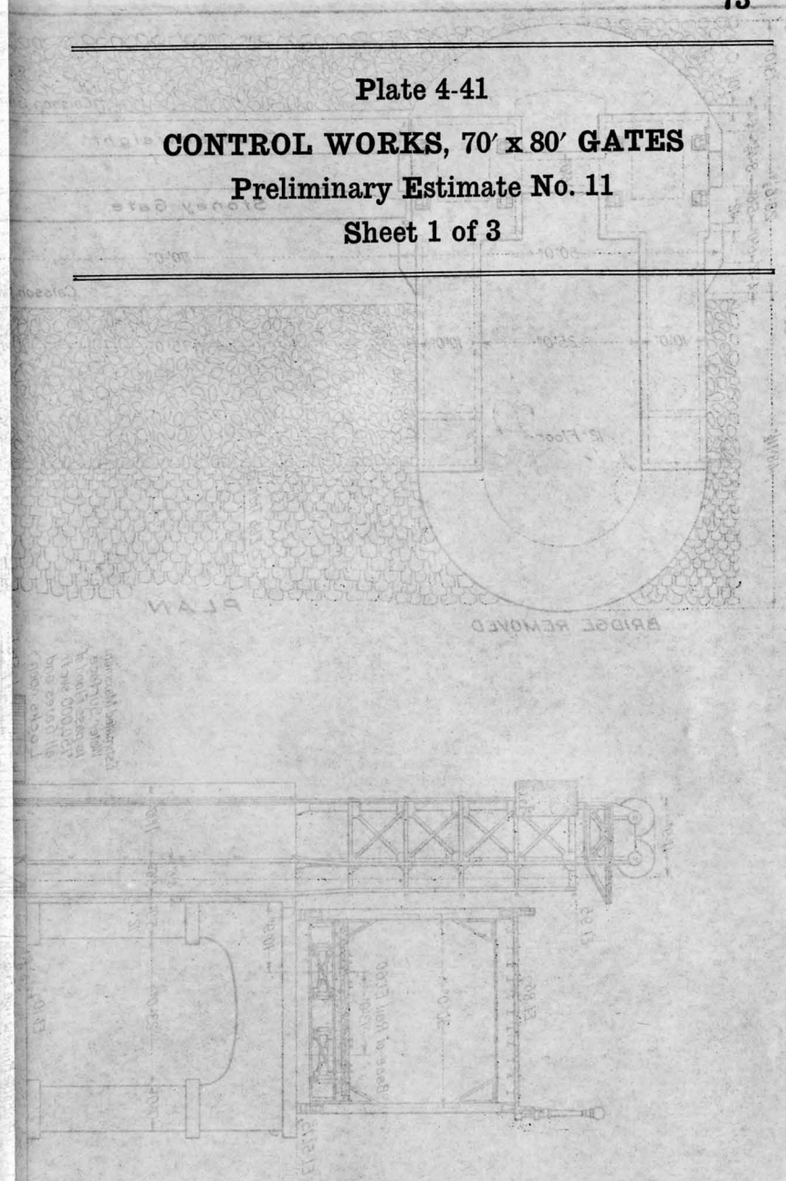
SV-111 | Ellensburg Wash July 28, 1926. | 193-D-63

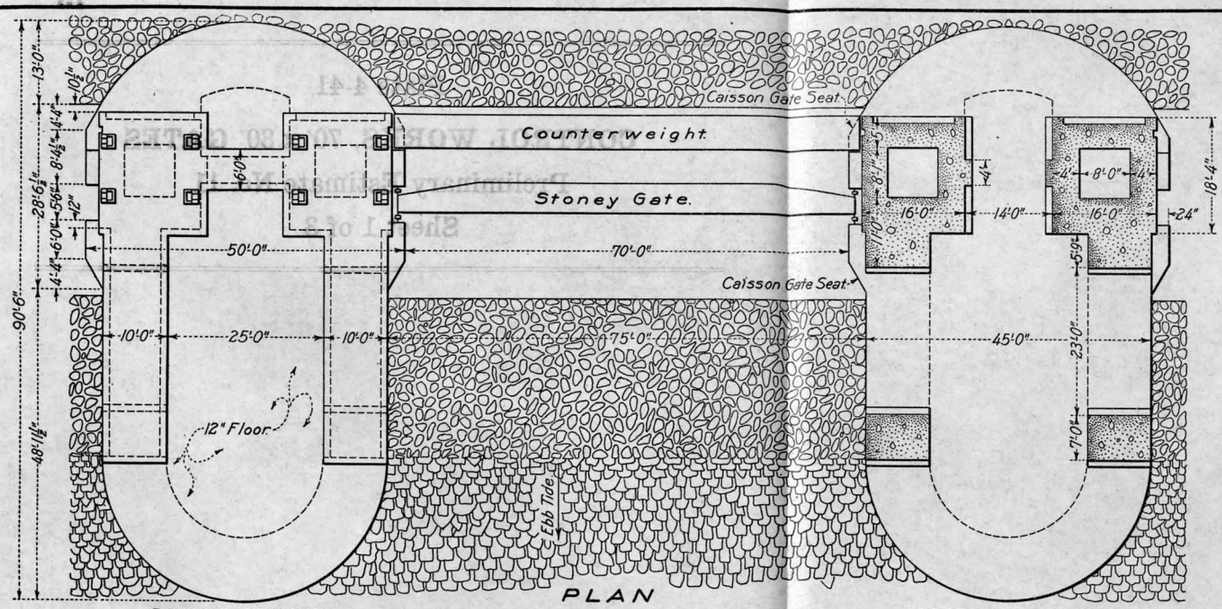
Plate 4-41

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 11

Sheet 1 of 3

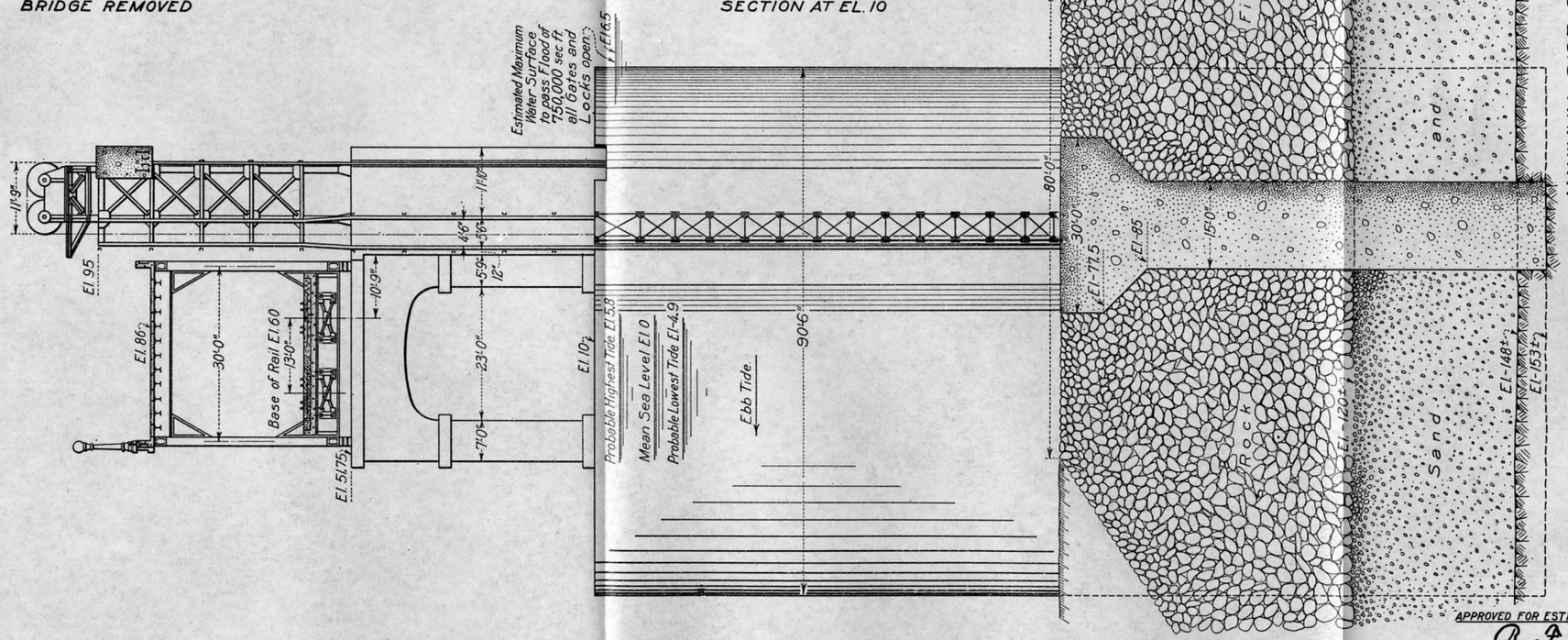




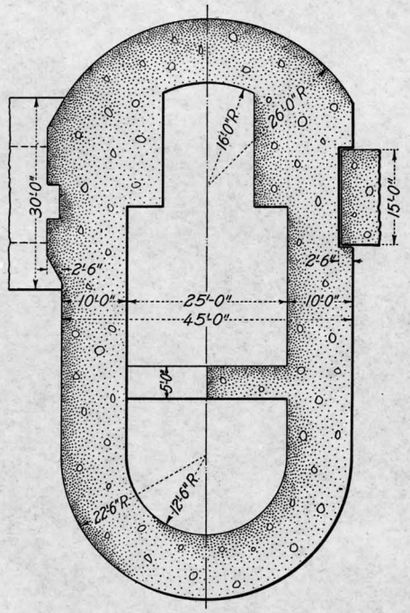
BRIDGE REMOVED

PLAN

SECTION AT EL. 10



MAXIMUM SIDE ELEVATION



ABOVE EL.-70 BELOW EL.-90
HALF SECTIONAL PLANS

Notes:-

Maximum Elevation of Base of Rail and lowest Elevation of Bed Rock do not actually occur in the same Section.

Sides of Piers to be gunited above low water after removal of Caisson Skin Plates.

Caisson Steel which is left in Place in Substructure and Reinforcing Steel in Bridge not shown.

12'0 5' 10' 20' 30' 40'

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:-
R. F. Walter
CHIEF ENGINEER.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS- 70' x 80' GATE
PRELIMINARY ESTIMATE NO. 11

DRAWN: G.M.J.: C.A.M. SUBMITTED: W. H. Hamg.
CHECKED: N.B.H RECOMMENDED: J. L. Savage

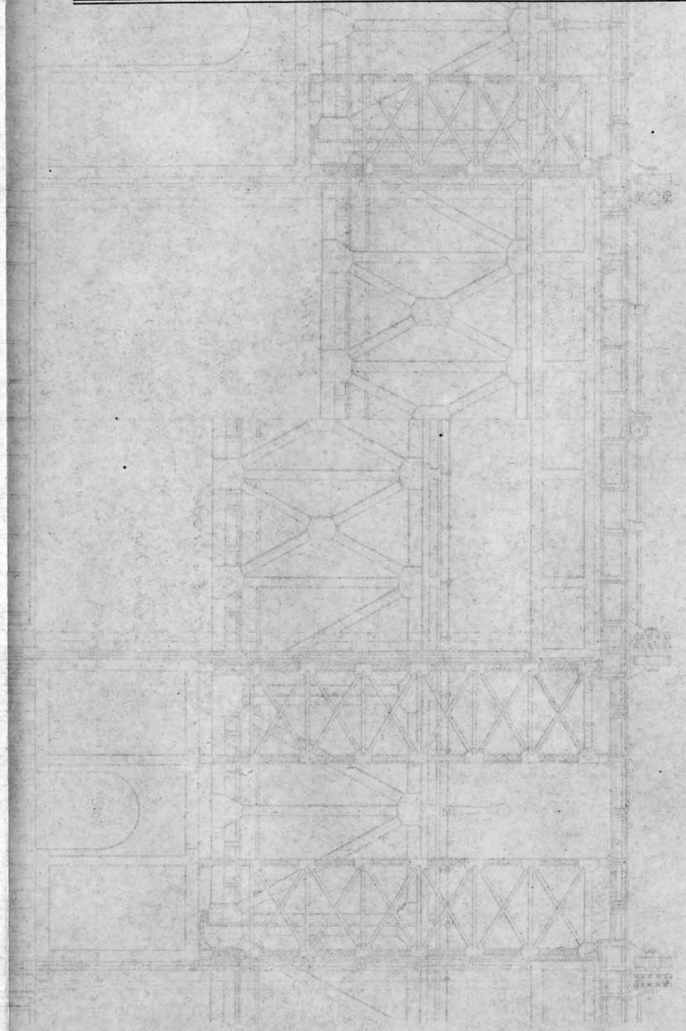
SV-112 | Ellensburg Wash. July 30, 1926. Sheet 1 of 3 | 193-D-64

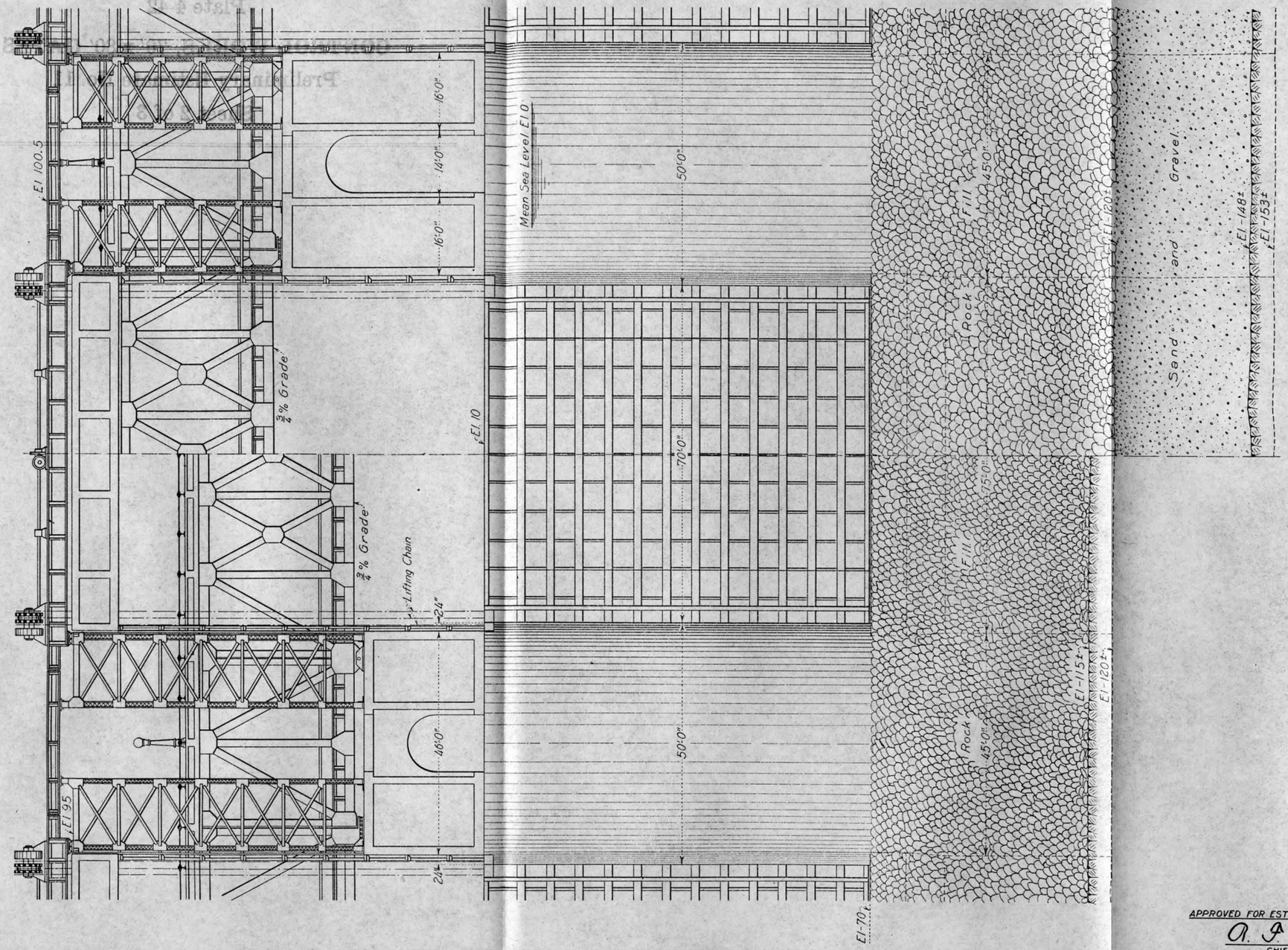
Plate 4-42

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 11

Sheet 2 of 3





HALF UPSTREAM ELEVATIONS

Notes:-
Sides of Piers to be gunited above low Water after removal of Caisson Skin Plates.
Caisson Steel which is left in place in Substructure not shown.

Scale.

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS- 70' x 80' GATE
PRELIMINARY ESTIMATE NO. 11

DRAWN: C.M.J. C.A.M. SUBMITTED: W. R. Young
CHECKED: N.B.H. RECOMMENDED: J. L. Savage

APPROVED FOR ESTIMATING PURPOSES-
A. F. Walter
CHIEF ENGINEER.

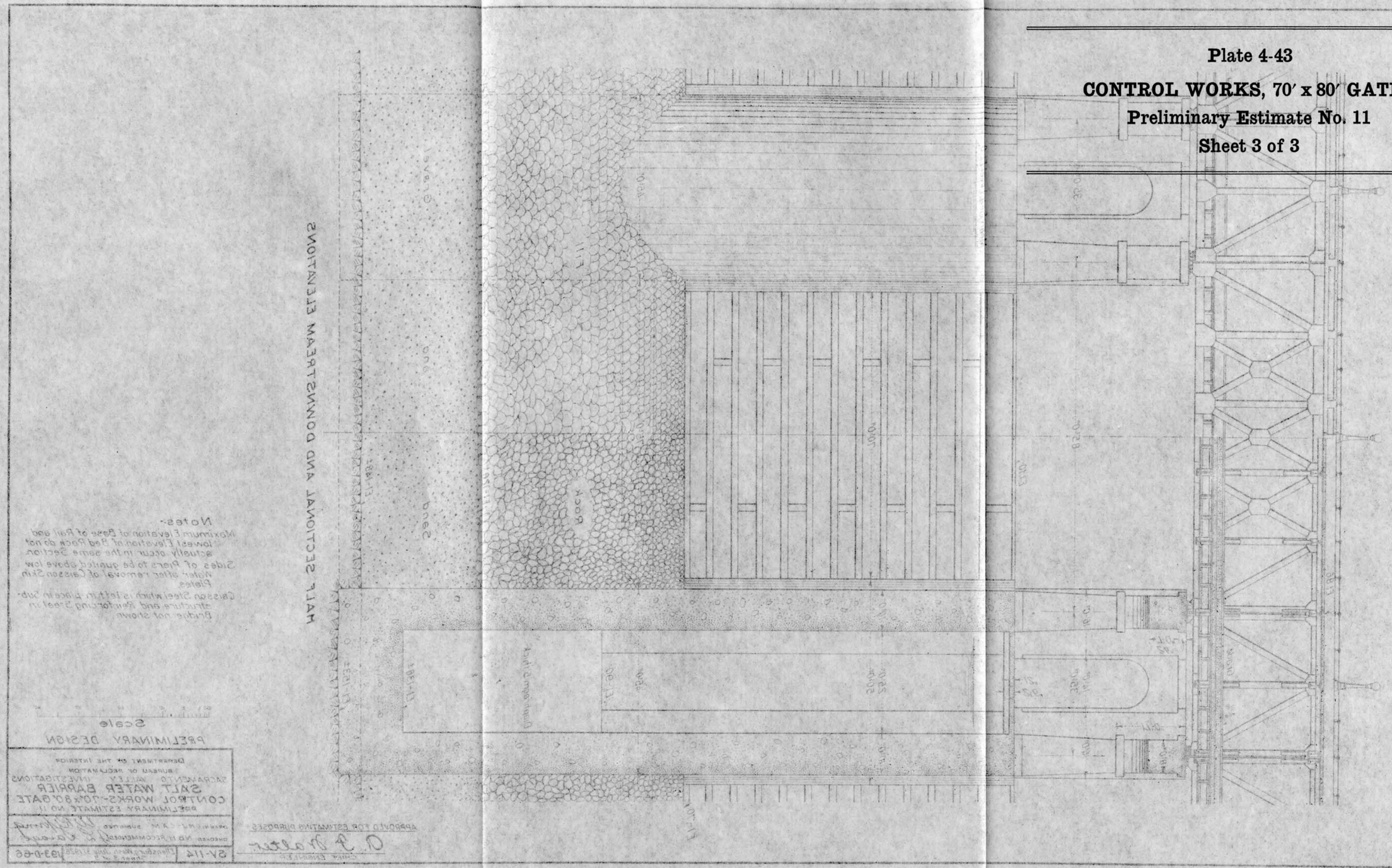
SV-113 | Ellensburg, Wash. July 31, 1926 Sheet 2 of 9 | 193-D-65

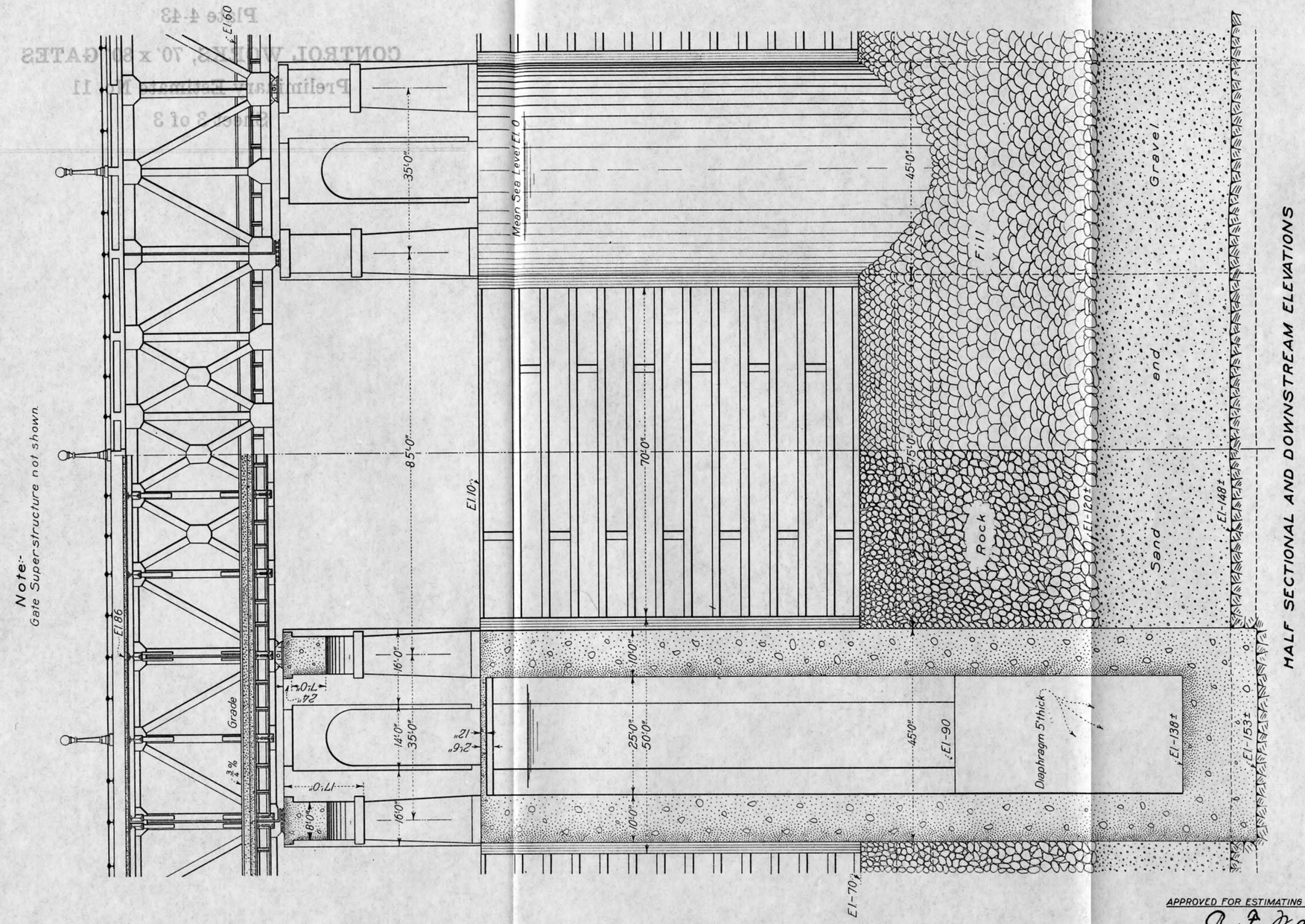
Plate 4-43

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 11

Sheet 3 of 3





HALF SECTIONAL AND DOWNSTREAM ELEVATIONS

Note:-
Gate Superstructure not shown.

Notes:-
Maximum Elevation of Base of Rail and lowest Elevation of Bed Rock do not actually occur in the same Section.
Sides of Piers to be gunited above low Water after removal of Caisson Skin Plates.
Caisson Steel which is left in place in Substructure and Reinforcing Steel in Bridge not shown.

Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:-
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS- 70'x80' GATE
PRELIMINARY ESTIMATE NO. 11

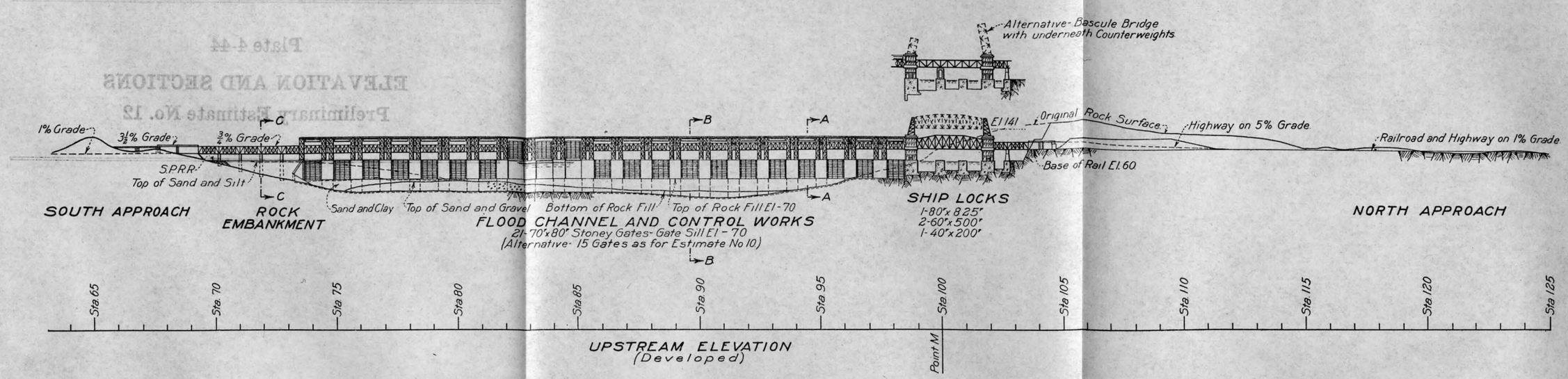
DRAWN: C.M.J.- C.A.M. SUBMITTED: W. R. Young
CHECKED: N.B.H. RECOMMENDED: J. L. Savage

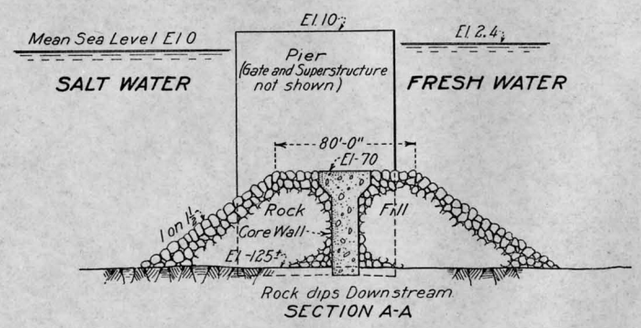
SV-114 | Ellensburg, Wash. July 31, 1926. Sheet 3 of 3 | 193-D-66

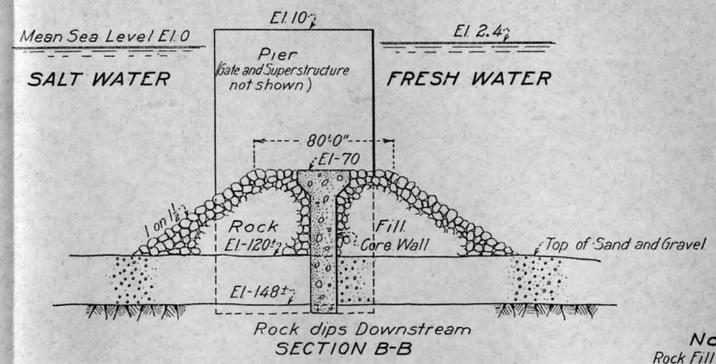
Plate 4-44

ELEVATION AND SECTIONS

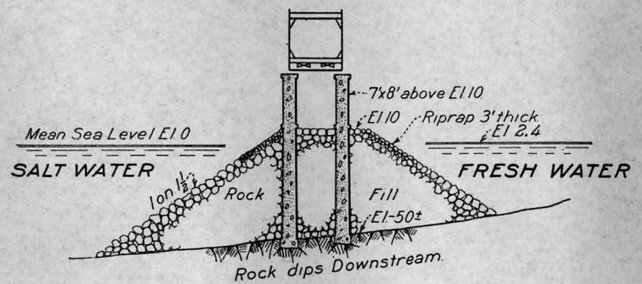
Preliminary Estimate No. 12







EMBANKMENT SECTIONS



Notes:-

Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft. Remainder to be placed by Derrick Barges and Skips

Sections A-A and B-B show Rock Fill deposited around Core Wall under Stoney Gates where action of Current is negligable below El-70

Section C-C shows Embankment placed inside South Cofferdam. Alternative Estimate No 12, gives cost with only 15 Flood Gates, located as for Estimate No 10

0 10' 50' 100' 150
Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:-
R. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO. 12

DRAWN: C.M.J-L.T.F-C.A.M SUBMITTED: W. R. Young
CHECKED: N.B.H RECOMMENDED: J. L. Savage

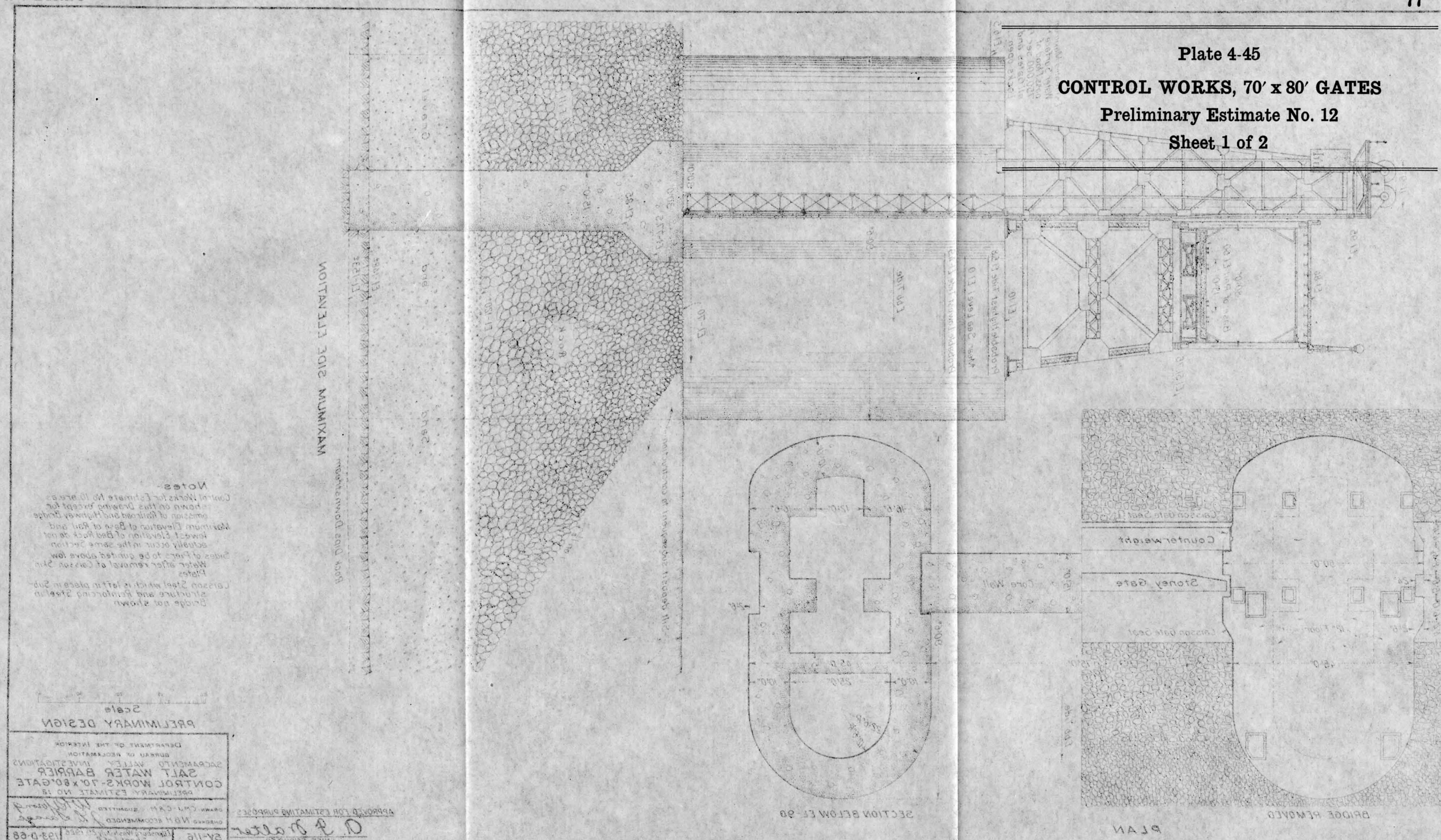
SV-115 | Ellensburg, Wash. July 19, 1926. | 193-D-67

Plate 4-45

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 12

Sheet 1 of 2



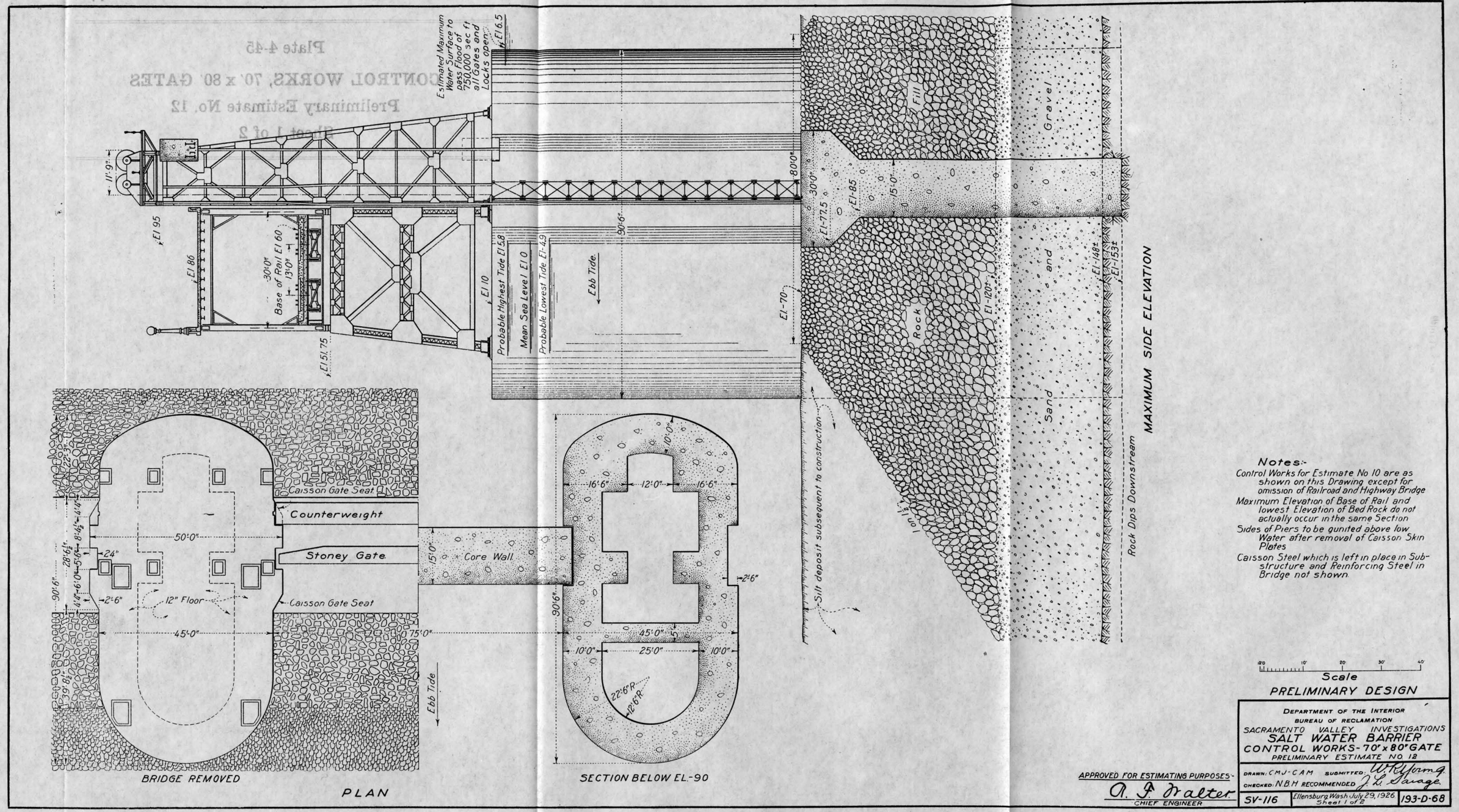
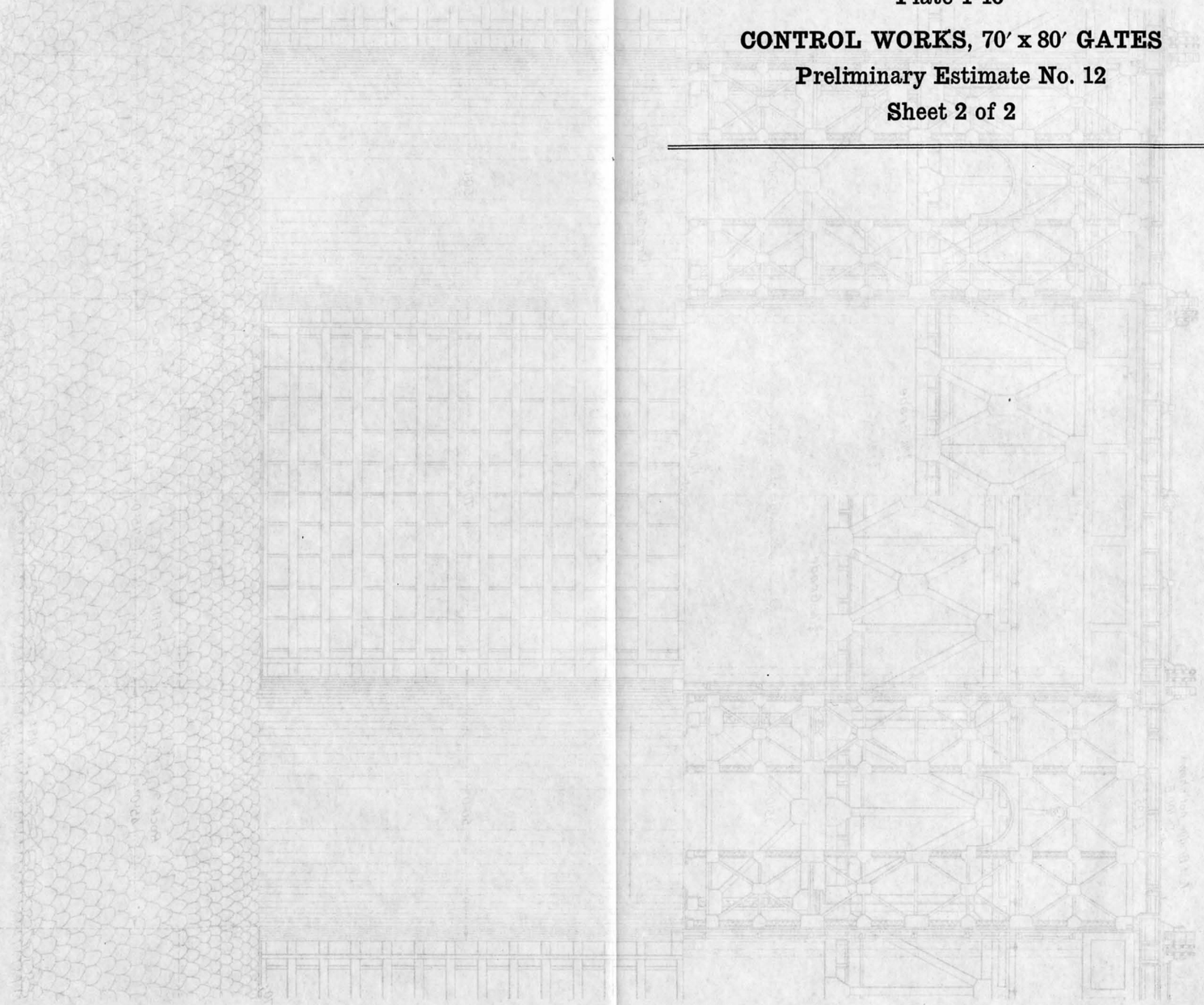

Estimated Maximum Water Surface to pass Flood of 750,000 sec ft all Gates and Locks open
El 16.5
11'-9"
El 95
El 86
30'-0"
Base of Rail El 60
13'-0"
El 51.75
El 110
Probable Highest Tide El 5.8
Mean Sea Level El 0
Probable Lowest Tide El -4.9
Ebb Tide
90'-6"
El -70
80'-0"
30'-0"
El -77.5
El -85
15'-0"
Fill
Gravel
Rock
Sand
El -120±
El -148±
El -153±
Silt deposit subsequent to construction
Rock Dips Downstream
MAXIMUM SIDE ELEVATION
Caisson Gate Seat
Counterweight
Stoney Gate
Core Wall
50'-0"
24"
2'-6"
12" Floor
45'-0"
75'-0"
15'-0"
Caisson Gate Seat
Ebb Tide
BRIDGE REMOVED
PLAN
16'-6"
12'-0"
16'-6"
10'-0"
2'-6"
90'-6"
45'-0"
10'-0"
25'-0"
10'-0"
22'-6" R
12'-6" R
SECTION BELOW EL-90
Notes:-
Control Works for Estimate No 10 are as shown on this Drawing except for omission of Railroad and Highway Bridge
Maximum Elevation of Base of Rail and lowest Elevation of Bed Rock do not actually occur in the same Section
Sides of Piers to be gunited above low Water after removal of Caisson Skin Plates
Caisson Steel which is left in place in Substructure and Reinforcing Steel in Bridge not shown.
Scale
PRELIMINARY DESIGN
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS-70' x 80' GATE
PRELIMINARY ESTIMATE NO 12
DRAWN: C.M.J-C.A.M. SUBMITTED: W. H. Lyons
CHECKED: N.B.H. RECOMMENDED: J. L. Savage
APPROVED FOR ESTIMATING PURPOSES:-
A. F. Walter
CHIEF ENGINEER
SV-116
Ellensburg Wash July 29, 1926
Sheet 1 of 2
193-D-68

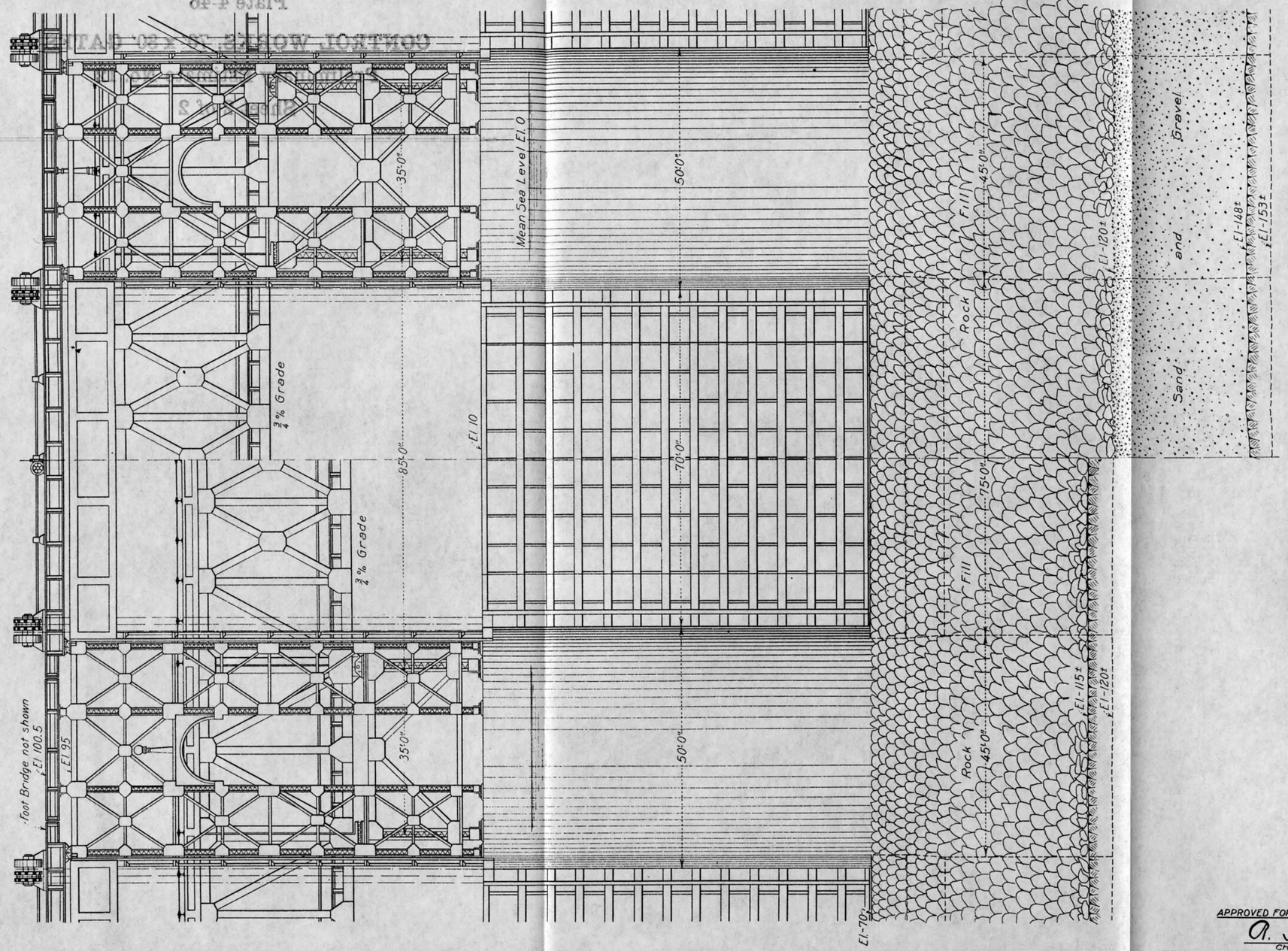
Plate 4-46

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 12

Sheet 2 of 2





HALF UPSTREAM ELEVATIONS

Notes:-

Control Works for Estimate No. 10 are as shown on this Drawing except for omission of Railroad and Highway Bridge.

