

12674 THRU 12698

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Diag. Cht. No. 1.

Form 504 U. S. DEPARTMENT OF COMMERCE COAST AND GEODETIC SURVEY DESCRIPTIVE REPORT	
Type of Survey <u>State Boundary</u> 40,000-142 T-12674 thru Field No. 20,000-858 Office No. T-12698	
LOCALITY State <u>Arizona - California</u> General locality <u>Colorado River</u> Locality <u>Nevada State Line to Mexican</u> Boundary	
<u>1962-65</u> CHIEF OF PARTY W.M.Reynolds, Chief of Field Party J.E.Waugh, Div. of Photo. Wash., D.C.	
LIBRARY & ARCHIVES	
DATE _____	

DESCRIPTIVE REPORT - DATA RECORD

T - 12674 thru 12698

PROJECT NO. (II):

40,000-142 & 20,000-858 (1964-1965 reimbursable nos.)

FIELD OFFICE (III):

Blythe, Calif.

CHIEF OF PARTY

W. M. Reynolds

PHOTOGRAMMETRIC OFFICE (III):

Washington, D.C.

OFFICER-IN-CHARGE

J. E. Waugh

INSTRUCTIONS DATED (II) (III):

Field:

Dec. 11, 1963

Supplement 1, Dec. 17, 1963

Office:

Jan. 13, 1964

Sept. 25, 1964

METHOD OF COMPILATION (III):

B-8 stereoplotter

MANUSCRIPT SCALE (III):

1:18,000

STEREOSCOPIC PLOTTING INSTRUMENT SCALE (III):

DATE RECEIVED IN WASHINGTON OFFICE (IV):

DATE REPORTED TO NAUTICAL CHART BRANCH (IV):

APPLIED TO CHART NO.

DATE:

DATE REGISTERED (IV):

GEOGRAPHIC DATUM (III):

N.A. 1927

VERTICAL DATUM (III):

MEAN SEA LEVEL EXCEPT AS FOLLOWS:

Elevations shown as (25) refer to mean high water

Elevations shown as (5) refer to sounding datum

i.e., mean low water or mean lower low water

REFERENCE STATION (III):

LAT.:

LONG.:

ADJUSTED

UNADJUSTED

PLANE COORDINATES (IV):

STATE

ZONE

Y =

X =

ROMAN NUMERALS INDICATE WHETHER THE ITEM IS TO BE ENTERED BY (II) FIELD PARTY, (III) PHOTOGRAMMETRIC OFFICE, OR (IV) WASHINGTON OFFICE.

WHEN ENTERING NAMES OF PERSONNEL ON THIS RECORD GIVE THE SURNAME AND INITIALS, NOT INITIALS ONLY.

DESCRIPTIVE REPORT - DATA RECORD

FIELD RECHECK BY (III): Control		W. M. Reynolds H. L. Gana	DATE: 1-14-64 2-28-64
MEANINGFUL LOCATION (III) (STATE DATE AND METHOD OF LOCATION): River Shoreline Winter 1964 Spring 1965			
PROJECTION AND GRIDS RULED BY (IV): A. E. Roundtree		DATE October 1964	
PROJECTION AND GRIDS CHECKED BY (IV): P. Hawkins		DATE October 1964	
CONTROL PLOTTED BY (III): D. H. Phillips		DATE November 1964	
CONTROL CHECKED BY (III): J. C. Richter		DATE November 1964	
RADIAL PLOT OR STEREOSCOPIC CONTROL EXTENSION BY (III): G. M. Ball		DATE September 1964	
STEREOSCOPIC INSTRUMENT COMPILATION (III): M. C. Webber J. B. Phillips		PLANIMETRY CONTOURS	DATE December 1964 Jan-May 1965
MANUSCRIPT DELINEATED BY (III): M. C. Webber, J. B. Phillips		DATE December 1964 Jan-May 1965	
SCRIBING BY (III): Negative Engraving Branch		DATE Jan-May 1965	
PHOTOGRAMMETRIC OFFICE REVIEW BY (III): J. Battley		DATE May 1965	
REMARKS:			