Sides of Piers to be gunited above low Water after removal of Caisson Skin Plates

Caisson Steel which is left in place in Substructure not shown

12'0 5 10' 20 30' 40'

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS-70'x80' GATE
PRELIMINARY ESTIMATE NO. 12

DRAWN: C.M.J.-C.A.M. SUBMITTED W. H. Young
CHECKED: N.B.H. RECOMMENDED J. L. Savage

APPROVED FOR ESTIMATING PURPOSES:
A. P. Walter
CHIEF ENGINEER

SV-117 | Ellensburg Wash. Aug. 2, 1926 Sheet 2 of 8 | 193-D-69

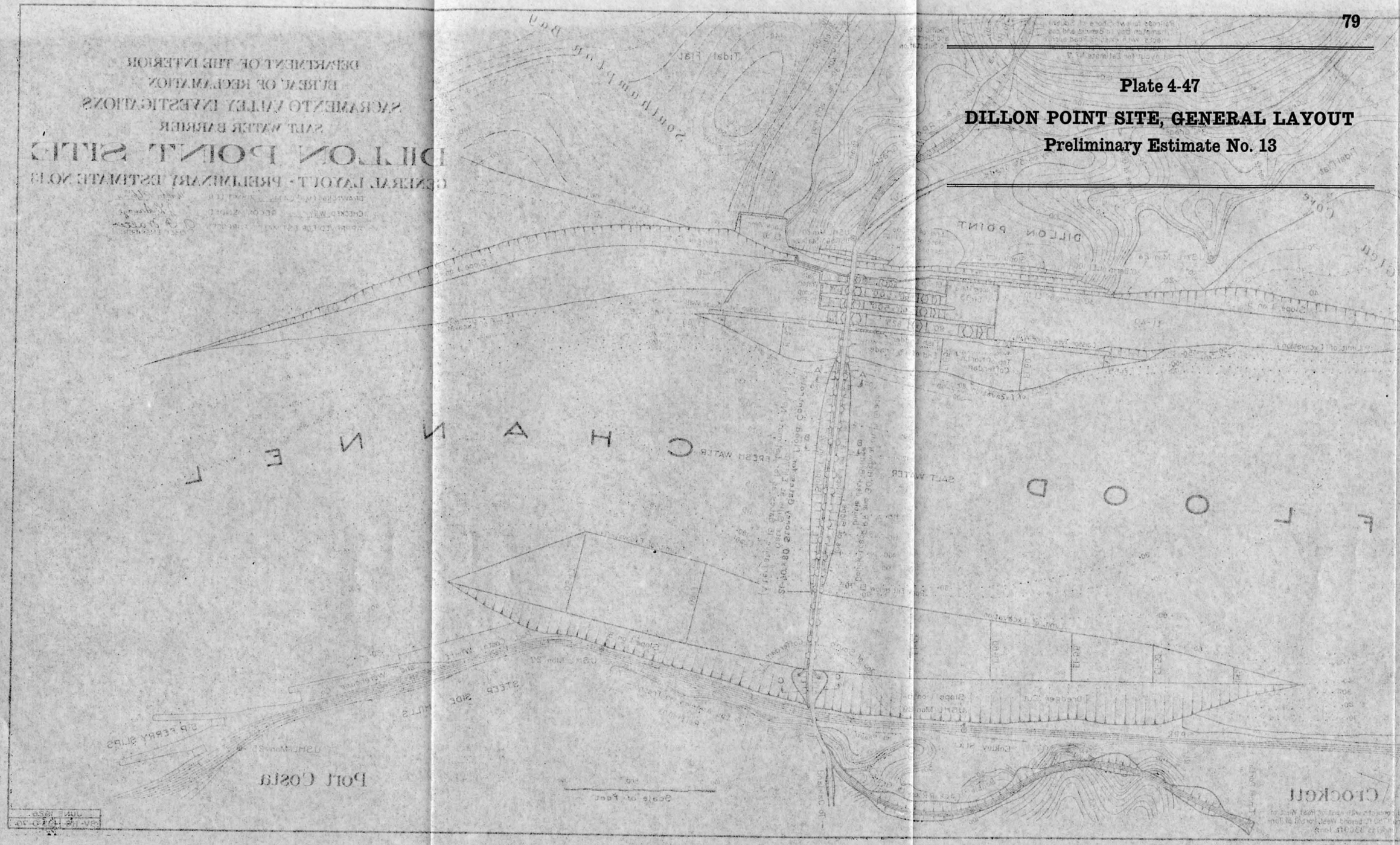


Plate 4-47

DILLON POINT SITE, GENERAL LAYOUT

Preliminary Estimate No. 13

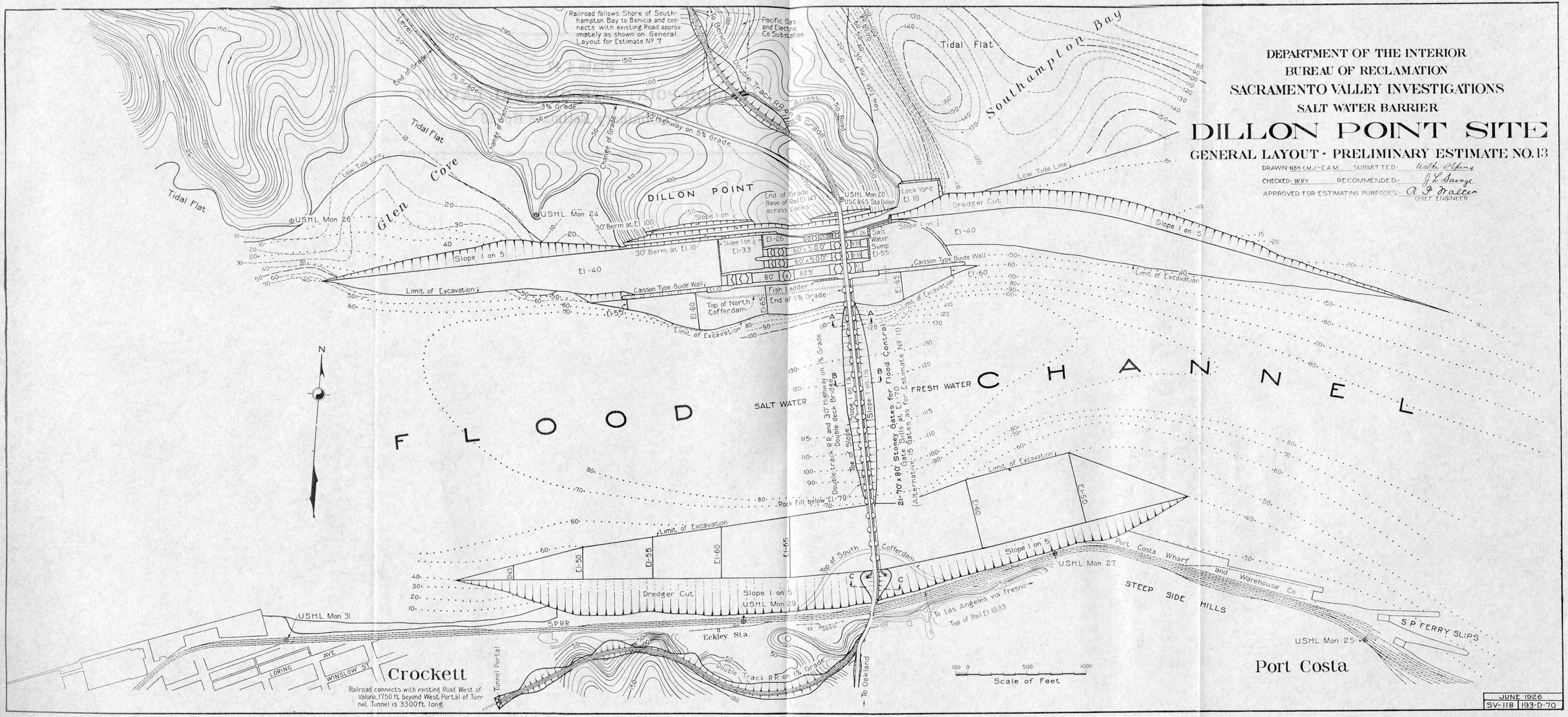
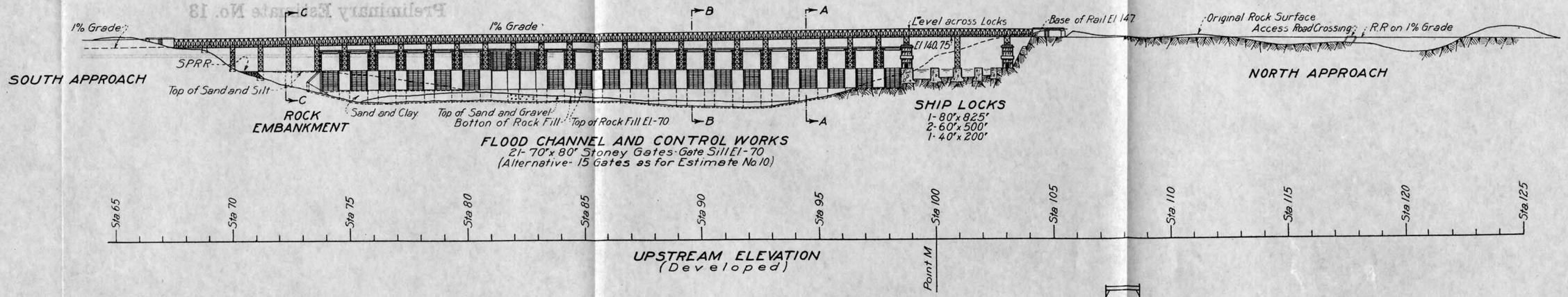
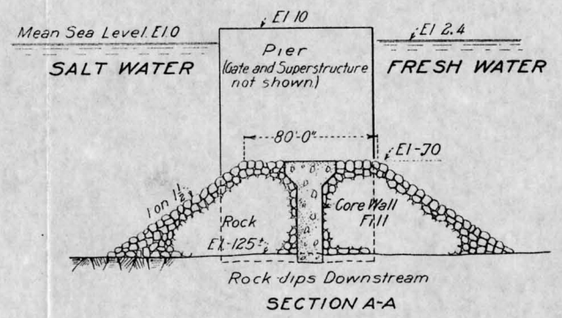

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT SITE
GENERAL LAYOUT - PRELIMINARY ESTIMATE NO. 13
DRAWN-NBH-CMJ-CAM SUBMITTED-
CHECKED-WRY RECOMMENDED-
APPROVED FOR ESTIMATING PURPOSES-
CHIEF ENGINEER
Railroad follows Shore of Southampton Bay to Benicia and connects with existing Road approximately as shown on General Layout for Estimate No 7
Pacific Gas and Electric Co Substation
Southampton Bay
Tidal Flat
Glen Cove
DILLON POINT
30' Highway on 5% Grade
Double Track RR on 1% Grade
Lock Yard El 10
Dredger Cut
Slope 1 on 5
Limit of Excavation
Caisson Type Guide Wall
Salt Water Sump
Fish Ladder
Top of North Cofferdam
End of Grade
Base of Rail El 14.7 across Locks
USHL Mon 20
USC&GS Sta Dillon
USHL Mon 26
USHL Mon 24
30' Berm at El 10
El-40
El-26
El-33
El-55
El-60
El-65
60' x 5.0'
80'
825'
FLOOD CHANNEL
SALT WATER
FRESH WATER
21-70' x 8.0' Stoney Gates for Flood Control
Gate Sills at El 7.0
(Alternative: 15 Gates, as for Estimate No 10)
Rock Fill below El -7.0
Top of Slope
Double-track RR and 30' Highway on 1% Grade
Double deck Bridge
Top of South Cofferdam
USHL Mon 27
Port Costa Wharf and Warehouse Co
STEEP SIDE HILLS
S P FERRY SLIPS
USHL Mon 25
Port Costa
USHL Mon 29
Eckley Sta
Double Track RR on 1% Grade
To Los Angeles via Fresno
Top of Rail El 10.03
To Oakland
Tunnel Portal
USHL Mon 31
SPRR
LORING AVE
WINSLOW ST
Crockett
Railroad connects with existing Road West of Valona, 1750 ft. beyond West Portal of Tunnel. Tunnel is 3300 ft. long.
Scale of Feet
JUNE 1926
SV-118 193-D-70

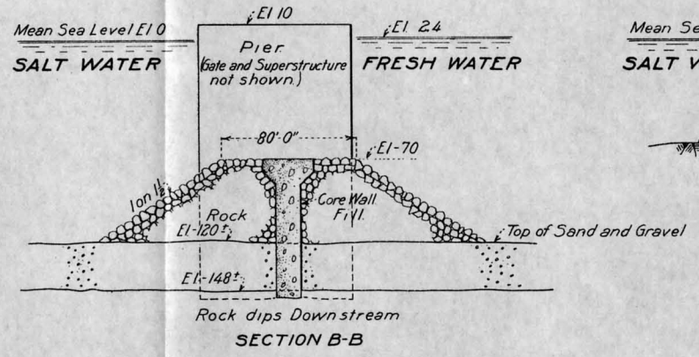
Plate 4-48

ELEVATION AND SECTIONS

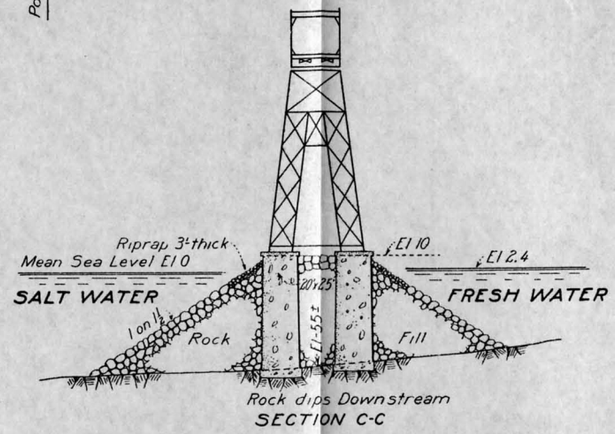
Preliminary Estimate No. 13







EMBANKMENT SECTIONS



Notes.-

Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft Remainder to be placed by Derrick Barges and Skips

Section A-A and B-B show Rock Fill to be deposited around Core Wall under Stoney Gates where action of Current is negligable below El-70

Section C-C shows Embankment placed inside of South Cofferdam.

Alternative Estimate No 13 gives Cost with only 15 Flood Gates, located as for Estimate No. 10.

0 10 50 100 150'

Scale

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 13

DRAWN: C.M.J. L.T. C.A.M. SUBMITTED: W. H. Sperry
CHECKED: N.B.H. RECOMMENDED: J. L. Savage

APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

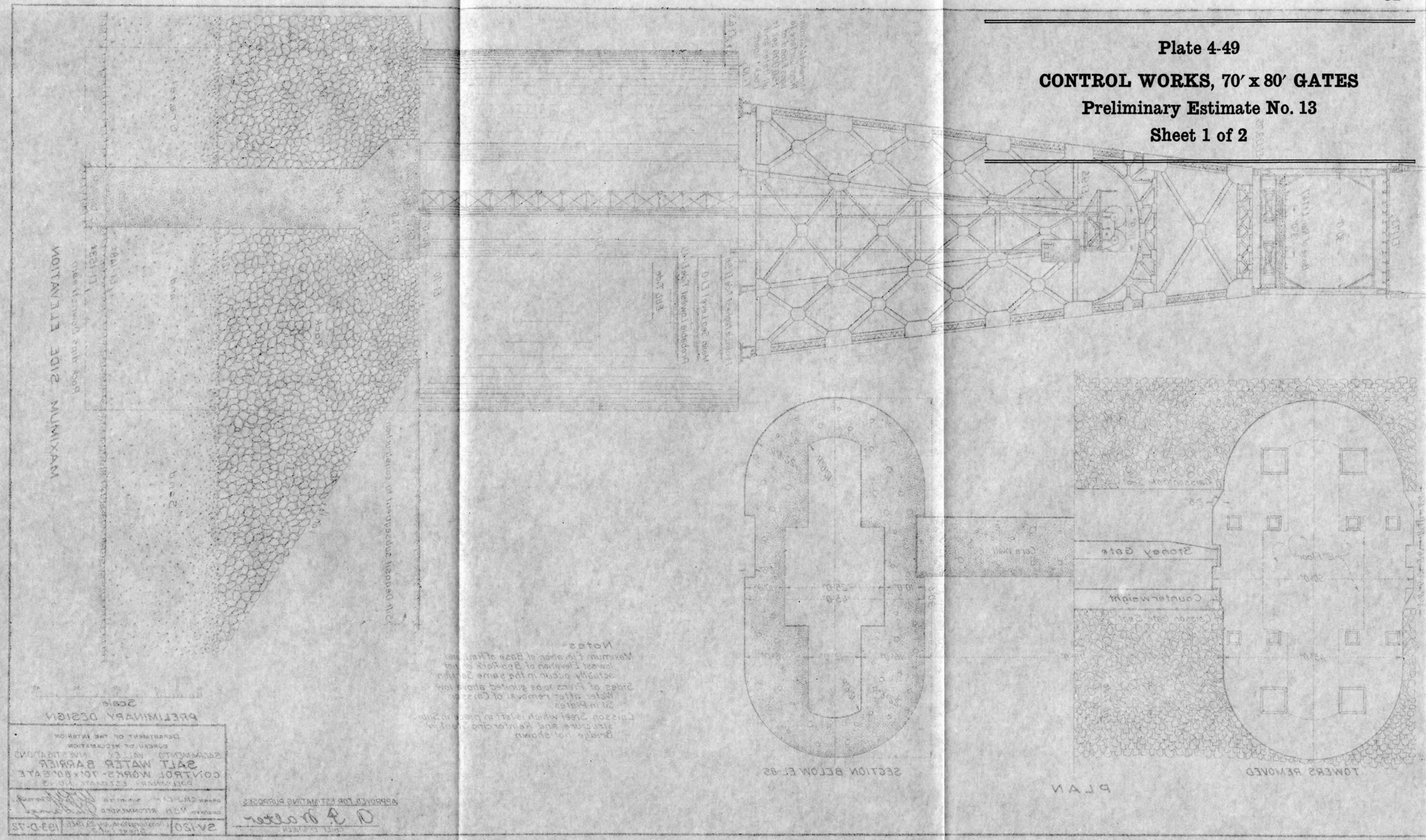
SV-119 | Ellensburg, Wash. July 23, 1926 | 193-D-71

Plate 4-49

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 13

Sheet 1 of 2



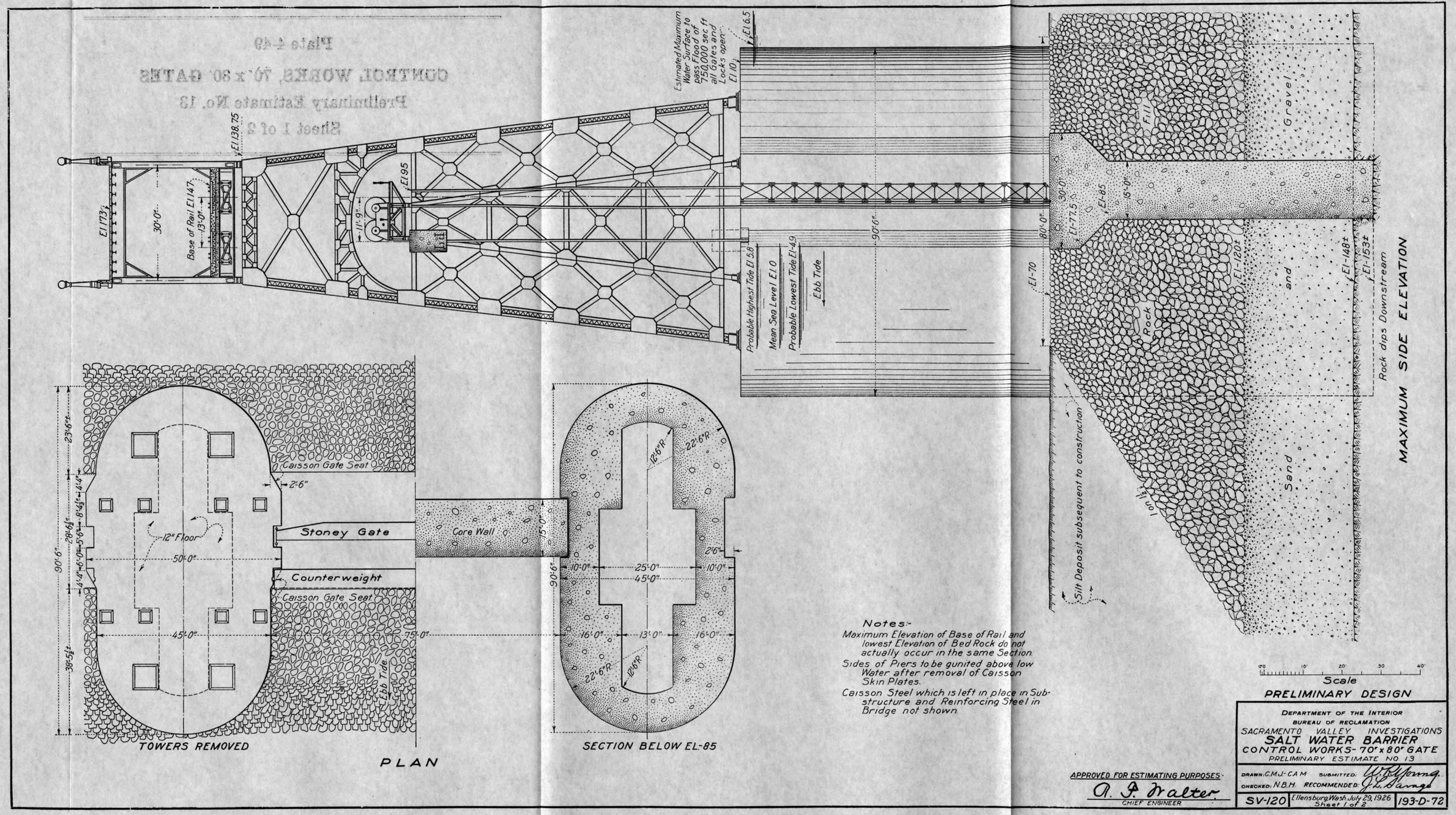
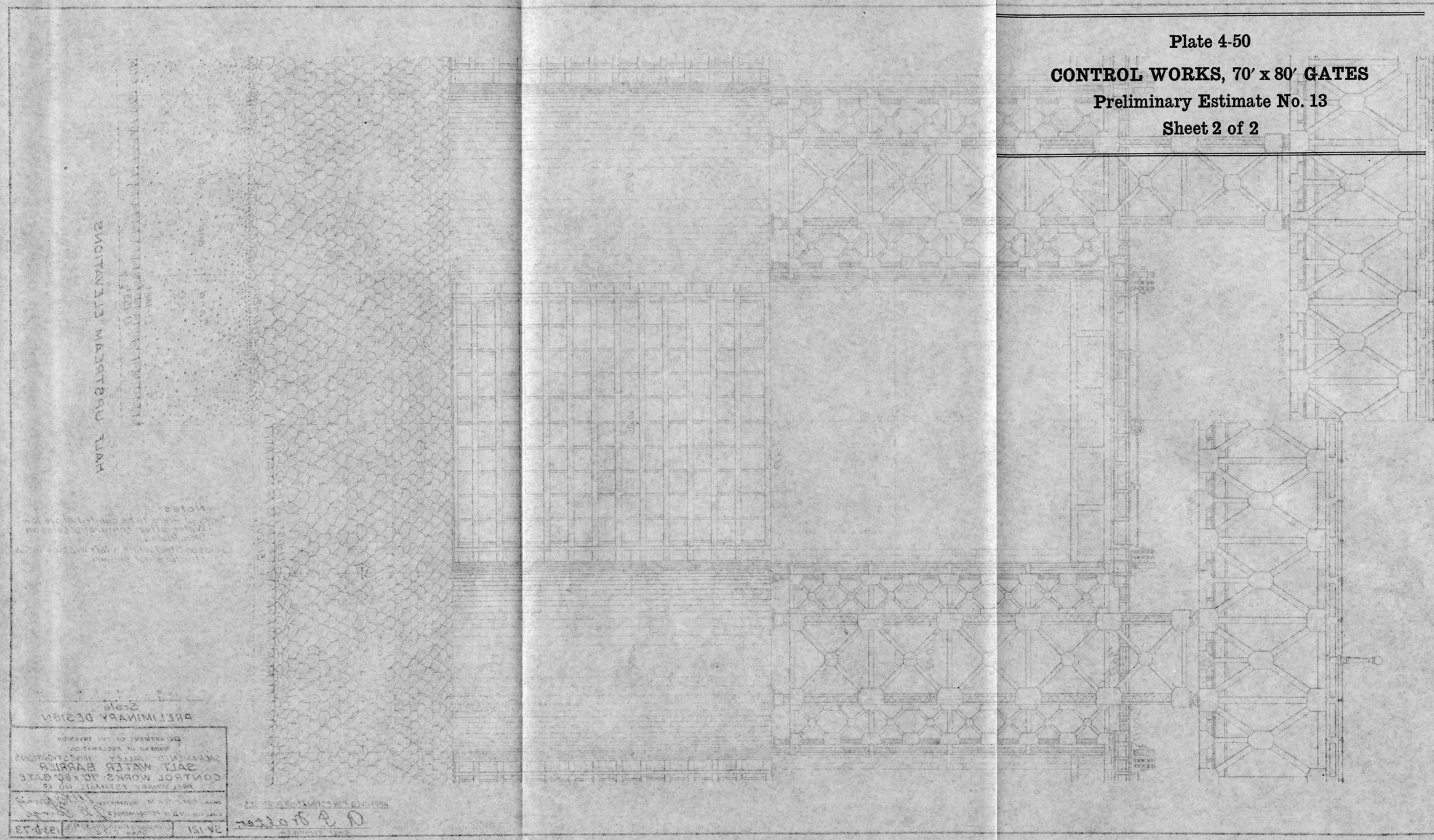

Estimated Maximum Water Surface to pass Flood of 750,000 sec ft all Gates and Locks open
El 6.5
El 10
El 138.75
El 173
30'-0"
Base of Rail El 147
13'-0"
El 95
11'-9"
Probable Highest Tide El 5.8
Mean Sea Level El 0
Probable Lowest Tide El -4.9
Ebb Tide
90'-6"
El -70
80'-0"
30'-0"
El -77.5
El -85
15'-0"
Fill
Gravel
El -120±
El -148±
El -153±
Rock
and
Sand
Rock dips Downstream
Silt Deposit subsequent to construction
1 on 1½
MAXIMUM SIDE ELEVATION
Caisson Gate Seat
2'-6"
Stoney Gate
12" Floor
50'-0"
Counterweight
Caisson Gate Seat
45'-0"
75'-0"
Ebb Tide
90'-6"
23'-6"
28'-6½"
8'-4½"
4'-4"
5'-6"
6'-0"
4'-4"
38'-5½"
TOWERS REMOVED
PLAN
Core Wall
15'-0"
90'-6"
10'-0"
25'-0"
45'-0"
10'-0"
2'-6"
16'-0"
13'-0"
16'-0"
12'-6"R
22'-6"R
22'-6"R
12'-6"R
SECTION BELOW EL-85
Notes:-
Maximum Elevation of Base of Rail and lowest Elevation of Bed Rock do not actually occur in the same Section.
Sides of Piers to be gunited above low Water after removal of Caisson Skin Plates.
Caisson Steel which is left in place in Substructure and Reinforcing Steel in Bridge not shown.
0 10' 20' 30 40'
Scale
PRELIMINARY DESIGN
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS-70'x80' GATE
PRELIMINARY ESTIMATE NO 13
DRAWN: C.M.J.-C.A.M. SUBMITTED:
CHECKED: N.B.H. RECOMMENDED:
APPROVED FOR ESTIMATING PURPOSES:
A. P. Walter
CHIEF ENGINEER
SV-120
Ellensburg Wash. July 29, 1926
Sheet 1 of 2
193-D-72

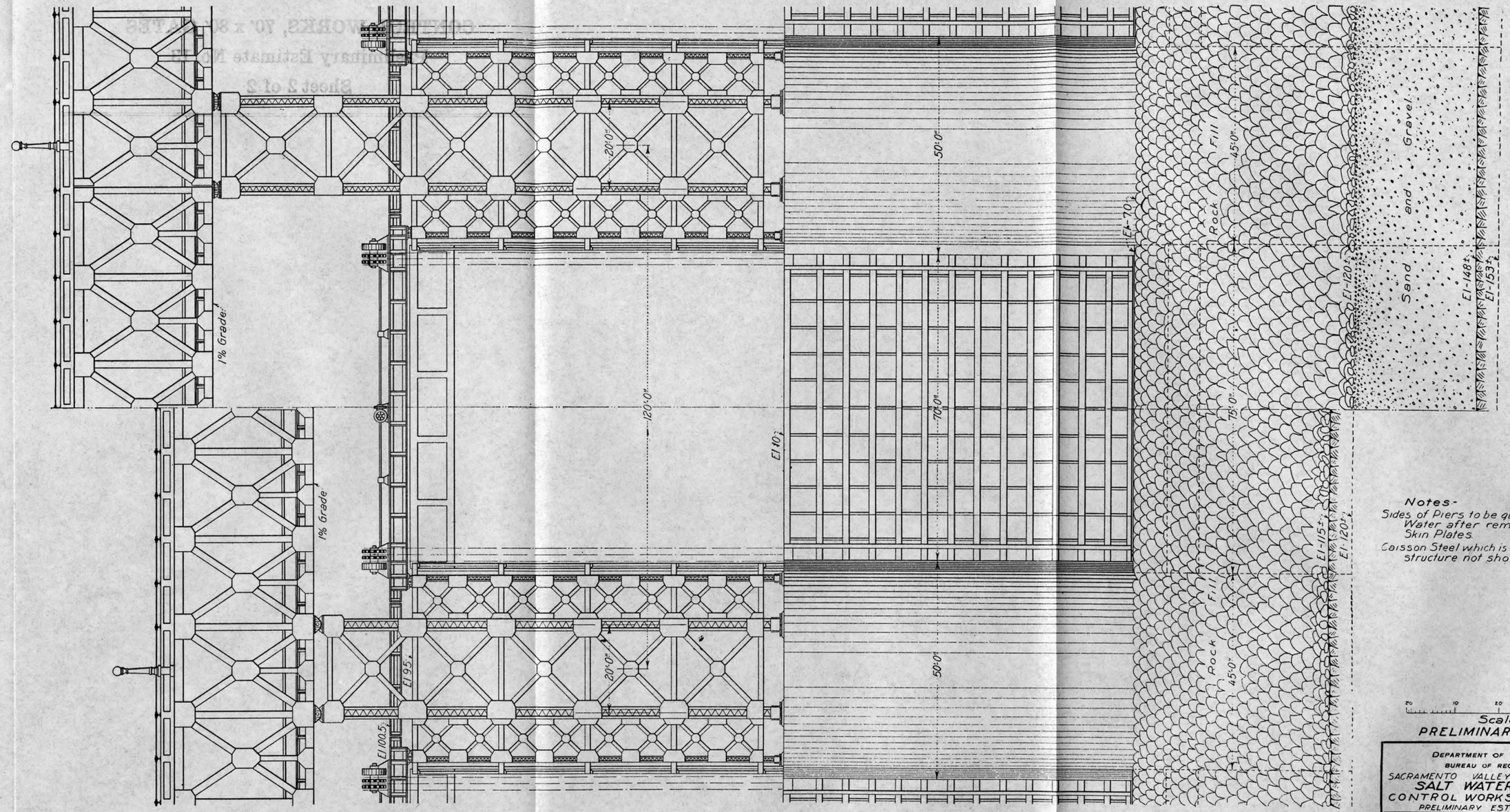
Plate 4-50

CONTROL WORKS, 70′ x 80′ GATES

Preliminary Estimate No. 13

Sheet 2 of 2





Notes-
Sides of Piers to be gunited above low Water after removal of Caisson Skin Plates.
Caisson Steel which is left in place in Substructure not shown.

Scale
PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CONTROL WORKS- 70' x 80' GATE
PRELIMINARY ESTIMATE NO. 13

DRAWN: C.M.J. C.A.M. SUBMITTED: W. H. Young
CHECKED: N.B.H. RECOMMENDED: J. B. Savage

SV-121 | Ellensburg, Wash. July 30, 1926 Sheet 2 of 2 | 193-D-73

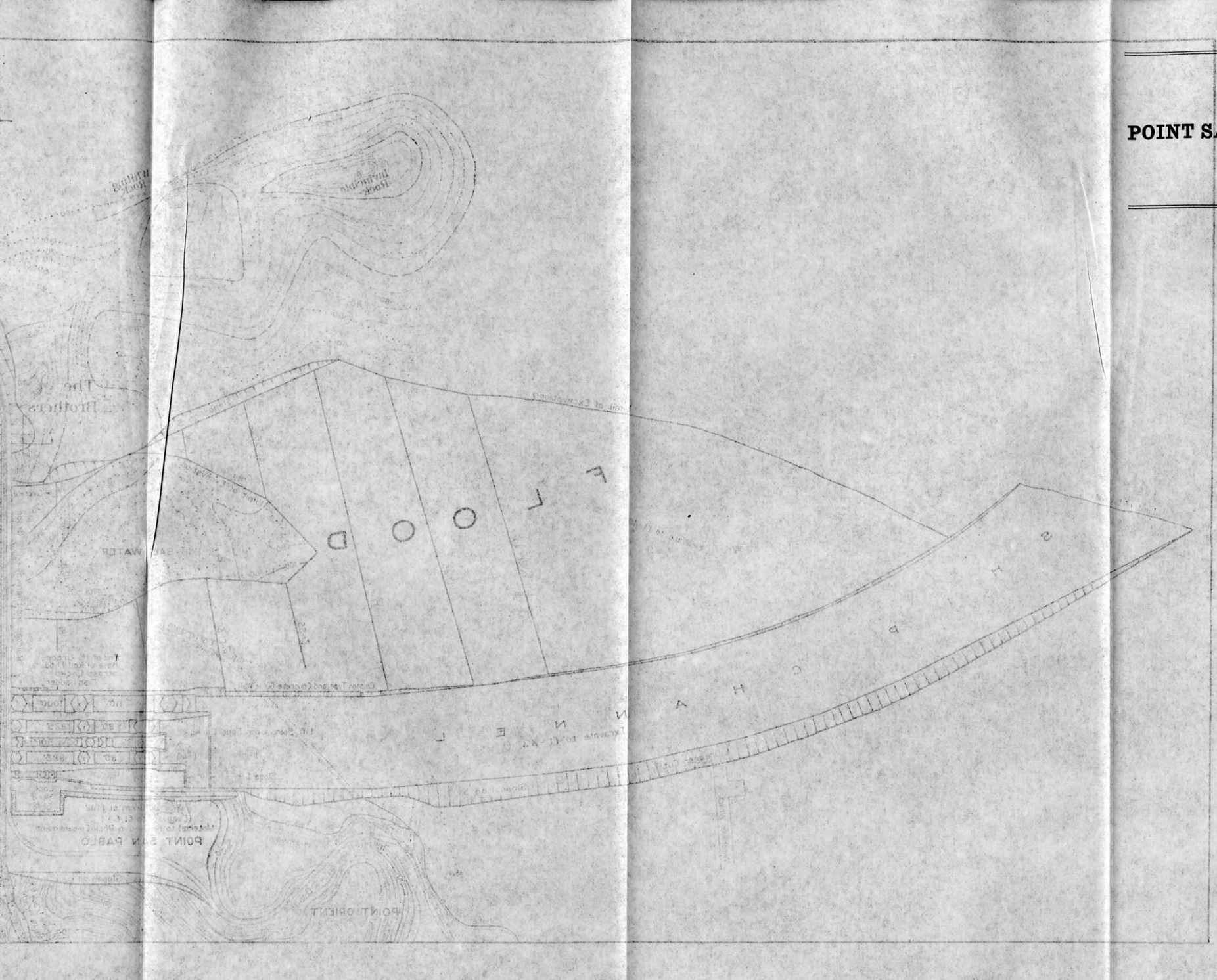


Plate 4-51

POINT SAN PABLO SITE, GENERAL LAYOUT

Preliminary Estimate No. 14

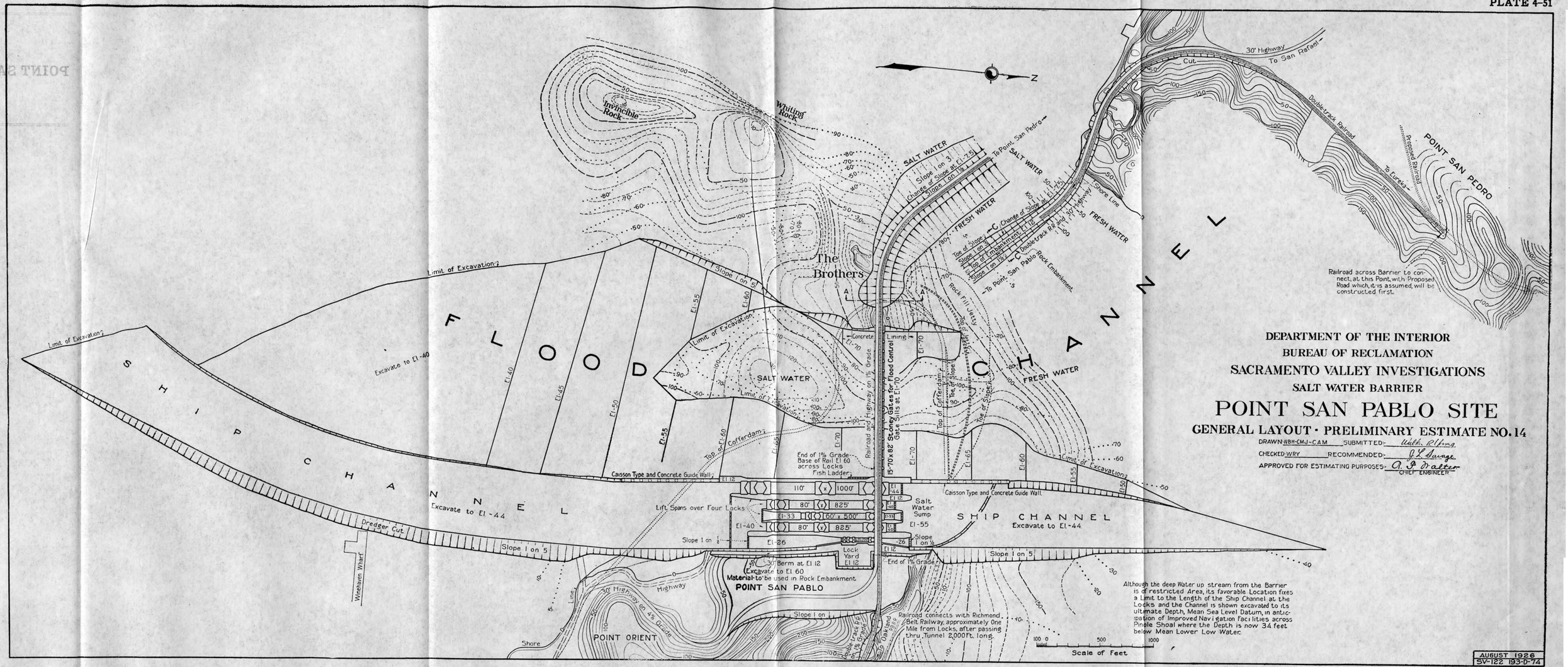
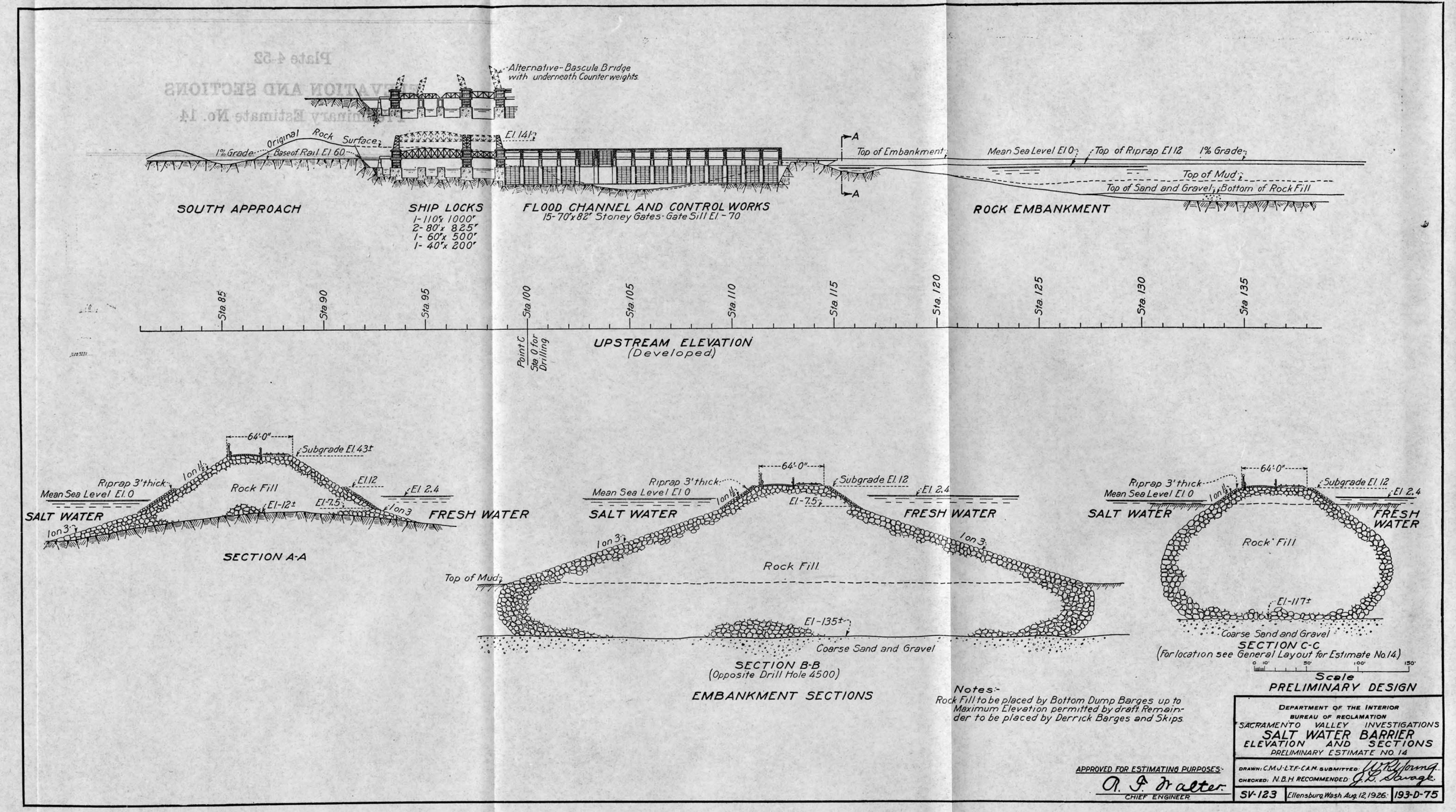

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
POINT SAN PABLO SITE
GENERAL LAYOUT · PRELIMINARY ESTIMATE NO. 14
DRAWN NBH-CMJ-CAM SUBMITTED: Walh. Rlong
CHECKED WRY RECOMMENDED: J. L. Savage
APPROVED FOR ESTIMATING PURPOSES: A. P. Walter
CHIEF ENGINEER
AUGUST 1926
SV-122 193-D-74
POINT SAN PEDRO
POINT SAN PABLO
POINT ORIENT
SHIP CHANNEL
FLOOD CHANNEL
SALT WATER
FRESH WATER
The Brothers
Invincible Rock
Whiting Rock
Winetavern Wharf
Dredger Cut
Limit of Excavation
Excavate to El -40
Excavate to El -44
Caisson Type and Concrete Guide Wall
Lift Spans over Four Locks
Salt Water Sump
Lock Yard El 12
Cofferdam
Railroad and Highway on 1% Grade
15-70x 82' Stoney Gates for Overflows at El 70 Flood Control
Rock Fill Jetty
Railroad across Barrier to connect, at this Point, with Proposed Road which, it is assumed, will be constructed first.
Although the deep Water up stream from the Barrier is of restricted Area, its favorable Location fixes a Limit to the Length of the Ship Channel at the Locks and the Channel is shown excavated to its ultimate Depth, Mean Sea Level Datum, in anticipation of Improved Navigation Facilities across Pinole Shoal where the Depth is now 34 feet below Mean Lower Low Water.
Railroad connects with Richmond Belt Railway, approximately One Mile from Locks, after passing thru Tunnel 2,000 Ft. long.
Scale of Feet

Plate 4-52

ELEVATION AND SECTIONS

Preliminary Estimate No. 14


Alternative-Bascule Bridge with underneath Counterweights
Original Rock Surface
1% Grade
Base of Rail El 60
El 141
A
A
Top of Embankment
Mean Sea Level El 0
Top of Riprap El 12
1% Grade
Top of Mud
Top of Sand and Gravel
Bottom of Rock Fill
SOUTH APPROACH
SHIP LOCKS
1-110'x 1000'
2-80'x 825'
1-60'x 500'
1-40'x 200'
FLOOD CHANNEL AND CONTROL WORKS
15-70'x 82' Stoney Gates-Gate Sill El - 70
ROCK EMBANKMENT
Sta 85
Sta 90
Sta 95
Sta 100
Sta 105
Sta 110
Sta 115
Sta 120
Sta 125
Sta 130
Sta 135
Point C
Sta 0 for Drilling
UPSTREAM ELEVATION
(Developed)
64'-0"
Subgrade El 43±
Riprap 3' thick
1 on 1½
Mean Sea Level El 0
Rock Fill
El 12
El 2.4
El-12±
El-7.5
1 on 3
SALT WATER
FRESH WATER
1 on 3
SECTION A-A
64'-0"
Riprap 3' thick
Subgrade El 12
Mean Sea Level El 0
1 on 1½
El 2.4
El-7.5
SALT WATER
FRESH WATER
1 on 3
1 on 3
Rock Fill
Top of Mud
El-135±
Coarse Sand and Gravel
SECTION B-B
(Opposite Drill Hole 4500)
EMBANKMENT SECTIONS
64'-0"
Riprap 3' thick
Subgrade El 12
Mean Sea Level El 0
1 on 1½
El 2.4
SALT WATER
FRESH WATER
Rock Fill
El-117±
Coarse Sand and Gravel
SECTION C-C
(For location see General Layout for Estimate No. 14)
0 10' 50' 100' 150'
Scale
PRELIMINARY DESIGN
Notes:-
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft. Remainder to be placed by Derrick Barges and Skips.
APPROVED FOR ESTIMATING PURPOSES:-
A. F. Walter
CHIEF ENGINEER
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 14
DRAWN: C.M.J.-L.T.F.-C.A.N. SUBMITTED:
CHECKED: N.B.H. RECOMMENDED:
SV-123
Ellensburg, Wash. Aug. 12, 1926
193-D-75

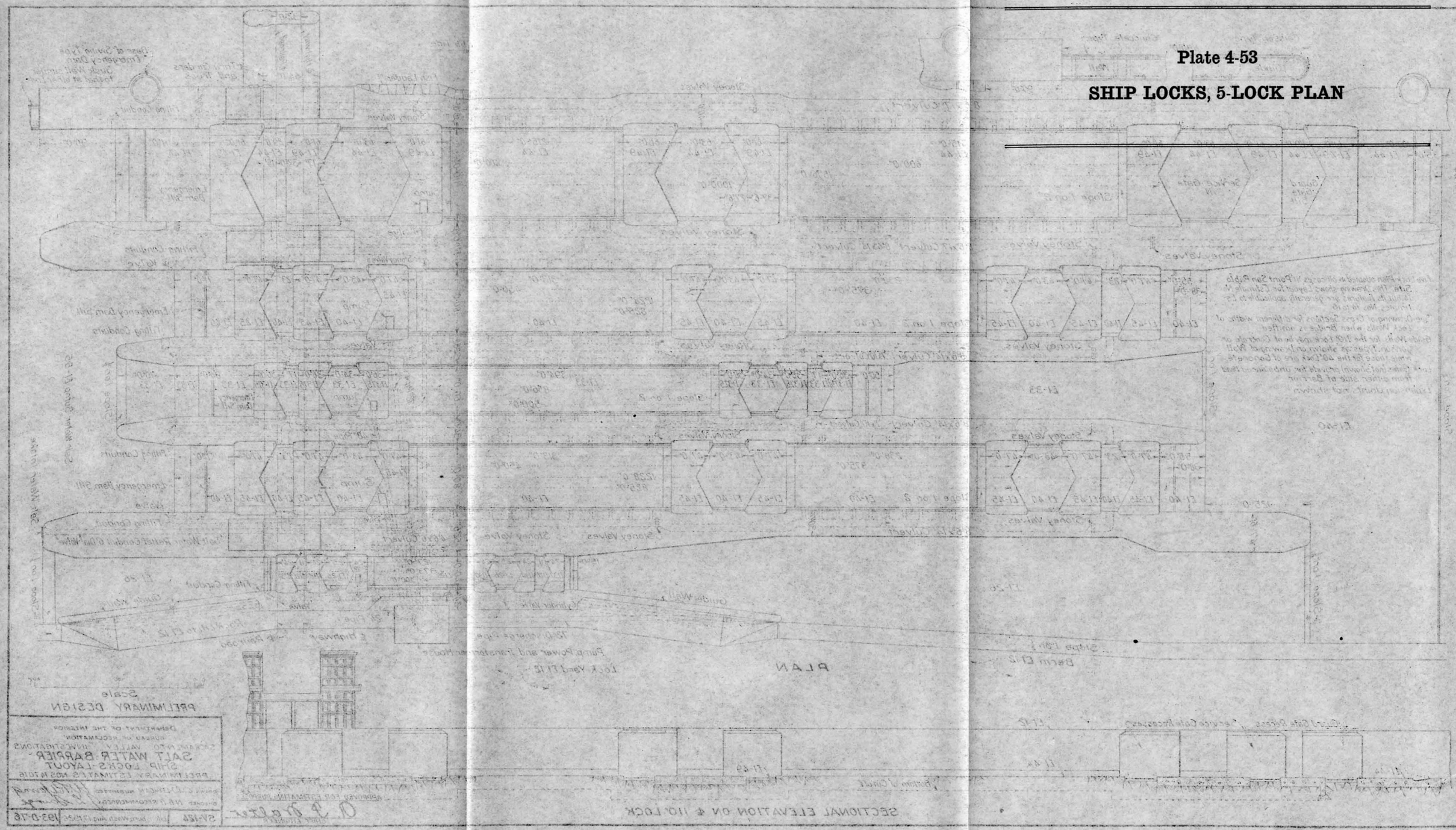


Plate 4-53

SHIP LOCKS, 5-LOCK PLAN

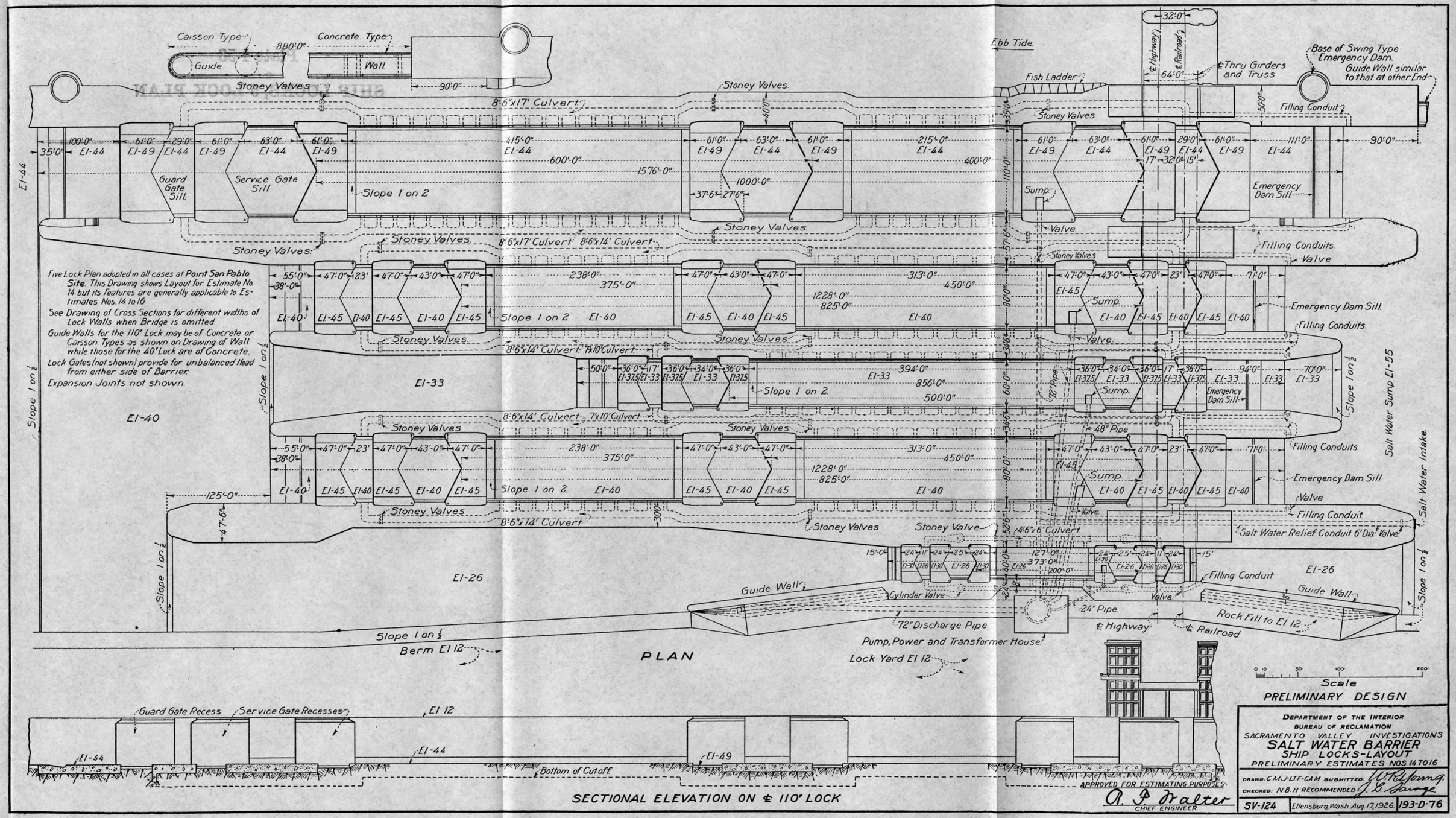
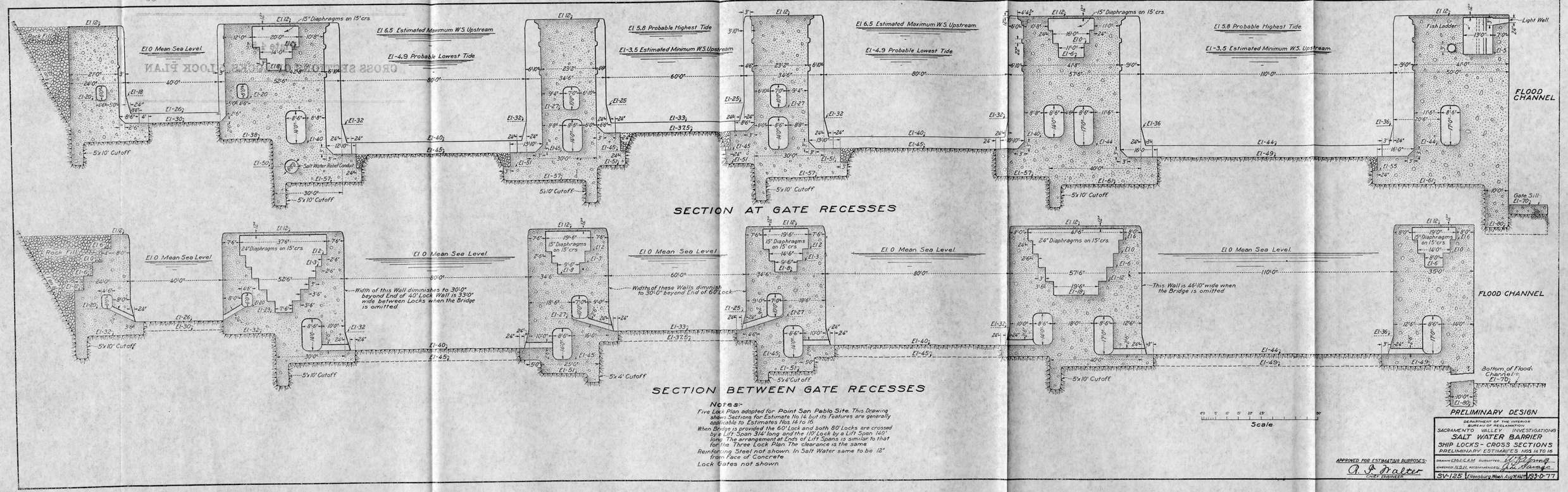

Caisson Type
Concrete Type
Guide
Wall
Stoney Valves
8'6"x17' Culvert
8'6"x14' Culvert
7'x10' Culvert
4'6"x6' Culvert
Ebb Tide
Fish Ladder
℄ Thru Girders and Truss
Base of Swing Type Emergency Dam. Guide Wall similar to that at other End
Filling Conduit
Filling Conduits
Emergency Dam Sill
Guard Gate Sill
Service Gate Sill
Slope 1 on 2
Sump
Valve
Salt Water Sump El-55
Salt Water Intake
Salt Water Relief Conduit 6' Dia. Valve
Guide Wall
Cylinder Valve
72" Discharge Pipe
Pump, Power and Transformer House
Lock Yard El 12
Rock Fill to El 12
℄ Highway
℄ Railroad
Berm El 12
PLAN
Five Lock Plan adopted in all cases at Point San Pablo Site. This Drawing shows Layout for Estimate No. 14 but its features are generally applicable to Estimates Nos. 14 to 16
See Drawing of Cross Sections for different widths of Lock Walls when Bridge is omitted
Guide Walls for the 110' Lock may be of Concrete or Caisson Types as shown on Drawing of Wall while those for the 40' Lock are of Concrete.
Lock Gates (not shown) provide for unbalanced Head from either side of Barrier.
Expansion Joints not shown.
Scale
PRELIMINARY DESIGN
Guard Gate Recess
Service Gate Recesses
Bottom of Cutoff
SECTIONAL ELEVATION ON ℄ 110' LOCK
APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS-LAYOUT
PRELIMINARY ESTIMATES NOS 14 TO 16
DRAWN: C.M.J.-LTF-CAM SUBMITTED:
CHECKED: N.B.H. RECOMMENDED:
SV-124
Ellensburg, Wash. Aug 17, 1926
193-D-76

Plate 4-54

CROSS SECTIONS OF LOCKS, 5-LOCK PLAN



Notes:-

Five Lock Plan adopted for Point San Pablo Site. This Drawing shows Sections for Estimate No 14 but its Features are generally applicable to Estimates Nos 14 to 16.