DESCRIPTIVE REPORT - DATA RECORD

CAMERA (KIND OR SOURCE) (III):

Single-lens 6" focal length ("S" & "W" cameras)

PHOTOGRAPHS (III)

NUMBER	DATE	TIME	SCALE	STAGE OF TIDE
62 S 9761A - 9770A				Inapplicable
62 S 9780A - 9786A				
62 S 9793A - 9801A				
62 S 9810A - 9816A				
62 S 9849A - 9838A				
62 S 9883A - 9902A				
62 S 9909A - 9917A				
62 S 9923A - 9935A				
62 S 9978A - 9991A				
63 W 9923 - 9927				

TIDE (III)

	RATIO OF RANGES	MEAN RANGE	SPRING RANGE
REFERENCE STATION:			
SUBORDINATE STATION:			
SUBORDINATE STATION:			

WASHINGTON OFFICE REVIEW BY (IV):

DATE:

PROOF EDIT BY (IV):

DATE:

NUMBER OF TRIANGULATION STATIONS SEARCHED FOR (II): 25

RECOVERED:
25

IDENTIFIED: 49#

NUMBER OF BM(S) SEARCHED FOR (II):

RECOVERED:

IDENTIFIED

NUMBER OF RECOVERABLE PHOTO STATIONS ESTABLISHED (III):

NUMBER OF TEMPORARY PHOTO HYDRO STATIONS ESTABLISHED (III):

REMARKS:

The only stations counted as recovered or searched for are the stations which were visited by the geodetic party. Also seven new stations were established by the geodetic party for the use of photogrammetry.