When Bridge is provided the 60' Lock and both 80' Locks are crossed by a Lift Span 314' long and the 110' Lock by a Lift Span 140' long. The arrangement at Ends of Lift Spans is similar to that for the Three Lock Plan. The clearance is the same.

Reinforcing Steel not shown. In Salt Water same to be 12" from Face of Concrete.

Lock Gates not shown.

PRELIMINARY DESIGN

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SHIP LOCKS - CROSS SECTIONS
PRELIMINARY ESTIMATES NOS 14 TO 16

DRAWN CSC-CAB SUBMITTED E.F. Spring
CHECKED DBE RECOMMENDED A.P. Drake

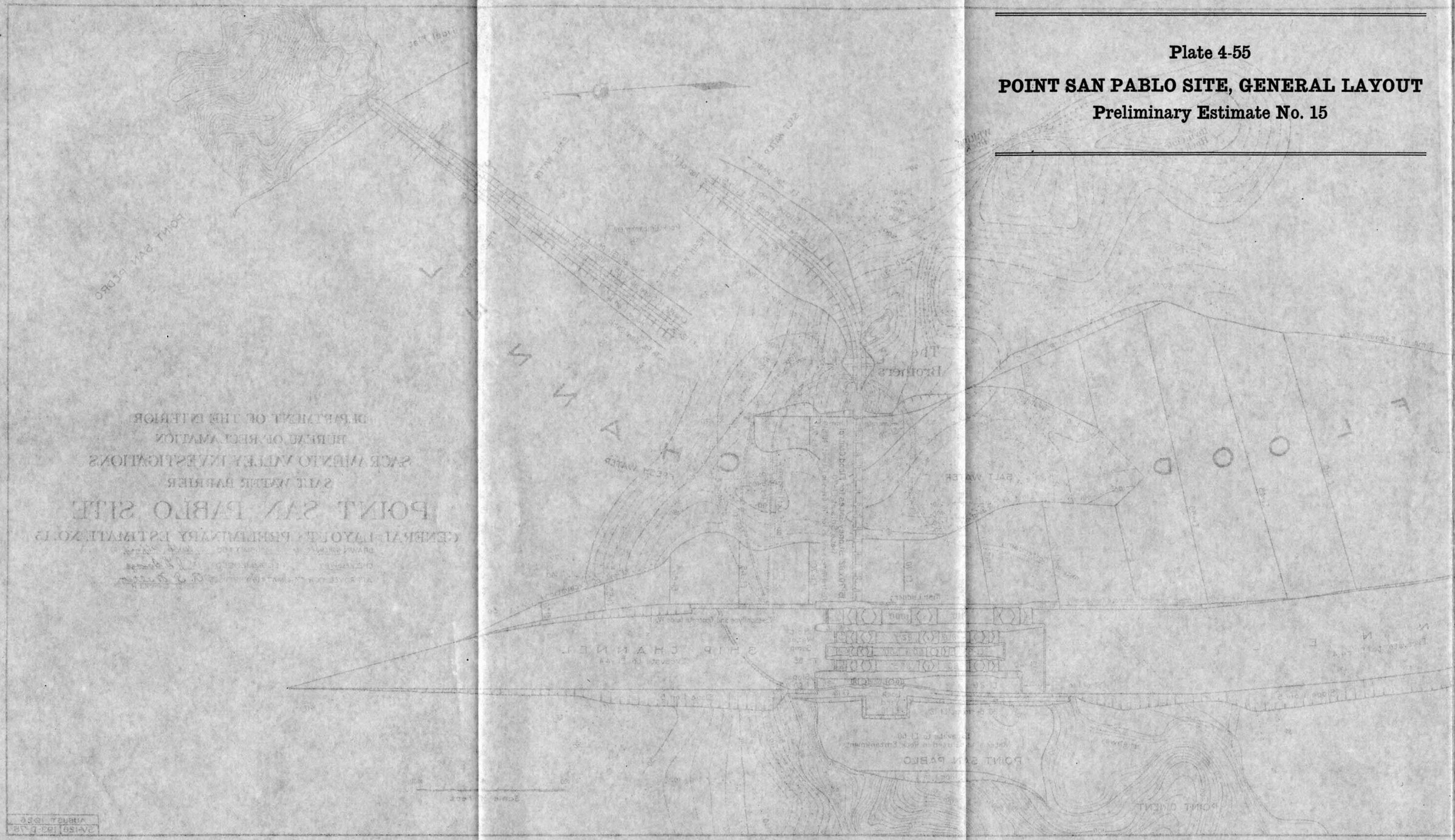
APPROVED FOR ESTIMATING PURPOSES:
A. P. Drake
CHIEF ENGINEER

SV-125 Vicksburg Mech Aug 1944 193-D-77

Plate 4-55

POINT SAN PABLO SITE, GENERAL LAYOUT

Preliminary Estimate No. 15



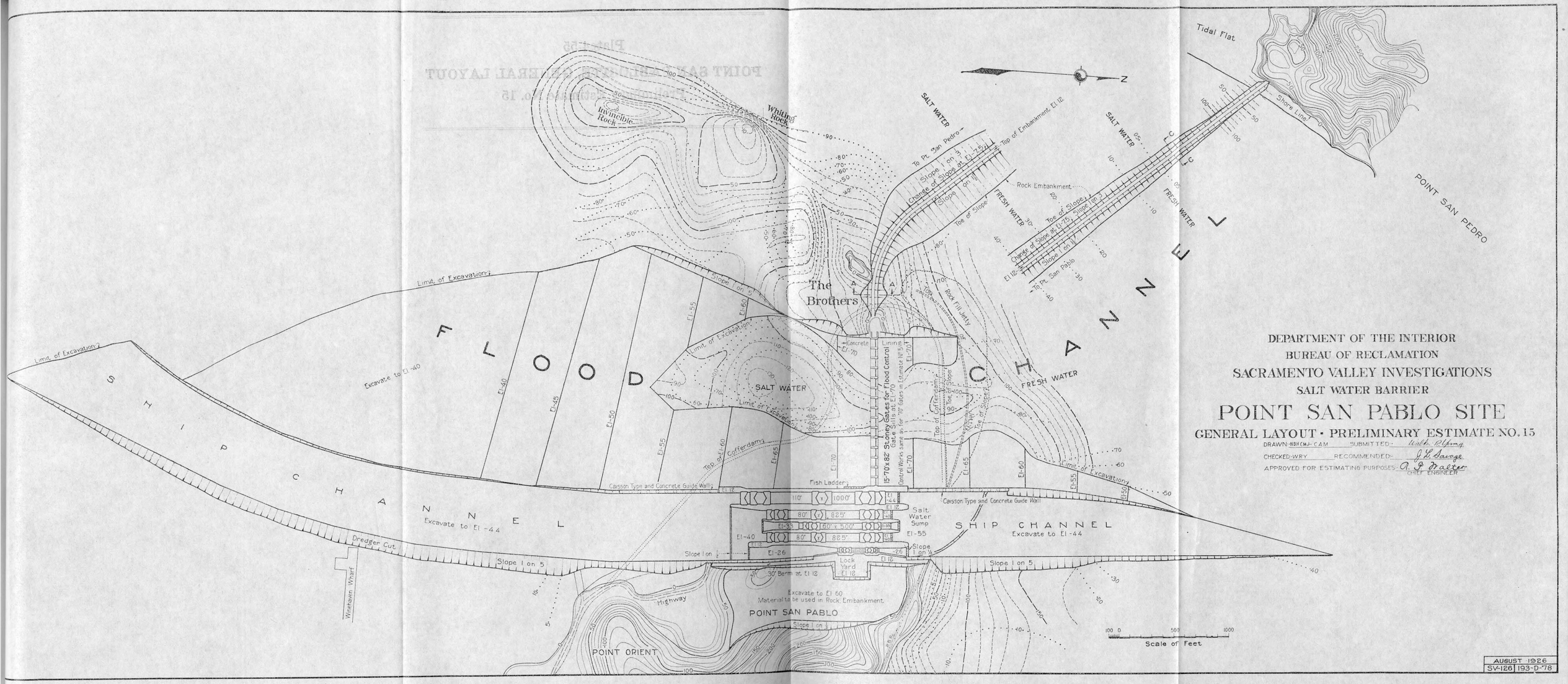
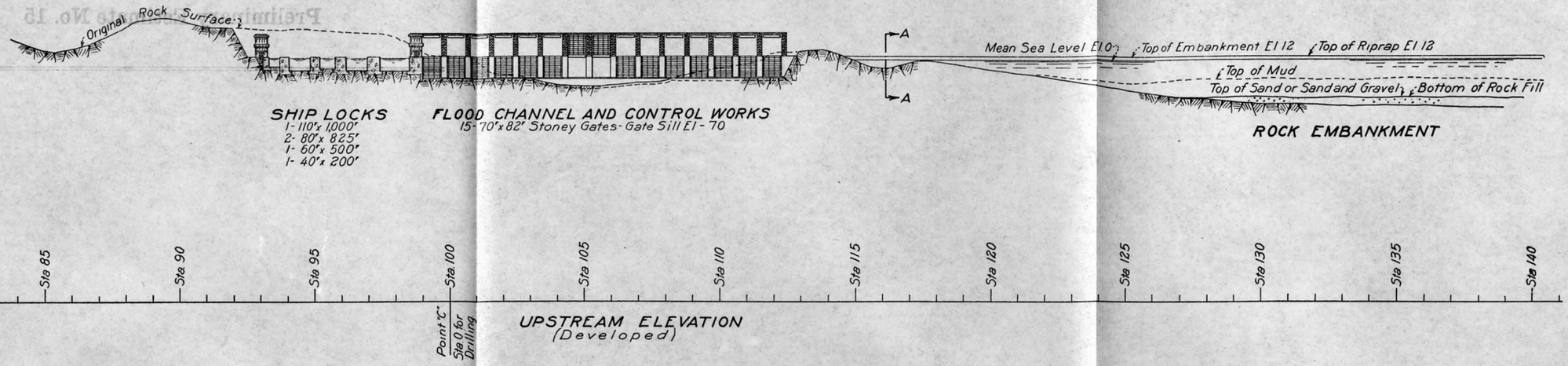

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
POINT SAN PABLO SITE
GENERAL LAYOUT · PRELIMINARY ESTIMATE NO. 15
DRAWN-NBH CMJ-CAM
SUBMITTED-
CHECKED-WRY
RECOMMENDED-
APPROVED FOR ESTIMATING PURPOSES-
CHIEF ENGINEER
AUGUST 1926
SV-126 193-D-78
Tidal Flat
Shore Line
POINT SAN PEDRO
Invincible Rock
Whiting Rock
The Brothers
SALT WATER
FRESH WATER
FLOOD CHANNEL
SHIP CHANNEL
Excavate to El -44
Excavate to El -40
Limit of Excavation
Rock Embankment
Rock Fill Jetty
Top of Embankment El 12
To Pt. San Pedro
To Pt. San Pablo
Slope 1 on 3
Slope 1 on 5
Slope 1 on 4
Toe of Slope
Change of Slope at El -7.5
Change of Slope at El -7.5
Toe of Cofferdam
Cofferdam
Concrete El -70
15-70'x 82' Stoney Gates for Flood Control
Fish Ladder
Caisson Type and Concrete Guide Wall
Salt Water Sump
Lock Yard El 12
30' Berm at El 12
Excavate to El 60
Material to be used in Rock Embankment
POINT SAN PABLO
POINT ORIENT
Highway
Dredger Cut
Winehaven Wharf
Scale of Feet

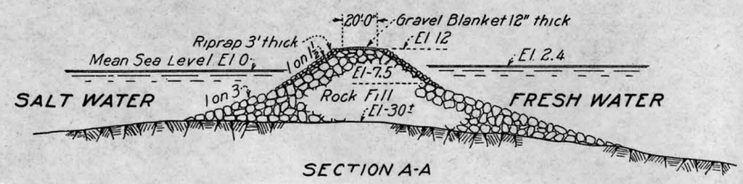
Plate 4-56

ELEVATION AND SECTIONS

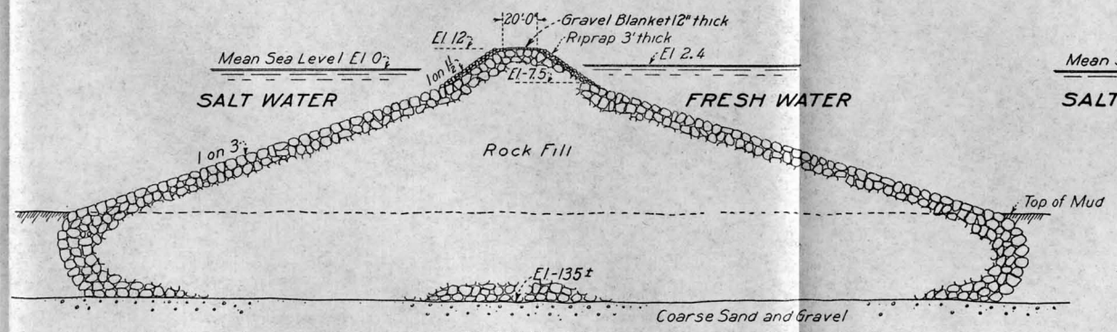
Preliminary Estimate No. 15



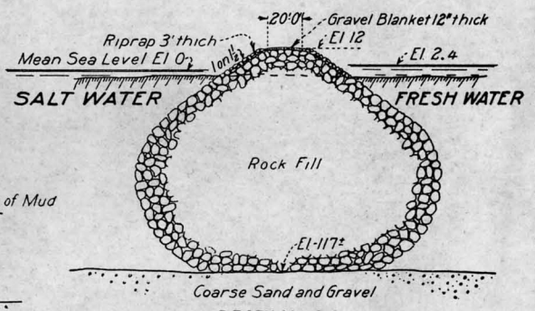
UPSTREAM ELEVATION
(Developed)



SECTION A-A



SECTION B-B
(Opposite Drill Hole 4500)



SECTION C-C
(For location see General Layout for Estimate No. 15)

EMBANKMENT SECTIONS

Notes:-
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by draft Remainder to be placed by Derrick Barges and Skips

0 10 50 100 150'
Scale

PRELIMINARY DESIGN

APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO. 15

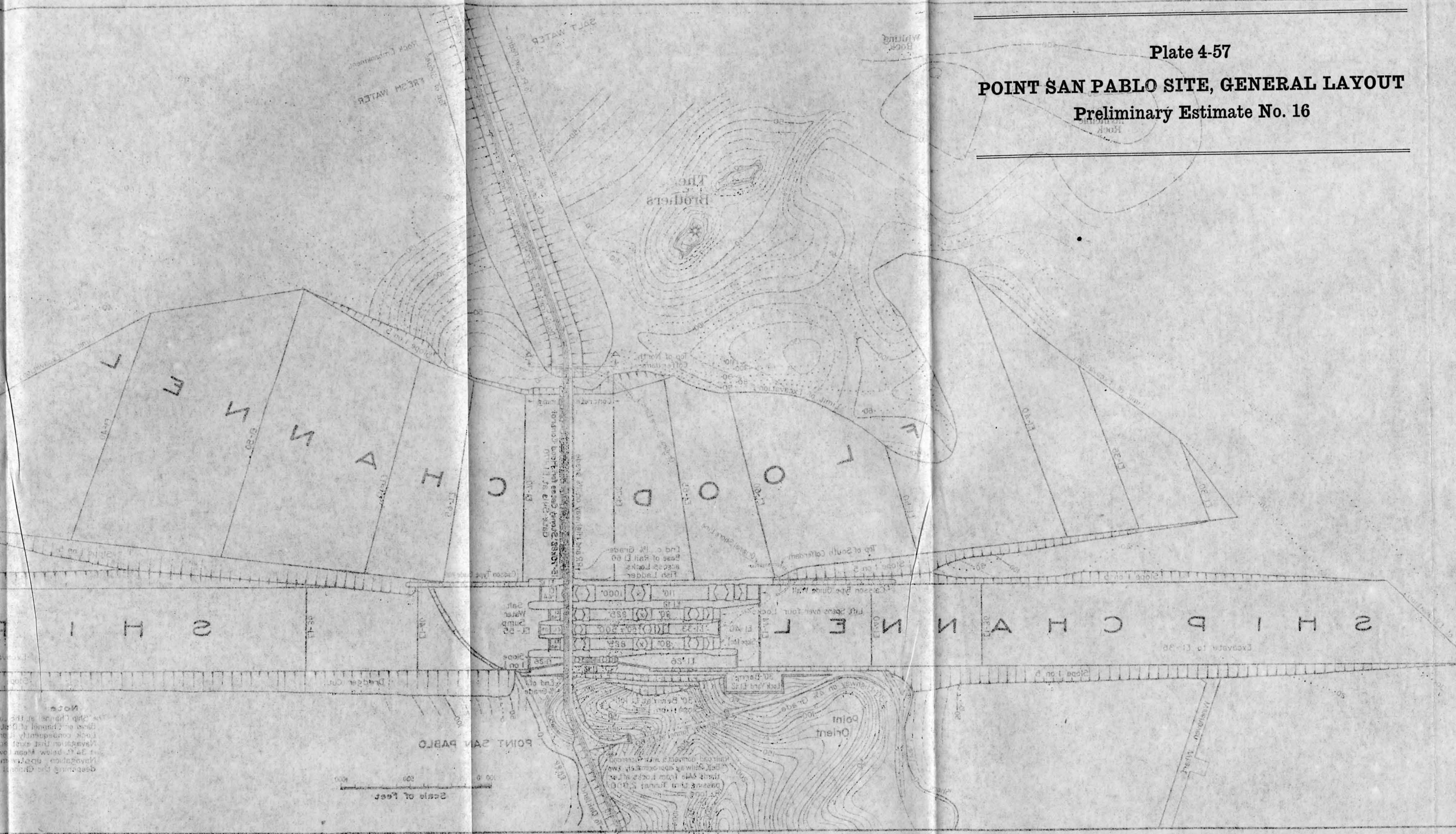
DRAWN: C.M.J.-L.T.F.-C.A.M. SUBMITTED: W. R. Young
CHECKED: N.B.H. RECOMMENDED: J. L. Savage

SV-127	Ellensburg, Wash. Aug. 14, 1926.	193-D-79

Plate 4-57

POINT SAN PABLO SITE, GENERAL LAYOUT

Preliminary Estimate No. 16



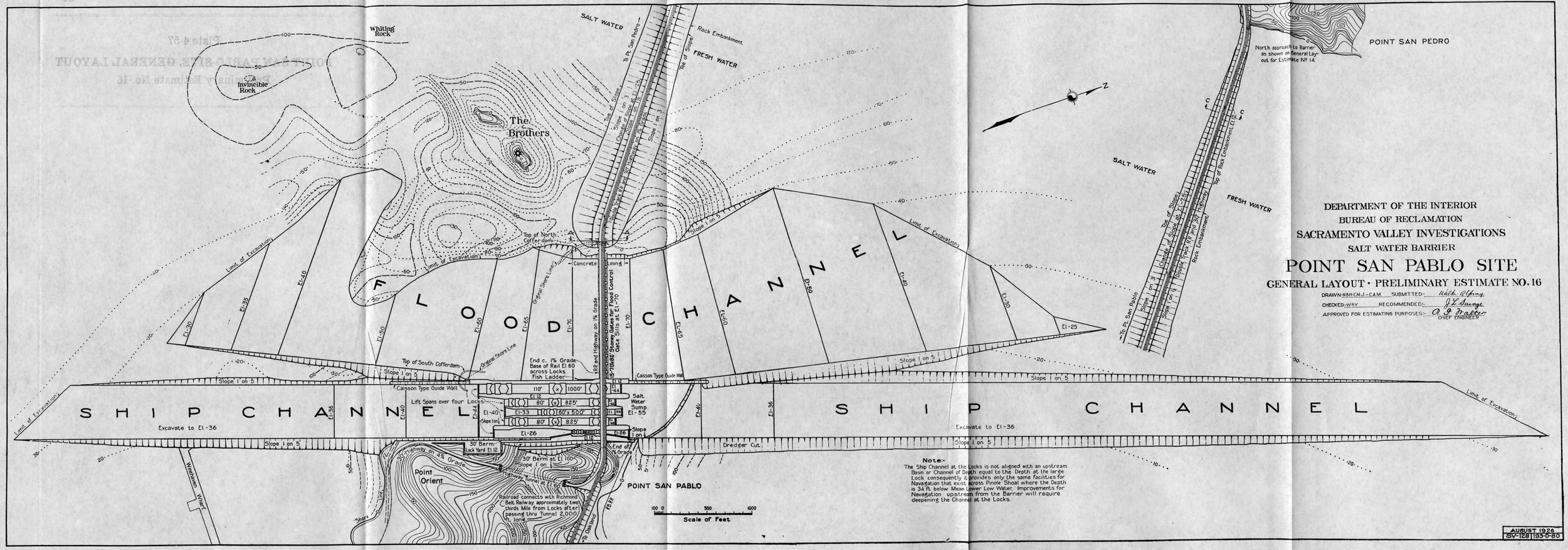

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
POINT SAN PABLO SITE
GENERAL LAYOUT · PRELIMINARY ESTIMATE NO. 16
DRAWN-NBH-CMJ-CAM SUBMITTED-
CHECKED-WRY RECOMMENDED-
APPROVED FOR ESTIMATING PURPOSES-
CHIEF ENGINEER
AUGUST 1926
SV-128 193-0-80
POINT SAN PEDRO
North approach to Barrier as shown on General Layout for Estimate No 14
SALT WATER
FRESH WATER
Whiting Rock
Invincible Rock
The Brothers
Point Orient
POINT SAN PABLO
FLOOD CHANNEL
SHIP CHANNEL
Limit of Excavation
Excavate to El-36
Slope 1 on 5
Caisson Type Guide Wall
Lift Spans over four Locks
Salt Water Sump El-55
30' Berm
30' Berm at El 100
Dredger Cut
Concrete Lining
Top of North Cofferdam
Top of South Cofferdam
Original Shore Line
End c. 1% Grade Base of Rail El 60 across Locks Fish Ladder
Highway on 4% Grade
Highway Tunnel at El 60
Railroad connects with Richmond Belt Railway approximately two thirds Mile from Locks after passing thru Tunnel 2,000 ft. long
Westpoint Wharf
To Ft. San Pedro
To Oakland
Rock Embankment
Top of Slope
Scale of Feet
Note:-
The Ship Channel at the Locks is not aligned with an upstream Basin or Channel of Depth equal to the Depth at the large Lock consequently it provides only the same facilities for Navigation that exist across Pinole Shoal where the Depth is 34 ft. below Mean Lower Low Water. Improvements for Navigation upstream from the Barrier will require deepening the Channel at the Locks.

Plate 4-58

ELEVATION AND SECTIONS

Preliminary Estimate No. 16

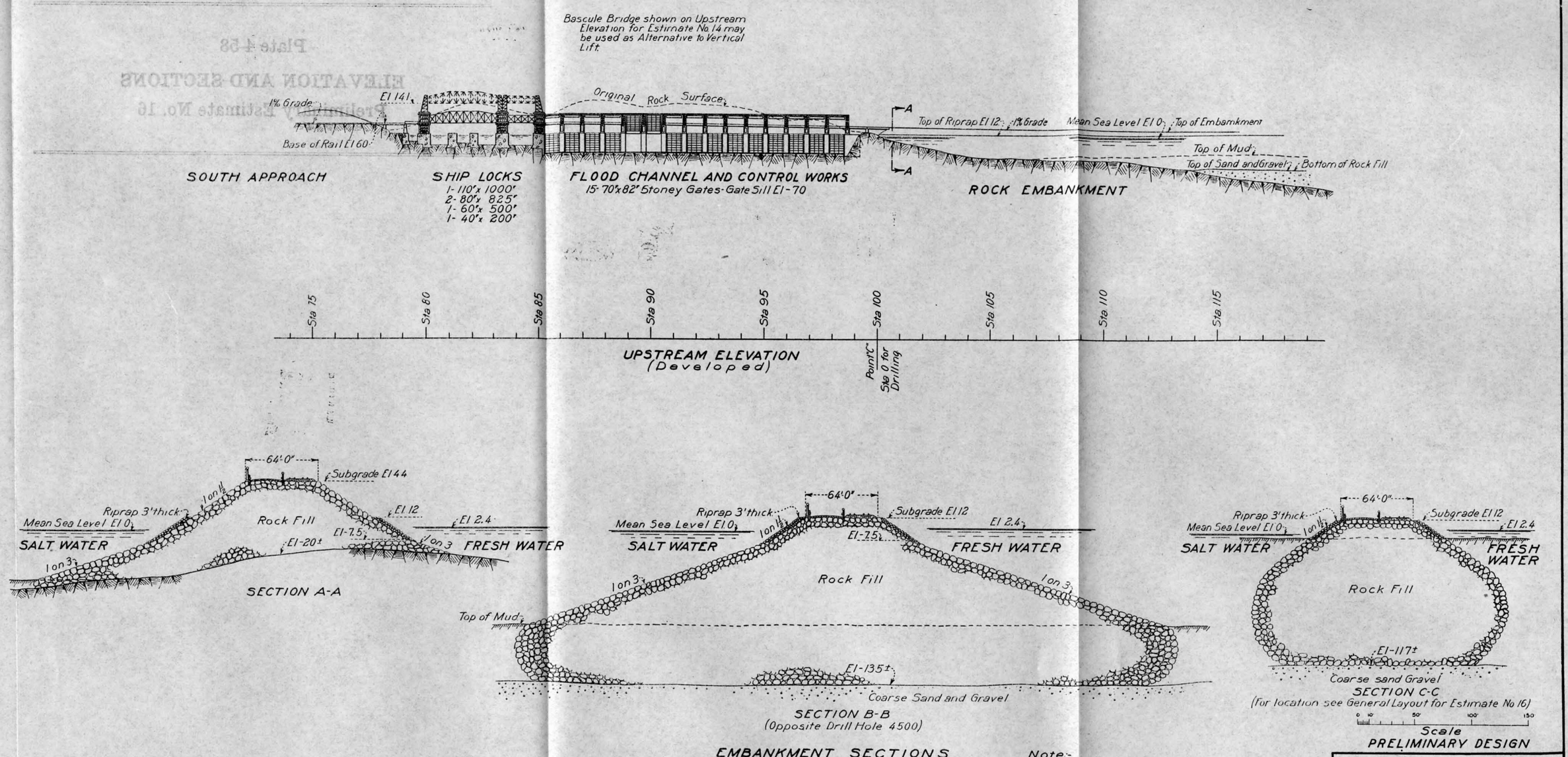
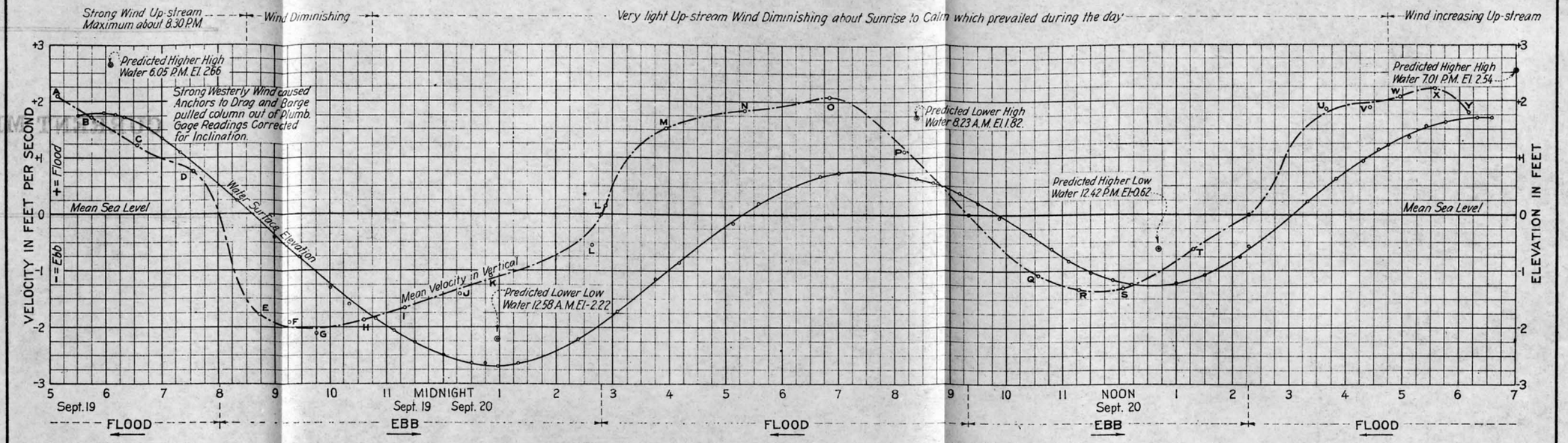

Bascule Bridge shown on Upstream Elevation for Estimate No. 14 may be used as Alternative to Vertical Lift
1% Grade
El 141
Base of Rail El 60
Original Rock Surface
A
A
Top of Riprap El 12
1% Grade
Mean Sea Level El 0
Top of Embankment
Top of Mud
Top of Sand and Gravel
Bottom of Rock Fill
SOUTH APPROACH
SHIP LOCKS
1- 110'x 1000'
2- 80'x 825'
1- 60'x 500'
1- 40'x 200'
FLOOD CHANNEL AND CONTROL WORKS
15- 70'x 82' Stoney Gates - Gate Sill El -70
ROCK EMBANKMENT
Sta 75
Sta 80
Sta 85
Sta 90
Sta 95
Sta 100
Sta 105
Sta 110
Sta 115
UPSTREAM ELEVATION
(Developed)
Point "C"
Sta 0 for Drilling
64'-0"
Subgrade El 44
Riprap 3' thick
1 on 1½
Mean Sea Level El 0
El 12
El 2.4
Rock Fill
El -7.5
El -20±
1 on 3
SALT WATER
FRESH WATER
SECTION A-A
Subgrade El 12
Top of Mud
El -135±
Coarse Sand and Gravel
SECTION B-B
(Opposite Drill Hole 4500)
EMBANKMENT SECTIONS
El -117±
SECTION C-C
(For location see General Layout for Estimate No 16)
0 10' 50' 100' 150
Scale
PRELIMINARY DESIGN
Note:-
Rock Fill to be placed by Bottom Dump Barges up to Maximum Elevation permitted by Draft Remainder to be placed by Derrick Barges and Skips
APPROVED FOR ESTIMATING PURPOSES
R. P. Walter
CHIEF ENGINEER
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ELEVATION AND SECTIONS
PRELIMINARY ESTIMATE NO 16
DRAWN: C.M.J. LTF-C.A.M. SUBMITTED: W. R. Young
CHECKED: N.B.H. RECOMMENDED: J. L. Savage
SV-129
Ellensburg, Wash. Aug 20, 1926
193-D-81

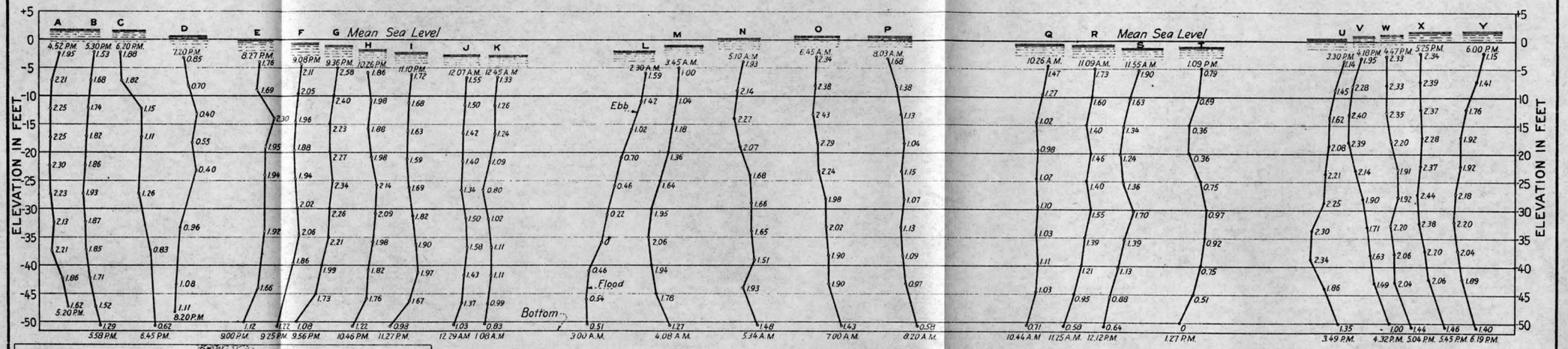
Plate 5-1

CURRENT METER MEASUREMENTS

Sheet 1 of 5



ELEVATION OF WATER SURFACE AND MEAN VELOCITY IN VERTICAL DURING TIDAL CYCLE



VELOCITY CURVES

(Numbers show velocity in ft. per sec.)

Observations made from Drill Barge at Hole 2500.

Water Surface elevations determined from point of known elevation on drill column.

The time and height of predicted tides at Benicia were determined by applying corrections to figures for Fort Point as described on pages 131, 339, 340 and 372 of Tide Tables for Pacific Coast for 1924, published by the United States Coast and Geodetic Survey.

Owing to elapse of time between first and last measurements, curves do not represent simultaneous conditions throughout vertical.

The direction of flow was toward and from the Martinez ferry slip except for a few minutes during each reversal of current when the direction was perpendicular to the prevailing direction

There was no evidence to indicate variance in direction of flow at different depths except in some cases at slack tide when all velocities were low. In many cases the direction of flow was indicated by the inclination of the meter cable. When velocities were too low to carry the cable out of plumb it is believed that with gradually changing velocities at different depths and a constant direction at the surface, a change in direction below the surface cannot be inferred unless the velocities diminished to zero, or nearly zero, at some point of depth. When however the velocities diminished to zero and then increased during successive measurements and a change in direction of surface flow took place during the vertical series it was assumed that the point of zero flow marked the change in direction below the surface. See measurement L.

APPROVED FOR ESTIMATING PURPOSES:-

A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR.
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE

GAGE HEIGHTS AND VELOCITIES
TIDAL CYCLE SEPT. 19 AND 20, 1924

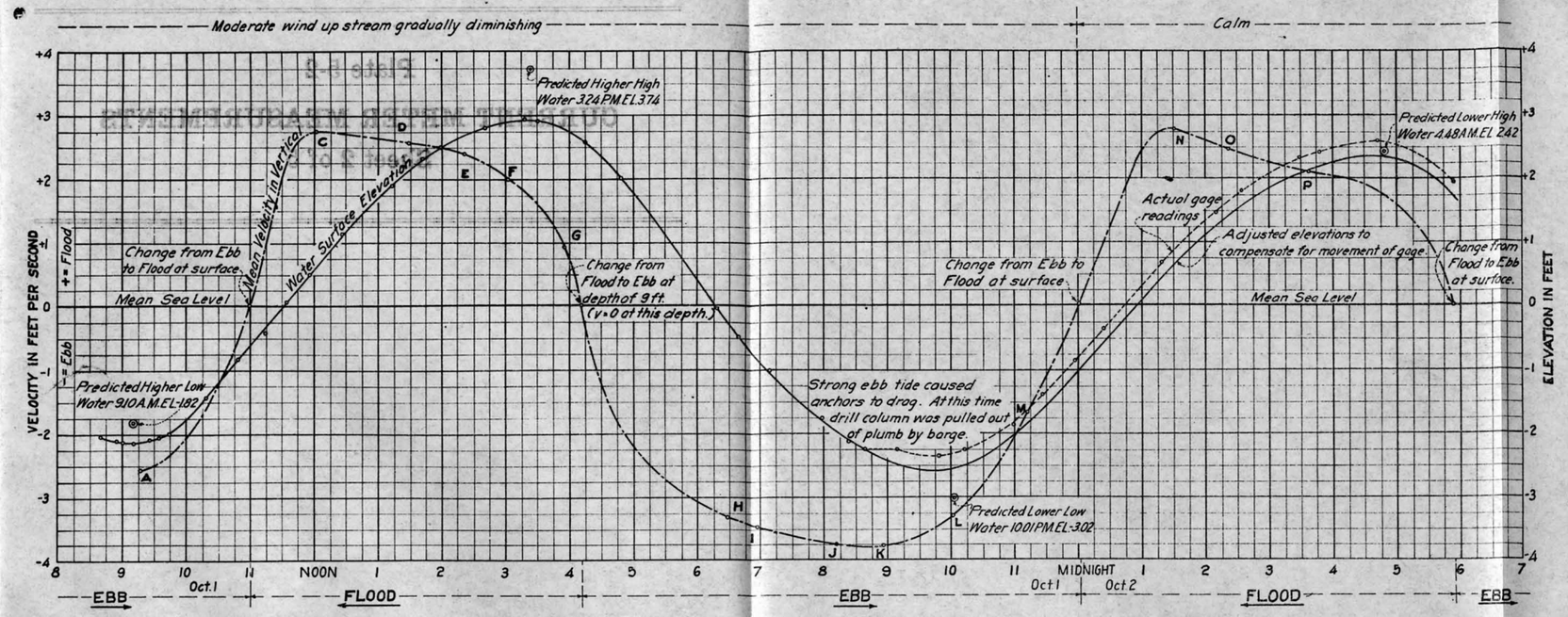
DRAWN: H.B.H.-C.B.G. SUBMITTED: W. P. Young
CHECKED: F. B. Ko. APPROVED: J. L. Savage

SV-4 | Berkeley, Calif. Oct. 21, 1924 | 193-D-99

Plate 5-2

CURRENT METER MEASUREMENTS

Sheet 2 of 5



ELEVATION OF WATER SURFACE AND MEAN VELOCITY IN VERTICAL DURING TIDAL CYCLE

Observations made from Drill Barge at Hole 3550.

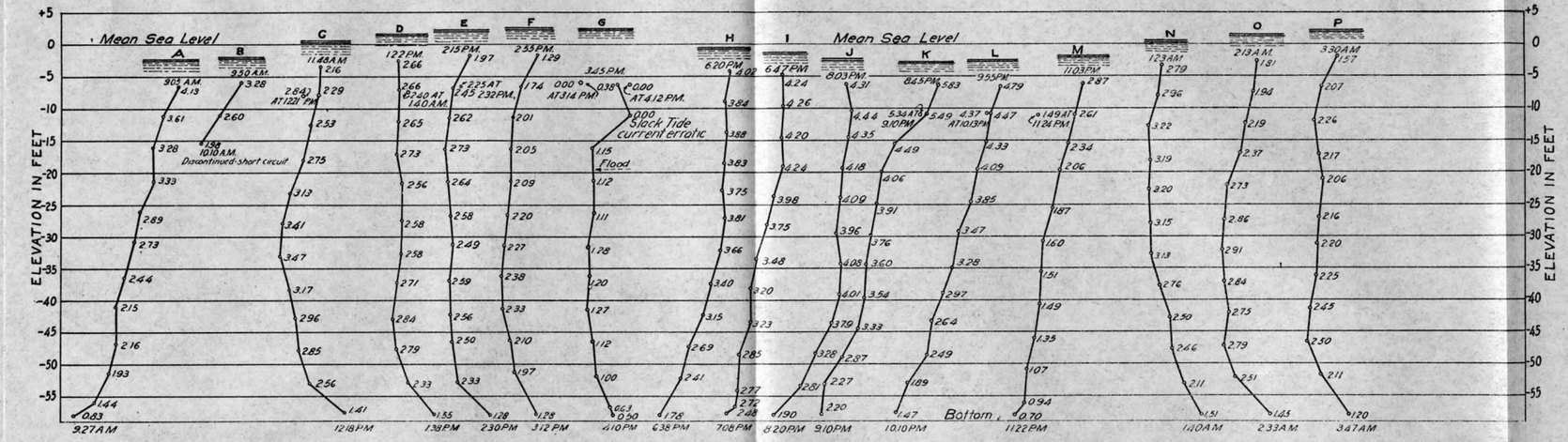
Water Surface elevations determined from point of known elevation on drill column.

The time and height of predicted tides at Benicia were determined by applying corrections to figures for Fort Point as described on pages 132, 339, 340 and 372 of Tide Tables for Pacific Coast for 1924, published by the United States Coast and Geodetic Survey.

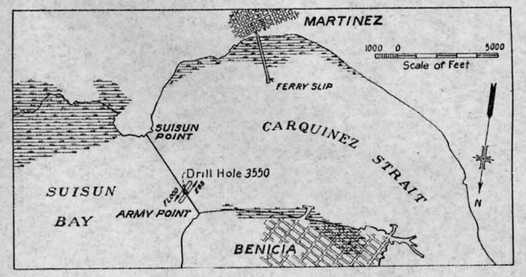
Owing to elapse of time between first and last measurements, curves do not represent simultaneous conditions throughout vertical.

The direction of flow was toward and from the Martinez ferry slip except for a few minutes during each reversal of current when the direction was perpendicular to the prevailing direction.

There was no evidence to indicate variance in direction of flow at different depths except in one case (measurement 6) at slack tide when all velocites were low. Near the end of this measurement the surface current changed from a direction across the Channel toward Suisun Point to ebb flow although the upstream inclination of cable with meter at depths greater than 35 ft showed that the flood flow had not ceased below the surface. This feature is substantiated by later measurements at other sites and these measurements also indicate that flood flow begins near the bottom before the ebb has ceased at the surface.



VELOCITY CURVES
(Numbers show velocity in ft per sec.)



APPROVED FOR ESTIMATING PURPOSES -
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE

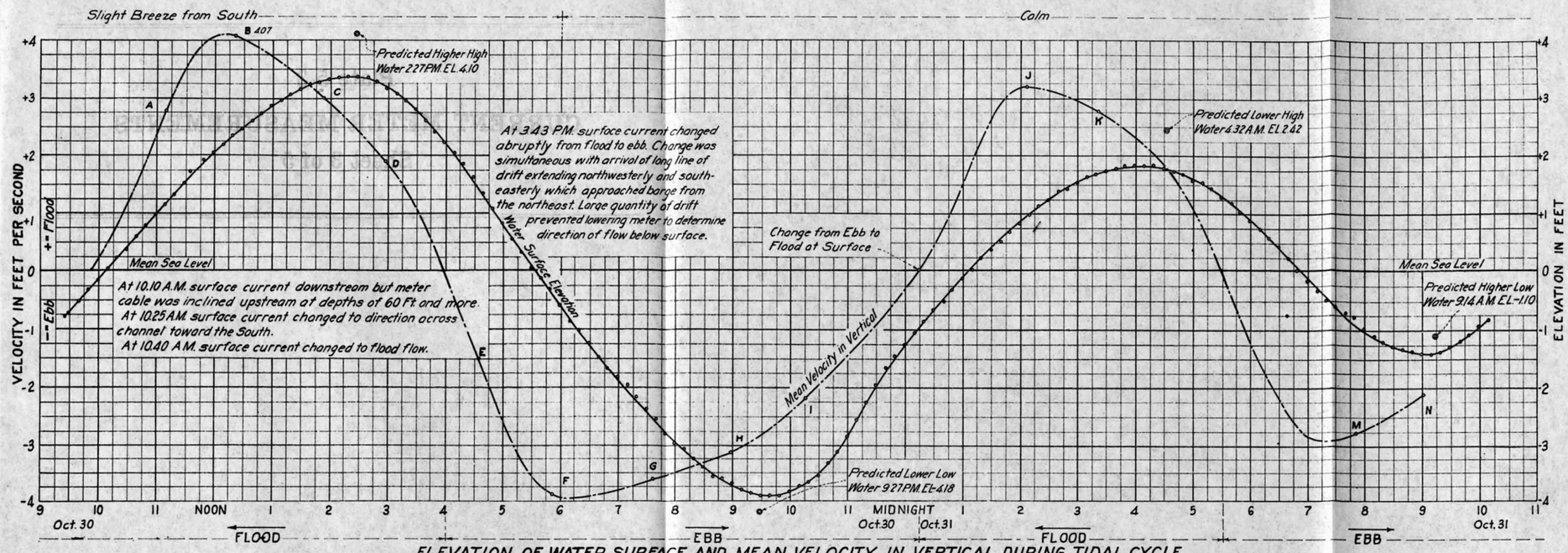
GAGE HEIGHTS AND VELOCITIES
TIDAL CYCLE OCT. 1 AND 2, 1924

DRAWN N.B.H.-H.W. SUBMITTED W.H. Young
CHECKED R.B.K. APPROVED G.H. Savage
SV-5 Berkeley, Calif. Dec. 11, 1924 193-D-100

Plate 5-3

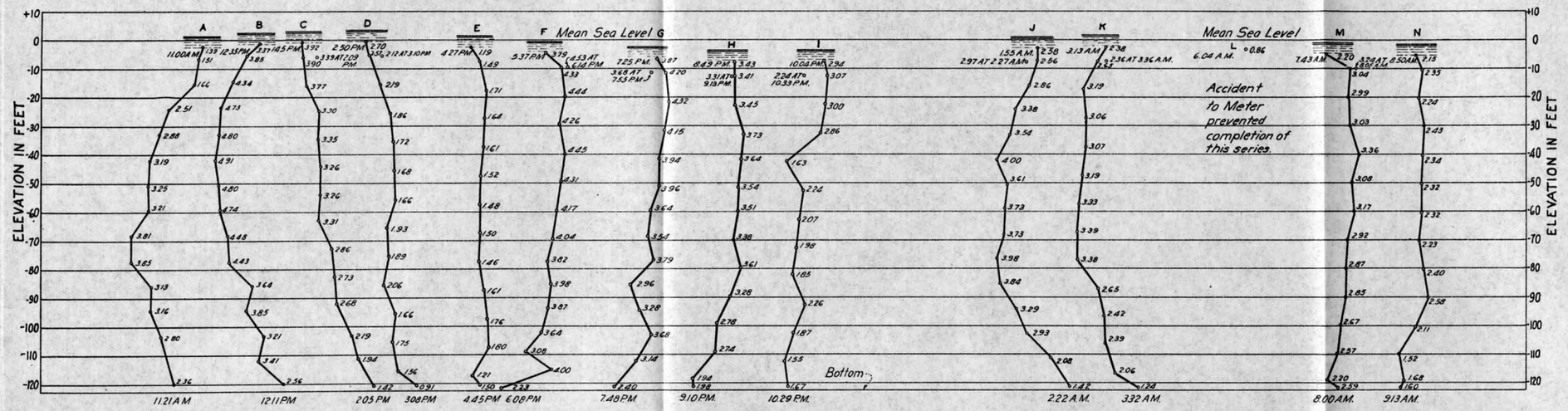
CURRENT METER MEASUREMENTS

Sheet 3 of 5

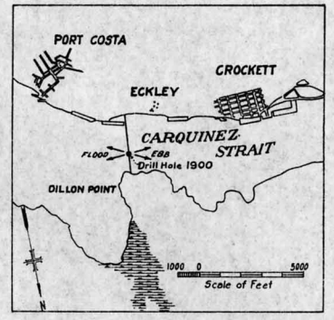


ELEVATION OF WATER SURFACE AND MEAN VELOCITY IN VERTICAL DURING TIDAL CYCLE

Observations made from Drill Barge at Hole 1900
Water surface elevations determined from gage on pier east of Eckley.
The time and height of predicted tides at Dillon Point were determined by applying corrections to figures for Fort Point as described on pages 132, 339, 340 and 372 of Tide Tables for Pacific Coast for 1924, published by the United States Coast and Geodetic Survey.
Owing to elapse of time between first and last measurements, curves do not represent simultaneous conditions throughout vertical.
The direction of flow fluctuated through an angle of 30 deg. during each ebb and flood tide and was never constant for periods of any length.
The indications that flood flow begins near the bottom before the ebb has ceased at the surface are substantiated by later measurements at another site. Measurements at other sites prior and subsequent to those at Dillon Point indicate that flood flow is sustained near the bottom after ebb has begun at the surface.



VELOCITY CURVES
(Numbers show velocity in ft. per sec.)



APPROVED FOR ESTIMATING PURPOSES:
R. P. Walter
CHIEF ENGINEER.

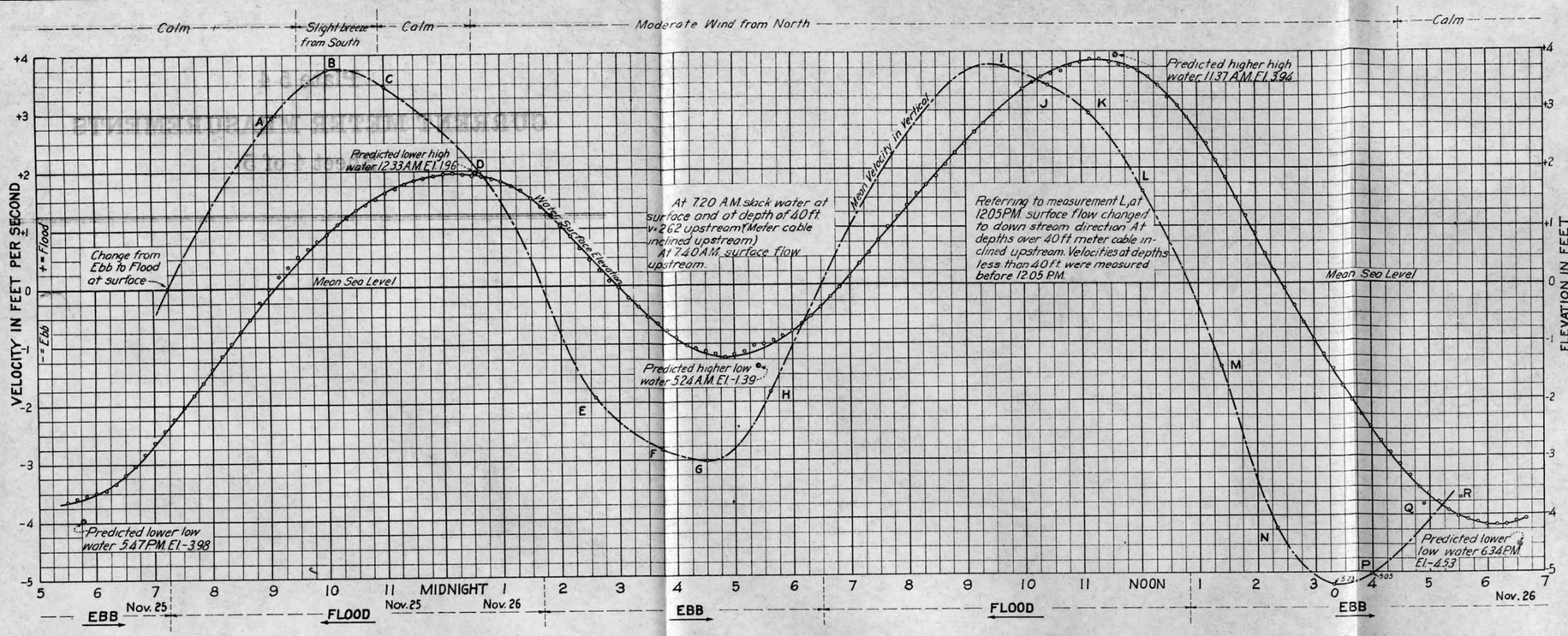
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DILLON POINT SITE
GAGE HEIGHTS AND VELOCITIES
TIDAL CYCLE OCT. 30 AND 31, 1924

DRAWN N.B.H.-H.U.W. SUBMITTED W.R. Young
CHECKED A.J.K. APPROVED J.L. Savage
SV-6 Berkeley, Calif. Dec. 12, 1924 193-D-101

Plate 5-4

CURRENT METER MEASUREMENTS

Sheet 4 of 5



ELEVATION OF WATER SURFACE AND MEAN VELOCITY IN VERTICAL DURING TIDAL CYCLE

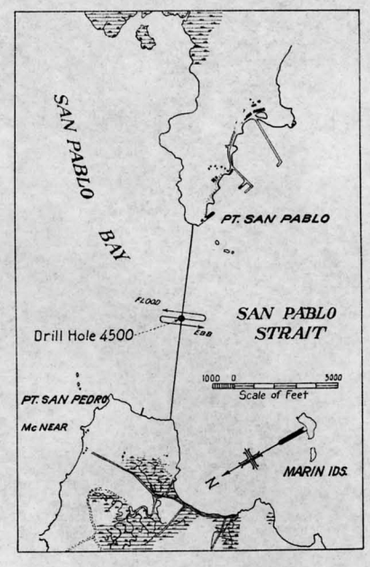
Observations made from Drill Barge at Hole 4500
Water surface elevations determined from gage on Pier at Point San Pablo.