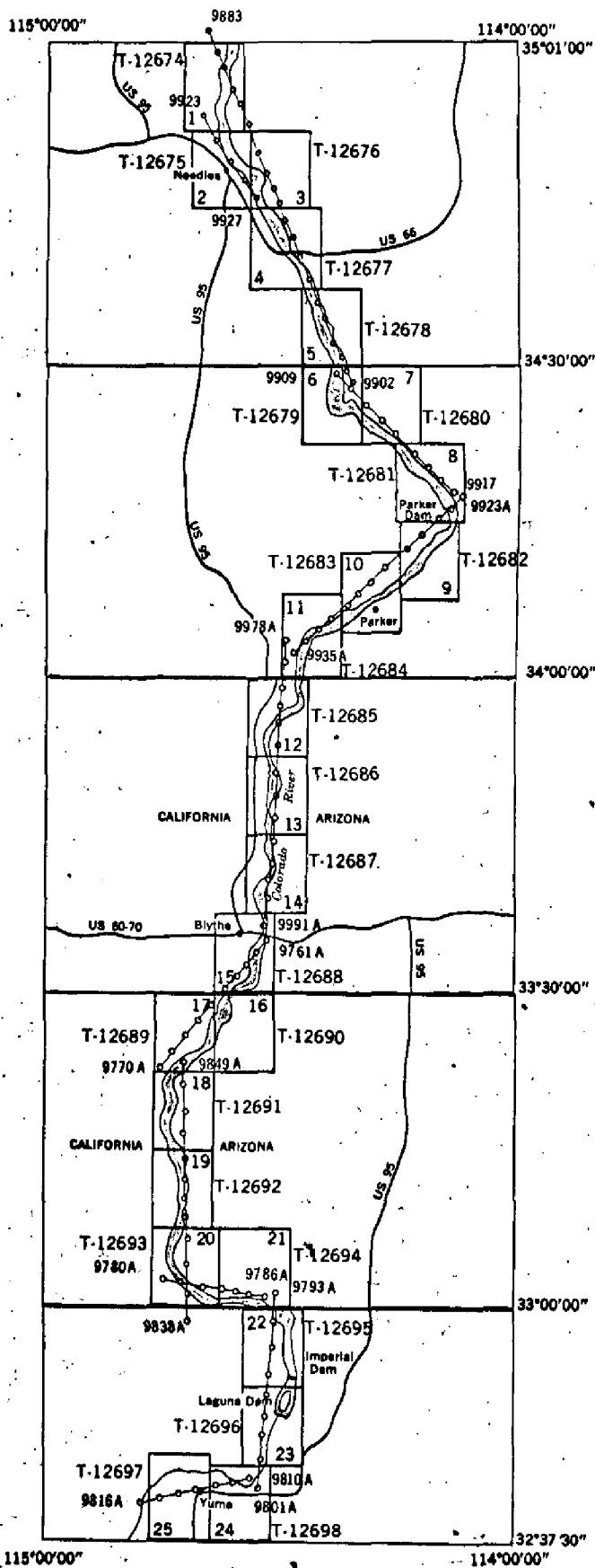
ARIZONA-CALIFORNIA BOUNDARY COMMISSION

BOUNDARY MAPS

SCALE 1:18,000

1 inch = 1500 ft.

photographs of July 1962 and September 1963



X

SUMMARY TO ACCOMPANY DESCRIPTIVE REPORT
T-12674 THROUGH T-12698
MAY 1965

Under an agreement with the States of Arizona and California, the Coast and Geodetic Survey has located 34 monumented boundary points by triangulation and 215 boundary sub points by photogrammetric methods in and along the Colorado River. Analytic aerotriangulation methods were used to bridge ten strips of 1:40,000 scale photography for the project.

The Colorado River Boundary Commission selected and pricked the 215 river sub points on a set of 1:18,000 scale ratio prints furnished by the Coast and Geodetic Survey. Negatives, carefully ratioed to the bridging glass diapositives, were then made of the pre-marked photographs. These negatives were registered over the bridging plates and drilled by direct transfer. Plane coordinates were thus obtained for these points by the well controlled bridge accomplished for this project. A list was prepared showing geographic positions and the California and Arizona State plane coordinates.

Following the location of the boundary points, the states of Arizona and California requested planimetric maps along the Colorado River showing the determined boundary points, the boundary line and planimetric detail within 4000 to 5000 feet of either bank of the river.

Twenty five surveys (T-12674 thru T-12698), all at a scale of 1:18,000, were compiled on the B-8 stereoplotter by the Washington Compilation Office.

The manuscripts were compiled on worksheets holding to plotted bridge positions and inked to the manuscripts after careful review. All details were compiled from office interpretation of the stereo models, with the exception of detail described in the vicinity of the boundary points by the field party during field identification. All details surrounding the boundary points were compiled to agree with the descriptions supplied in the "Interstate Compact Defining the Boundary Between the States of Arizona and California". The boundary line between points was also compiled in accordance with the Interstate Compact.

Field operations encompassed the recovery, establishment and identification of horizontal control, including the location of the monumented boundary stations on the field ratio prints. Field inspection for and field edit of compiled features was not performed for the project.

Compilation was completed in April 1965. The surveys were then scribed by the Negative Engraving Branch, type applied and the completed sheets printed.

One negative, one cronaflex copy and 100 ozalids of each map were supplied to the states of Arizona and California. Each state also was supplied with a set of negatives and a set of ratio prints showing all boundary points located for the project.

A copy of these surveys will be registered in the Bureau Archives under their respective T-nos. (T-12674 through T-12698).

Submitted by:

J. P. Battley, Jr.

J. P. Battley, Jr.
Cartographer

FIELD INSPECTION REPORT
ARIZONA - CALIFORNIA STATE BOUNDARY
PROJECT 21421 - 40,000 - 142

The only item pertaining to this project is Horizontal Control. It is discussed below and all other items have been omitted.