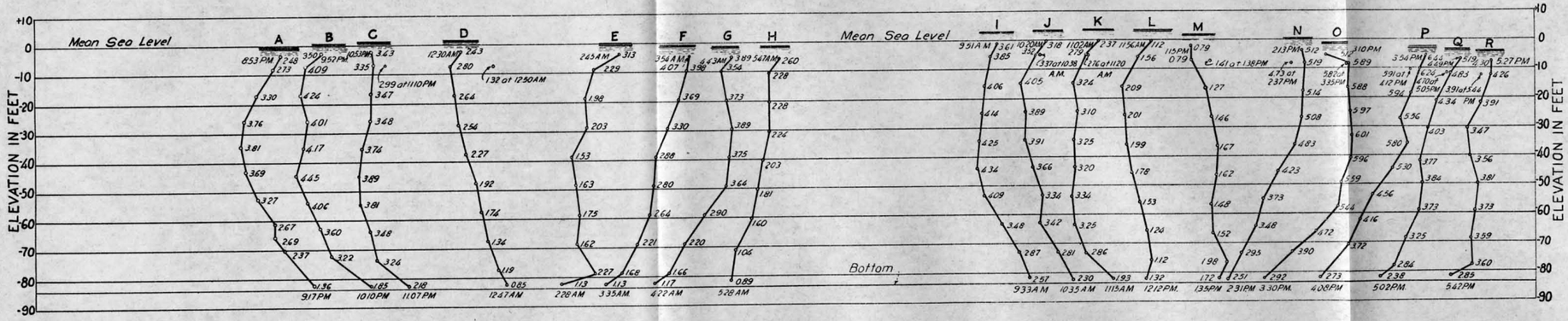
The time and height of predicted Tides at McNear Landing were determined by applying corrections to figures for Fort Point as described on pages 132, 339, 340 and 372 of Tide Tables for Pacific Coast for 1924, published by the United States Coast and Geodetic Survey.

Owing to elapse of time between first and last measurements, curves do not represent simultaneous conditions throughout vertical.

The direction of flow was generally perpendicular to the line of drilling. During the early part of the flood flow however the surface current approached the Barge from a point between San Quentin and the Marin Islands while the direction of current below the surface was perpendicular to the line of drilling as at other times.

Observations indicate that flood flow begins near the bottom before the ebb has ceased at the surface and is sustained near the bottom after ebb has begun at the surface.





VELOCITY CURVES
(Numbers show velocity in ft per sec.)

APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
POINT SAN PABLO SITE

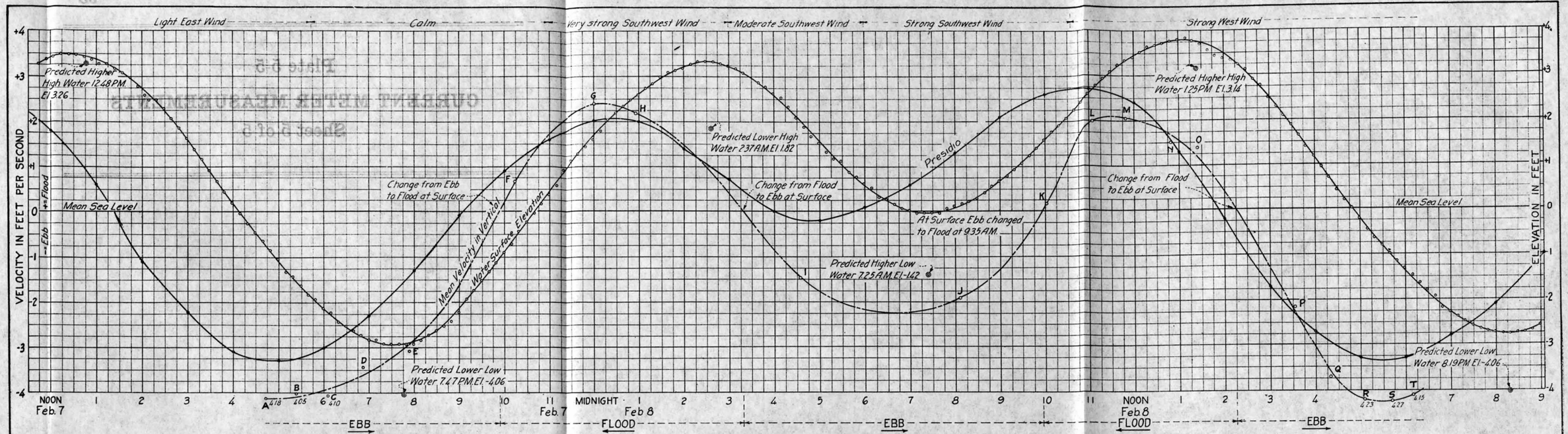
GAGE HEIGHTS AND VELOCITIES
TIDAL CYCLE NOV. 25 AND 26, 1924

DRAWN N.B.H.-H.U.W. SUBMITTED W.H. Young
CHECKED N.B.H. APPROVED J.L. Savage
SV-7 Berkeley, Cal. Dec. 22, 1924 193-D-102

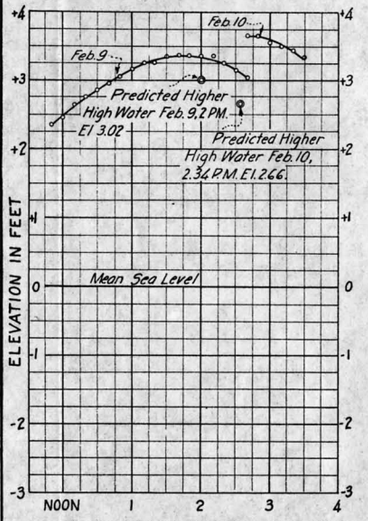
Plate 5-5

CURRENT METER MEASUREMENTS

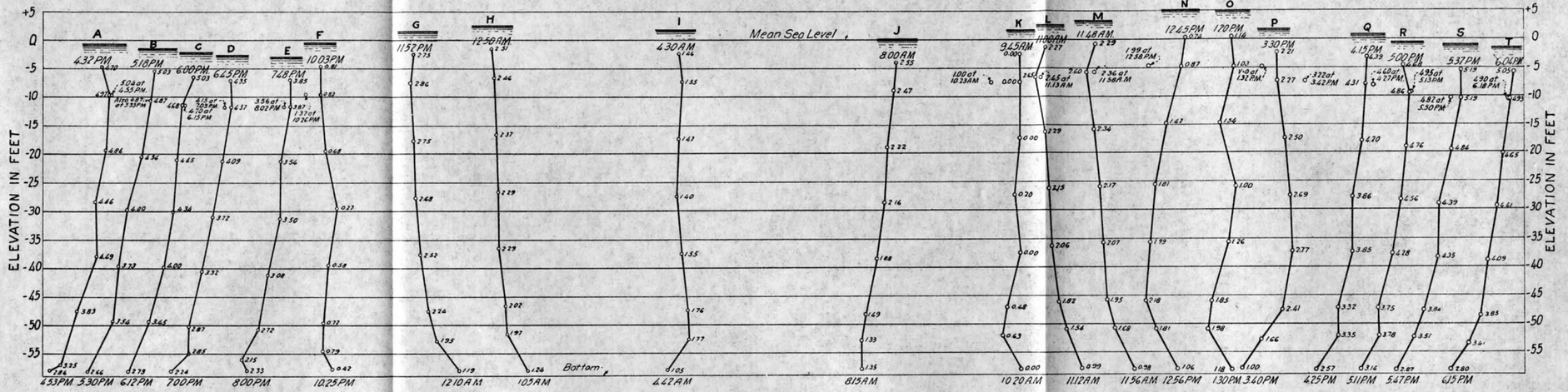
Sheet 5 of 5



ELEVATION OF WATER SURFACE AND MEAN VELOCITY IN VERTICAL DURING TIDAL CYCLE



ELEVATION OF WATER SURFACE



VELOCITY CURVES
(Numbers show velocity in ft per sec.)

Observations made from Drill Barge at Hole 3550 For locality Map see Dwg SV-5 prepared in connection with observations made Oct 1 and 2, 1926 at the same place
Water surface elevations determined from gage on Pier at Suisun Point
The time and height of predicted Tides at Benicia were determined by applying corrections to figures for Fort Point as described on pages 129, 339, 340 and 372 of Tide Tables for Pacific Coast for 1925, published by the United States Coast and Geodetic Survey

Owing to elapse of time between first and last measurements, curves do not represent simultaneous conditions throughout vertical
The direction of flow was towards and from Martinez ferry slip except for a short period during each reversal of current, when the direction was perpendicular to the prevailing direction
During reversal of surface current there was at no time any inclination of Cable to indicate direction of flow below surface

APPROVED FOR ESTIMATING PURPOSES
R. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
ARMY POINT SITE
GAGE HEIGHTS AND VELOCITIES
TIDAL CYCLE FEB. 7 AND 8, 1925

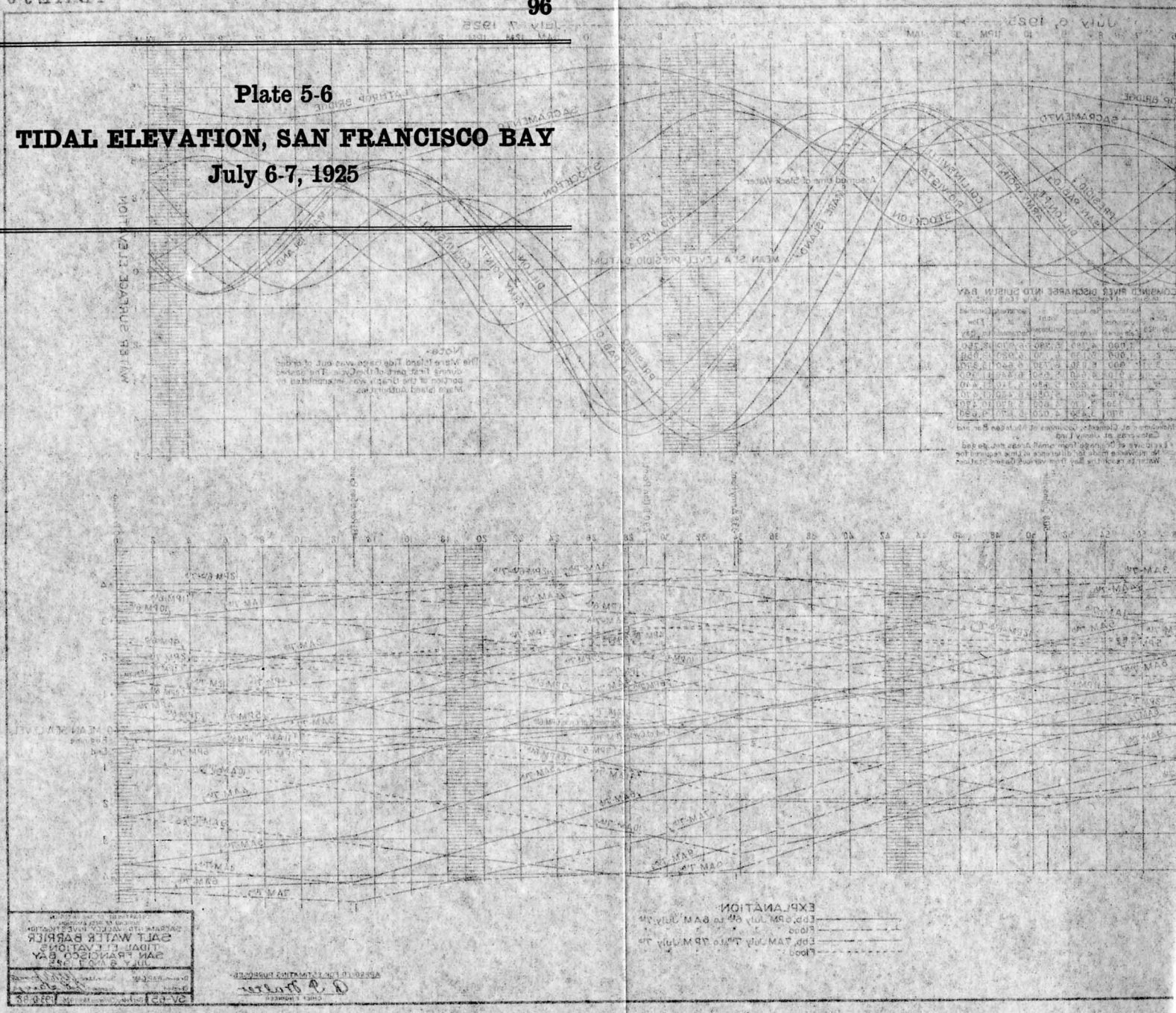
DRAWN N.B.H.-H.W. SUBMITTED W. R. Young
CHECKED R.A.K. APPROVED J. L. Savage

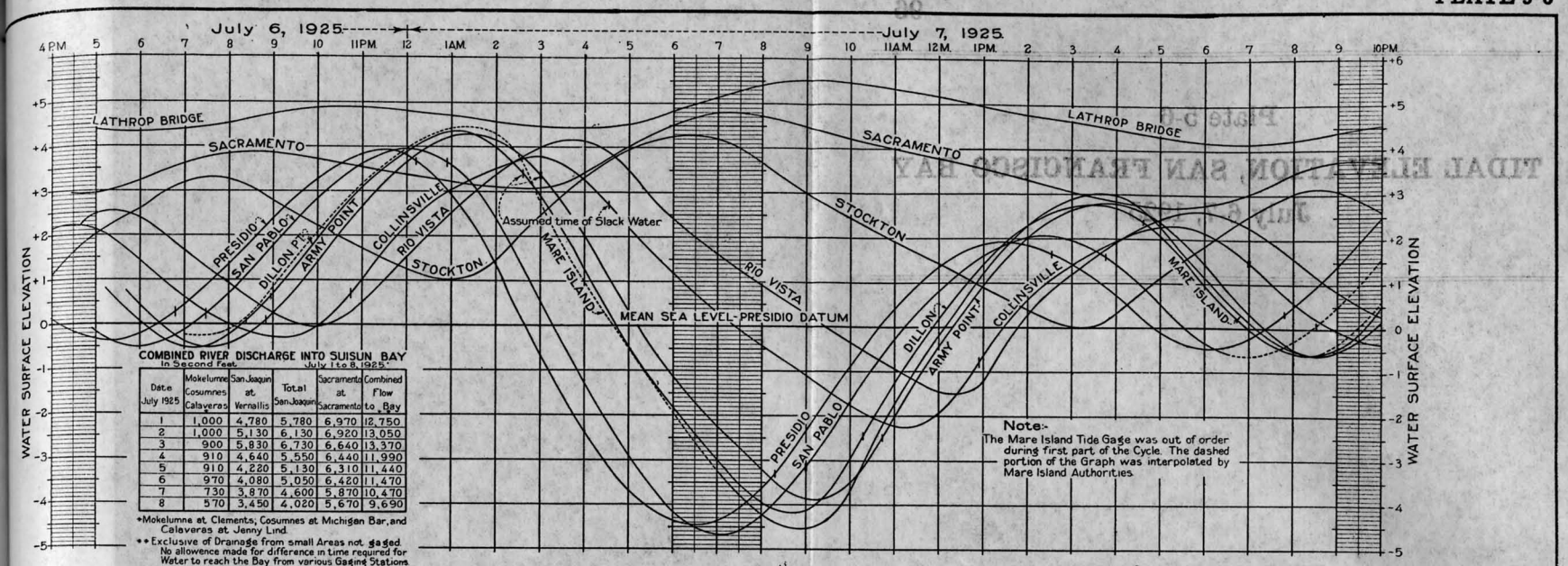
SV-27 | Berkeley, Calif. Mar. 7, 1925 | 193-D-103

Plate 5-6

TIDAL ELEVATION, SAN FRANCISCO BAY

July 6-7, 1925





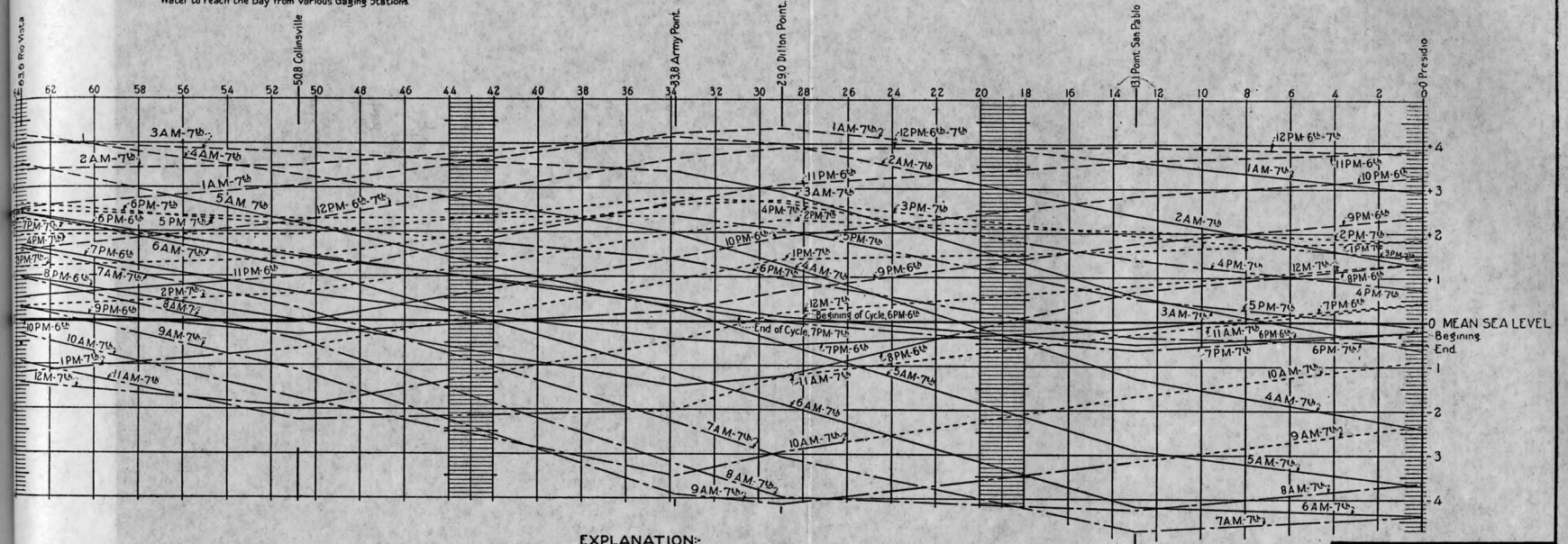
COMBINED RIVER DISCHARGE INTO SUISUN BAY
In Second feet. July 1 to 8, 1925.*

Date July 1925	Mokelumne Cosumnes Calaveras	San Joaquin at Vernalis	Total San Joaquin	Sacramento at Sacramento	Combined Flow to Bay
1	1,000	4,780	5,780	6,970	12,750
2	1,000	5,130	6,130	6,920	13,050
3	900	5,830	6,730	6,640	13,370
4	910	4,640	5,550	6,440	11,990
5	910	4,220	5,130	6,310	11,440
6	970	4,080	5,050	6,420	11,470
7	730	3,870	4,600	5,870	10,470
8	570	3,450	4,020	5,670	9,690

*Mokelumne at Clements; Cosumnes at Michigan Bar, and Calaveras at Jenny Lind.

** Exclusive of Drainage from small Areas not gaged. No allowence made for difference in time required for Water to reach the Bay from various Gaging Stations.

Note:-
The Mare Island Tide Gage was out of order during first part of the Cycle. The dashed portion of the Graph was interpolated by Mare Island Authorities.



EXPLANATION:-
Ebb, 6PM July 6th to 6A.M. July 7th
Flood " " " " " "
Ebb, 7AM July 7th to 7P.M. July 7th
Flood " " " " " "

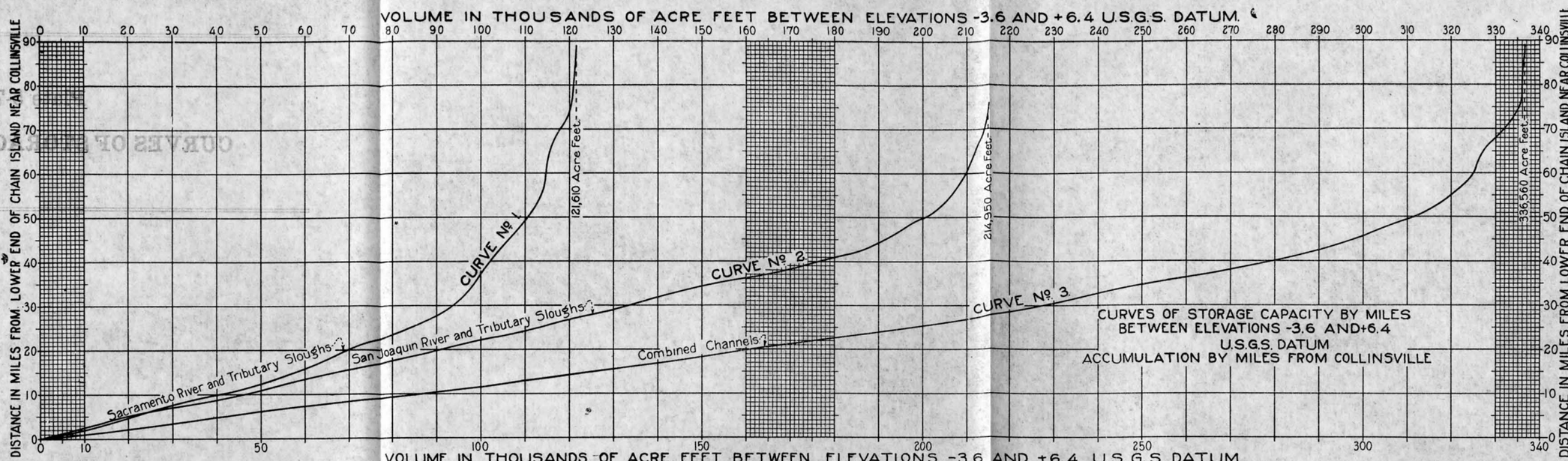
APPROVED FOR ESTIMATING PURPOSES:-
R. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
TIDAL ELEVATIONS
SAN FRANCISCO BAY
JULY 6 AND 7 1925

Drawn W.A.P.-C.A.M. Submitted: W. H. Lyons
Checked: Approved: J. D. Savage
SV-65 Berkeley, California Mch 1926 193-D-88

Plate 5-7

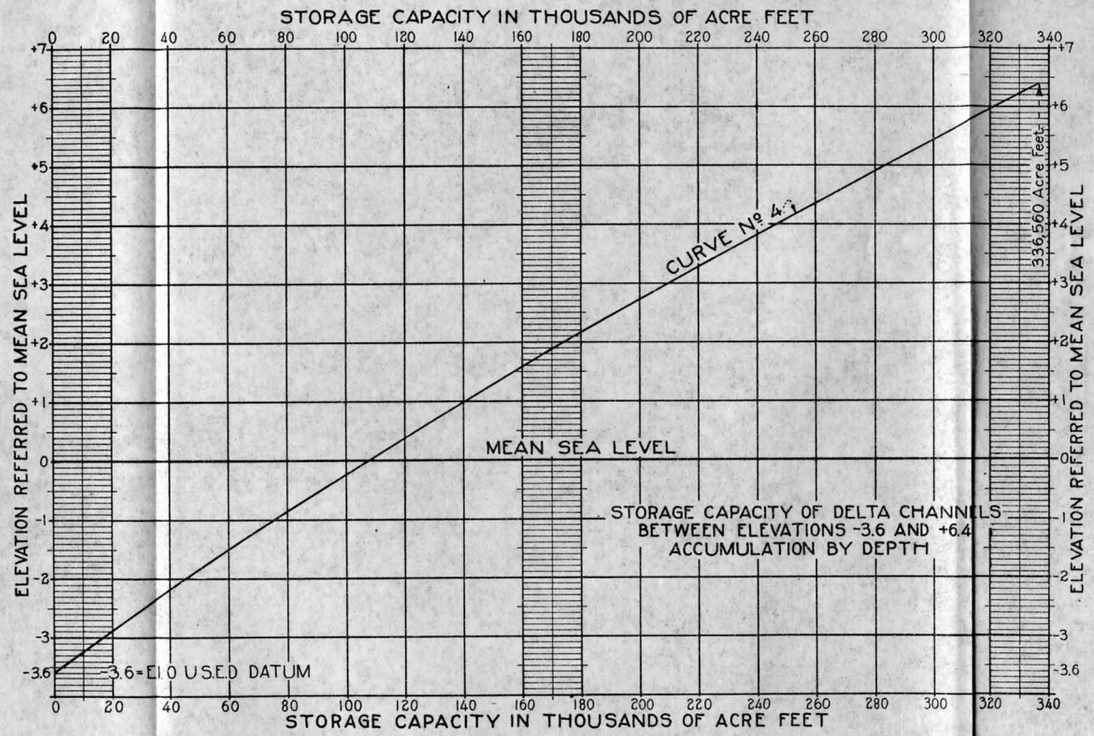
CURVES OF STORAGE IN DELTA



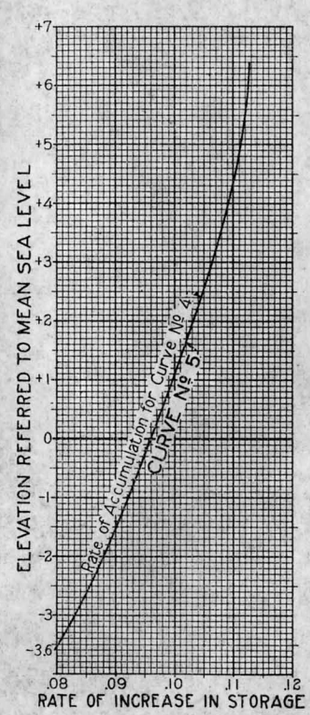
VOLUME IN THOUSANDS OF ACRE FEET BETWEEN ELEVATIONS -3.6 AND +6.4 U.S.G.S. DATUM

TABLE OF INCREMENTS FOR CURVES NOS 1, 2 AND 3

DISTANCE IN MILES FROM LOWER END OF CHAIN ISLAND	SACRAMENTO RIVER	SAN JOAQUIN RIVER	COMBINED CHANNELS
0			
2	10,200	8,000	18,200
4	7,500	7,800	15,300
6	6,300	8,200	14,500
8	7,000	11,500	18,500
10	9,500	10,500	20,000
2	8,600	8,100	16,700
4	5,800	8,470	14,270
6	5,300	9,770	15,070
8	5,000	10,250	15,250
20	4,630	8,260	12,890
2	5,720	8,580	14,300
4	6,060	9,690	15,750
6	5,080	7,700	12,780
8	3,780	9,180	12,960
30	3,120	7,560	10,680
2	2,340	6,940	9,280
4	1,470	8,040	9,510
6	1,510	10,010	11,520
8	1,710	10,540	12,250
40	1,670	7,530	9,200
2	1,660	7,480	9,140
4	1,570	5,230	6,800
6	1,760	4,100	5,860
8	1,760	2,890	4,650
50	1,640	4,360	6,000
2	1,200	2,500	3,700
4	1,250	2,370	3,620
6	850	1,540	2,390
8	600	1,580	2,180
60	300	1,030	1,330
2	100	830	930
4	300	790	1,090
6	550	860	1,410
8	950	950	1,900
70	1,100	860	1,960
2	1,300	470	1,770
4	800	390	1,190
6	600	100	700
8	250		250
80	100		100
2	100		100
4	150		150
6	250		250
8	150		150
90	30		30



STORAGE CAPACITY IN THOUSANDS OF ACRE FEET



Notes.-

The Abcissas on Curve Nº 5 represent the fractional part of the total accumulation which would be included in a Section one foot deep at the various Elevations indicated by the Ordinates

It was assumed in the use of Curves Nºs 4 and 5 that Curve Nº 4 represents the form of the Storage Curve for each two Mile Block as well as for the total Volume of Storage.

The Curves do not include 16,810 Acre Feet of Marsh Storage lying above El. 2.9 Upstream from Cache Slough.

APPROVED FOR ESTIMATING PURPOSES:-
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
CURVES OF STORAGE IN DELTA FOR TIDAL STUDIES

Drawn: WAP-CAM. Submitted: W. H. Lyons
Checked: Approved: J. D. Savage

SV-130 | Berkeley California, Mch 1926 | 193-D-83

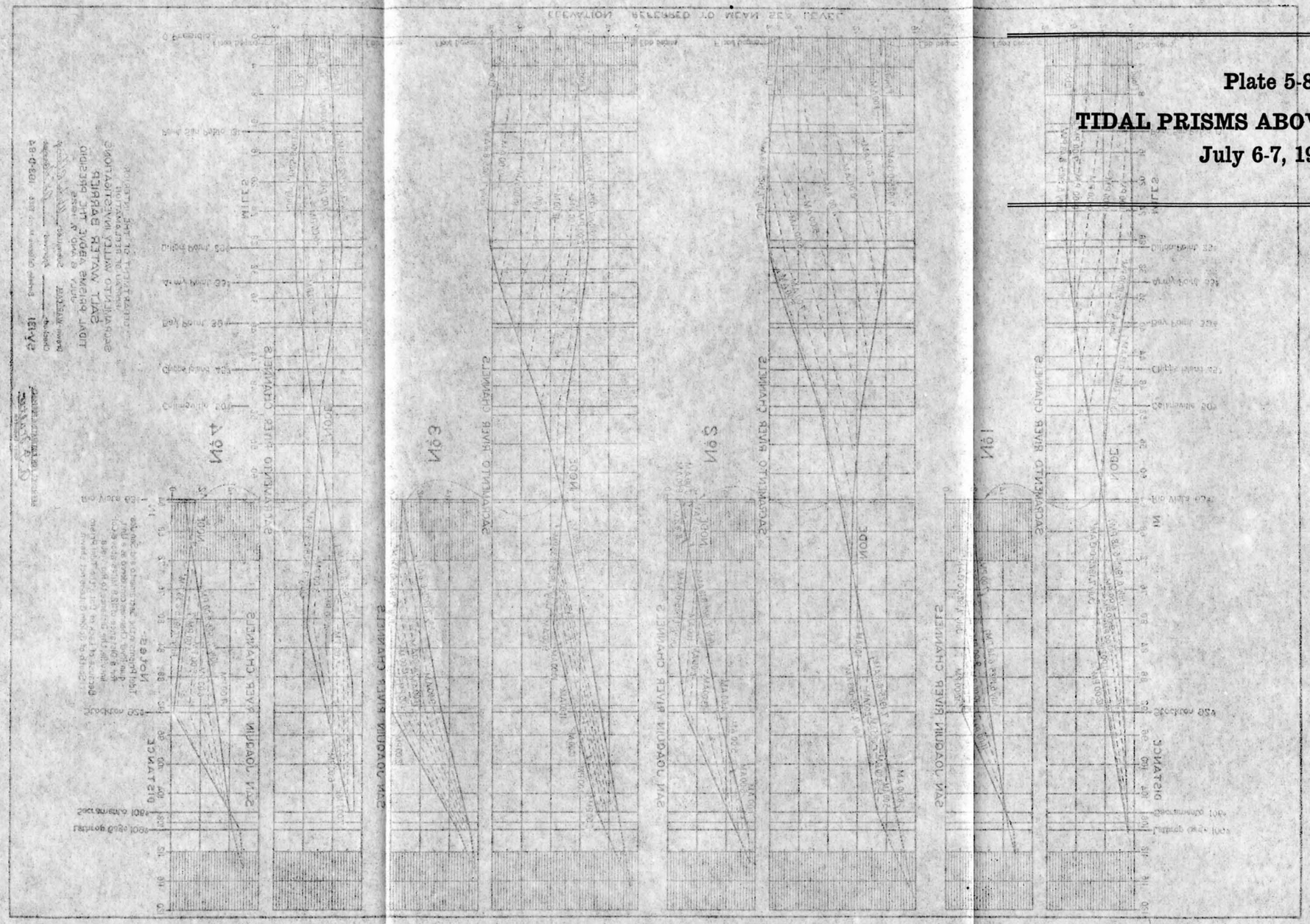
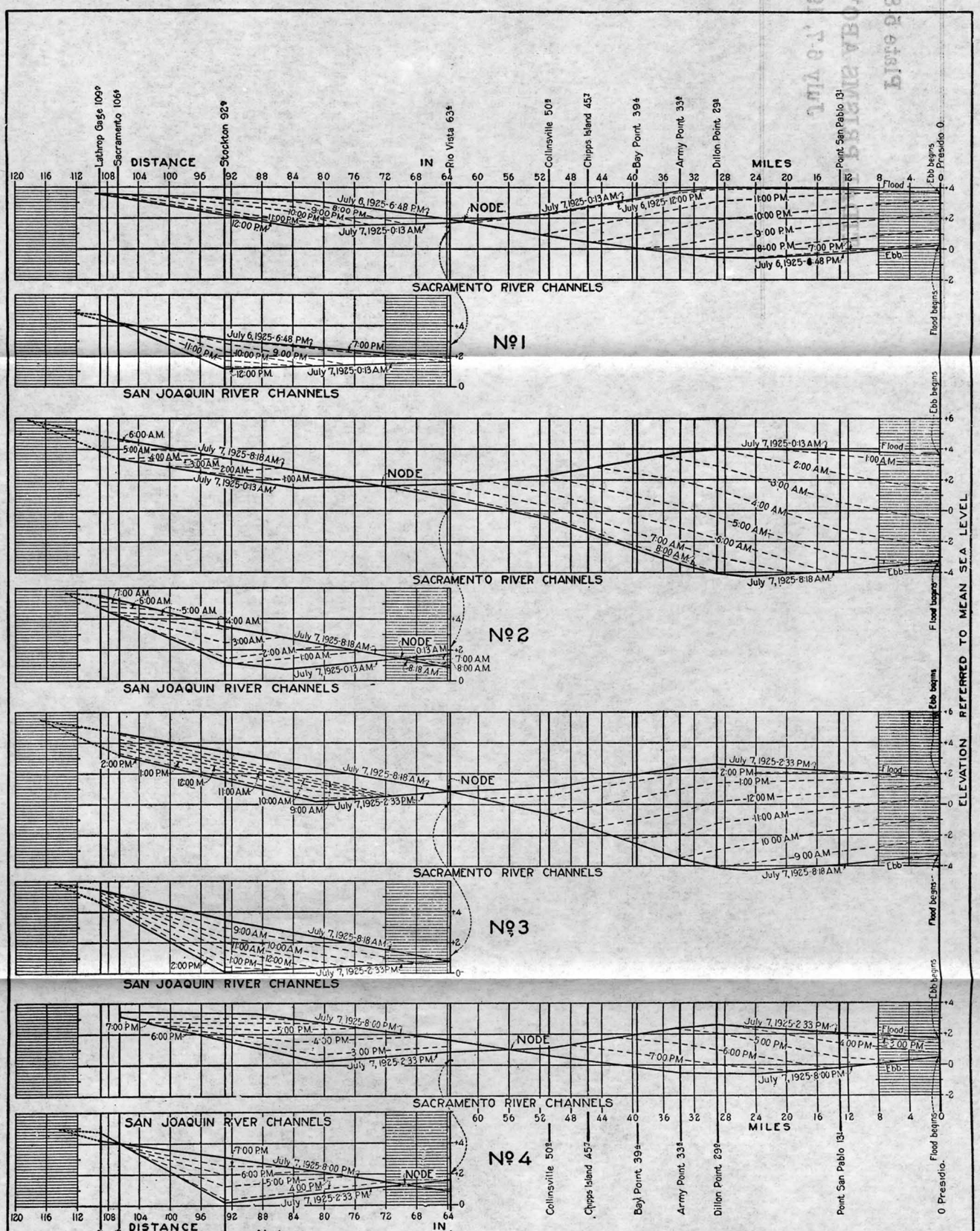


Plate 5-8

TIDAL PRISMS ABOVE PRESIDIO

July 6-7, 1925



Notes:-

Tidal Prisms in the Sacramento and San Joaquin River Channels considered as a Unit, for a Distance of 12.8 Miles above Collinsville, the Distance to Rio Vista.

Because of Lack of Data, the Tidal Prism South of Golden Gate is not shown.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
TIDAL PRISMS ABOVE THE PRESIDIO
JULY 6 AND 7, 1925

Drawn-WAP-CAM. Submitted- Wilbur R. Young
Checked- Approved- G. P. Savage

APPROVED FOR ESTIMATING PURPOSES:
A. P. Walter
CHIEF ENGINEER

SV-131 Berkeley California March 1926. 193-D-84

PLATE 5-8

Plate 5-9

TIDAL PRISMS ABOVE POINT SAN PABLO

July 6-7, 1925

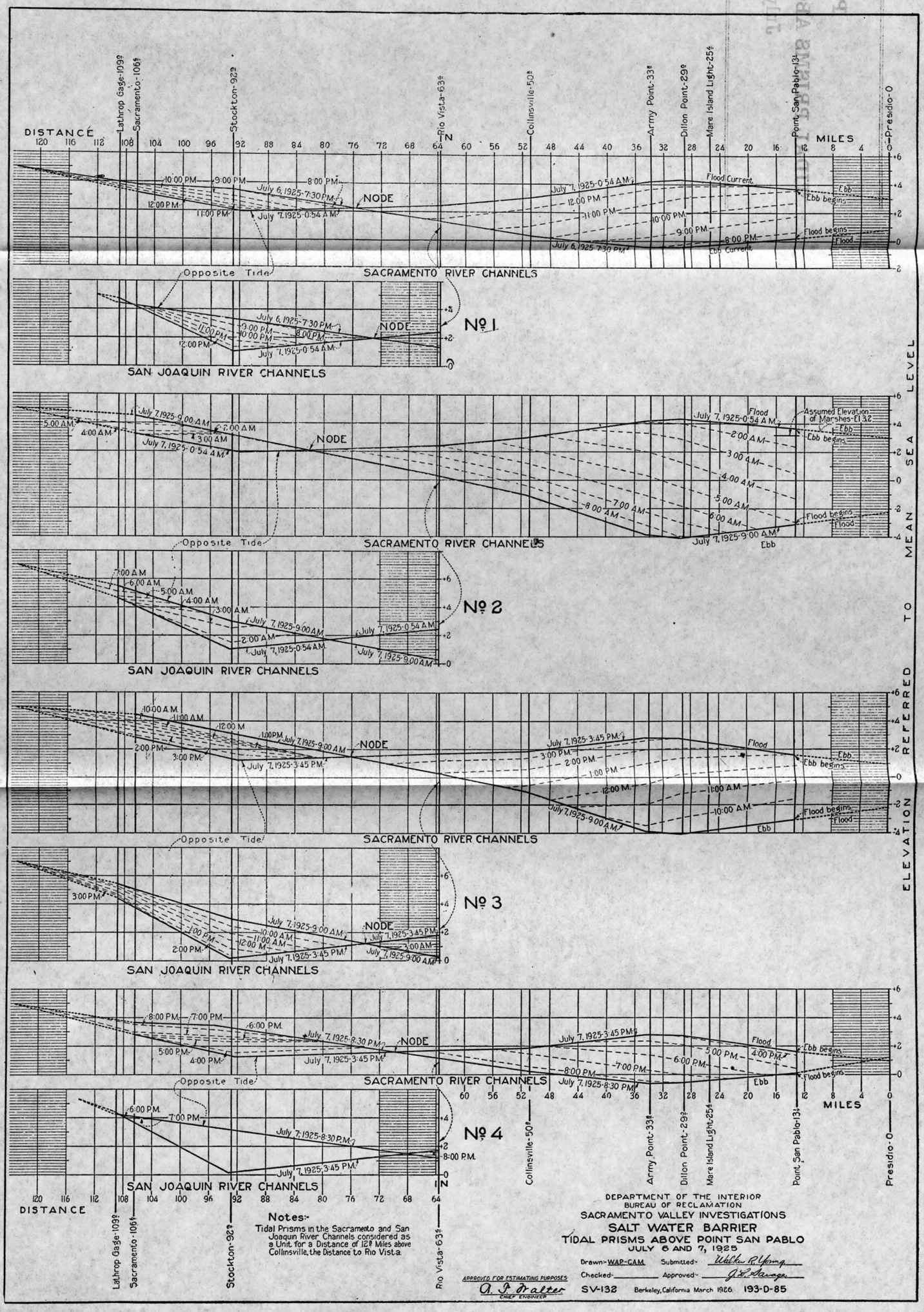

DISTANCE
MILES
Lathrop Gage-109.2
Sacramento-106.4
Stockton-92.2
Rio Vista-63.4
Collinsville-50.2
Army Point-33.8
Dillon Point-29.9
Mare Island Light-25.4
Point San Pablo-13.4
Presidio-0
SACRAMENTO RIVER CHANNELS
SAN JOAQUIN RIVER CHANNELS
Opposite Tide
NODE
Flood Current
Ebb Current
Ebb begins
Flood begins
Flood
Ebb
Assumed Elevation of Marshes-El 3.2
ELEVATION REFERRED TO MEAN SEA LEVEL
Nº 1
Nº 2
Nº 3
Nº 4
Notes:-
Tidal Prisms in the Sacramento and San Joaquin River Channels considered as a Unit, for a Distance of 12.8 Miles above Collinsville, the Distance to Rio Vista.
APPROVED FOR ESTIMATING PURPOSES
A. F. Walter
CHIEF ENGINEER
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
TIDAL PRISMS ABOVE POINT SAN PABLO
JULY 6 AND 7, 1925
Drawn-WAP-CAM. Submitted-
Checked- Approved-
SV-132 Berkeley, California March 1926 193-D-85

PLATE 5-9

Plate 5-10

TIDAL PRISMS ABOVE ARMY POINT

July 6-7, 1925

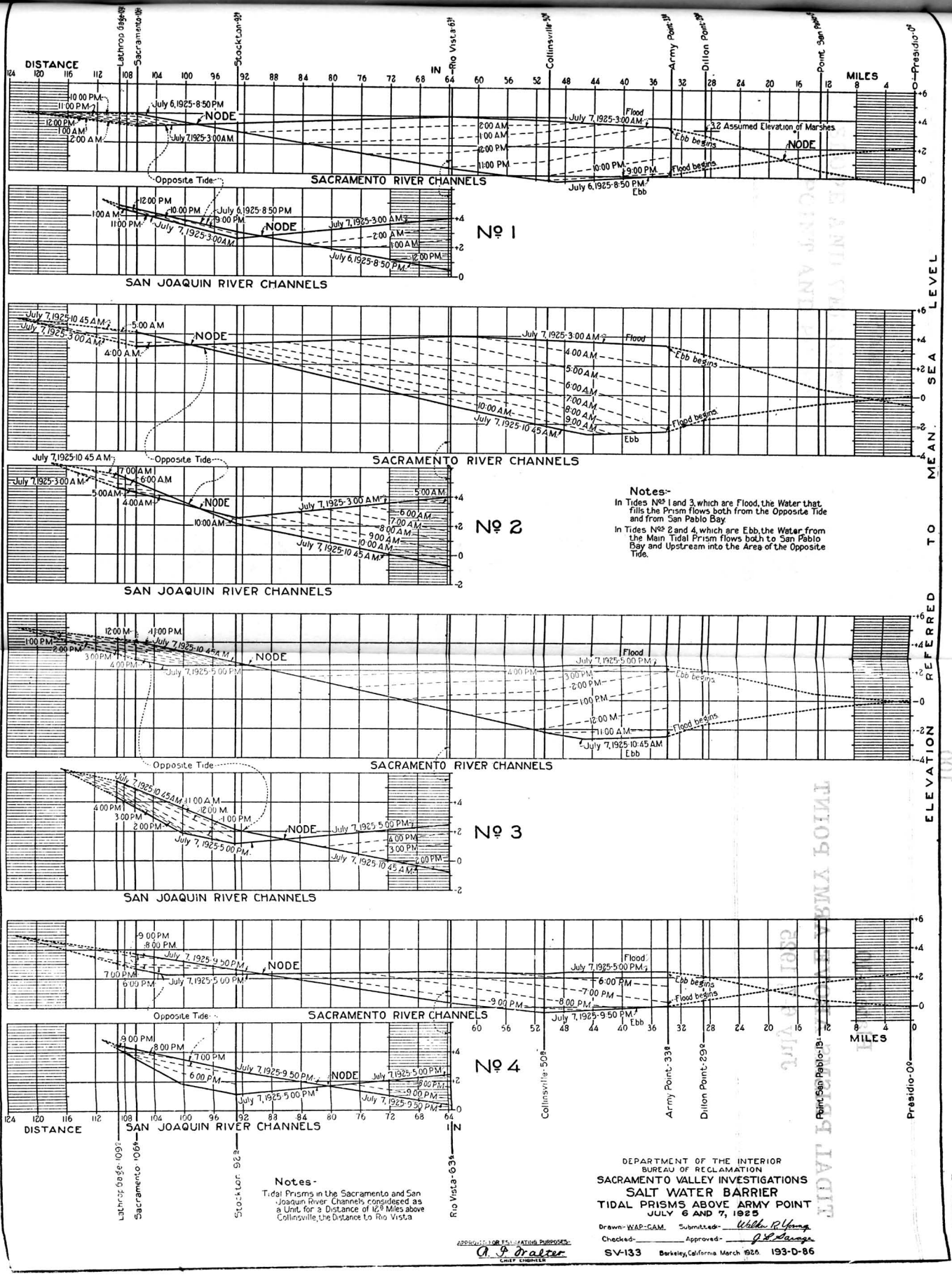

DISTANCE IN MILES
Lathrop Bridge 109.2
Sacramento 106.9
Stockton 92.8
Rio Vista 63.8
Collinsville 50.8
Army Point 33.8
Dillon Point 29.2
Point San Pablo 13.1
Presidio 0.0
NODE
Flood
Ebb
Ebb begins
Flood begins
Opposite Tide
3.2 Assumed Elevation of Marshes
SACRAMENTO RIVER CHANNELS
SAN JOAQUIN RIVER CHANNELS
Nº 1
Nº 2
Nº 3
Nº 4
ELEVATION REFERRED TO MEAN SEA LEVEL
Notes:-
In Tides Nos 1 and 3, which are Flood, the Water that fills the Prism flows both from the Opposite Tide and from San Pablo Bay.
In Tides Nos 2 and 4, which are Ebb, the Water from the Main Tidal Prism flows both to San Pablo Bay and Upstream into the Area of the Opposite Tide.
Notes-
Tidal Prisms in the Sacramento and San Joaquin River Channels considered as a Unit, for a Distance of 12.8 Miles above Collinsville, the Distance to Rio Vista
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
TIDAL PRISMS ABOVE ARMY POINT
JULY 6 AND 7, 1925
Drawn-WAP-CAM. Submitted-
Checked- Approved-
SV-133 Berkeley, California March 1926 193-D-86
APPROVED FOR ESTIMATING PURPOSES:
A. F. Walter
CHIEF ENGINEER

PLATE 5-10

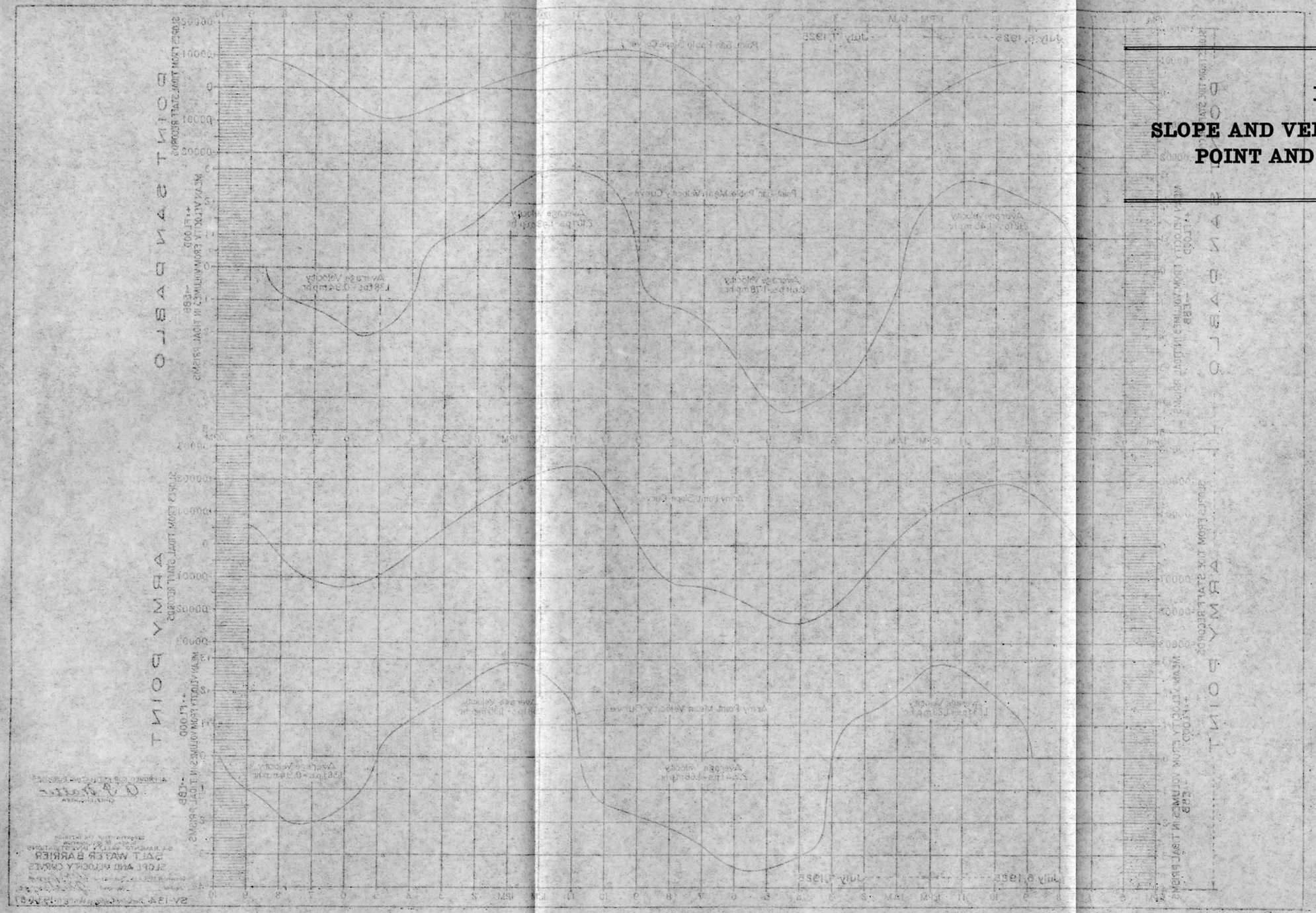


Plate 5-11

SLOPE AND VELOCITY CURVES, ARMY POINT AND POINT SAN PABLO

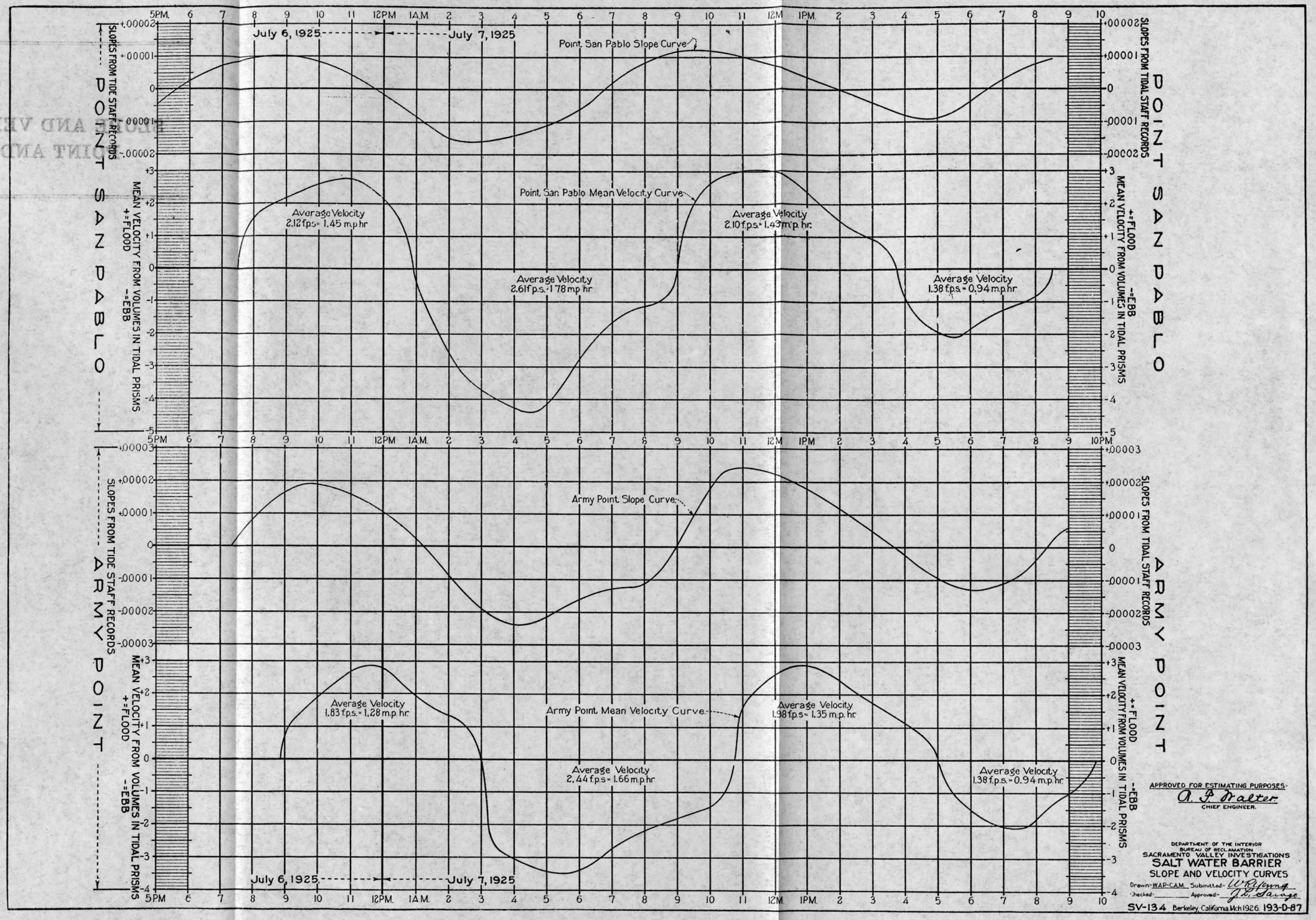
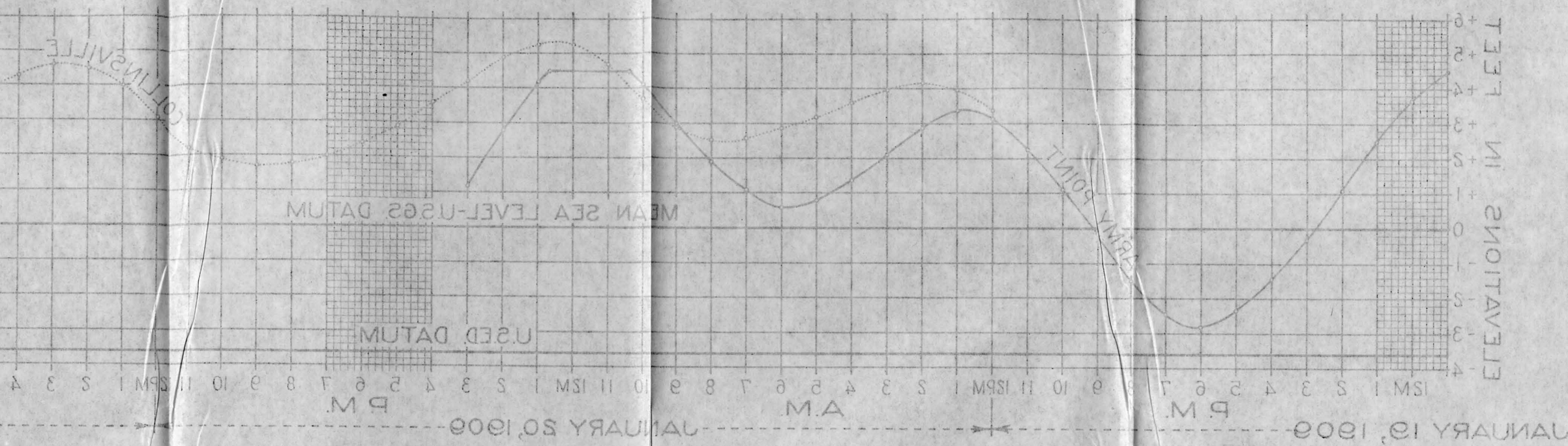
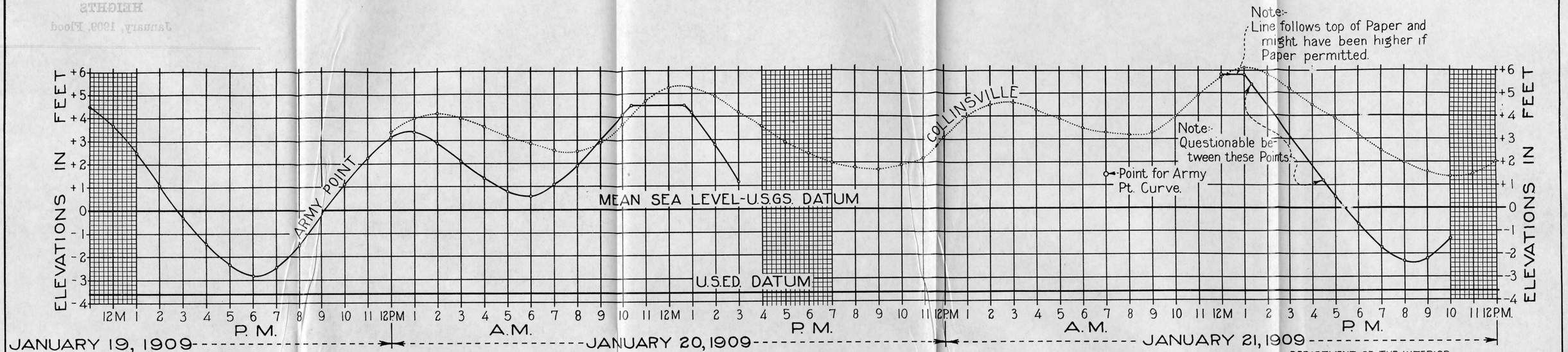

POINT SAN PABLO
SLOPES FROM TIDE STAFF RECORDS
MEAN VELOCITY FROM VOLUMES IN TIDAL PRISMS
+=FLOOD
-=EBB
July 6, 1925
July 7, 1925
Point San Pablo Slope Curve
Point San Pablo Mean Velocity Curve
Average Velocity 2.12 f.p.s.=1.45 m.p.hr.
Average Velocity 2.61 f.p.s.=1.78 m.p.hr.
Average Velocity 2.10 f.p.s.=1.43 m.p.hr.
Average Velocity 1.38 f.p.s.=0.94 m.p.hr.
ARMY POINT
Army Point Slope Curve
Army Point Mean Velocity Curve
Average Velocity 1.83 f.p.s.=1.28 m.p.hr.
Average Velocity 2.44 f.p.s.=1.66 m.p.hr.
Average Velocity 1.98 f.p.s.=1.35 m.p.hr.
Average Velocity 1.38 f.p.s.=0.94 m.p.hr.
APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER.
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SLOPE AND VELOCITY CURVES
Drawn-WAP-CAM. Submitted-
Checked- Approved-
SV-13.4 Berkeley, California Mch 1926. 193-D-87

Plate 5-12

ARMY POINT AND COLLINSVILLE GAGE HEIGHTS

January, 1909, Flood





DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER

ARMY POINT AND, COLLINSVILLE GAGE HEIGHTS DURING JAN. 1909 FLOOD-FROM U.S. ENGINEER DEPARTMENT RECORDS - AUG. 25, 1924

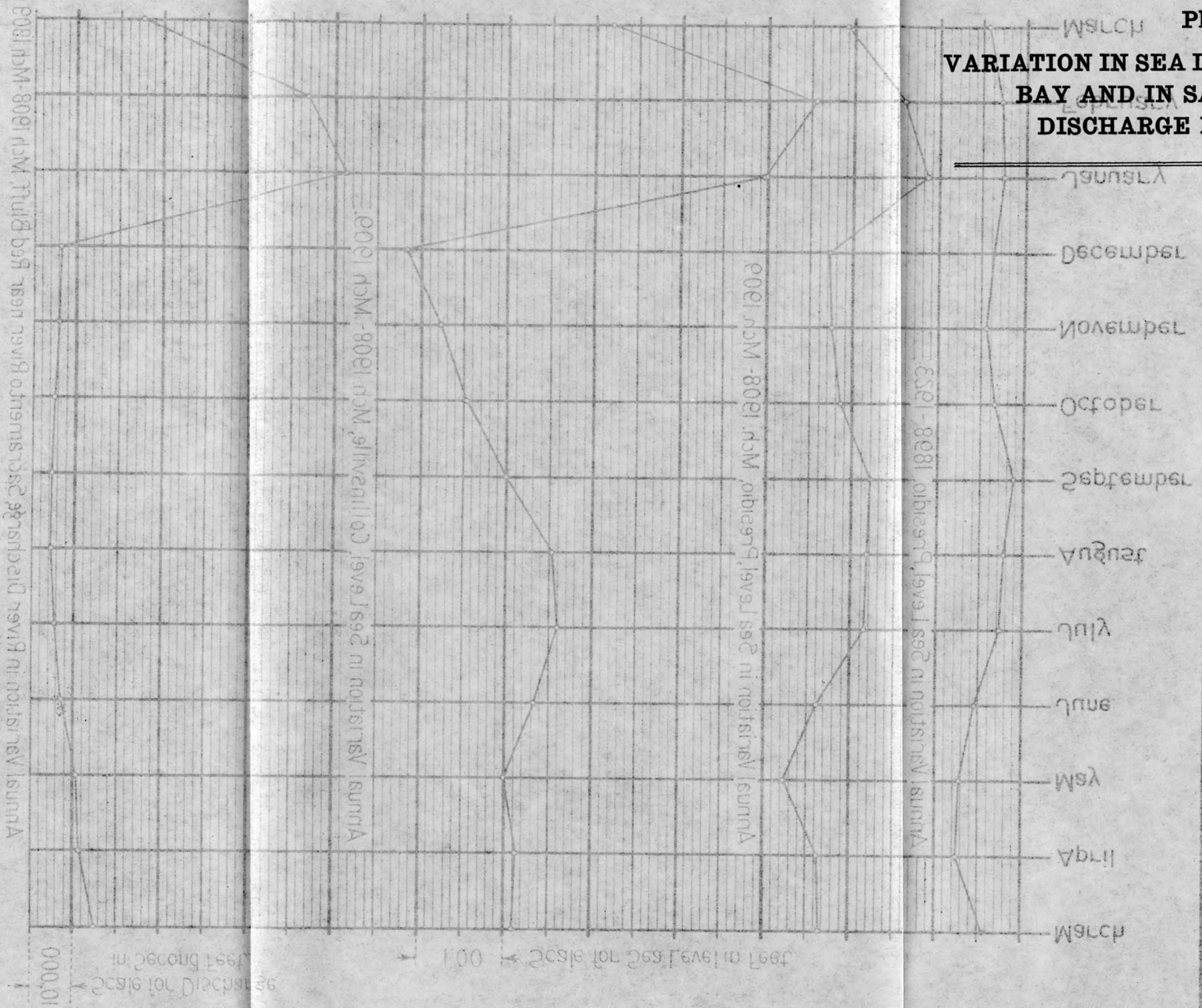
Drawn:- N.B.H. C.A.M. Submitted:- W. R. Young
Checked:- Approved:- J. L. Savage

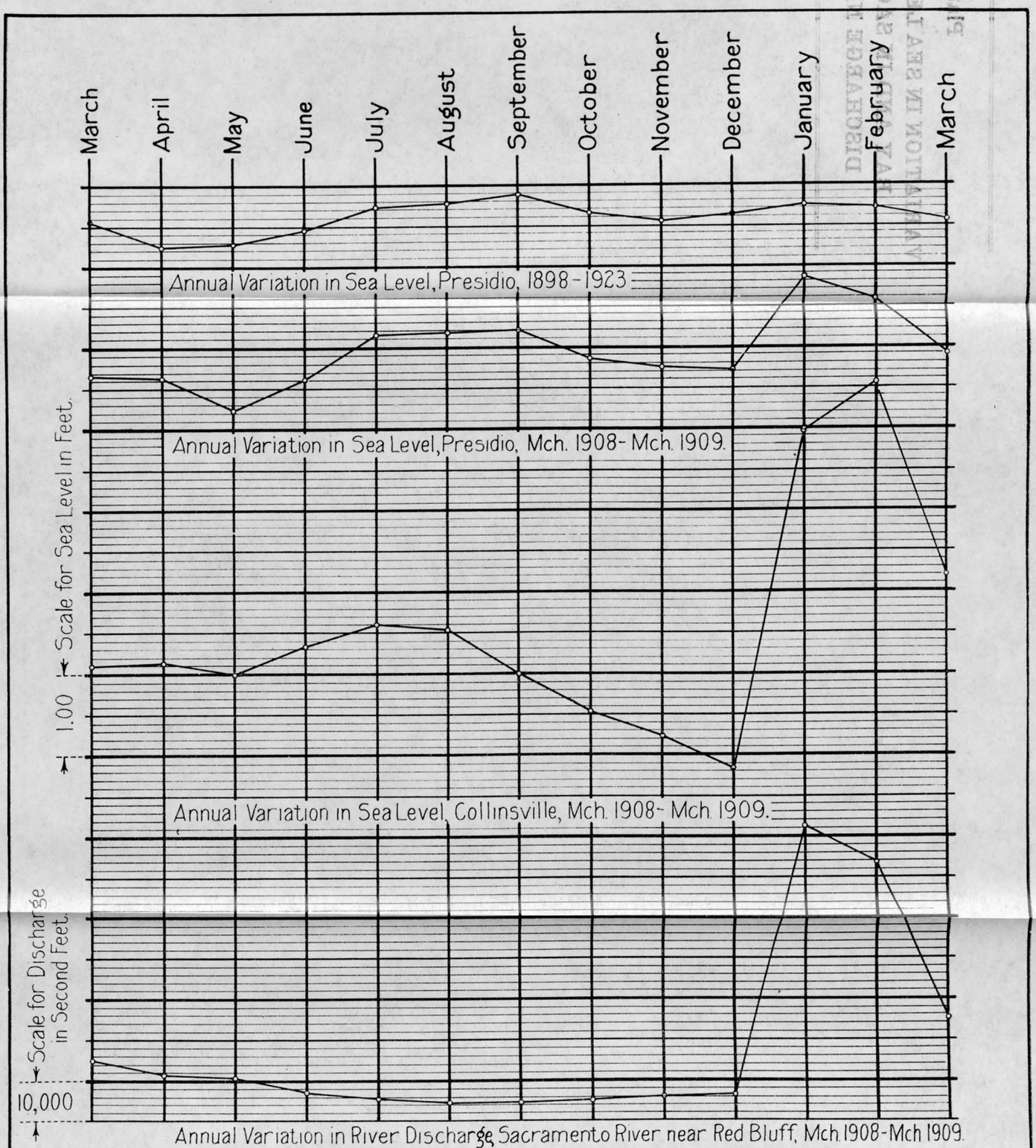
APPROVED FOR ESTIMATING PURPOSES:-
R. F. Walter.
CHIEF ENGINEER.

SV-135 Berkeley, California Mch. 1926. 193-D-88

Plate 5-13

VARIATION IN SEA LEVEL IN SAN FRANCISCO BAY AND IN SACRAMENTO RIVER DISCHARGE NEAR RED BLUFF





Note:-
Reproduced from Curves accompanying Letter of Dec. 18, 1925 from Mr. R.L. Faris, Acting Director, U.S. Coast and Geodetic Survey.

APPROVED FOR ESTIMATING PURPOSES:-
R. F. Walter
CHIEF ENGINEER.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER

VARIATION IN SEA LEVEL IN S.F. BAY
AND IN
SACRAMENTO RIVER DISCHARGE NEAR RED BLUFF

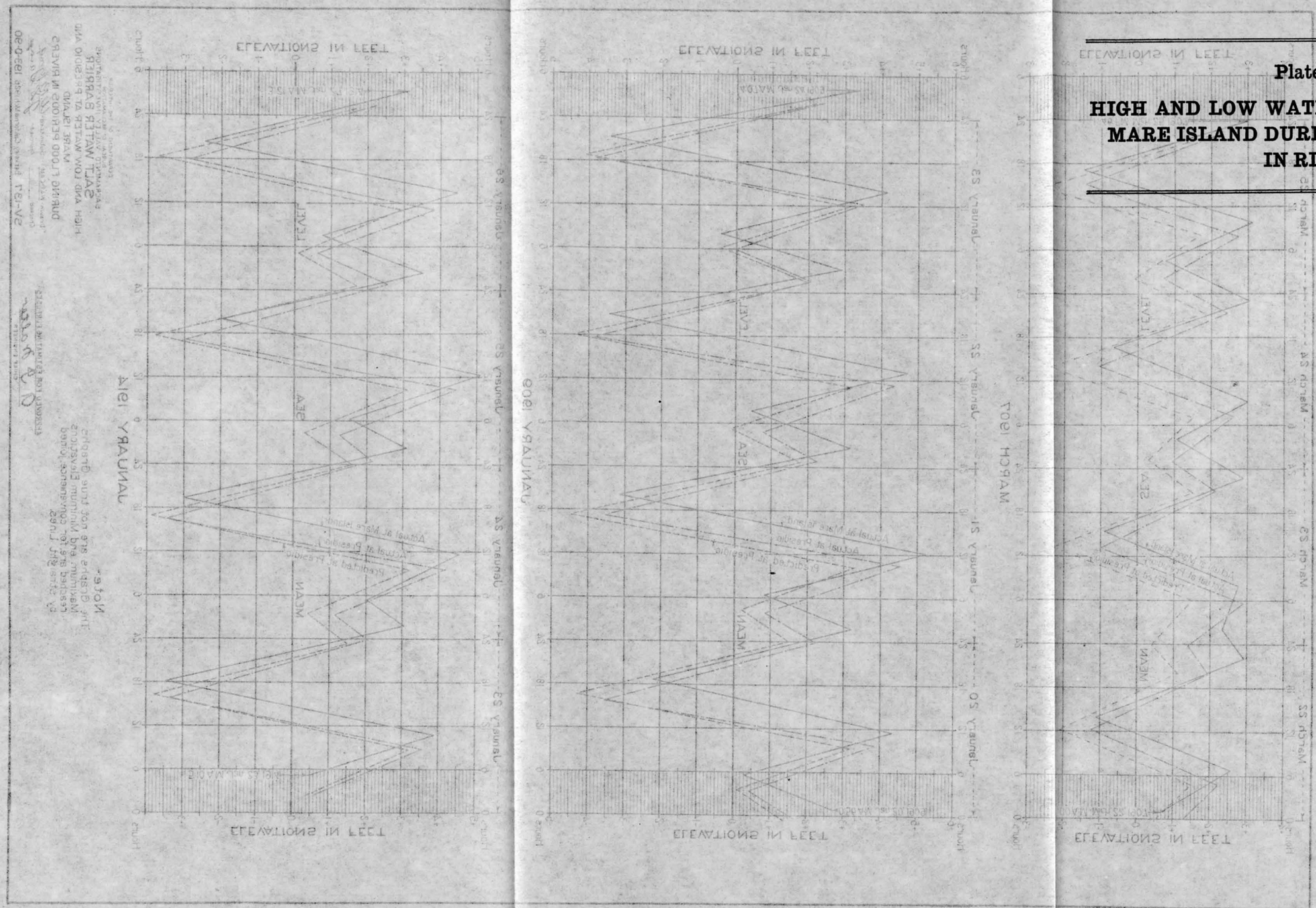
Drawn: W.R.Y.-C.A.M. Submitted:- W.R.Young
Checked:- Approved:- J.D. Savage

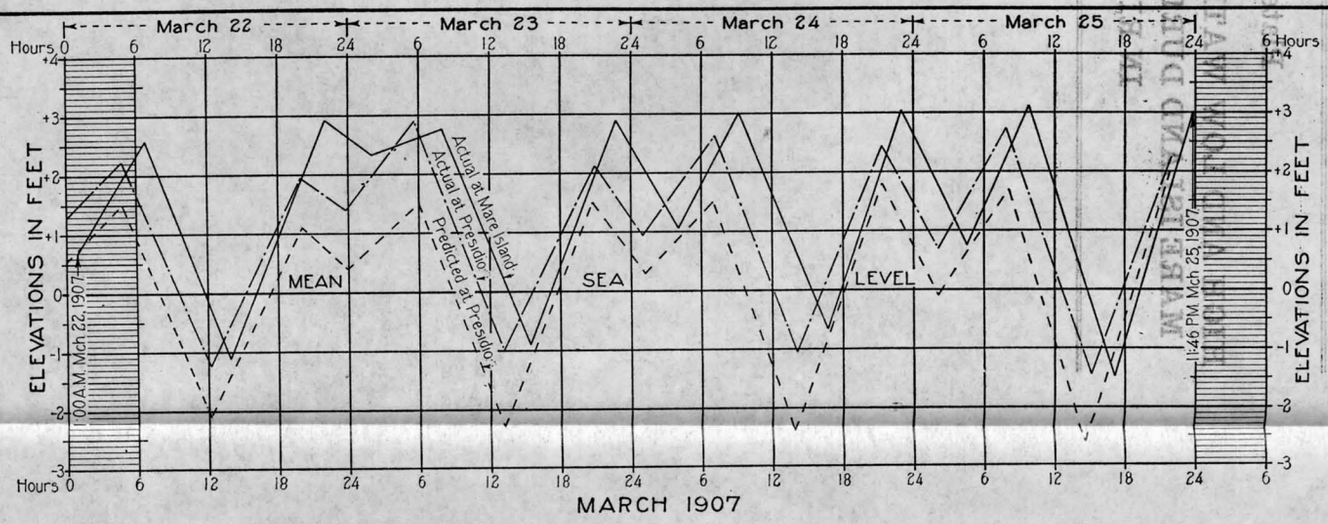
SV-136 Berkeley, California Mch. 1926. 193-D-89

PLATE 5-13

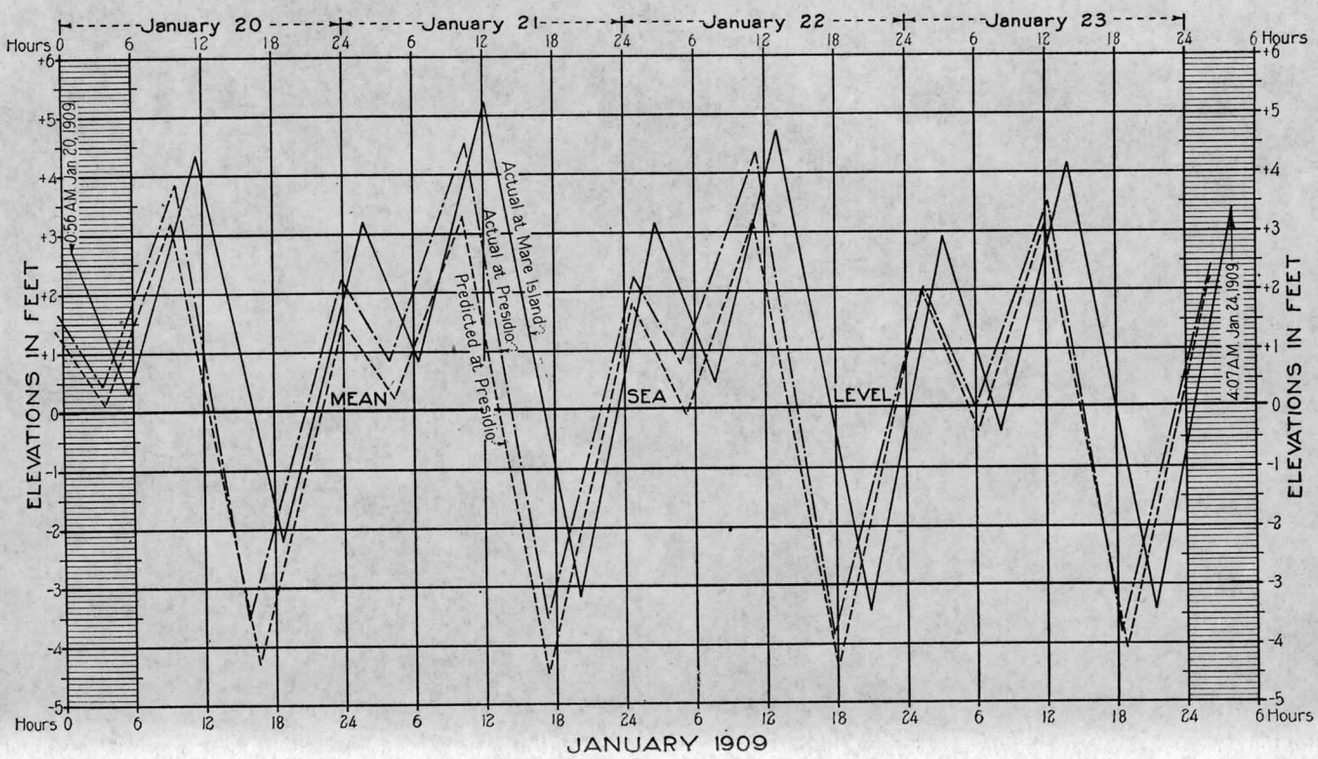
Plate 5-14

HIGH AND LOW WATER AT PRESIDIO AND MARE ISLAND DURING FLOOD PERIODS IN RIVERS

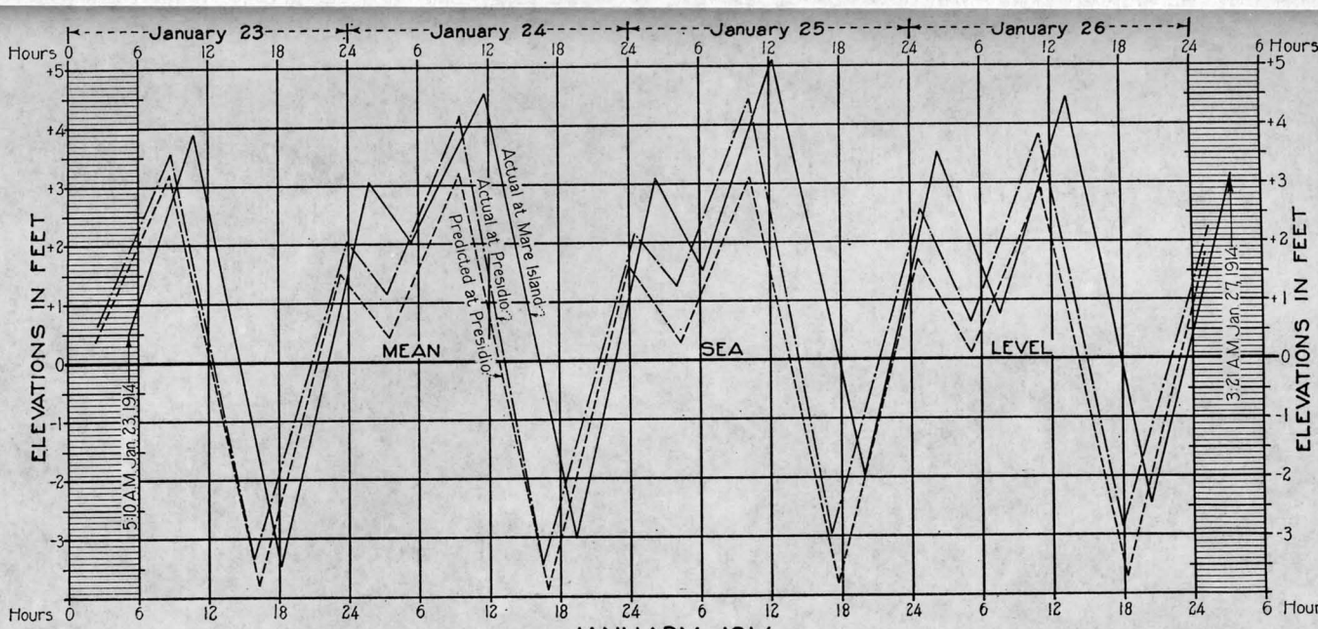




MARCH 1907



JANUARY 1909



JANUARY 1914

Note:-
The Graphs are not true Graphs. Maximum and Minimum Elevations reached are, for convenience, joined by straight Lines.

APPROVED FOR ESTIMATING PURPOSES:-
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
HIGH AND LOW WATER AT PRESIDIO AND MARE ISLAND
DURING FLOOD PERIODS IN RIVERS

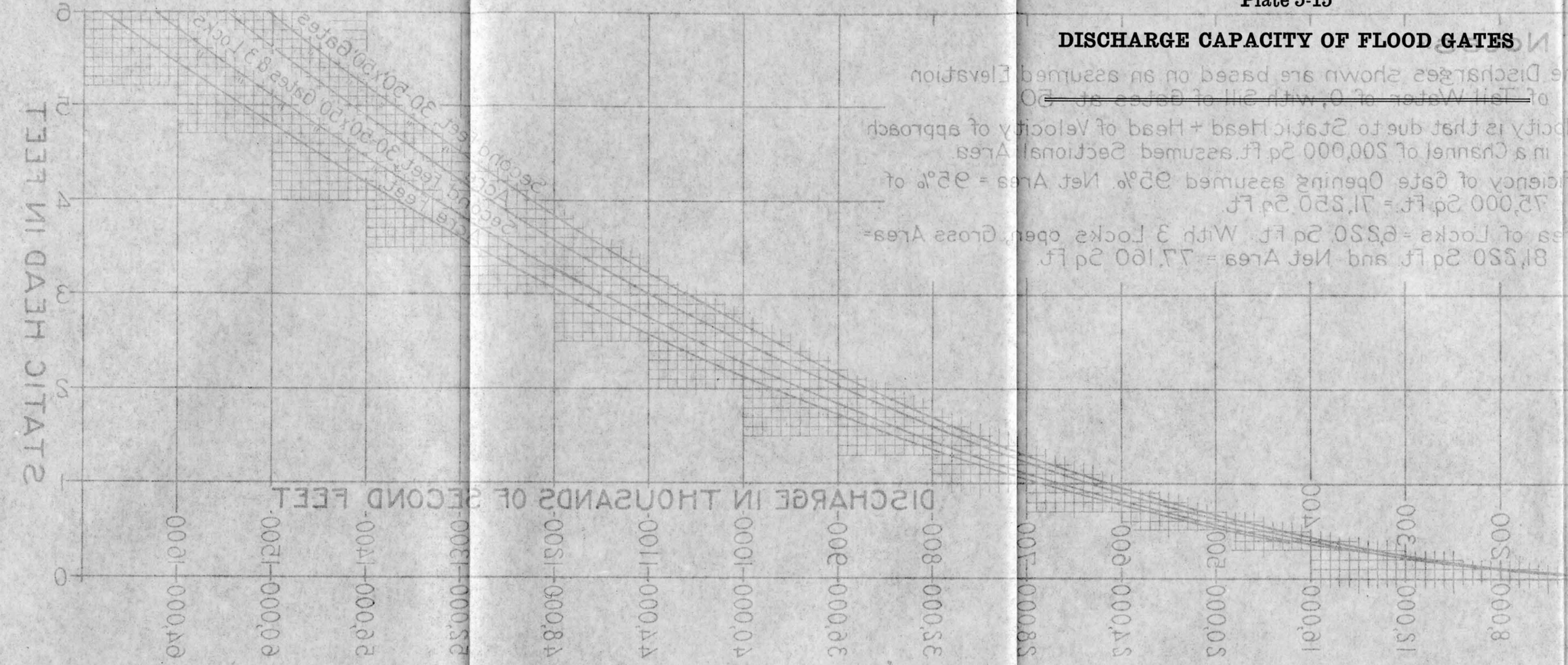
Drawn:- WAP-CAM. Submitted:- W. B. Young
Checked:- _____ Approved:- J. D. Savage

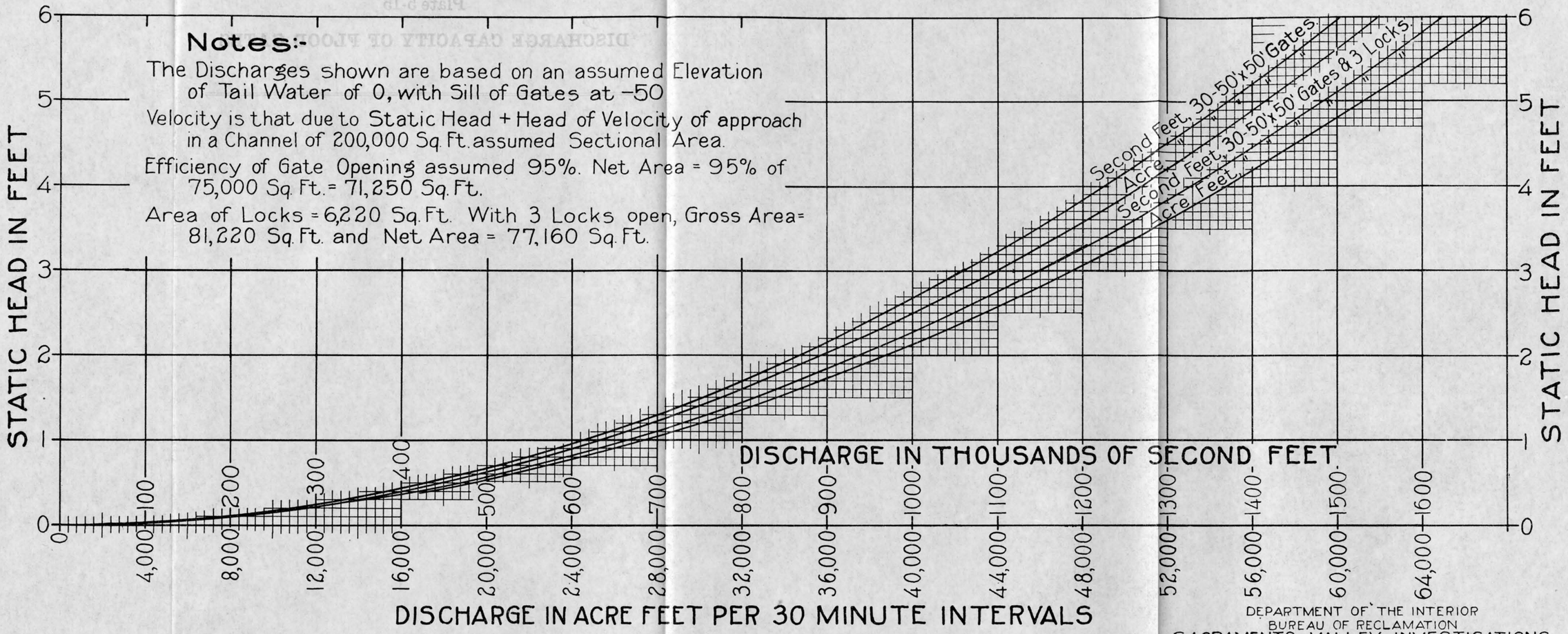
SV-137 Berkeley, California Mch. 1926. 193-D-90

PLATE 5-14

Plate 5-15

DISCHARGE CAPACITY OF FLOOD GATES





DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER

DISCHARGE CAPACITY OF FLOOD GATES

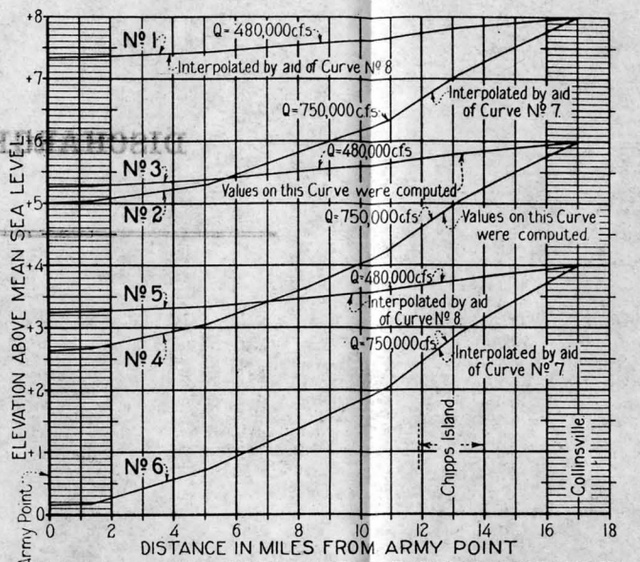
Drawn:- W.A.P.-C.A.M. Submitted:- W. P. Young
Checked:- Approved:- J. L. Savage

APPROVED FOR ESTIMATING PURPOSES:-
A. F. Walter
CHIEF ENGINEER.

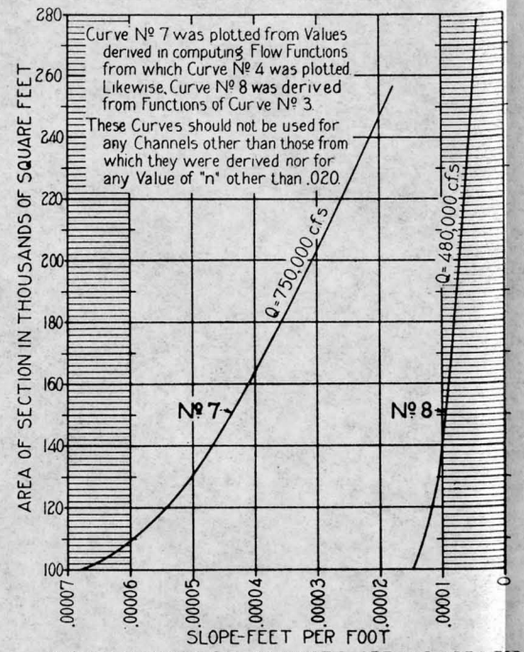
SV-138 Berkeley, California. Mch. 1926. 193-D-91

Plate 5-16

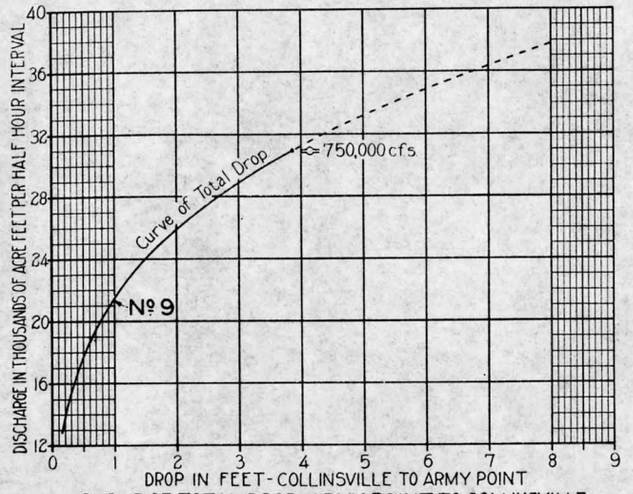
DISCHARGE AND SLOPE CURVES



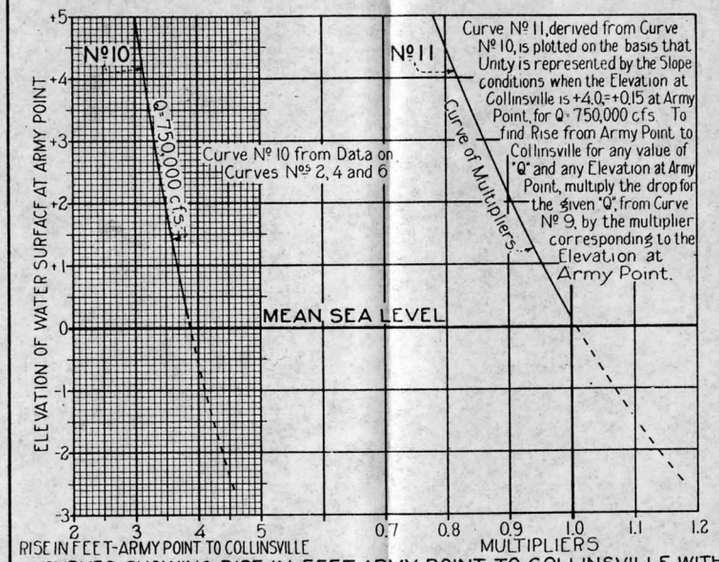
CURVES SHOWING WATER SURFACE ELEVATIONS FOR INDICATED VALUES OF "Q" BETWEEN ARMY POINT AND COLLINSVILLE



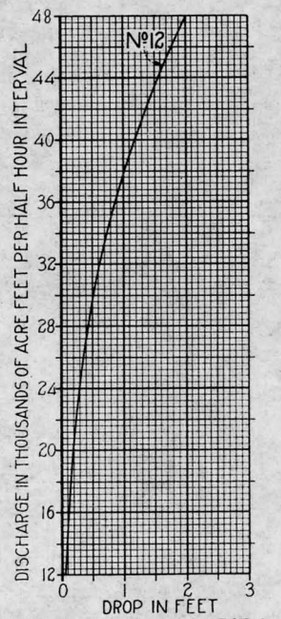
CURVES SHOWING RELATION OF SLOPE AND AREA FOR GIVEN VALUES OF "Q"



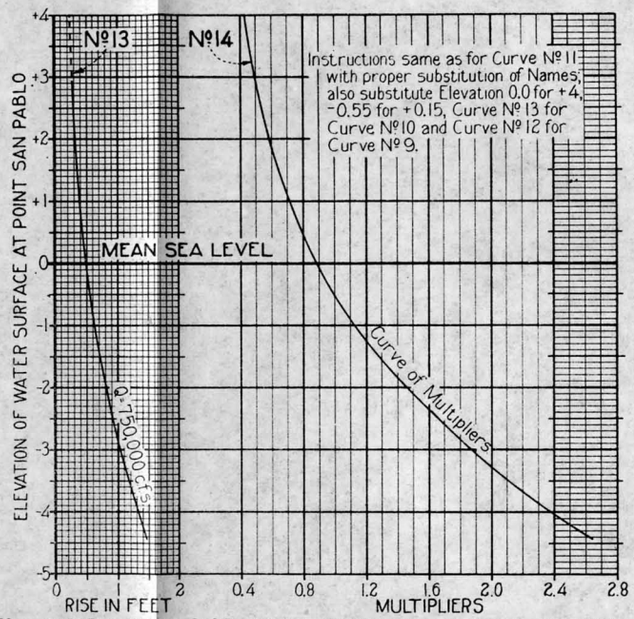
CURVE OF TOTAL DROP-ARMY POINT TO COLLINSVILLE-FOR DIFFERENT VALUES OF "Q" WITH CONSTANT ELEVATION OF +4.0 AT COLLINSVILLE



CURVES SHOWING RISE IN FEET, ARMY POINT TO COLLINSVILLE WITH Q=750,000 C.F.S. AND DIFFERENT ELEVATIONS OF WATER SURFACE AT ARMY POINT



CURVE OF TOTAL DROP SECTION "A" TO POINT SAN PABLO FOR DIFFERENT VALUES OF "Q" WITH CONSTANT ELEVATION OF 0.0 AT SECTION "A"
(See Notes)



CURVES SHOWING RISE IN FEET-POINT SAN PABLO TO SECTION "A" WITH Q=750,000 C.F.S. AND DIFFERENT ELEVATIONS OF WATER SURFACE AT POINT SAN PABLO
(See Notes)

Notes:-

All Elevations are referred to Mean Sea Level.

Kutter's Formula, with "n"=.020 used in computation of Flow.

Section "A" is located 4½ Miles below Mare Island Light. Effective Flow Channel assumed to extend from the 6' depth at Low Water on the South Side to the 9' depth on the North. Section taken from U.S.C and G.S. Chart Nº 5533, issue of June, 1925.

One Cubic Foot per Second=.0413 Acre Feet per Half Hour.

APPROVED FOR ESTIMATNG PURPOSES:-
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
DISCHARGE AND SLOPE CURVE

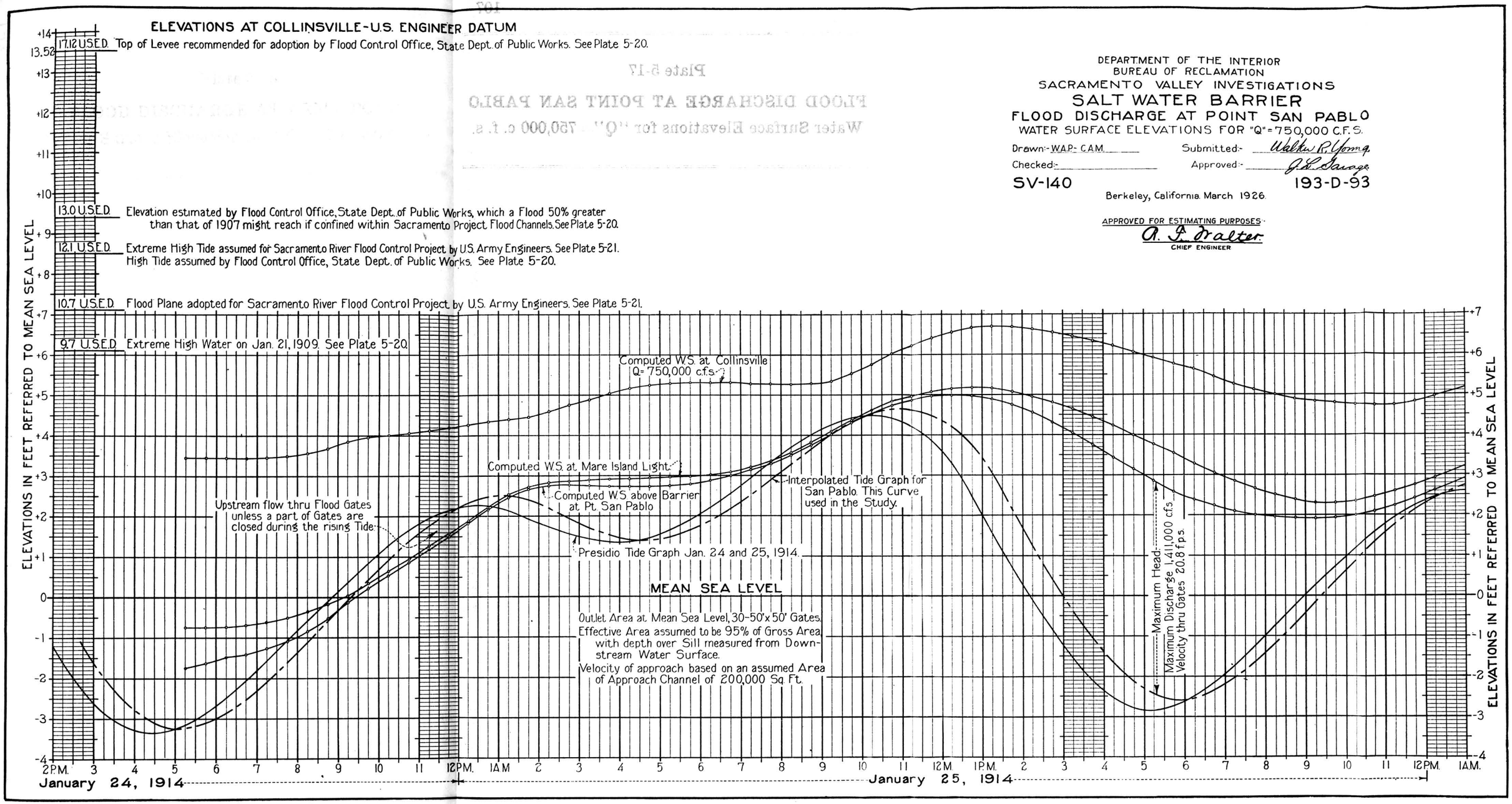
Drawn-WAP-CAM Submitted-W.R.Young
Checked Approved-J.L.Savage

SV-139 Berkeley, California, Mch 1926 193-D-92

Plate 5-17

FLOOD DISCHARGE AT POINT SAN PABLO

Water Surface Elevations for "Q"=750,000 c. f. s.



DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER

FLOOD DISCHARGE AT POINT SAN PABLO

WATER SURFACE ELEVATIONS FOR "Q"=750,000 C.F.S.

Drawn:- W.A.P.- C.A.M. Submitted:- Walter P. Young
Checked:- Approved:- A. F. Savage

SV-140 193-D-93

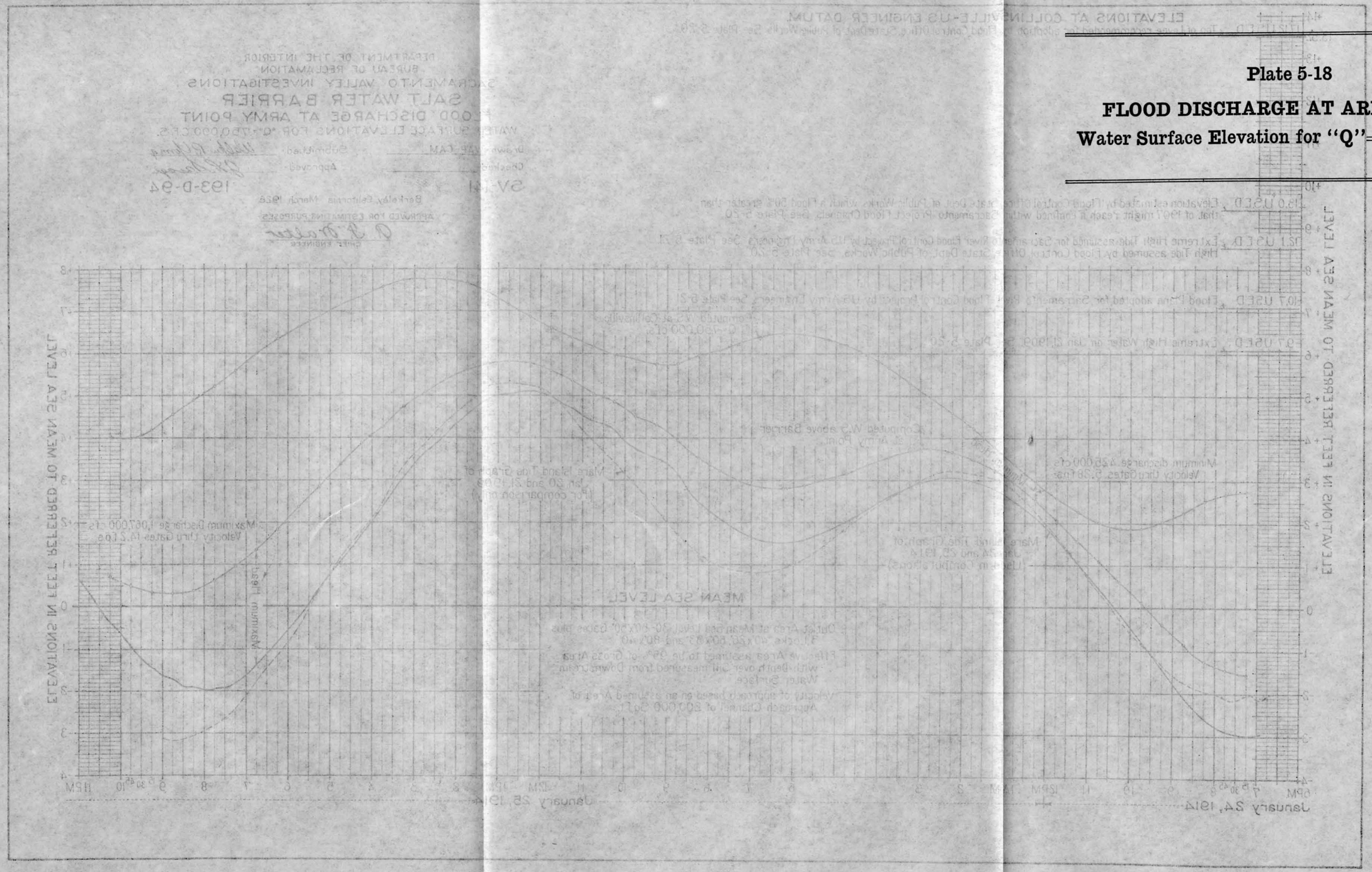
Berkeley, California. March 1926.