3. Horizontal Control.

This was a joint project assigned to Geodetic Party 639 and a sub-unit of Photogrammetric Party 6420. Horizontal control was searched for and identified in accordance with Project Instructions and a copy of the project diagram which was furnished the field unit. The geodetic party established 35 permanently marked points along the Colorado River from the Nevada state line to the Mexican Border. Fifteen of these points were identified to help control the aerotriangulation by the photogrammetry division. These points are REFUGE 1964, Point No. 2, DOCK 1964, Point No. 7, FLAT 1964, Point No. 9, VIEW 1964, Point No. 10, POINT NO. 12 1964, EHRON 1964, Point No. 13, CIBOLA 1964, Point No. 14, SQUAW 1964, Point No. 15, KOOL 1964, Point No. 19, T8S-R22W-S4-S9 1964, Point No. 20, CAL-ARIZ PT. NO: 21 1964, CAL-ARIZ PT. NO. 22 1964, W1SEC 13 1964, Point No. 26, MISSION 1964, Point No. 32 and S35-S22 BLM 1964, Point No. 34. Seven stations were established by the geodetic party for the use of the photogrammetric unit. These stations are SAN 1964, FIELD 1964, ELBOW 1964, CIB 1964, ZON 1964, WHITE 1964 and INEZ 1964. Eight stations were requested by the photogrammetry division but one was cancelled with the approval of the Washington Office.

It was necessary to use ordinary base lines and the Short Base Method to determine distances to substitute points. All base lines were laid out with a common side to two triangles. All side checks were less than 3 feet. Vertical angles were observed where there was a noticeable difference in elevation between the station and substitute point.

Supplemental instructions were received to identify all turning points, on the state line, which were established by the geodetic party. Twenty-five additional points were identified for transfer to an un-controlled mosaic. These points were identified for the above purpose only and are not to be used for horizontal control. These points are 1A, 1B, 3, 4, 5, 6, 8, 11, 12A, 13, 14, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31 and 33. Substitute points were identified at EHRON 1964, Point No. 13, CAL-ARIZ PT. NO. 21, CAL-ARIZ POINT NO. 22 and W1 SEC. 13, Point No. 26. The substitute points are to be used for horizontal control if needed. The direct pricking of the stations is for transfer to the mosaic only.

Recovery Notes are submitted for all stations which were used by the photogrammetric unit but were not visited by the geodetic party.

Identification was performed on 1:40,000 scale contact prints. The photography was of very good quality and no great difficulty was encountered in identifying the substitute points except in the farming area along the Colorado River. The cultivation in these areas had eliminated many of the points which were in place at the time of photography. Some of the areas had been cleared and put to cultivation since photography. In several instances it was impossible to select points on opposite sides of the stations. However, this was done whenever practicable. Ratio prints were requested in the vicinity of stations FORT GASS (USGS) 1934 and RED (USGS) 1933. The prints were not used due to fuzziness from being enlarged 6 times.

In the case of Points 12 and 12A, the reconnaissance description called for the station to be established in the center of the concrete section of Palo Verde Dam while the COMPACT called for the center of the earth fill section of the dam. Point No. 12 was established in the center of the concrete section and Point 12A was established in the center of the earth fill section of the dam.

Computed positions of the 1964 stations were not completed when the unit left the area. These positions will be furnished by the geodetic party in approximately one month.

William M. Reynolds
Chief, Sub-unit Photo.
Party 6420

Photogrammetric Plot Report

Project 40,000-142

Colorado River, Arizona-California Boundary

21. Area Covered

This report covers the boundary between the states of Arizona and California on the Colorado River from the boundary intersection at 35 degrees north latitude, to a point on the international boundary of United States and Mexico.

22. Method

Analytic aerotriangulation methods were used to bridge ten strips of photography at the scale of 1:40,000. The purpose was to furnish positions for preselected boundary points in the Colorado River and to furnish control for shoreline maps at a scale of 1:18,000. Approximately 200 unmonumented subpoints were preselected and pricked on a set of ratio prints of the bridging photography by the Boundary Commissions of the states of California and Arizona (see Interstate Compact, defining the boundary between the states of Arizona and California). By means of a set of ratioed negatives of the prints, the points were located on the bridging diapositives by direct transfer. A list was provided showing geographic positions and state coordinate positions (Transverse Mercator system for Arizona and Lambert system for California) of each of these points.

23. Adequacy of Control

Horizontal control was adequate and complied with project instructions. Ties between strips were good. Bridging results comply with National Standards of Map Accuracy, thus insuring compilation accuracy well within national standards.