APPROVED FOR ESTIMATING PURPOSES:-
A. F. Walter
CHIEF ENGINEER

Plate 5-18

FLOOD DISCHARGE AT ARMY POINT

Water Surface Elevation for "Q"=750,000 c. f. s.



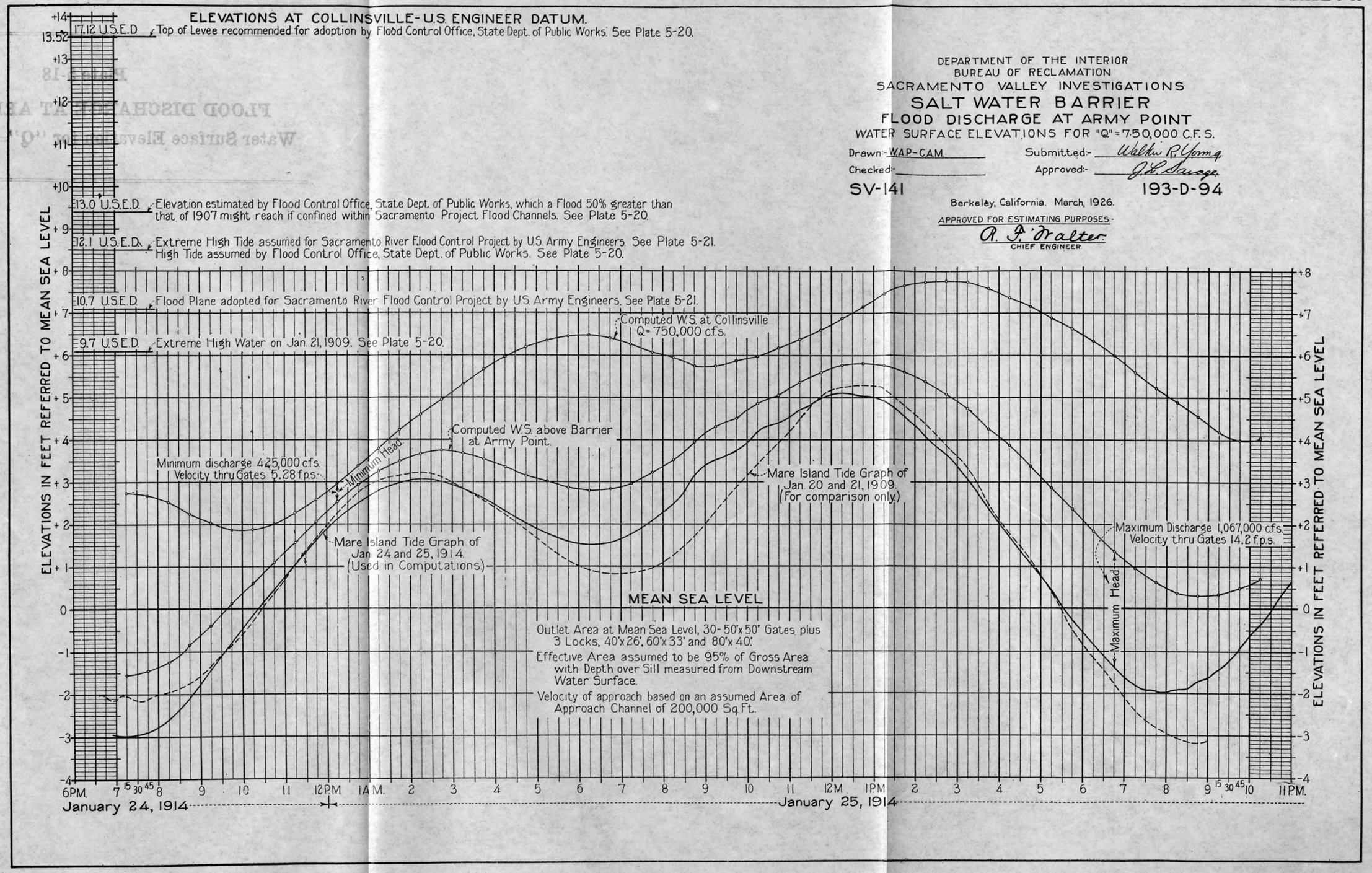

ELEVATIONS AT COLLINSVILLE-U.S. ENGINEER DATUM.
17.12 U.S.E.D. Top of Levee recommended for adoption by Flood Control Office, State Dept. of Public Works. See Plate 5-20.
13.0 U.S.E.D. Elevation estimated by Flood Control Office, State Dept. of Public Works, which a Flood 50% greater than that of 1907 might reach if confined within Sacramento Project Flood Channels. See Plate 5-20.
12.1 U.S.E.D. Extreme High Tide assumed for Sacramento River Flood Control Project by U.S. Army Engineers. See Plate 5-21.
High Tide assumed by Flood Control Office, State Dept. of Public Works. See Plate 5-20.
10.7 U.S.E.D. Flood Plane adopted for Sacramento River Flood Control Project by U.S. Army Engineers. See Plate 5-21.
9.7 U.S.E.D. Extreme High Water on Jan. 21, 1909. See Plate 5-20.
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
FLOOD DISCHARGE AT ARMY POINT
WATER SURFACE ELEVATIONS FOR "Q" = 750,000 C.F.S.
Drawn:- W.A.P.-C.A.M.
Checked:-
Submitted:- Walter P. Young
Approved:- J. L. Savage
SV-141
193-D-94
Berkeley, California. March, 1926.
APPROVED FOR ESTIMATING PURPOSES:-
A. F. Walter
CHIEF ENGINEER.
Computed W.S. at Collinsville Q = 750,000 c.f.s.
Computed W.S. above Barrier at Army Point.
Minimum discharge 425,000 cfs. Velocity thru Gates 5.28 f.p.s.
Minimum Head
Mare Island Tide Graph of Jan. 20 and 21, 1909. (For comparison only.)
Mare Island Tide Graph of Jan. 24 and 25, 1914. (Used in Computations)
Maximum Discharge 1,067,000 cfs. Velocity thru Gates 14.2 f.p.s.
Maximum Head
MEAN SEA LEVEL
Outlet Area at Mean Sea Level, 30-50'x50' Gates plus 3 Locks, 40'x26', 60'x33' and 80'x40'.
Effective Area assumed to be 95% of Gross Area with Depth over Sill measured from Downstream Water Surface.
Velocity of approach based on an assumed Area of Approach Channel of 200,000 Sq. Ft.
ELEVATIONS IN FEET REFERRED TO MEAN SEA LEVEL
January 24, 1914
January 25, 1914

Plate 5-19

FLOOD DISCHARGE AT ARMY POINT

Water Surface Elevation for "Q"=500,000 c. f. s.

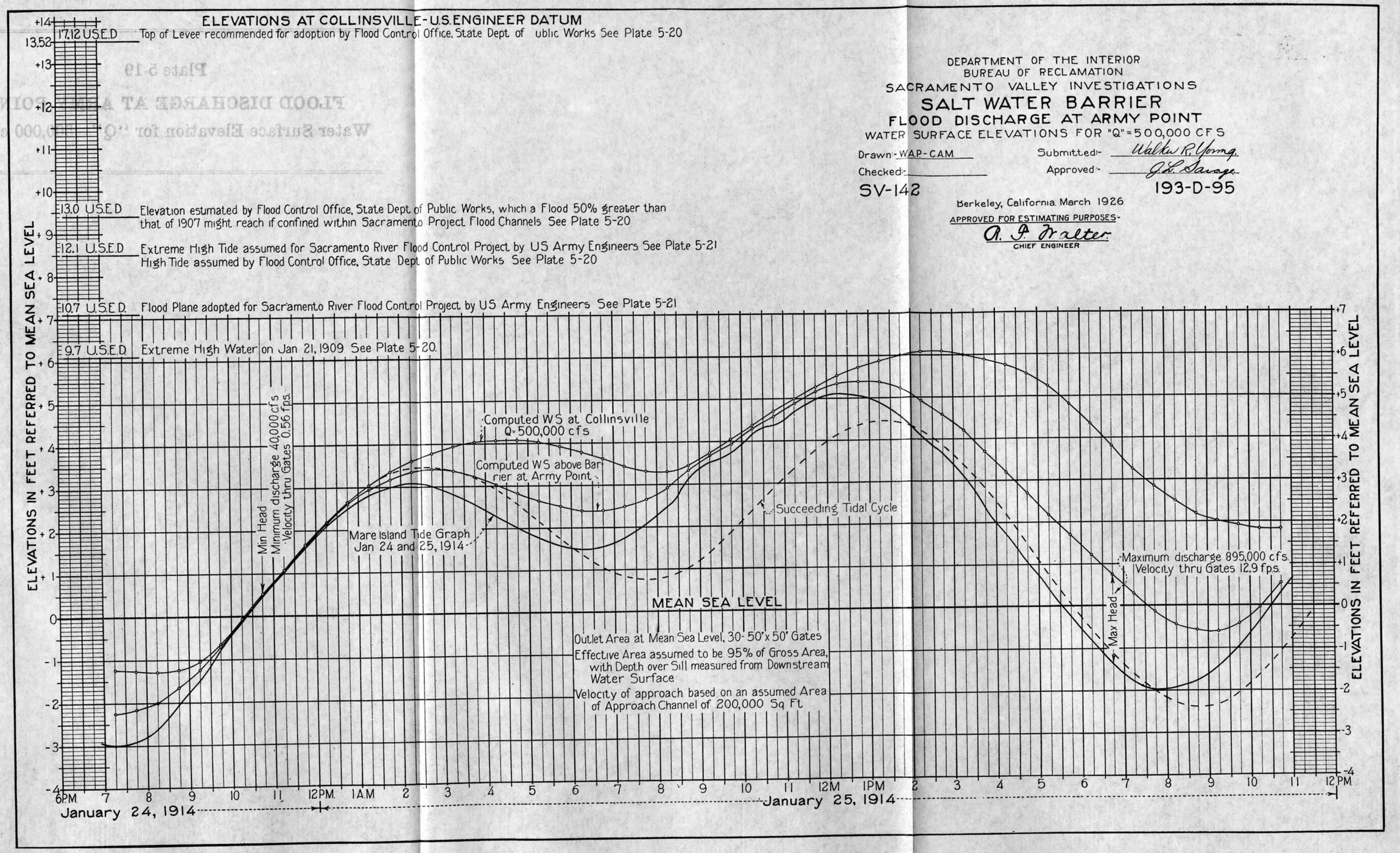
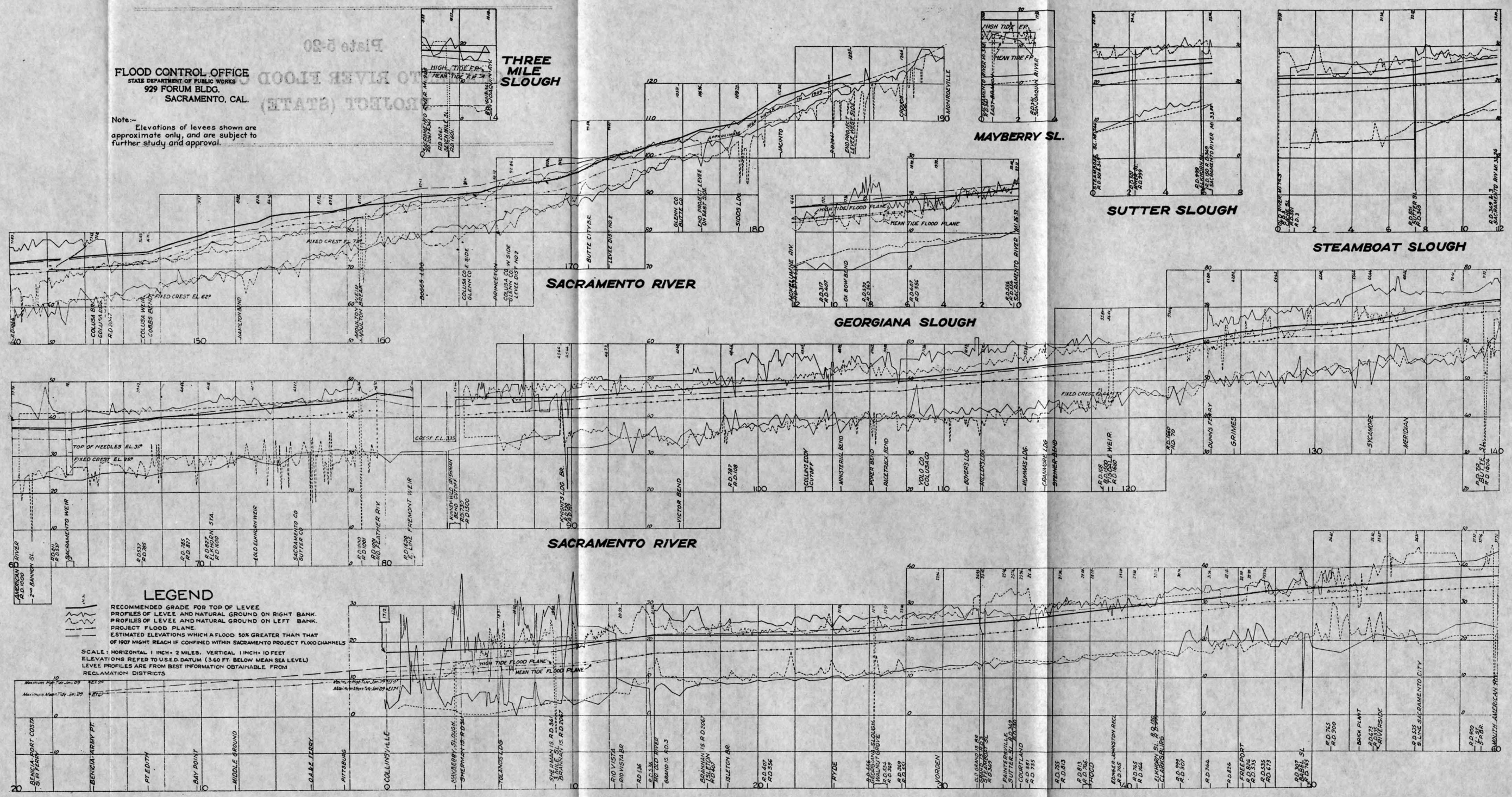

ELEVATIONS AT COLLINSVILLE-U.S. ENGINEER DATUM
17.12 U.S.E.D Top of Levee recommended for adoption by Flood Control Office, State Dept of ublic Works See Plate 5-20
13.52
13.0 U.S.E.D Elevation estimated by Flood Control Office, State Dept of Public Works, which a Flood 50% greater than that of 1907 might reach if confined within Sacramento Project Flood Channels See Plate 5-20
12.1 U.S.E.D Extreme High Tide assumed for Sacramento River Flood Control Project by US Army Engineers See Plate 5-21
High Tide assumed by Flood Control Office, State Dept of Public Works See Plate 5-20
10.7 U.S.E.D. Flood Plane adopted for Sacramento River Flood Control Project by US Army Engineers See Plate 5-21
9.7 U.S.E.D Extreme High Water on Jan 21, 1909 See Plate 5-20.
ELEVATIONS IN FEET REFERRED TO MEAN SEA LEVEL
Min Head
Minimum discharge 40,000 cfs
Velocity thru Gates 0.56 fps.
Computed WS at Collinsville
Q=500,000 cfs
Computed WS above Barrier at Army Point
Mare Island Tide Graph
Jan 24 and 25, 1914
Succeeding Tidal Cycle
Maximum discharge 895,000 cfs.
Velocity thru Gates 12.9 fps.
Max Head
MEAN SEA LEVEL
Outlet Area at Mean Sea Level, 30-50'x50' Gates
Effective Area assumed to be 95% of Gross Area, with Depth over Sill measured from Downstream Water Surface
Velocity of approach based on an assumed Area of Approach Channel of 200,000 Sq Ft
6PM 7 8 9 10 11 12PM 1AM 2 3 4 5 6 7 8 9 10 11 12M 1PM 2 3 4 5 6 7 8 9 10 11 12PM
January 24, 1914
January 25, 1914
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
FLOOD DISCHARGE AT ARMY POINT
WATER SURFACE ELEVATIONS FOR "Q"=500,000 CFS
Drawn-WAP-CAM
Checked-
Submitted- Walter R. Young
Approved- J. L. Savage
SV-142
193-D-95
Berkeley, California. March 1926
APPROVED FOR ESTIMATING PURPOSES-
A. P. Walter
CHIEF ENGINEER

Plate 5-20

SACRAMENTO RIVER FLOOD CONTROL PROJECT (STATE)



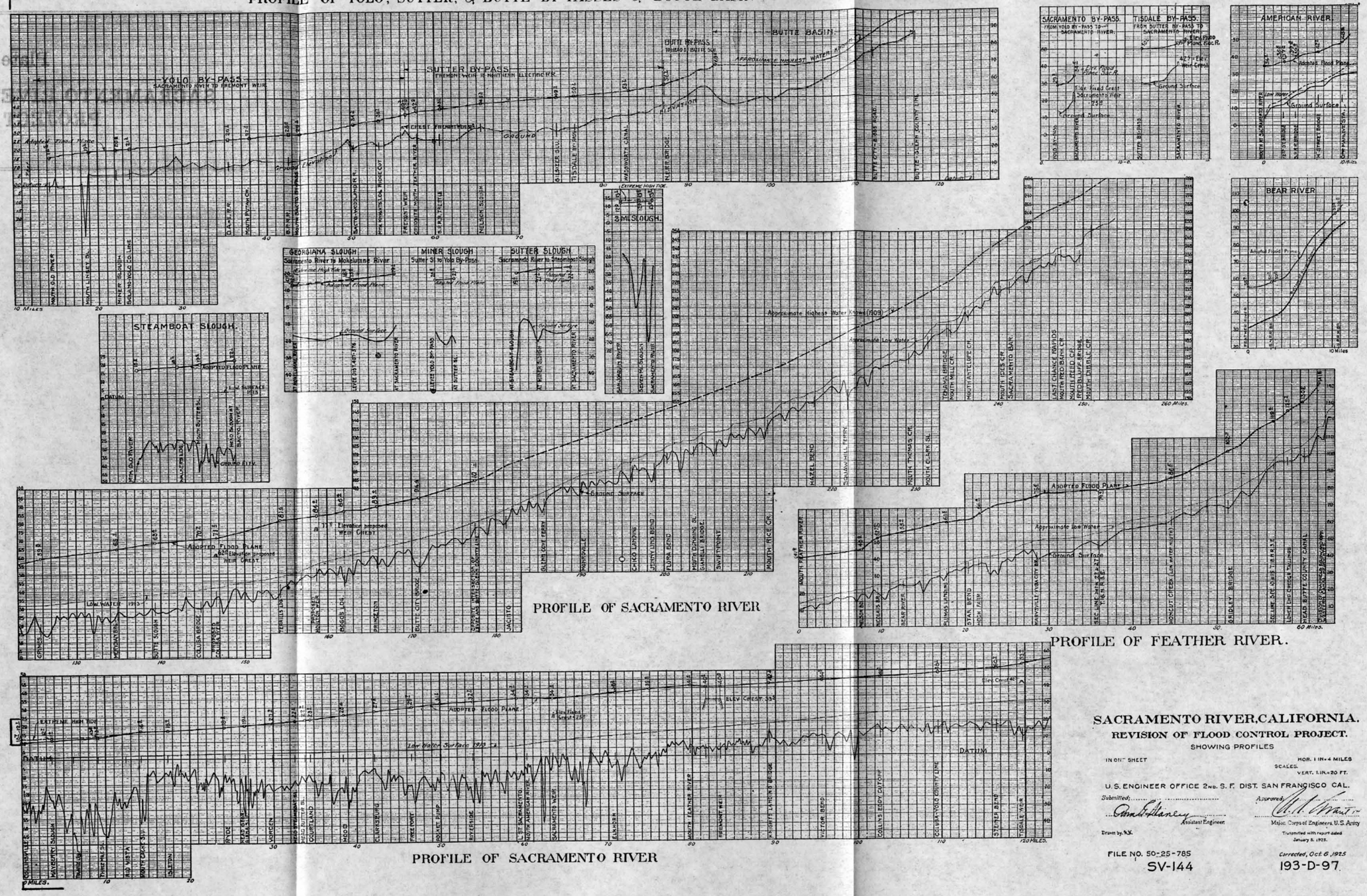
Sacramento River Flood Control Project (State)

Plate 5-21

SACRAMENTO RIVER FLOOD CONTROL PROJECT (ARMY)

WAR DEPARTMENT

PROFILE OF YOLO, SUTTER, & BUTTE BY-PASSES & BUTTE BASIN



SACRAMENTO RIVER, CALIFORNIA.

REVISION OF FLOOD CONTROL PROJECT.

SHOWING PROFILES

IN ONE SHEET

SCALES. HOR. 1 IN.=4 MILES VERT. 1 IN.=20 FT.

U.S. ENGINEER OFFICE 2ND. S. F. DIST. SAN FRANCISCO CAL.

Submitted: Chas. F. Haney, Assistant Engineer

Approved: R. L. Moore, Major, Corps of Engineers, U.S. Army

Drawn by N.S.

Transmitted with report dated January 5, 1925.

FILE NO. 50-25-785

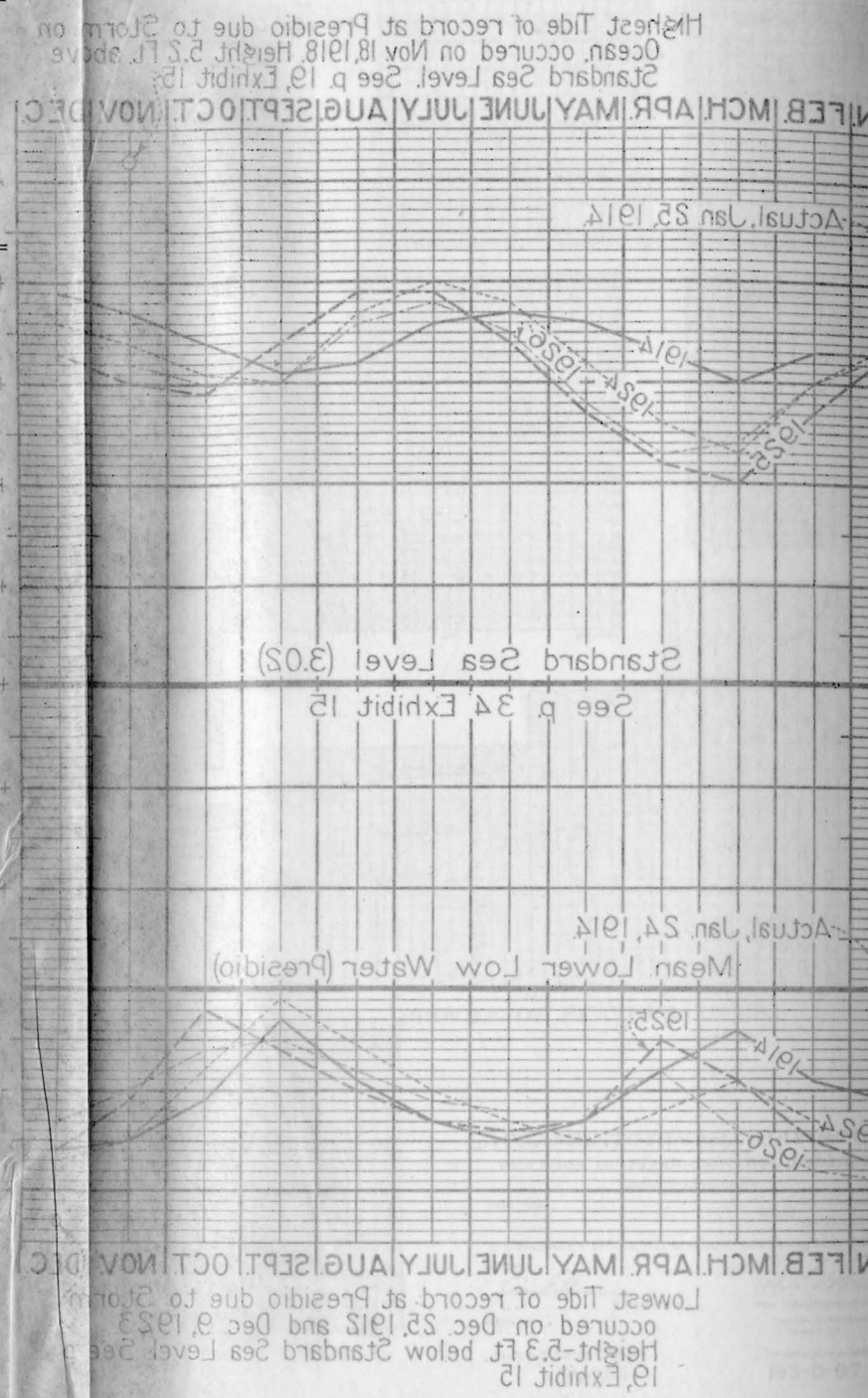
SV-144

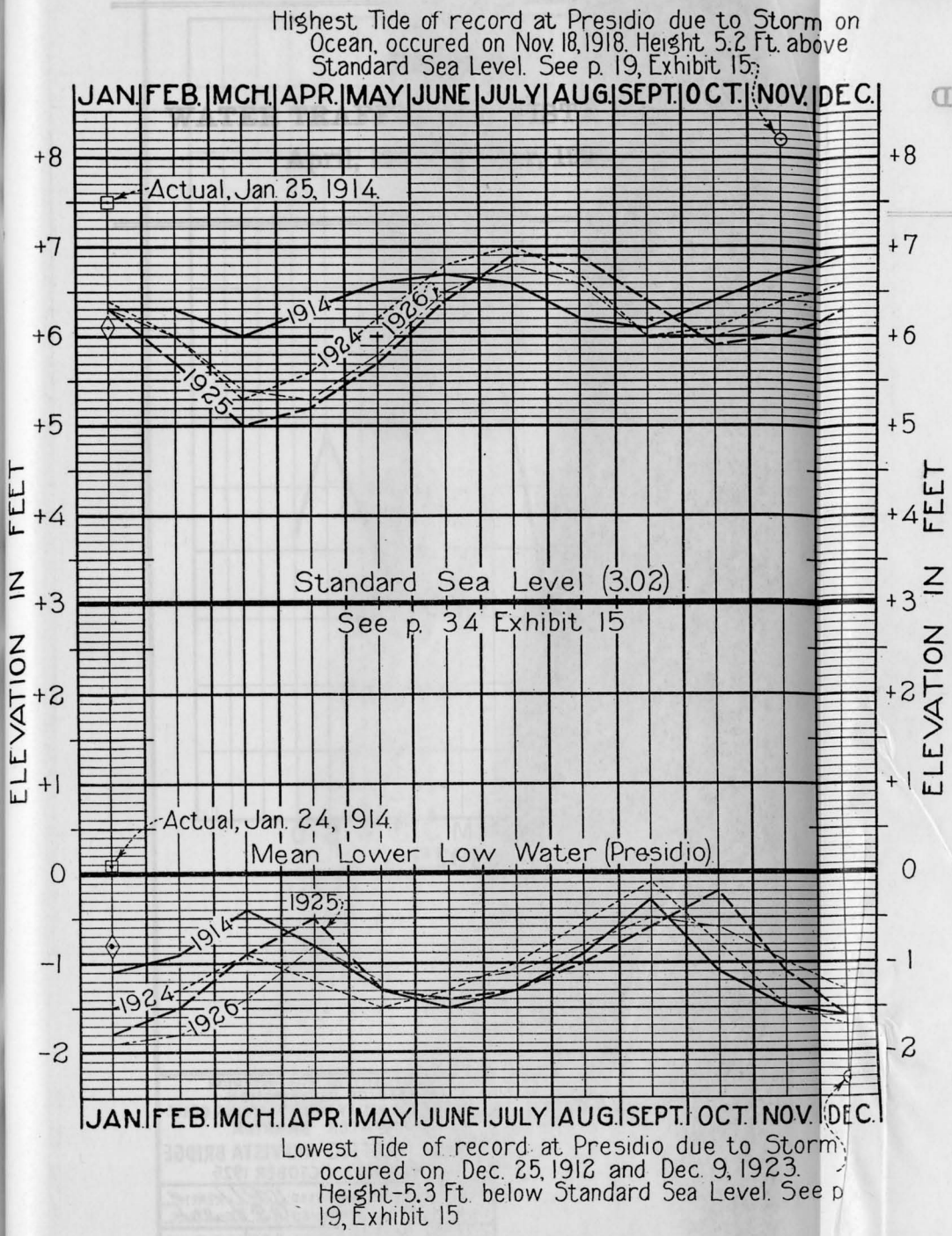
Corrected, Oct. 6, 1925

193-D-97.

Plate 5-22

MAXIMUM AND MINIMUM PREDICTED TIDES AT PRESIDIO FOR 1914, 1924, 1925 AND 1926





NOTES:-

The Points of the Curves show the Maximum Tide for the Month and the corresponding Minimum as indicated in the Tide Tables for Presidio, California. In practically all cases the Minimum occured with the Maximum but if not, the Minimum was only 0.1 or 0.2 lower than shown. It should not be inferred from the position of the Points on the Curves that the Maximum or Minimum Tides occurred on the 15th of each Month.

Latest Standard Sea Level is at Elevation 2.97 above Mean Lower Low Water.

EXPLANATION:-

——————— Year 1914.
- - - - - - - - - - " 1924.
— — — — — — — " 1925.
—·—·—·—·— " 1926.

⊡ Points show Maximum and corresponding Minimum Tide which occured during the Storm of Jan. 19, 1914 as taken from Plate 5-14.

◇ Points show the corresponding predicted Heights.

APPROVED FOR ESTIMATING PURPOSES:-

R. F. Walter.

CHIEF ENGINEER.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER

MAXIMUM AND MINIMUM PREDICTED TIDES AT PRESIDIO FOR 1914-24-25 AND 26

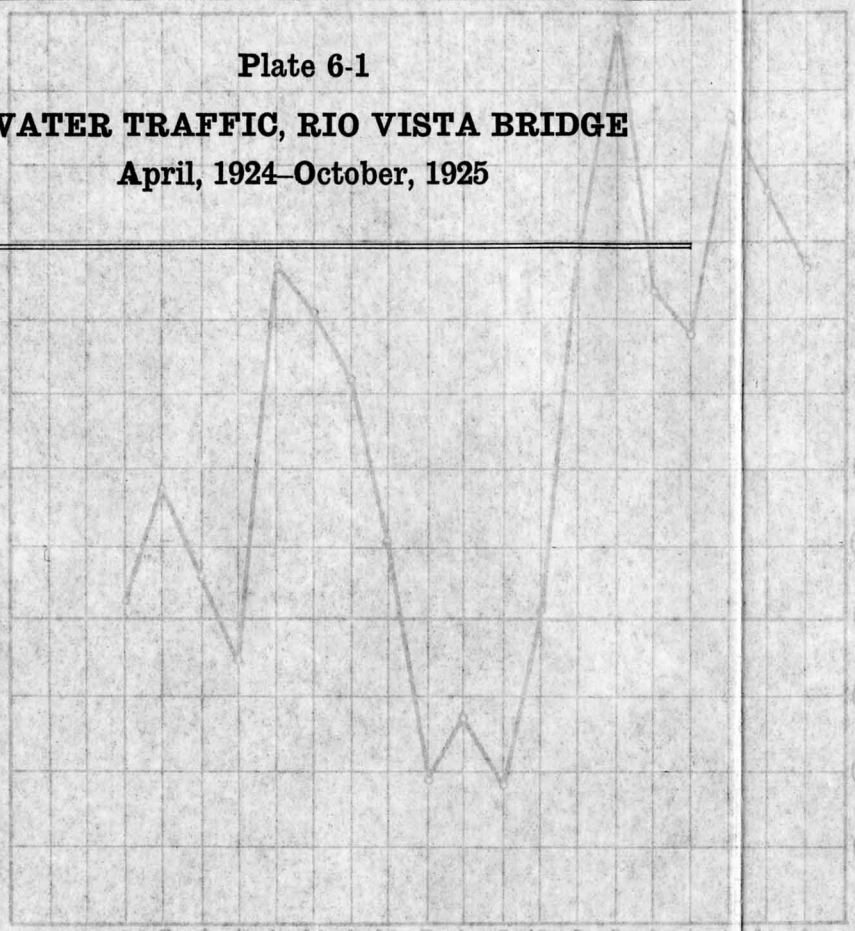
Drawn: W.R.Y.-C.A.M. Submitted:- W. R. Young
Checked: Approved:- J. D. Savage

SV-155 Ellensburg, Wash. Feb. 1927. 193-D-98

Plate 6-1

WATER TRAFFIC, RIO VISTA BRIDGE

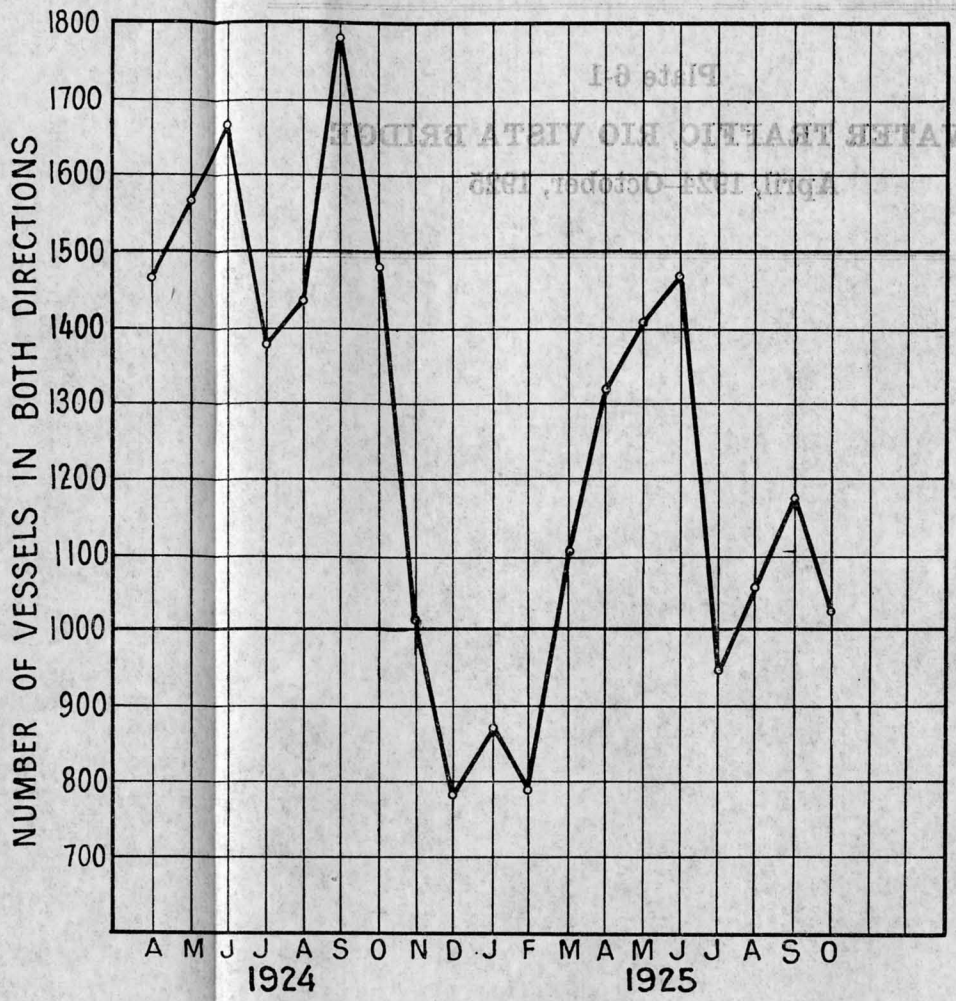
April, 1924–October, 1925



Figures include only vessels which required operation of lift bridge.
Traffic on San Joaquin River does not pass this point and some Sacramento River traffic reaches points above bridge via Three Mile Slough and Seven Mile Slough.

Total Vessels in 1923 13,798
Total Vessels from July 1924 to June 1925 inclusive 14,830

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS, CALIF.
SALT WATER BARRIER
WATER TRAFFIC-RIO VISTA BRIDGE
APRIL 1924 – OCTOBER 1925
DRAWN M.H.M. SUBMITTED
CHECKED R.E.N. APPROVED
SV-64 BERKELEY, CALIF. 1-31-26 1925-D-113



Figures include only vessels which required operation of lift bridge.
Traffic on San Joaquin River does not pass this point and some Sacramento River traffic reaches points above bridge via Three Mile Slough and Seven Mile Slough.
Total Vessels in 1923 13,798
Total Vessels from July 1924 to June 1925, inclusive 14,830

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS, CALIF.
SALT WATER BARRIER
WATER TRAFFIC - RIO VISTA BRIDGE
APRIL 1924 — OCTOBER 1925

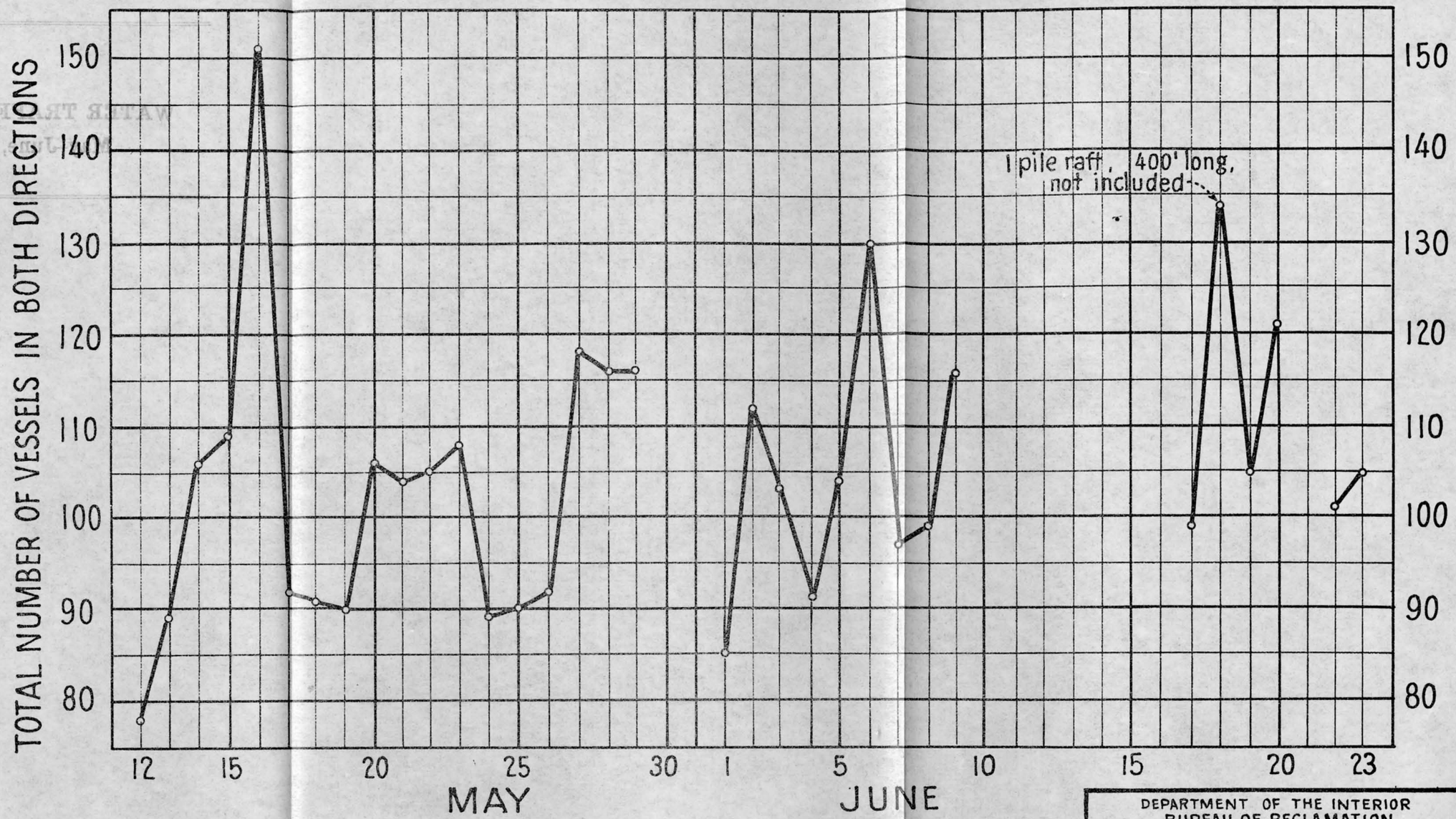
DRAWN N.B.H., M.C. SUBMITTED W.R. Young
CHECKED N.B.H. APPROVED A.P. Walter

SV-64 | BERKELEY, CALIF., 11-3-25 | 193-D-113

Plate 6-2

WATER TRAFFIC, SAN PABLO STRAIT

May–June, 1925 (Discontinuous)



Minimum Number per day 78
Maximum " " " 151
Average " " " 105
Ratio Maximum to Average 1.44

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS - CALIF.
SALT WATER BARRIER
WATER TRAFFIC - SAN PABLO STRAIT
MAY - JUNE, 1925

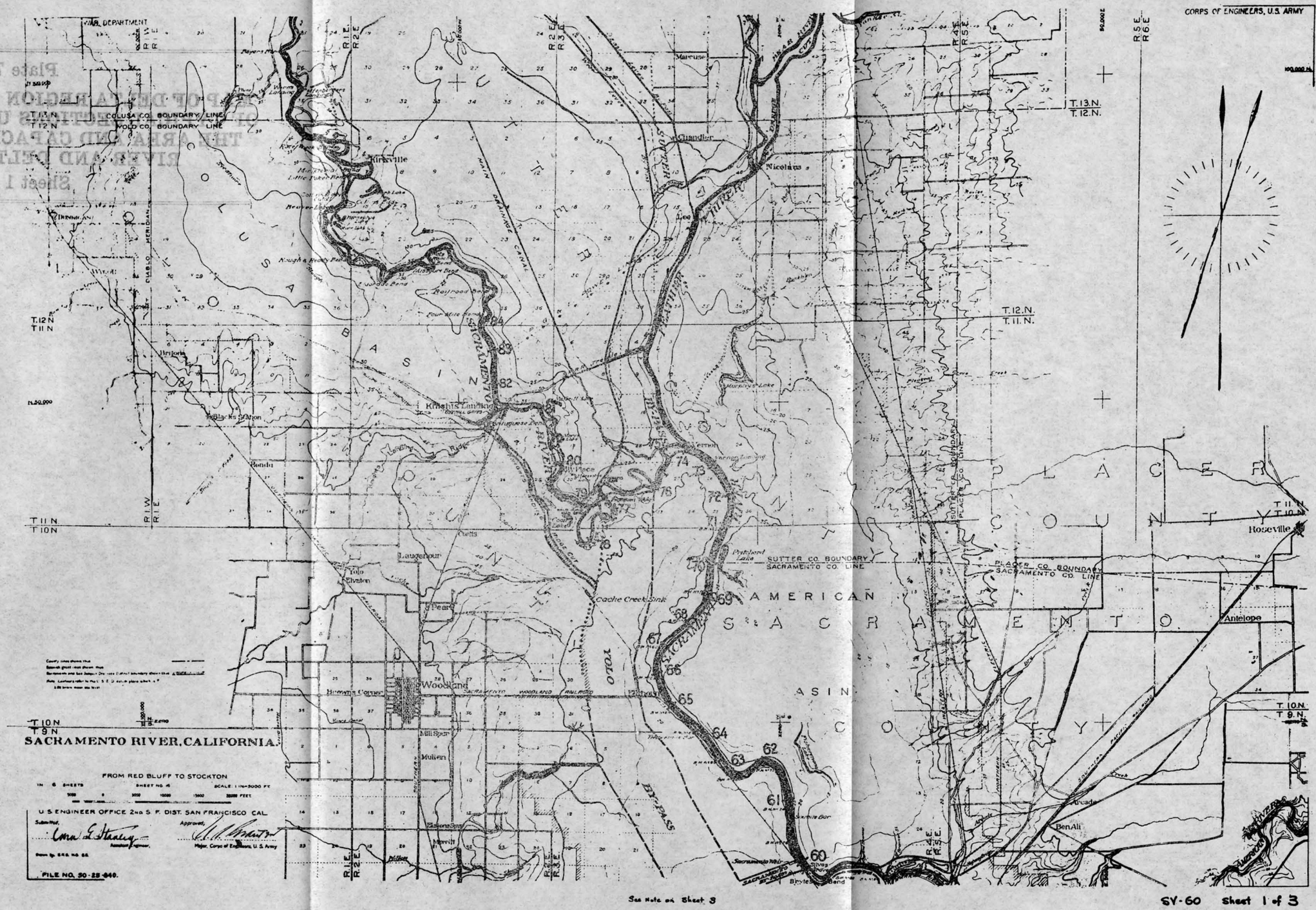
DRAWN: N.B.H., McC. SUBMITTED W.R. Young
CHECKED N.B.H. APPROVED R.F. Walter

SV-63 | BERKELEY, CALIF., 11-3-'25 | 193-D-112

Plate 7-1

MAP OF DELTA REGION SHOWING LOCATION OF TYPICAL SECTIONS USED IN ESTIMATING THE AREA AND CAPACITY OF THE LOWER RIVER AND DELTA CHANNELS

Sheet 1 of 3



Map of Delta Region showing location of typical sections used in estimating the area and capacity of the lower river and delta channels

Plate 7-2

MAP OF DELTA REGION SHOWING LOCATION OF TYPICAL SECTIONS USED IN ESTIMATING THE AREA AND CAPACITY OF THE LOWER RIVER AND DELTA CHANNELS

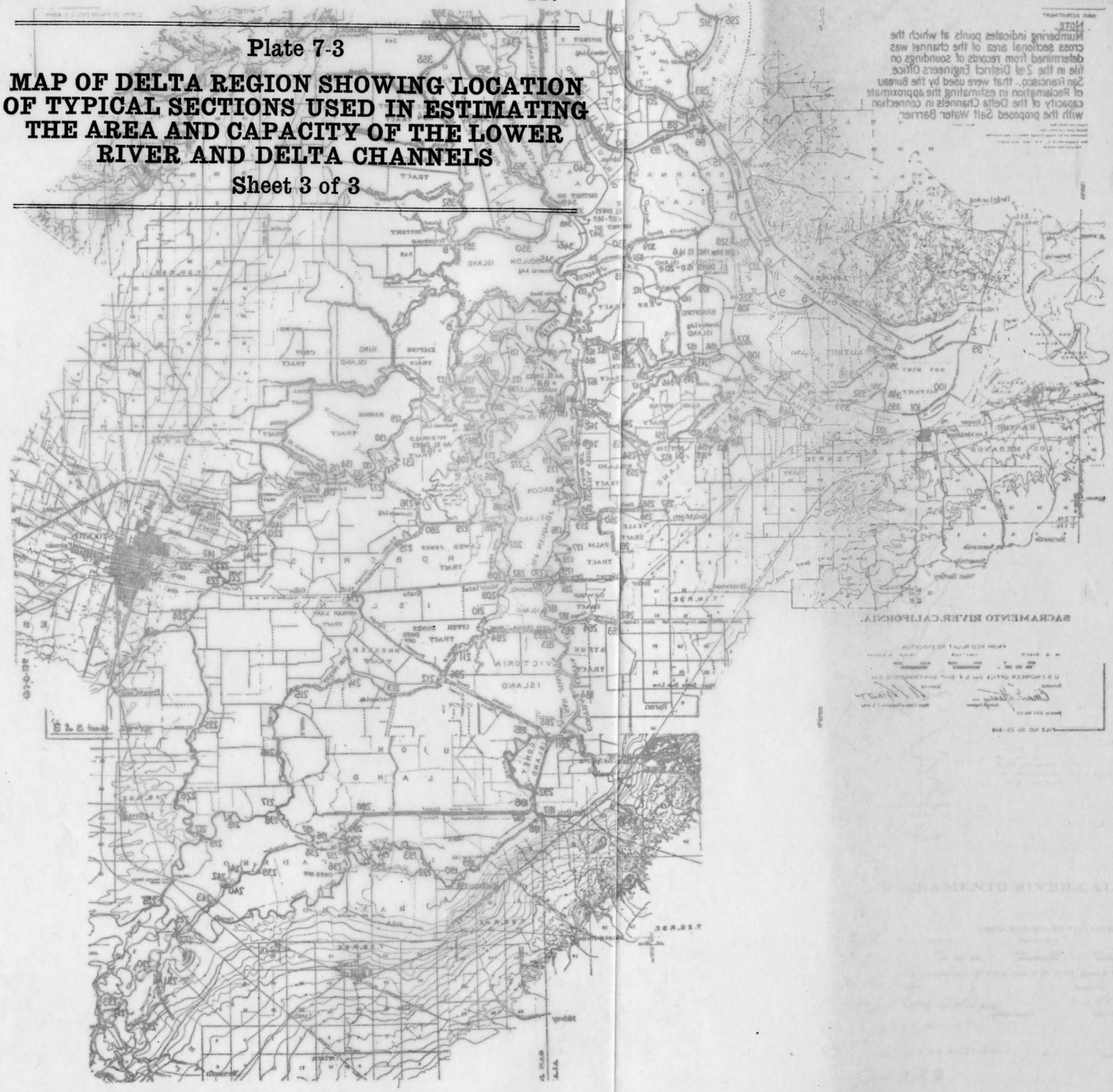
Sheet 2 of 3

Map of the Delta Region showing location of typical sections used in estimating the area and capacity of the lower river and delta channels

Plate 7-3

MAP OF DELTA REGION SHOWING LOCATION OF TYPICAL SECTIONS USED IN ESTIMATING THE AREA AND CAPACITY OF THE LOWER RIVER AND DELTA CHANNELS

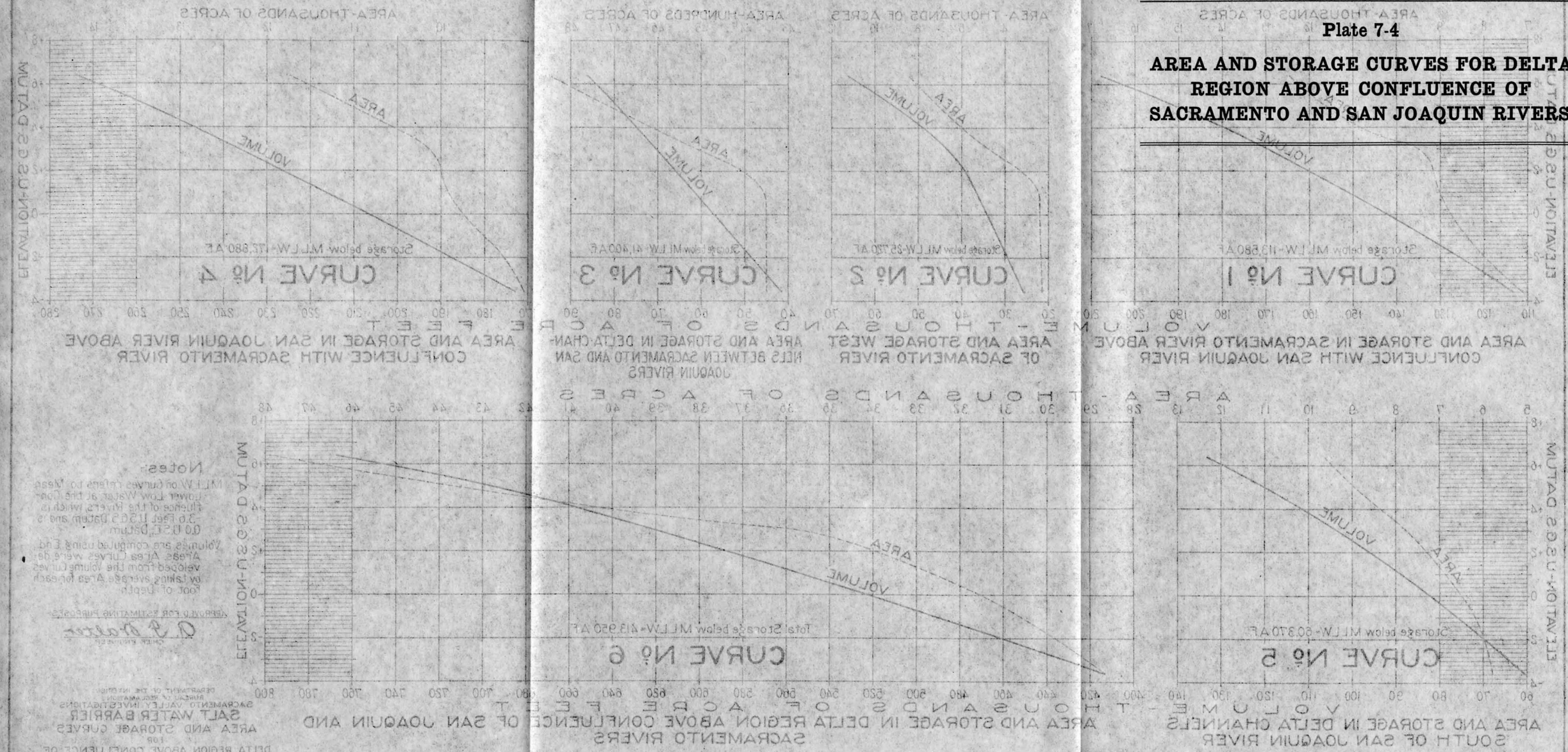
Sheet 3 of 3

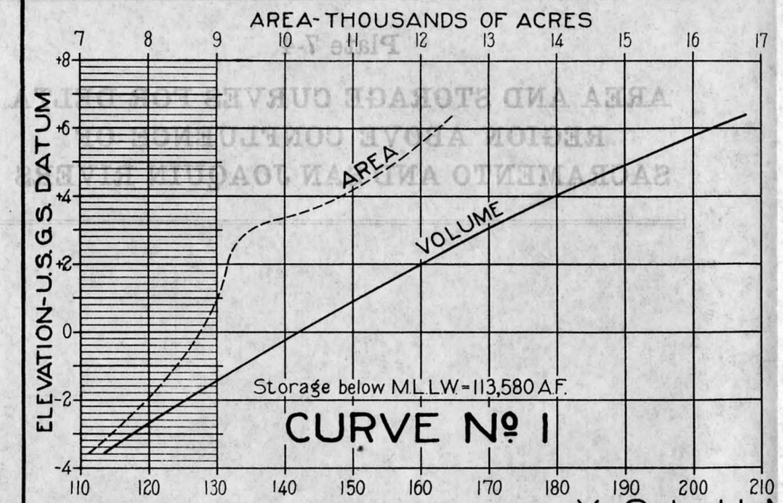


Map of the Delta Region showing location of typical sections used in estimating the area and capacity of lower river and delta channels

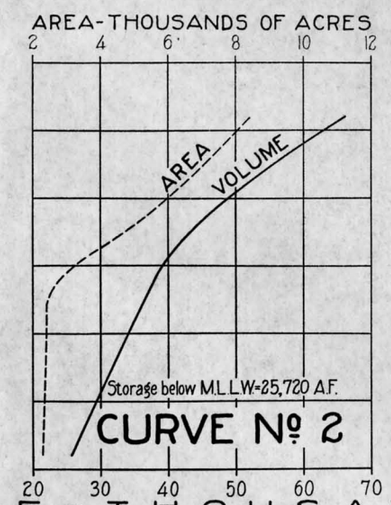
Plate 7-4

AREA AND STORAGE CURVES FOR DELTA REGION ABOVE CONFLUENCE OF SACRAMENTO AND SAN JOAQUIN RIVERS

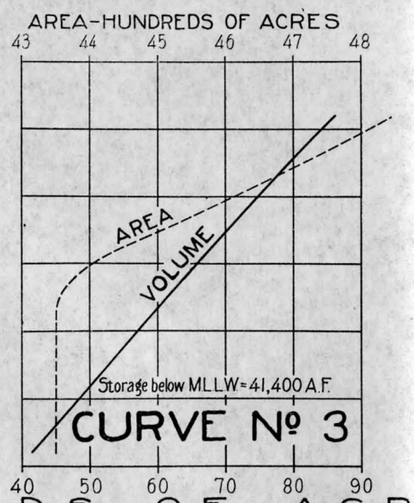




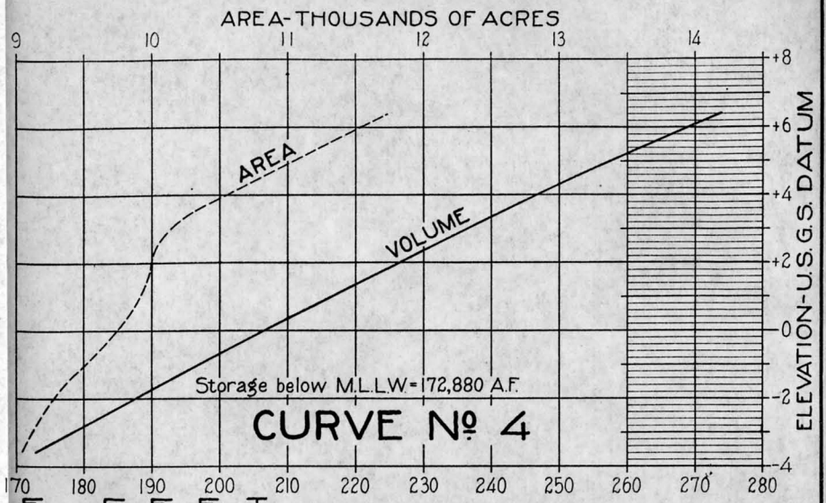
AREA AND STORAGE IN SACRAMENTO RIVER ABOVE CONFLUENCE WITH SAN JOAQUIN RIVER



AREA AND STORAGE WEST OF SACRAMENTO RIVER

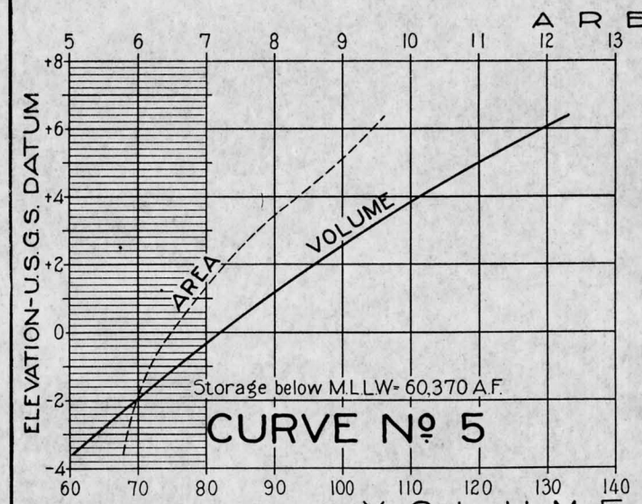


AREA AND STORAGE IN DELTA CHANNELS BETWEEN SACRAMENTO AND SAN JOAQUIN RIVERS



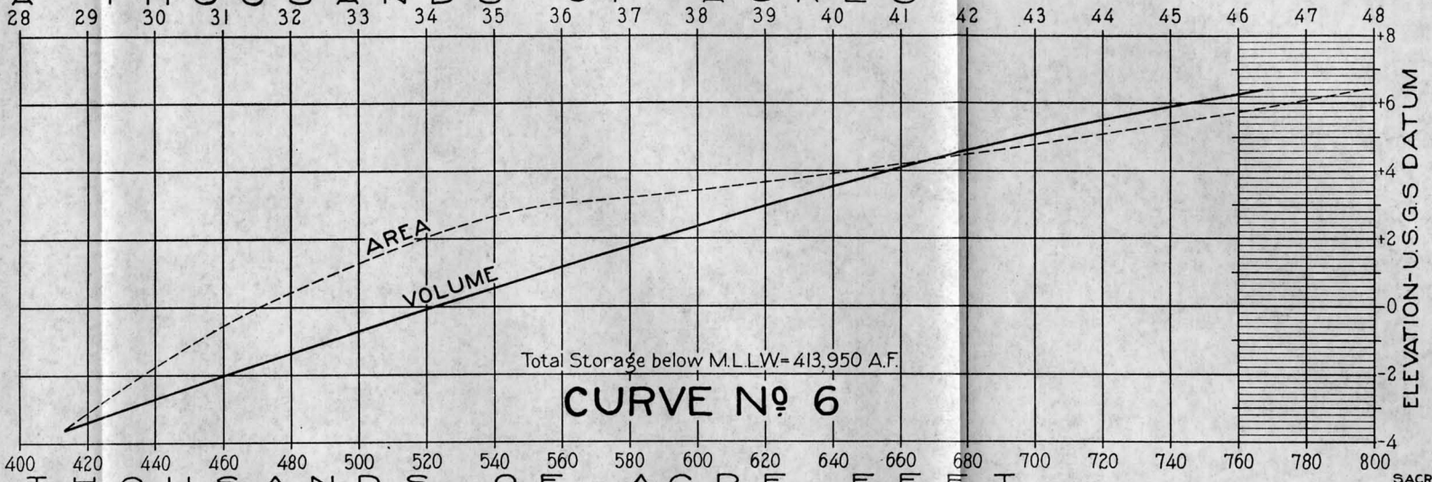
AREA AND STORAGE IN SAN JOAQUIN RIVER ABOVE CONFLUENCE WITH SACRAMENTO RIVER

VOLUME - THOUSANDS OF ACRE FEET



AREA AND STORAGE IN DELTA CHANNELS SOUTH OF SAN JOAQUIN RIVER

AREA - THOUSANDS OF ACRES



VOLUME - THOUSANDS OF ACRE FEET

AREA AND STORAGE IN DELTA REGION ABOVE CONFLUENCE OF SAN JOAQUIN AND SACRAMENTO RIVERS

Notes:-

M.L.L.W on Curves refers to Mean Lower Low Water at the Confluence of the Rivers, which is -3.6 Feet U.S.G.S. Datum and is 0.0 U.S.E. Datum.

Volumes are computed using End Areas. Area Curves were developed from the Volume Curves by taking average Area for each Foot of Depth

APPROVED FOR ESTIMATING PURPOSES:-

A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
AREA AND STORAGE CURVES
FOR
DELTA REGION ABOVE CONFLUENCE OF SACRAMENTO AND SAN JOAQUIN RIVERS

Drawn-P.A.J.-C.A.M. Submitted- W. Fleming
Checked-_____ Approved- J. D. Savage

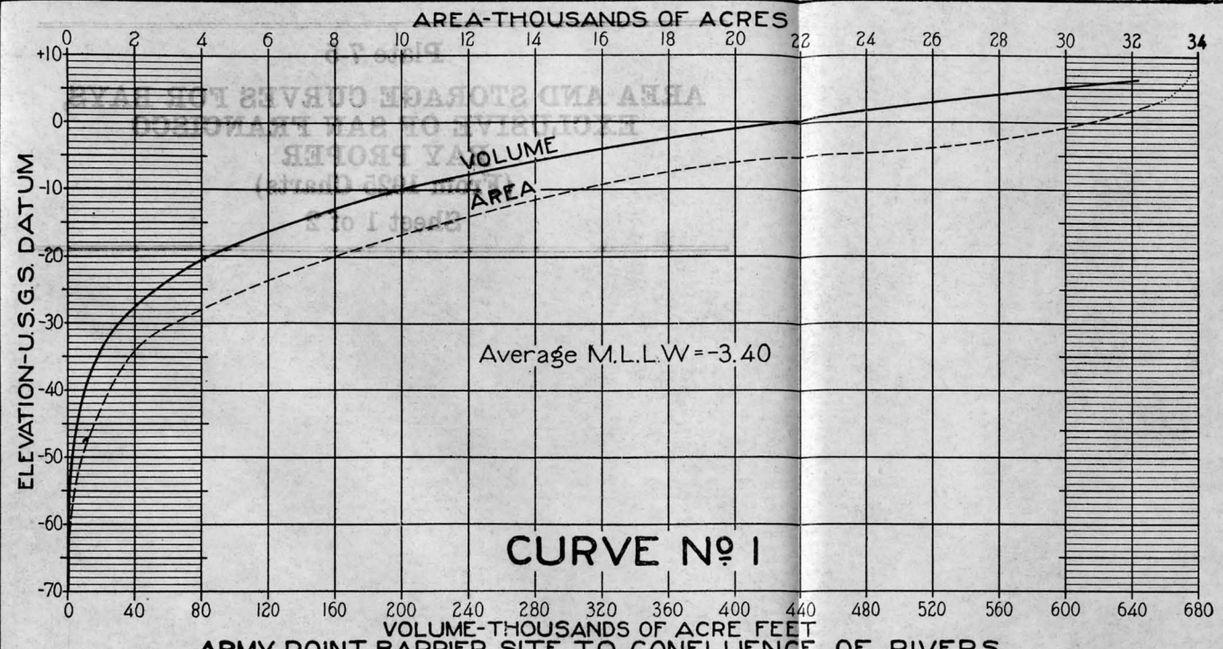
SV-156 Berkeley, California Mch 1925 193-D-104

Plate 7-5

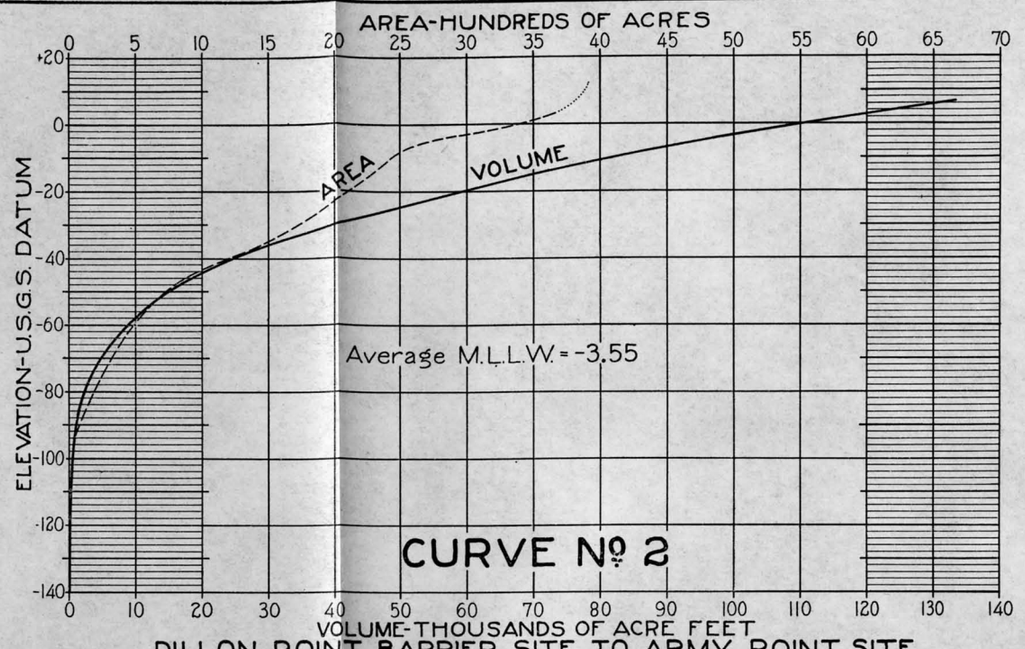
AREA AND STORAGE CURVES FOR BAYS, EXCLUSIVE OF SAN FRANCISCO BAY PROPER

(From 1925 Charts)

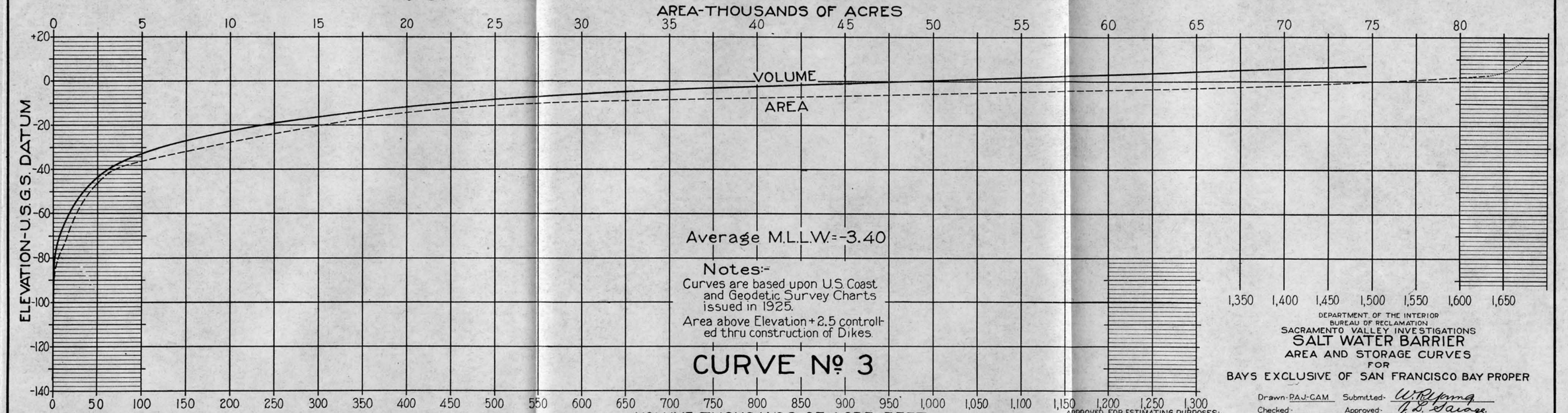
Sheet 1 of 2



ARMY POINT BARRIER SITE TO CONFLUENCE OF RIVERS



DILLON POINT BARRIER SITE TO ARMY POINT SITE



POINT SAN PABLO BARRIER SITE TO DILLON POINT SITE

APPROVED FOR ESTIMATING PURPOSES:-
A. F. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

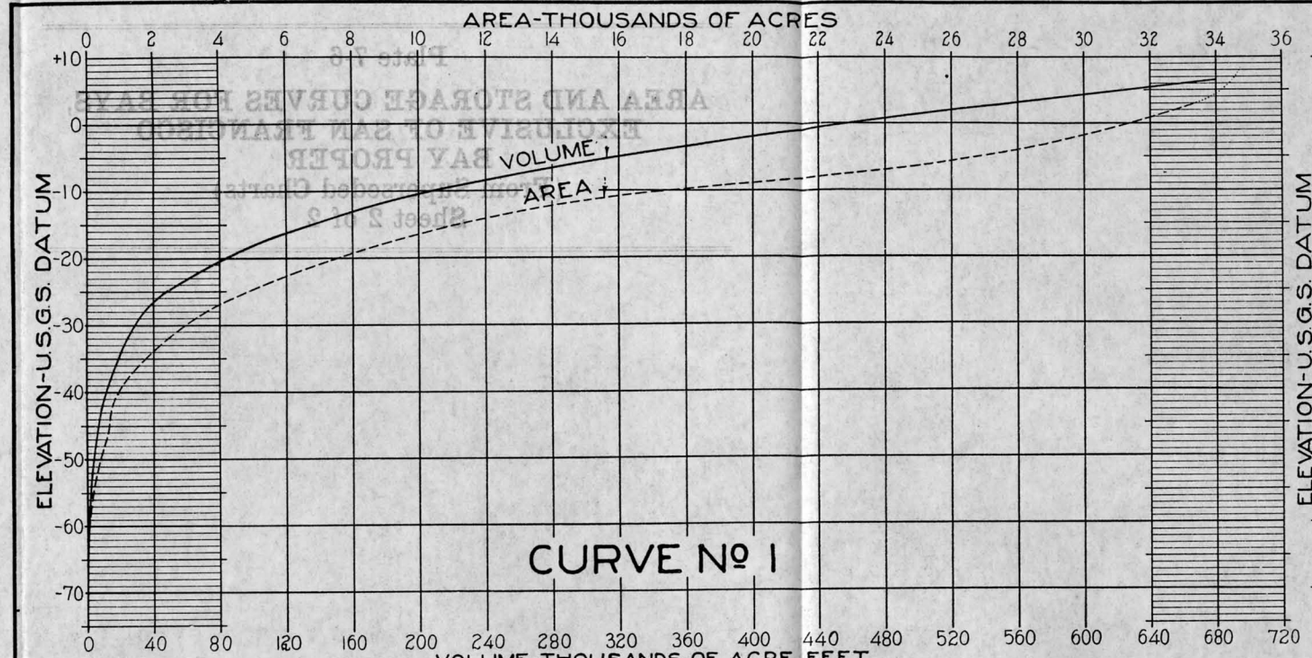
SALT WATER BARRIER

AREA AND STORAGE CURVES
FOR
BAYS EXCLUSIVE OF SAN FRANCISCO BAY PROPER

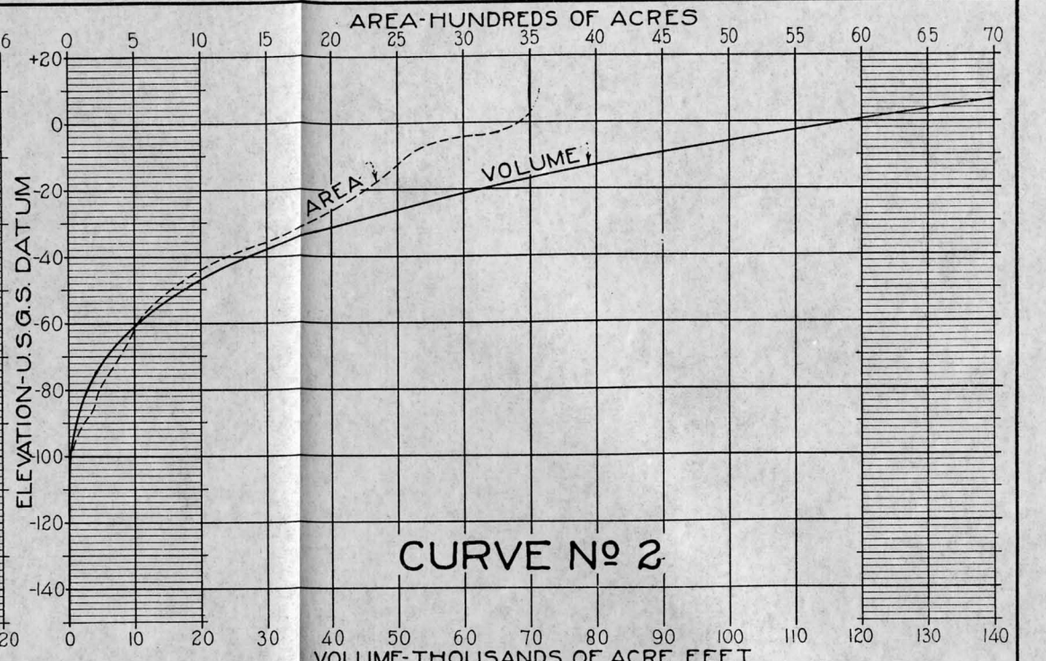
Drawn-PAJ-CAM Submitted- W. R. Young
Checked- Approved- J. L. Savage
SV-157 Berkeley, California Mch 1925. Sheet 1 of 2 193-D-105

Plate 7-6

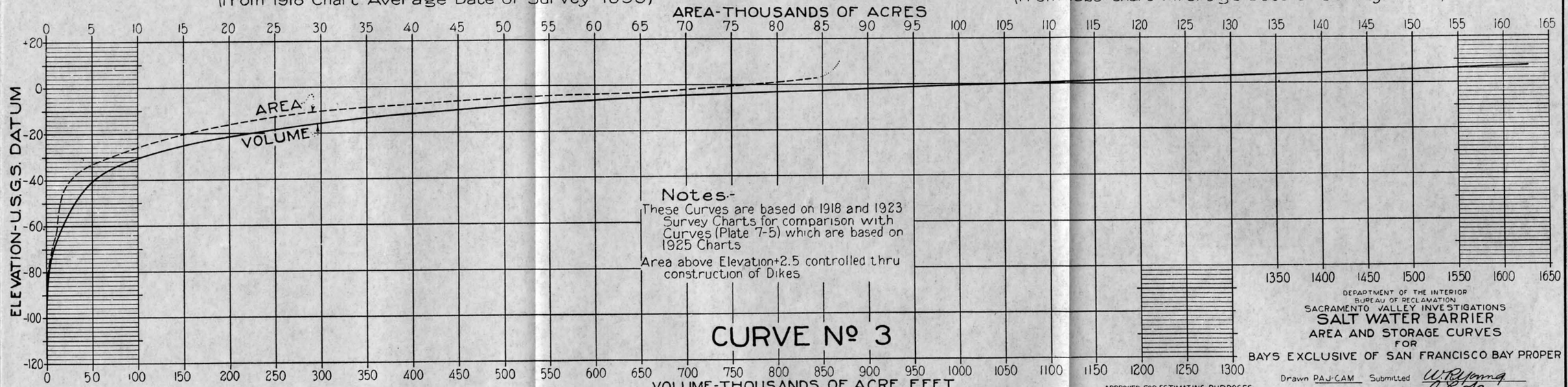
AREA AND STORAGE CURVES FOR BAYS, EXCLUSIVE OF SAN FRANCISCO BAY PROPER
(From Superseded Charts)
Sheet 2 of 2



ARMY POINT BARRIER SITE TO CONFLUENCE OF RIVERS
(From 1918 Chart-Average Date of Survey 1895)



DILLON POINT BARRIER SITE TO ARMY POINT SITE
(From 1923 Chart-Average Date of Survey-1877.)



Notes:-
These Curves are based on 1918 and 1923 Survey Charts for comparison with Curves (Plate 7-5) which are based on 1925 Charts
Area above Elevation +2.5 controlled thru construction of Dikes

POINT SAN PABLO BARRIER SITE TO DILLON POINT SITE
(From 1923 Chart-Average Date of Survey 1896.)

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
AREA AND STORAGE CURVES
FOR
BAYS EXCLUSIVE OF SAN FRANCISCO BAY PROPER

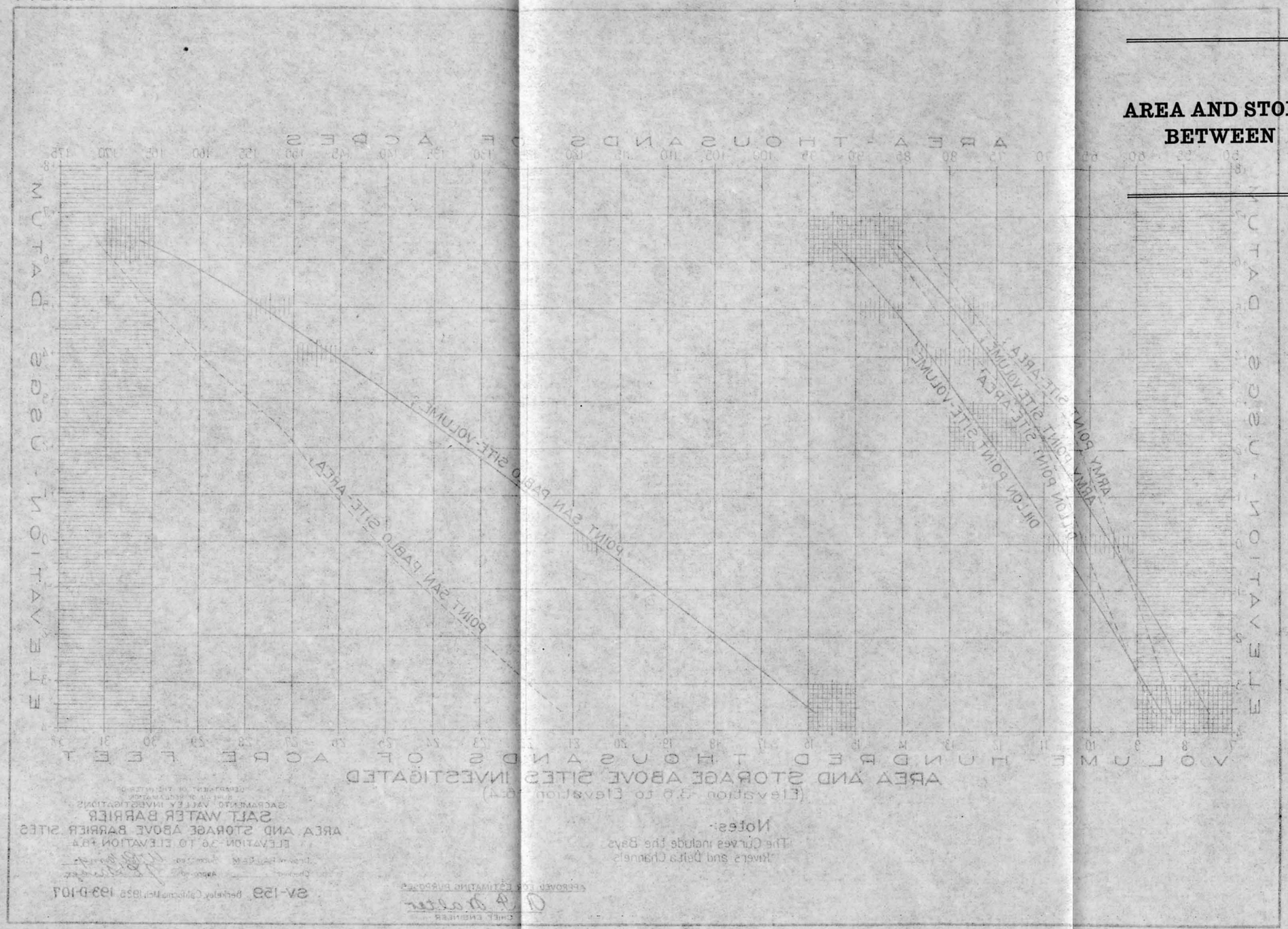
APPROVED FOR ESTIMATING PURPOSES
A. P. Walter
CHIEF ENGINEER

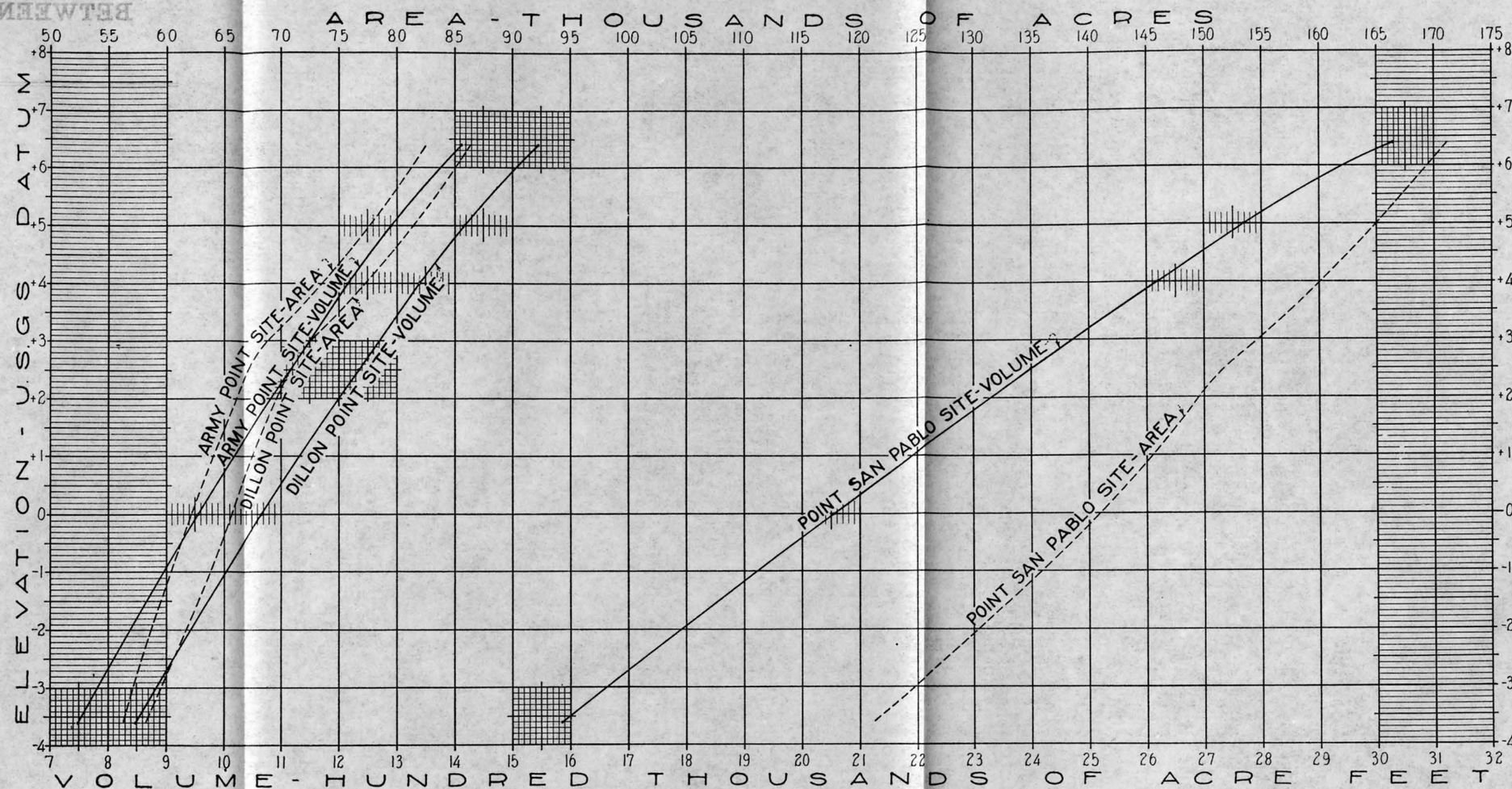
Drawn PAJ-CAM Submitted W. R. Young
Checked _____ Approved J. B. Savage

SV-158 Berkeley, California Mch 1925 Sheet 2 of 2 193-D-106

Plate 7-7

AREA AND STORAGE ABOVE BARRIER SITES BETWEEN ELEVATION —3.6 and +6.4 U. S. G. S.





AREA AND STORAGE ABOVE SITES INVESTIGATED

(Elevation -3.6 to Elevation +6.4)

Notes:-

The Curves include the Bays
Rivers and Delta Channels

APPROVED FOR ESTIMATING PURPOSES:-
A. P. Walter
CHIEF ENGINEER

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER

AREA AND STORAGE ABOVE BARRIER SITES
ELEVATION -3.6 TO ELEVATION +6.4

Drawn: PAJ-CAM Submitted: W. R. Young
Checked: _____ Approved: J. B. Savage

SV-159 Berkeley, California Mch 1925 193-D-107

Plate 8-1

PLAN AND SECTIONS OF GOLDEN GATE BAR

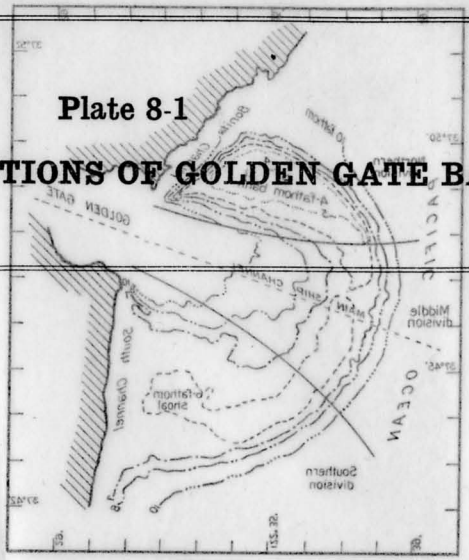


Figure No 1

Plan of the Golden Gate bar, showing the divisions referred to in the text. All contours are in fathoms based on the surveys by the United States Coast and Geodetic Survey and U.S.Engineer Department in 1900 & 1921.

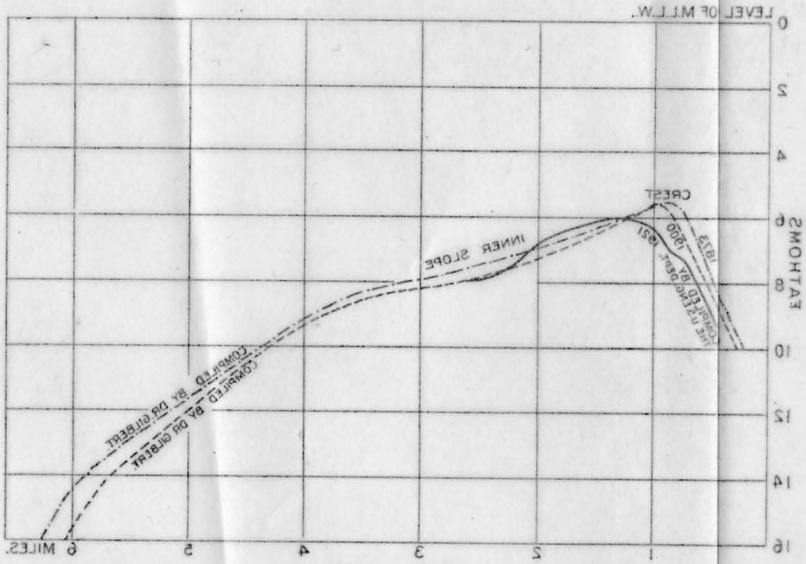


Figure No 2

Generalized cross profiles of the Golden Gate bar in its middle division

Plan and Sections of Golden Gate Bar

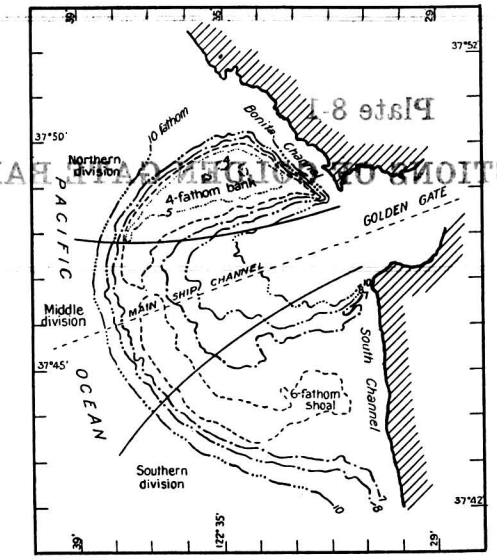


Figure Nº 1

Plan of the Golden Gate bar, showing the divisions referred to in the text. All contours are in fathoms based on the surveys by the United States Coast and Geodetic Survey and U.S. Engineer Department in 1900 & 1921.

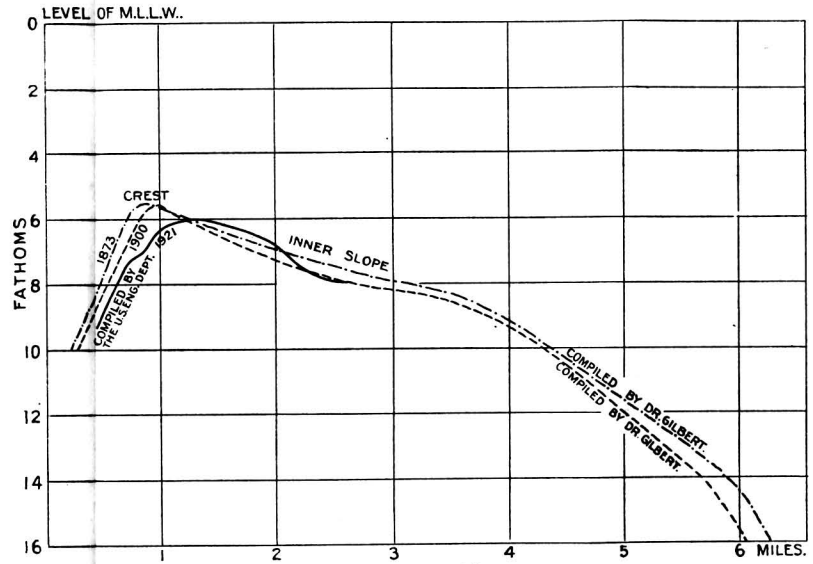


Figure Nº 2

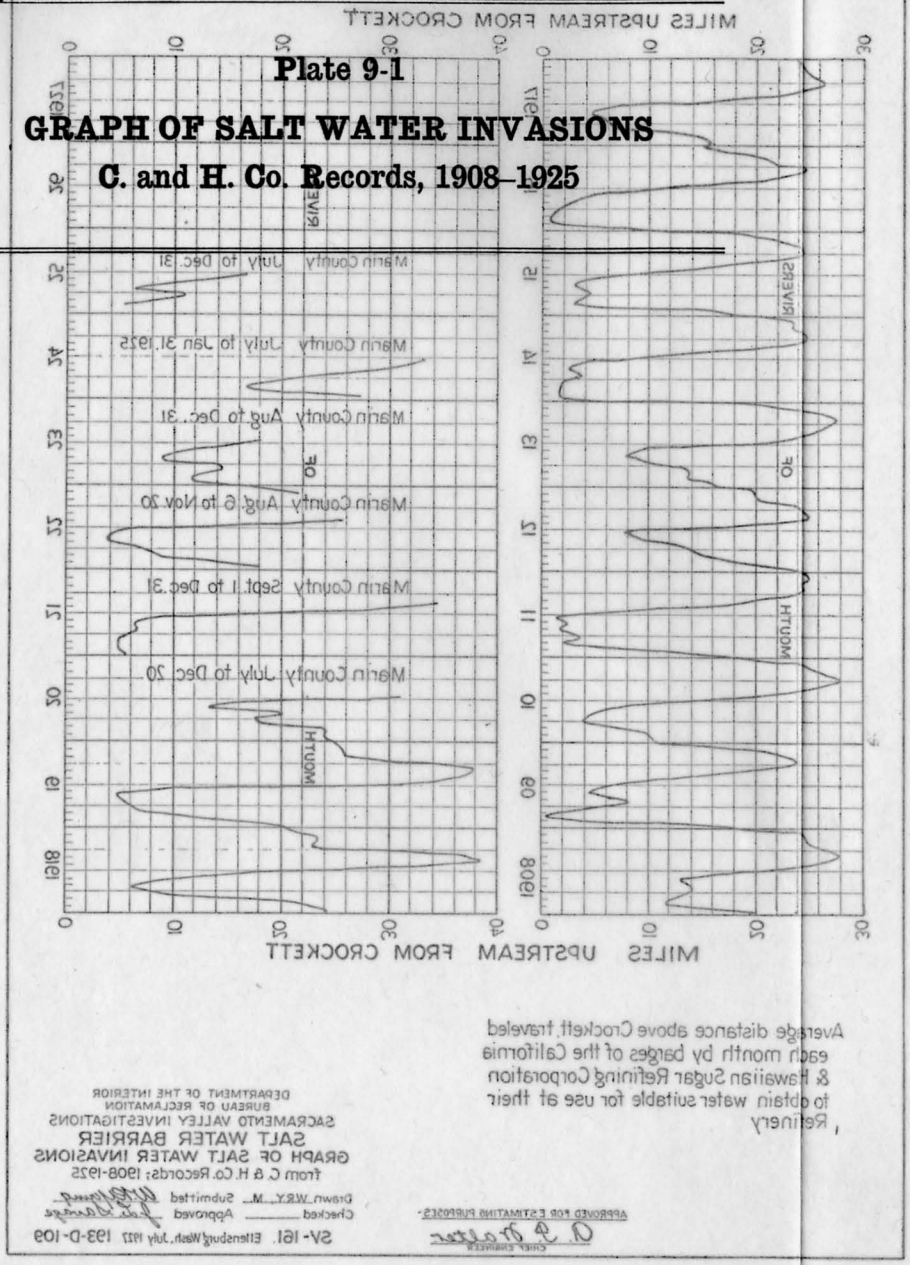
Generalized cross profiles of the Golden Gate bar in its middle division

Plan and Sections of Golden Gate Bar

Plate 9-1

GRAPH OF SALT WATER INVASIONS

C. and H. Co. Records, 1908–1925

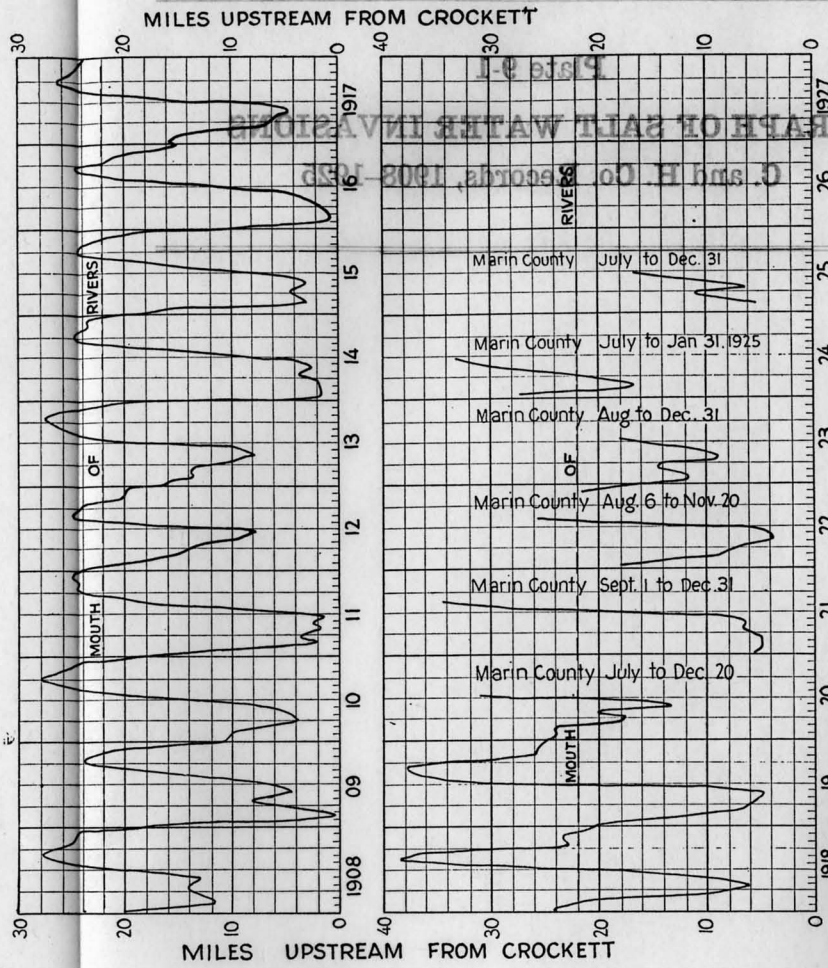


Average distance above Crockett, traveled each month by barges of the California & Hawaiian Sugar Refining Corporation to obtain water suitable for use at their Refinery.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
GRAPH OF SALT WATER INVASIONS
from C. & H. Co. Records; 1908-1925

Drawn WRY M. Submitted
Checked Approved
SV-161. Elmshurst Wash. July 1927 193-D-109

APPROVED FOR ESTIMATING PURPOSES:
CHIEF ENGINEER



Average distance above Crockett, traveled each month by barges of the California & Hawaiian Sugar Refining Corporation to obtain water suitable for use at their Refinery

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
GRAPH OF SALT WATER INVASIONS
from C. & H. Co. Records; 1908-1925

Drawn W.R.Y., M. Submitted W.R. Young
Checked _____ Approved J.S. Savage

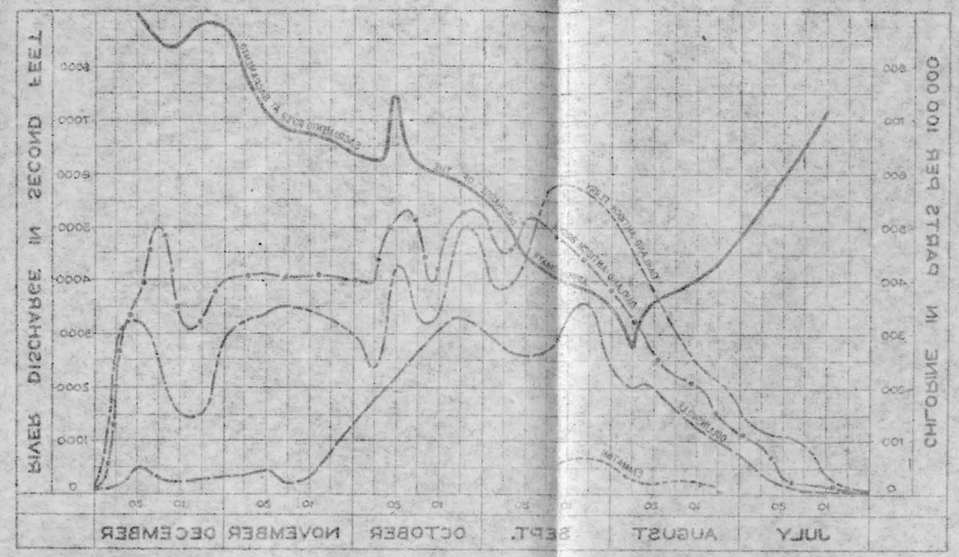
APPROVED FOR ESTIMATING PURPOSES:
A. P. Walter
CHIEF ENGINEER

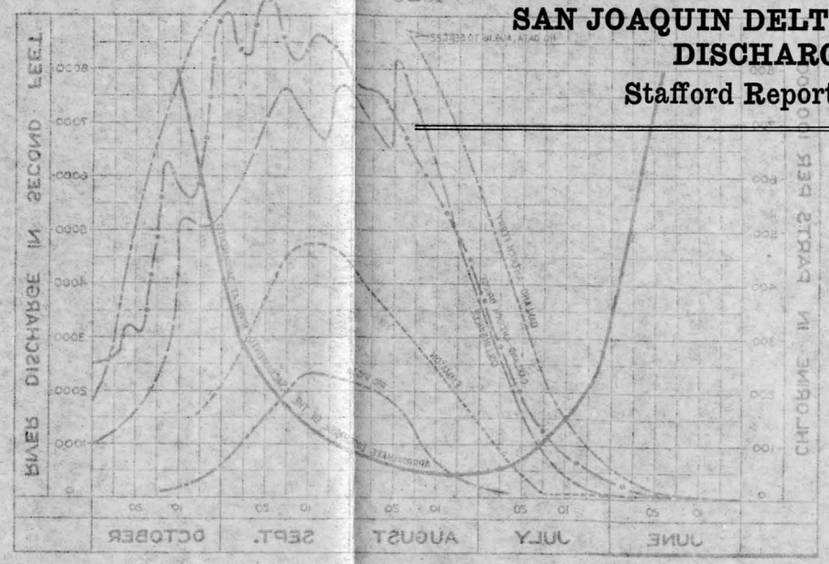
SV-161 Ellensburg Wash. July 1927 193-D-109

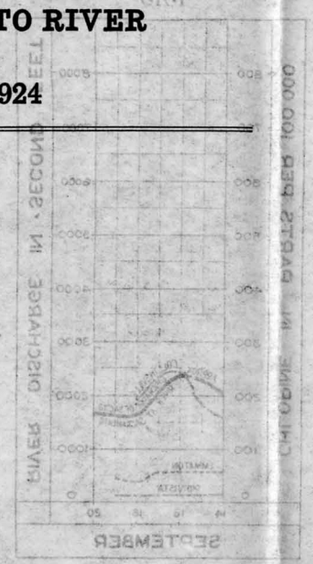
Plate 9-2

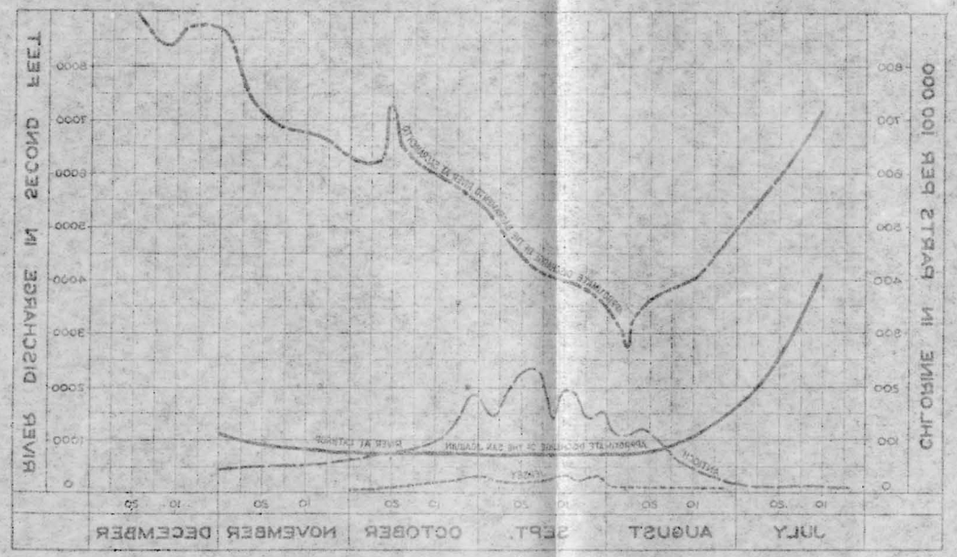
RELATION OF SALINITY IN SACRAMENTO-SAN JOAQUIN DELTA TO RIVER DISCHARGE

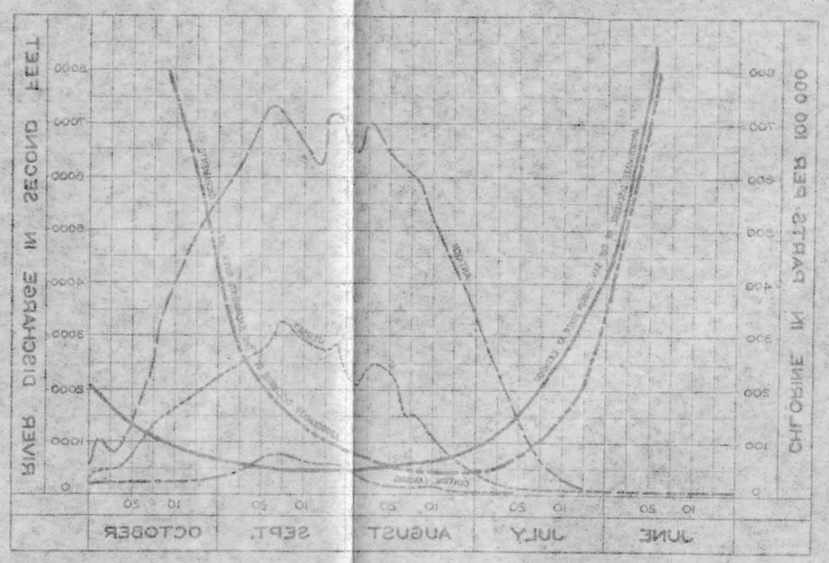
Stafford Report, 1924

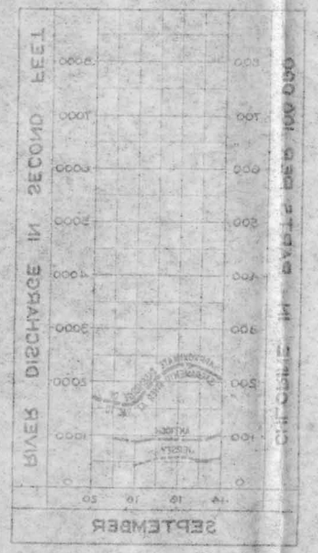












RELATION OF SALINITY IN THE SACRAMENTO-SAN JOAQUIN DELTA TO RIVER DISCHARGE

NOTE: SALINITY CURVES INDICATE MAXIMUM SALINITY DURING DAYLIGHT HOURS

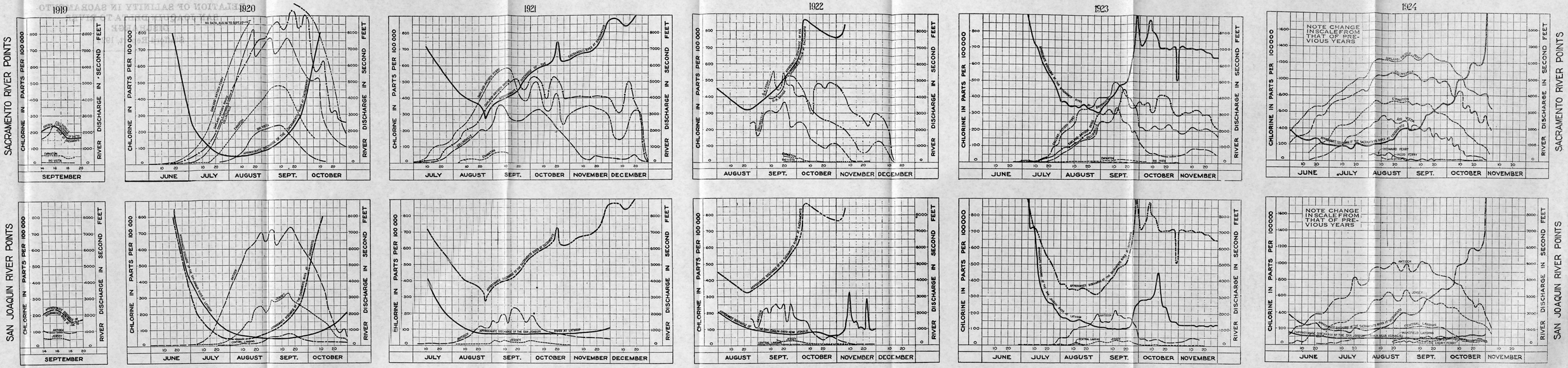
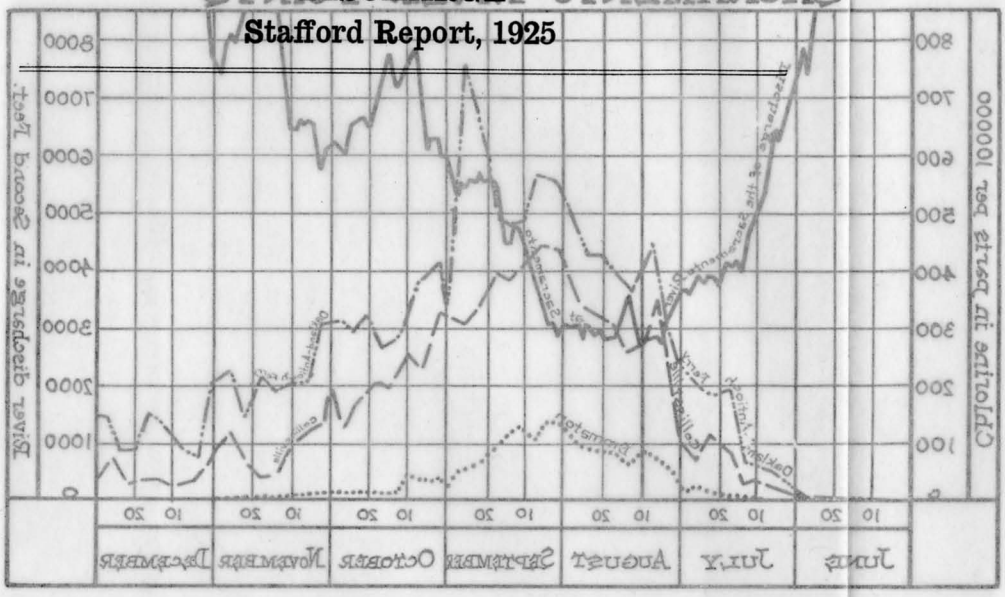
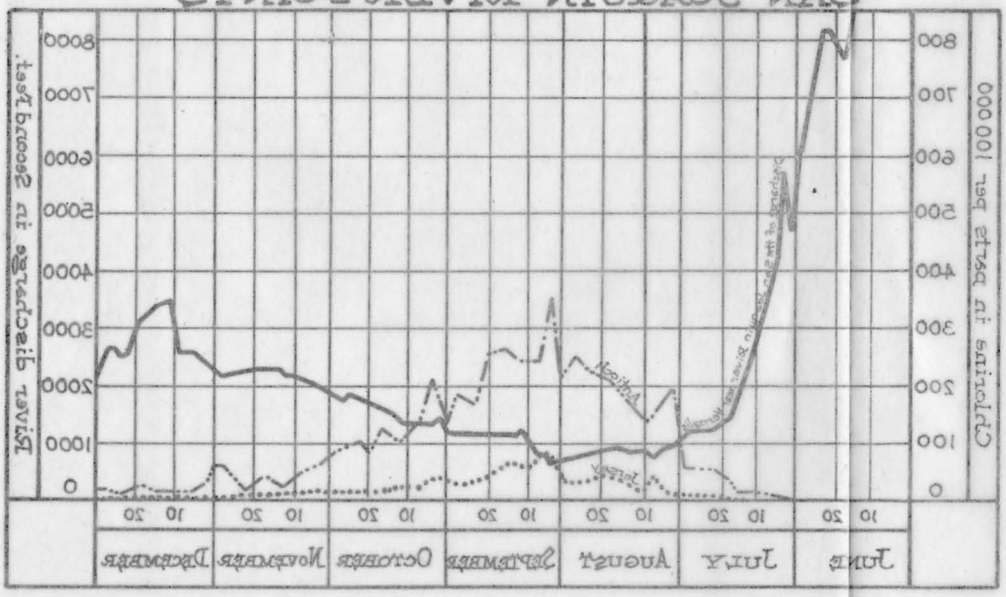


Plate 9-3

RELATION OF SALINITY IN SACRAMENTO-SAN JOAQUIN DELTA TO RIVER DISCHARGE

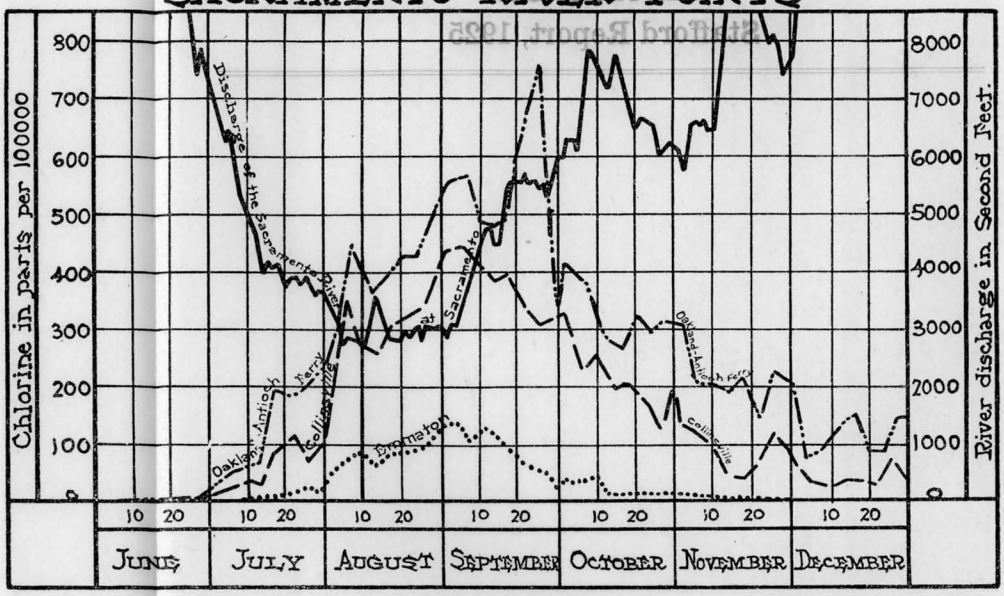
Stafford Report, 1925





RELATION OF SALINITY IN THE SACRAMENTO-SAN JOAQUIN DELTA TO RIVER DISCHARGE 1925.

SACRAMENTO RIVER POINTS



SAN JOAQUIN RIVER POINTS

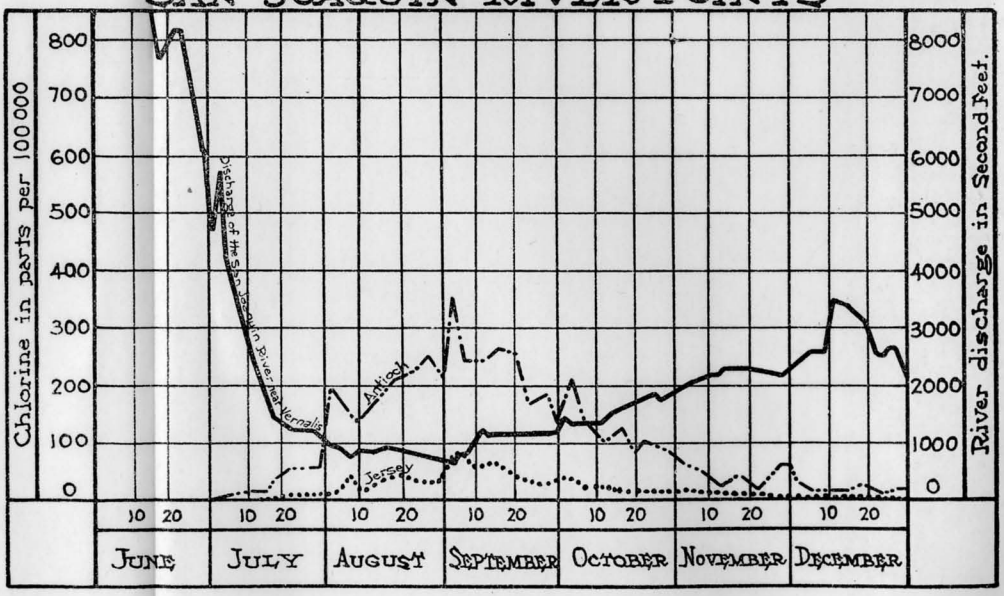
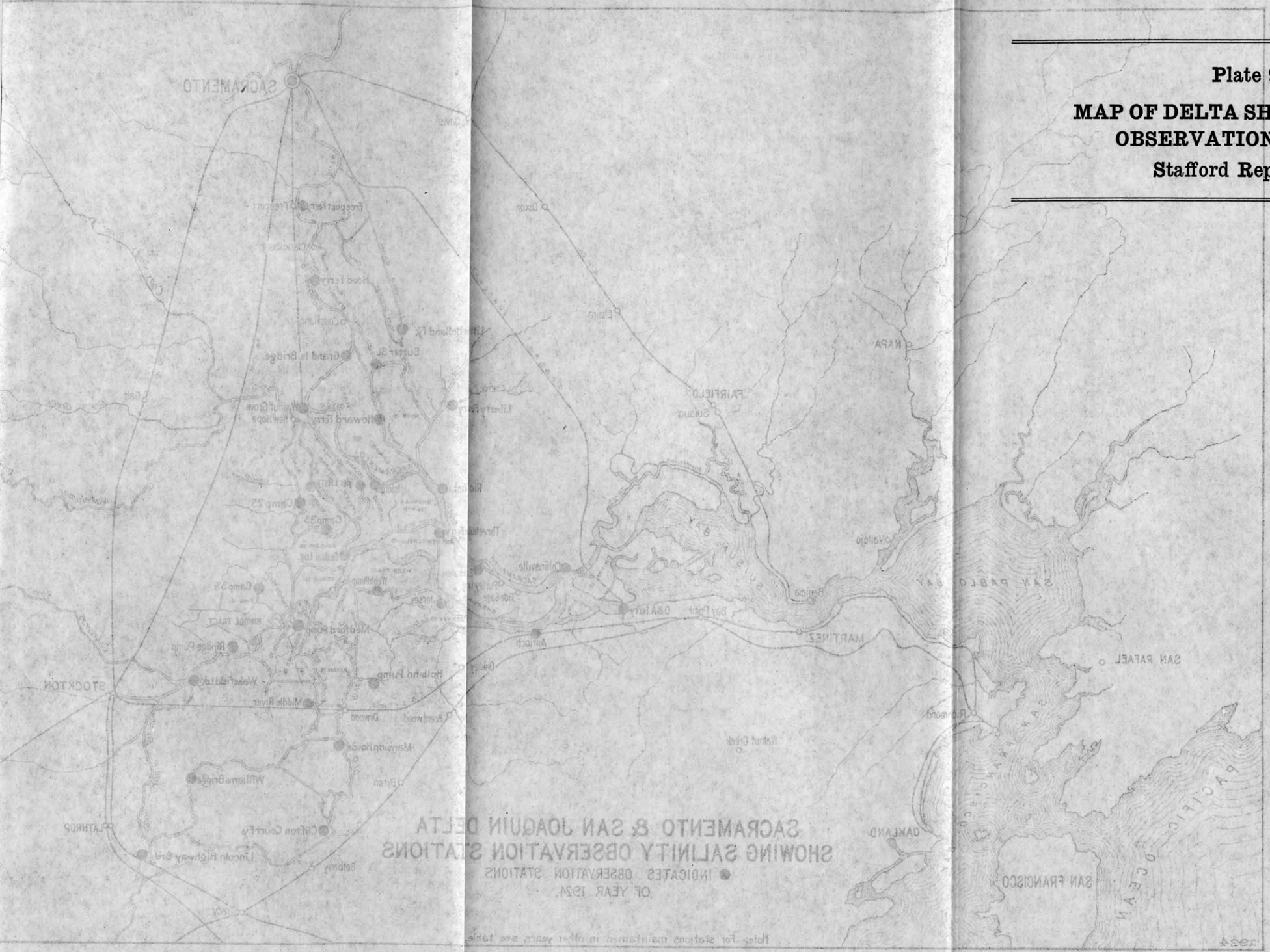
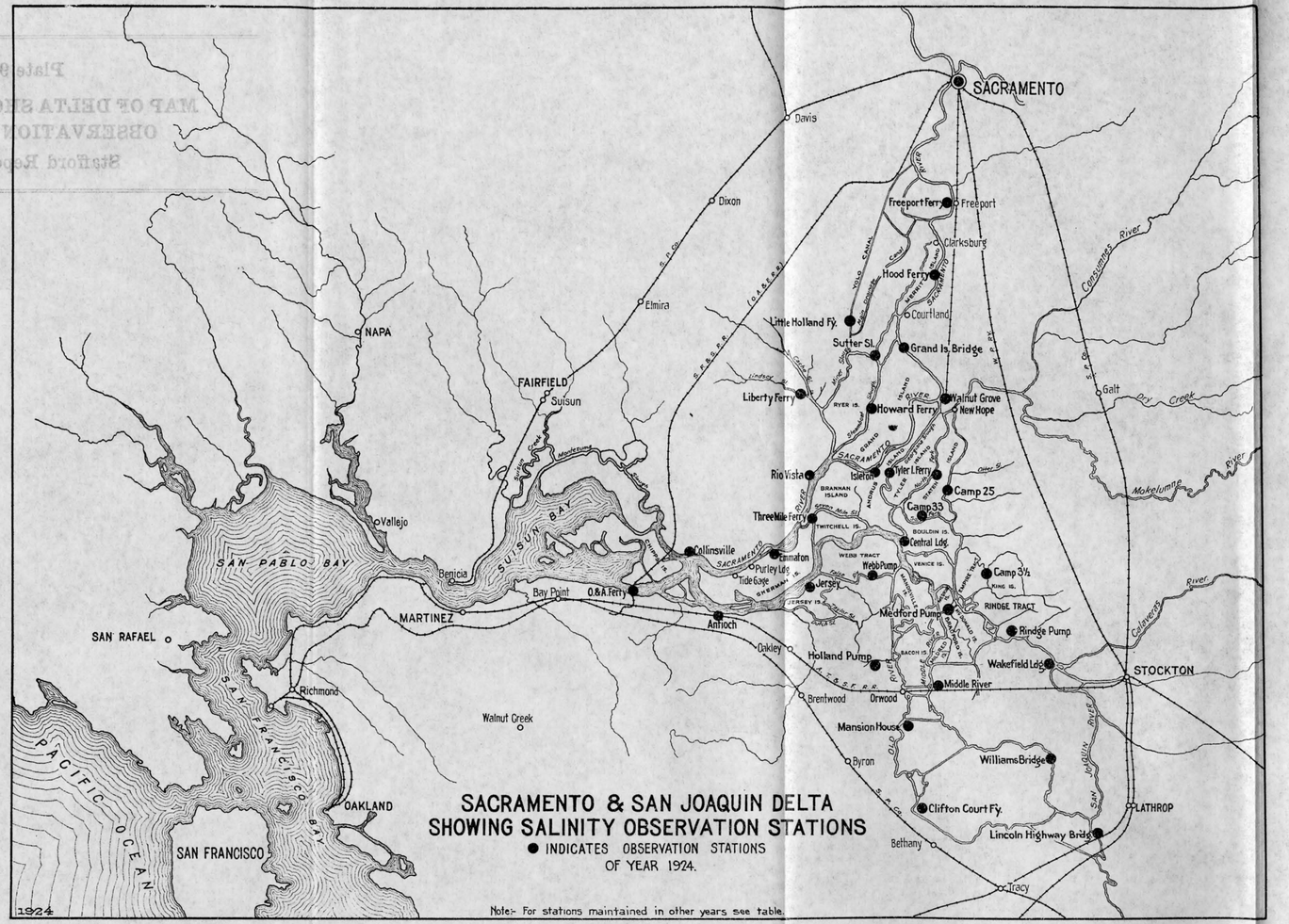


Plate 9-4

MAP OF DELTA SHOWING SALINITY OBSERVATION STATIONS

Stafford Report, 1924





SALINITY OBSERVATION STATIONS MAINTAINED BY DIVISION OF WATER RIGHTS, 1919 TO 1923, INCLUSIVE, AND BY SACRAMENTO-SAN JOAQUIN WATER SUPERVISOR, 1924

Station	Periods under observation					
	1919	1920	1921	1922	1923	1924
Antioch	Sept. 14–Sept. 19	June 3–Nov. 22	July 5–Nov. 28	Aug. 26–Nov. 28	June 28–Nov. 16	May 24– *
Blylock Landing on Bradford Island	Sept. 13–Sept. 19					
Camp 11						July 22– *
Camp 24		Sept. 18–Oct. 19				
Camp 25						July 30– *
Camp 33						July 22– *
Camp 35		Aug. 26–				
Central Landing	Sept. 13–Sept. 15	July 22–Nov. 11		Sept. 2–Nov. 16	June 28–Aug. 22	June 22– *
Clifton Court Ferry						Aug. 20–Nov. 14
Collinsville	Sept. 13–Sept. 19	June 2–Nov. 25	July 1–Dec. 7	Aug. 26–Nov. 30	June 24–Nov. 28	May 28– *
Emmaton	Sept. 14–Sept. 19	June 4–Oct. 6	Aug. 6–Sept. 13	Sept. 20–Nov. 16	June 24–Oct. 6	June 14– *
Freeport						Aug. 16–Oct. 6
Grand Island Bridge						Aug. 6–Oct. 30
Hood Ferry						Aug. 10–Oct. 28
Holland Pump						July 26– *
Howard Ferry						July 30–Oct. 26
Island Home		Aug. 14–Sept. 29				
Isleton		Aug. 14–Sept. 28				July 2–Nov. 20
Jersey	Sept. 13–Sept. 18	June 2–Dec. 14	Aug. 6–Oct. 31	Sept. 16–Nov. 10	June 28–Nov. 20	May 22–Nov. 14
Jones Landing		Aug. 27–Sept. 28				
Junction of North Fork and South Fork of Mokelumne River		Aug. 26–Nov. 19				
King Island—Camp 3½						Aug. 12– *
Liberty Ferry						Aug. 4–Nov. 14
Lincoln Highway—San Joaquin River						Sept. 8– *
Little Holland Ferry						Aug. 10–Oct. 2
Mansion House—Victoria Island						Aug. 6– *
McDonald Pump		July 23–Nov. 19				
Medford Island Pump						July 18–Nov. 20
Middle River						Aug. 8– *
New Hope Bridge		Aug. 26–Nov. 19				
North Fork Pump		Sept. 18–Oct. 9				
Oakland and Antioch Bridge		June 16–Nov. 19	July 1–Dec. 31	Sept. 8–Dec. 14	June 24–Nov. 30	
Oakland and Antioch Ferry		June 2–Dec. 2	July 1–Dec. 30	Sept. 6–Dec. 14	June 24–Nov. 30	May 24– *
Orwood Pump		July 22–Nov. 24				
Quimby Pump		July 23–Nov. 24				
Rindge Pump						Aug. 8– *
Rio Vista	Sept. 13–Sept. 19	July 23–Oct. 9		Sept. 22–Oct. 16	Aug. 22–Nov. 16	June 16–Nov. 20
Ryer Island Ferry		Aug. 16–Sept. 28				
Sacramento		Sept. 21–				
Sing Kee Landing		Oct. 9–Oct. 15				
Sherman Island Ferry		June 2–Sept. 30	Aug. 6–Oct. 31			
Sutter Slough						July 26–Oct. 30
Terminous		Sept. 18–Nov. 19				
Three-Mile Ferry		June 2–Oct. 31	Aug. 7–Oct. 27		July 2–Oct. 30	June 14– *
Tyler Island Ferry		Aug. 14–Oct. 30				July 30–Oct. 14
Venice		July 23–Nov. 13				
Wakefield Landing		Aug. 7–				Aug. 18– *
Walker Landing		Sept. 15–Oct. 6				
Walnut Grove		Aug. 14–Nov. 1				July 18–Oct. 24
Webb Pump		July 23–Dec. 13				July 16–Nov. 18
Williams Bridge						Aug. 20–Oct. 20
Zuckerman Pump		July 25–Dec. 3				

*Observation season not closed.

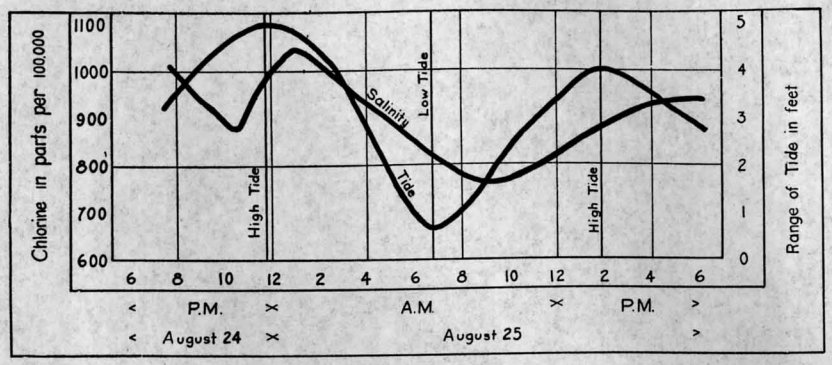
Plate 9-5

CURVES SHOWING VARIATION OF SALINITY WITH TIDE

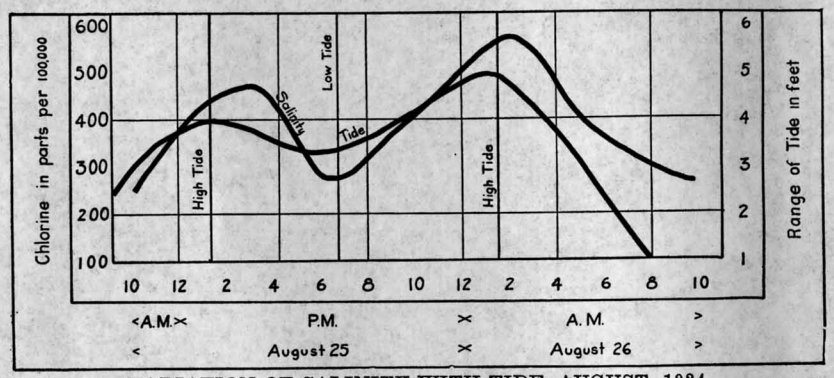
Stafford Report, 1924

PLATE 9-5

ANTIOCH-AUGUST 24 AND 25



RIO VISTA- AUGUST 25 AND 26

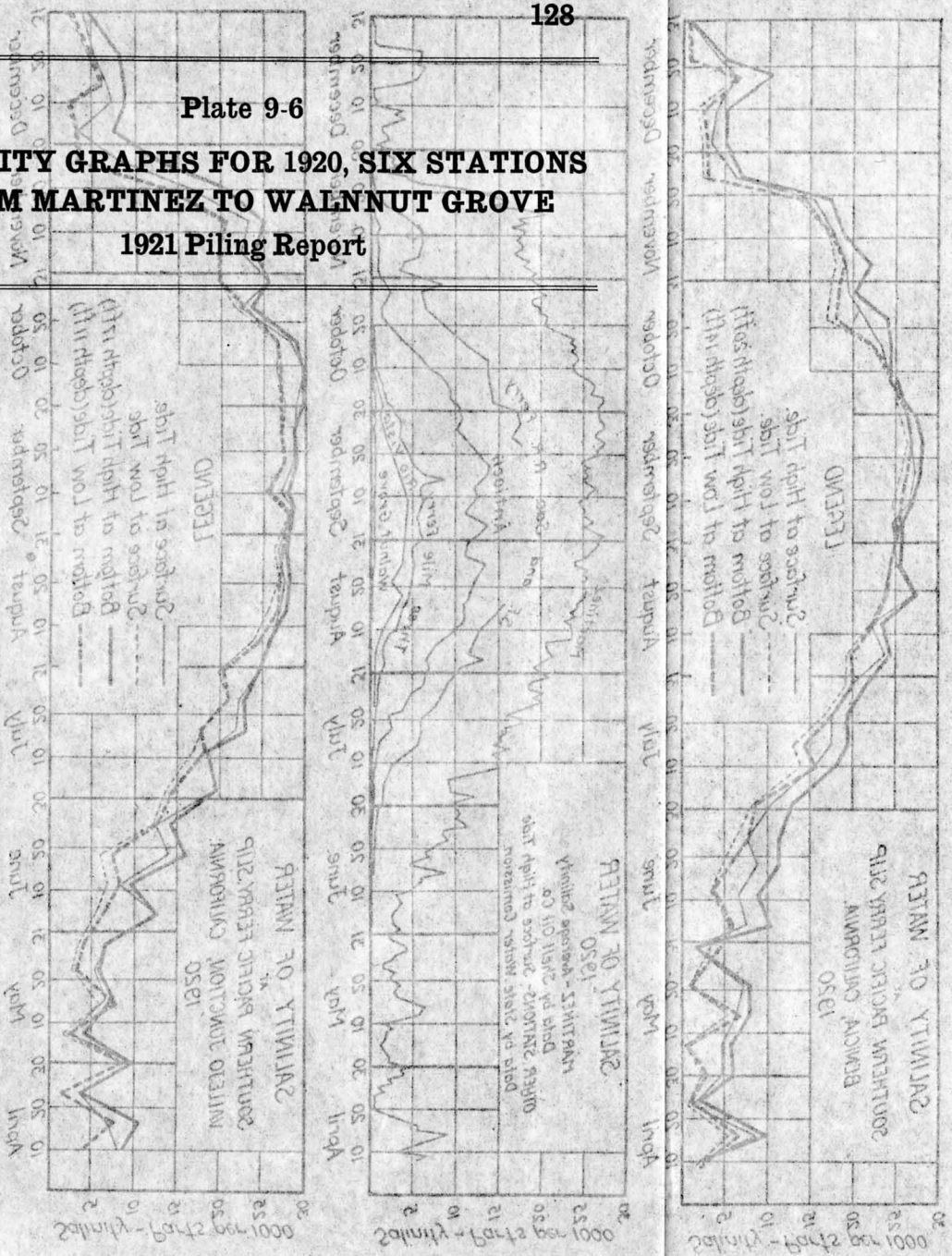


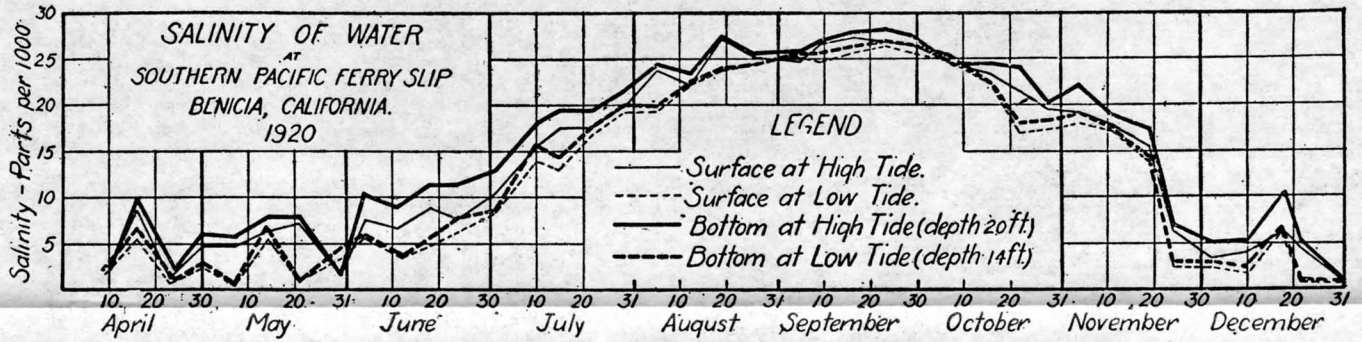
VARIATION OF SALINITY WITH TIDE, AUGUST, 1924

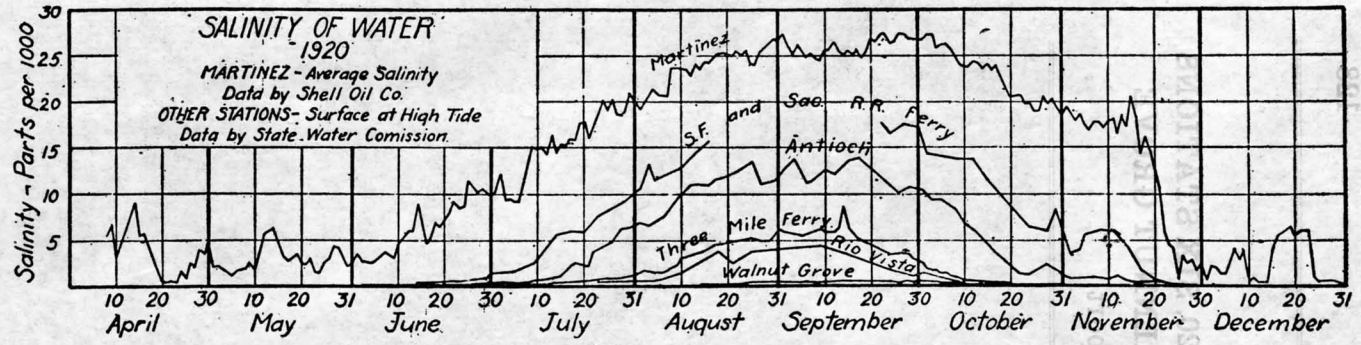
Plate 9-6

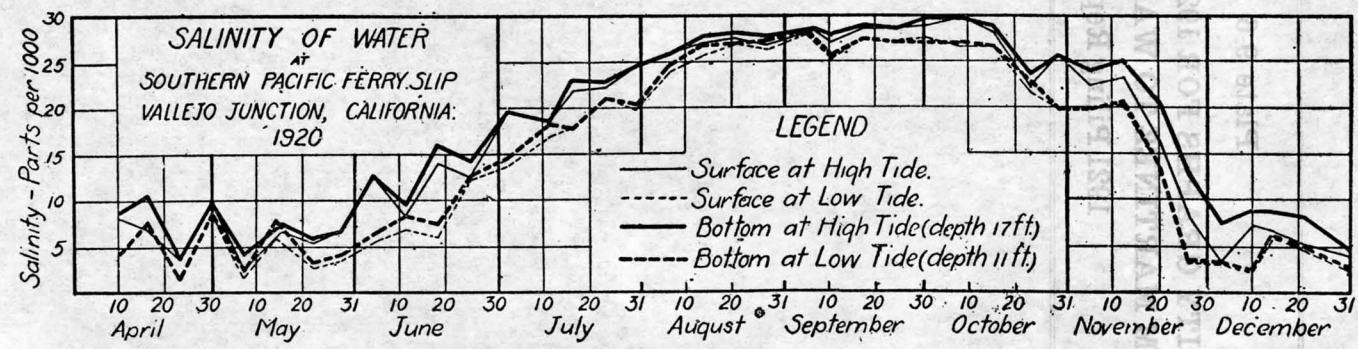
SALINITY GRAPHS FOR 1920, SIX STATIONS FROM MARTINEZ TO WALNNUT GROVE

1921 Piling Report









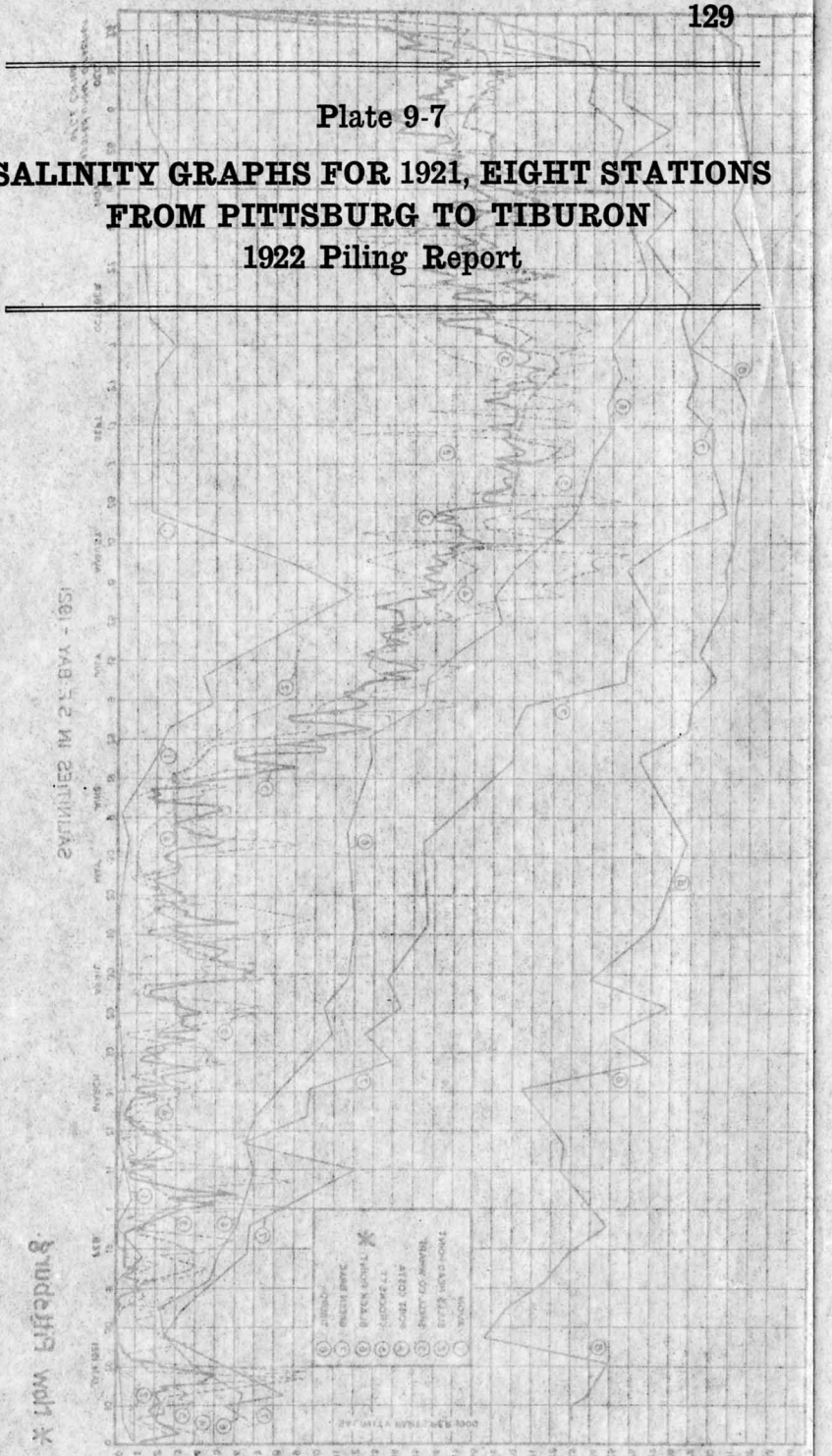
Salinity graphs.

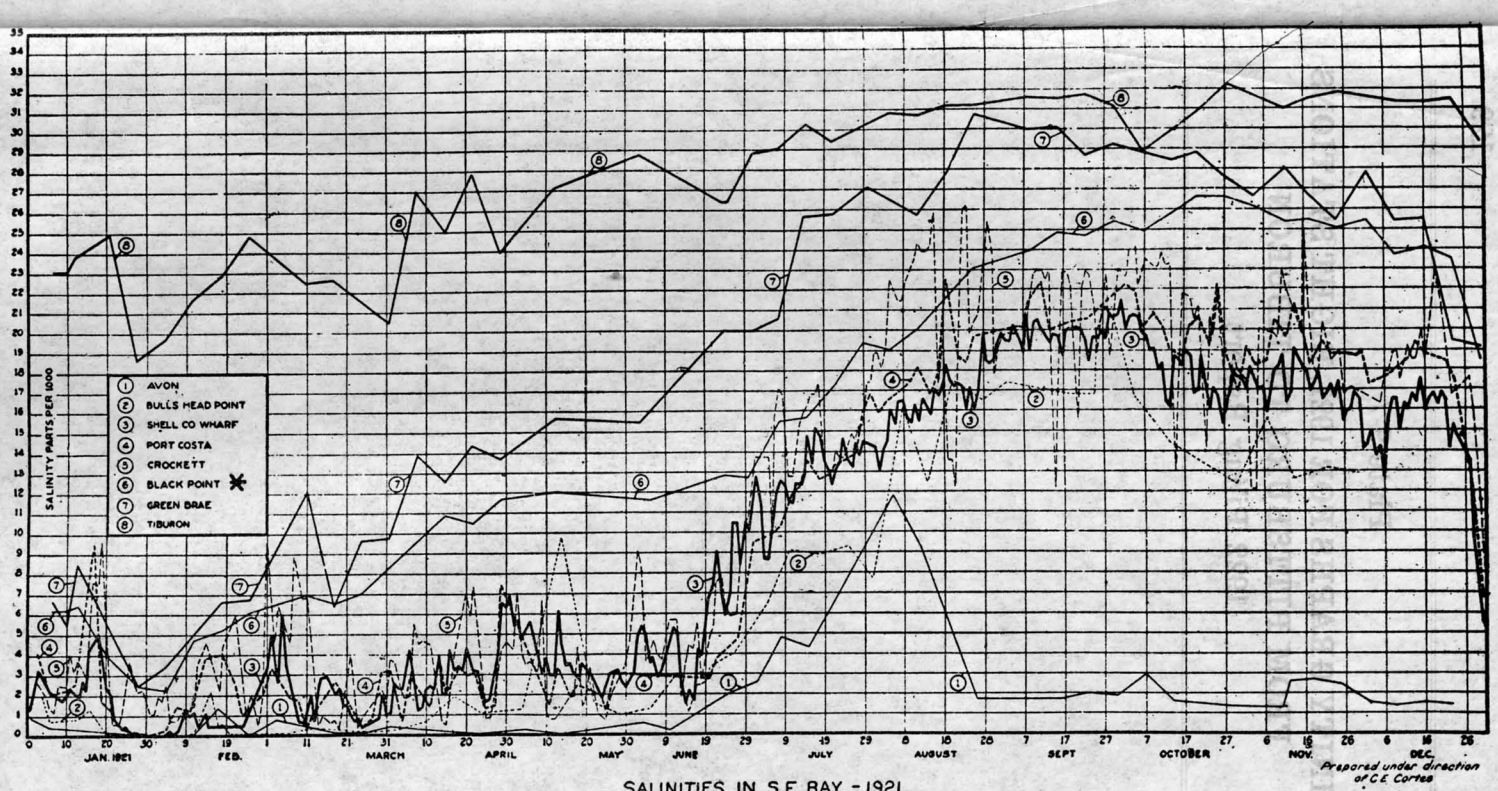
PLATE 9-6

Plate 9-7

SALINITY GRAPHS FOR 1921, EIGHT STATIONS FROM PITTSBURG TO TIBURON

1922 Piling Report





SALINITIES IN S.F. BAY - 1921

* Now Pittsburg.

PLATE 9-7

Plate 9-8

SALINITY CURVES, RELATION BETWEEN RIVER DISCHARGE AND BAY SALINITY

Sheet 1 of 2

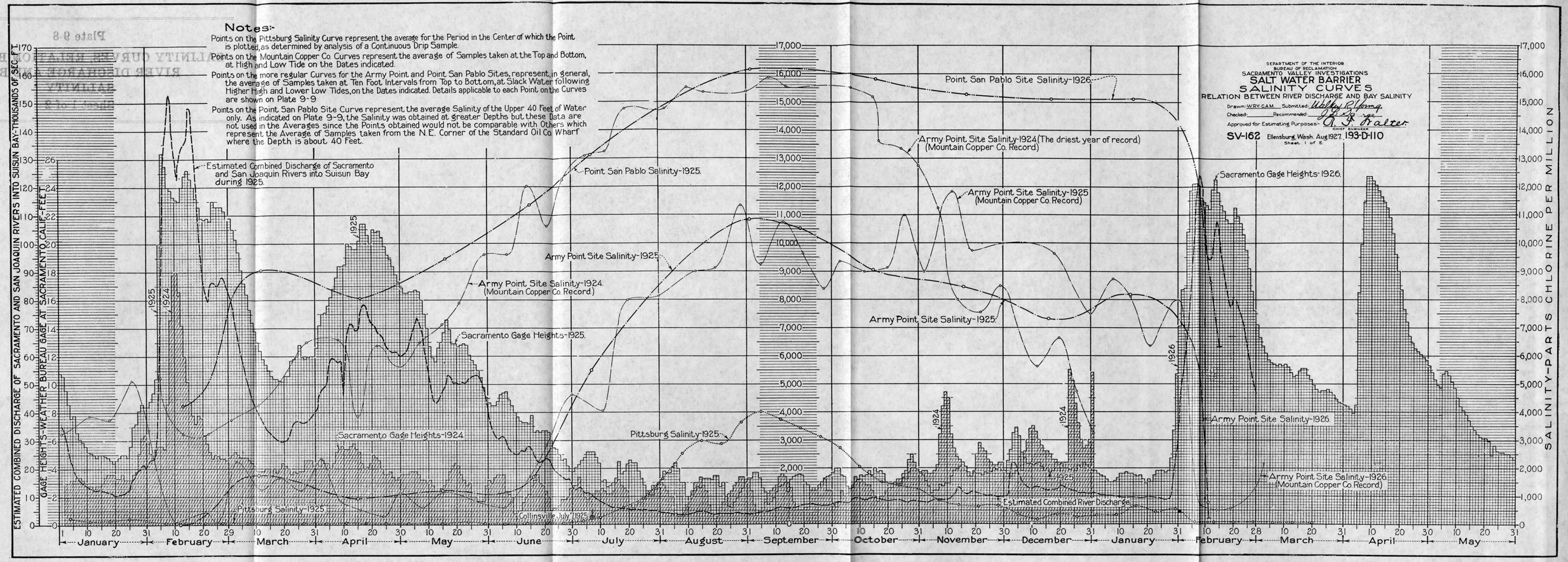
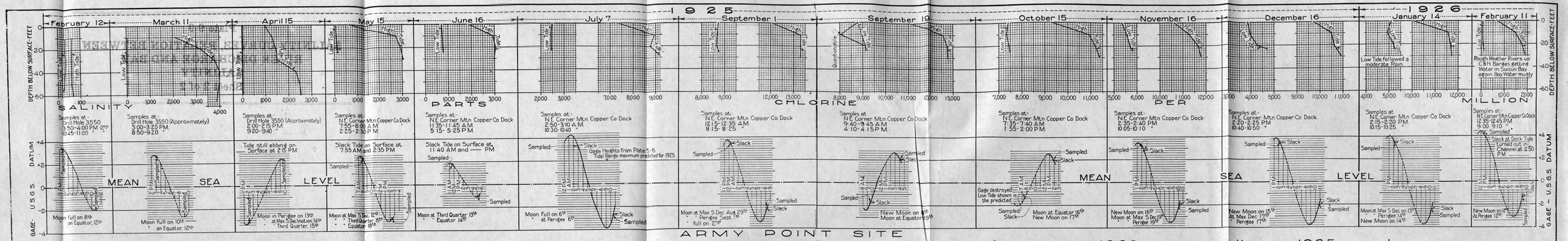
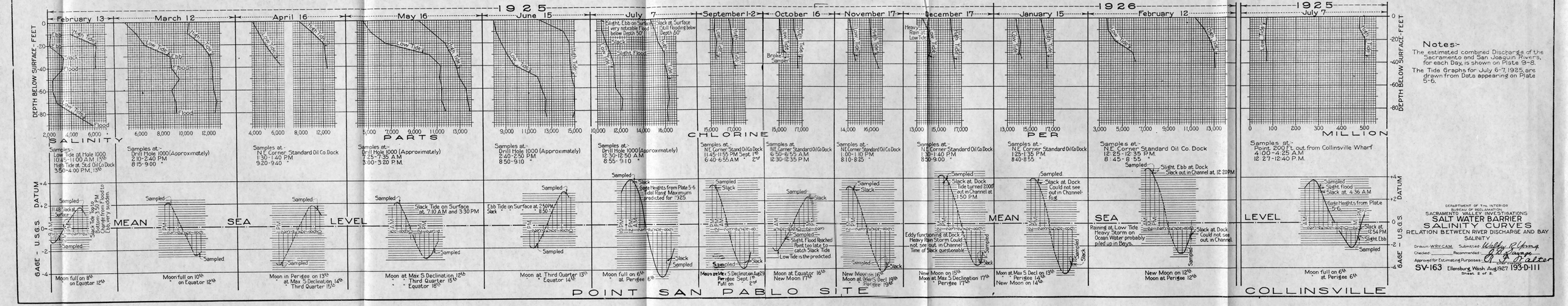

Notes:-
Points on the Pittsburg Salinity Curve represent the average for the Period in the Center of which the Point is plotted, as determined by analysis of a Continuous Drip Sample.
Points on the Mountain Copper Co. Curves represent the average of Samples taken at the Top and Bottom, at High and Low Tide on the Dates indicated.
Points on the more regular Curves for the Army Point and Point San Pablo Sites, represent, in general, the average of Samples taken at Ten Foot Intervals from Top to Bottom, at Slack Water following Higher High and Lower Low Tides, on the Dates indicated. Details applicable to each Point on the Curves are shown on Plate 9-9.
Points on the Point San Pablo Site Curve represent the average Salinity of the Upper 40 Feet of Water only. As indicated on Plate 9-9, the Salinity was obtained at greater Depths but these Data are not used in the Averages since the Points obtained would not be comparable with Others which represent the Average of Samples taken from the N.E. Corner of the Standard Oil Co. Wharf where the Depth is about 40 Feet.
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS
SALT WATER BARRIER
SALINITY CURVES
RELATION BETWEEN RIVER DISCHARGE AND BAY SALINITY
Drawn: W.R.Y. C.A.M. Submitted: Wesley R. Young
Checked: Recommended: J. L. Savage
Approved for Estimating Purposes:- A. F. Walter
Chief Engineer
SV-162 Ellensburg, Wash. Aug. 1927. 193-D-110
Sheet 1 of 2
ESTIMATED COMBINED DISCHARGE OF SACRAMENTO AND SAN JOAQUIN RIVERS INTO SUISUN BAY-THOUSANDS OF SEC. FT.
GAGE HEIGHTS-WEATHER BUREAU GAGE AT SACRAMENTO, CALIF.-FEET
SALINITY-PARTS CHLORINE PER MILLION
Estimated Combined Discharge of Sacramento and San Joaquin Rivers into Suisun Bay during 1925.
Point San Pablo Salinity-1925.
Point San Pablo Site Salinity-1926
Army Point Site Salinity-1924 (The driest year of record) (Mountain Copper Co. Record)
Army Point Site Salinity-1925 (Mountain Copper Co. Record)
Sacramento Gage Heights-1926.
Army Point Site Salinity-1925
Army Point Site Salinity-1924 (Mountain Copper Co. Record)
Sacramento Gage Heights-1925.
Army Point Site Salinity-1925
Sacramento Gage Heights-1924
Pittsburg Salinity-1925
Pittsburg Salinity-1925
Collinsville, July 1925 & 26
Estimated Combined River Discharge
Army Point Site Salinity-1926
Army Point Site Salinity-1926 (Mountain Copper Co. Record)
1925
1924
1926
January
February
March
April
May
June
July
August
September
October
November
December
January
February
March
April
May

Plate 9-9

SALINITY CURVES, RELATION BETWEEN RIVER DISCHARGE AND BAY SALINITY

Sheet 2 of 2





Notes:-

The estimated combined Discharge of the Sacramento and San Joaquin Rivers, for each Day, is shown on Plate 9-8.

The Tide Graphs for July 6-7, 1925, are drawn from Data appearing on Plate 5-6.

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SACRAMENTO VALLEY INVESTIGATIONS

SALT WATER BARRIER
SALINITY CURVES
RELATION BETWEEN RIVER DISCHARGE AND BAY SALINITY

Drawn W.B.Y.-C.A.M. Submitted Walley R. Young
Checked _____ Recommended _____
Approved for Estimating Purposes O. L. Walter

SV-163 Ellensburg, Wash. Aug 1927 193-D-111
Sheet 5 of 8