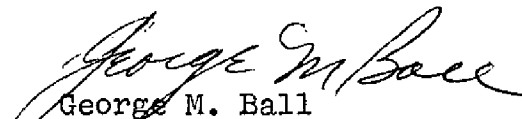
24. Supplemental Data

None

25. Photography

Photography was adequate with regard to coverage, overlap and definition.

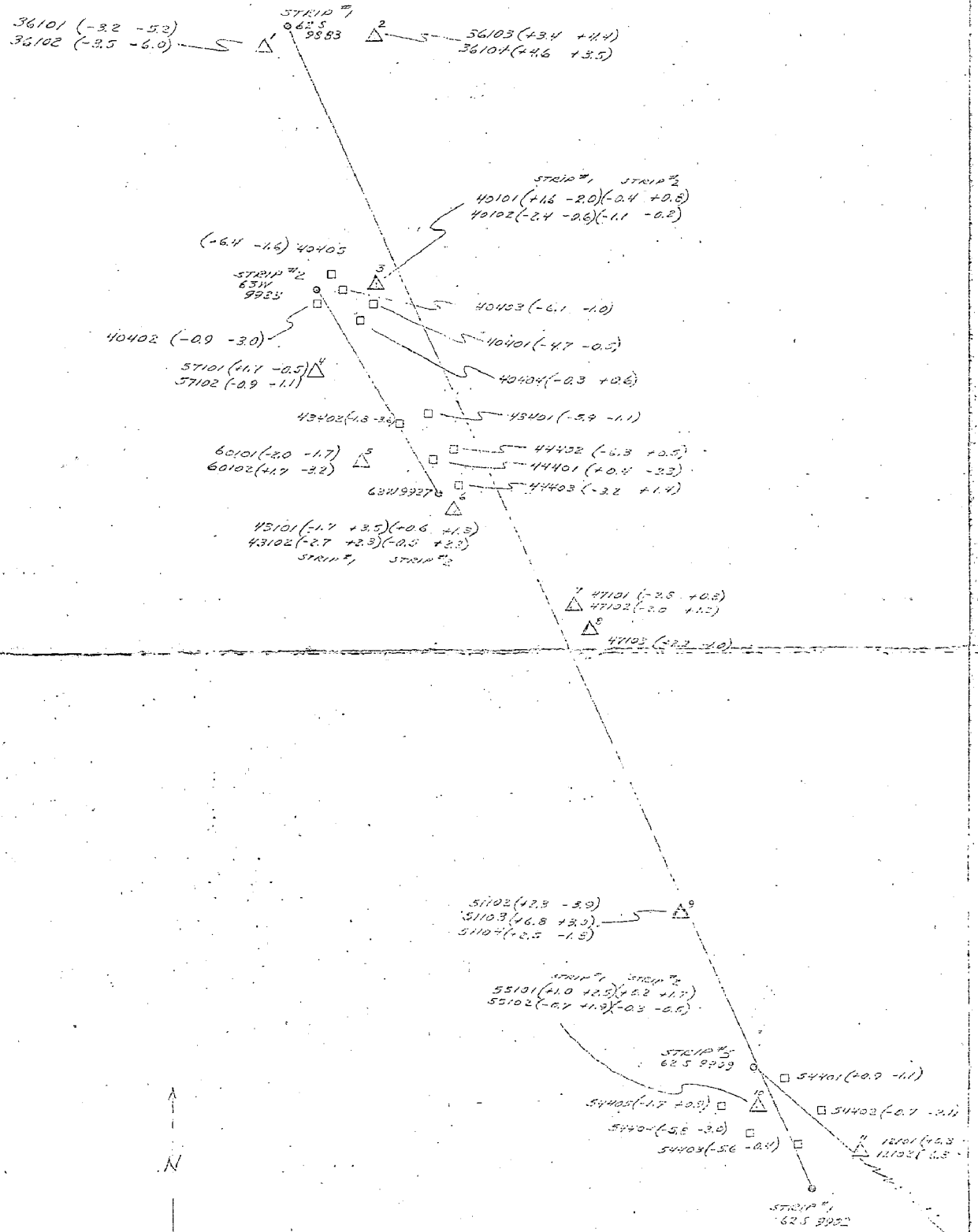
Respectfully submitted,

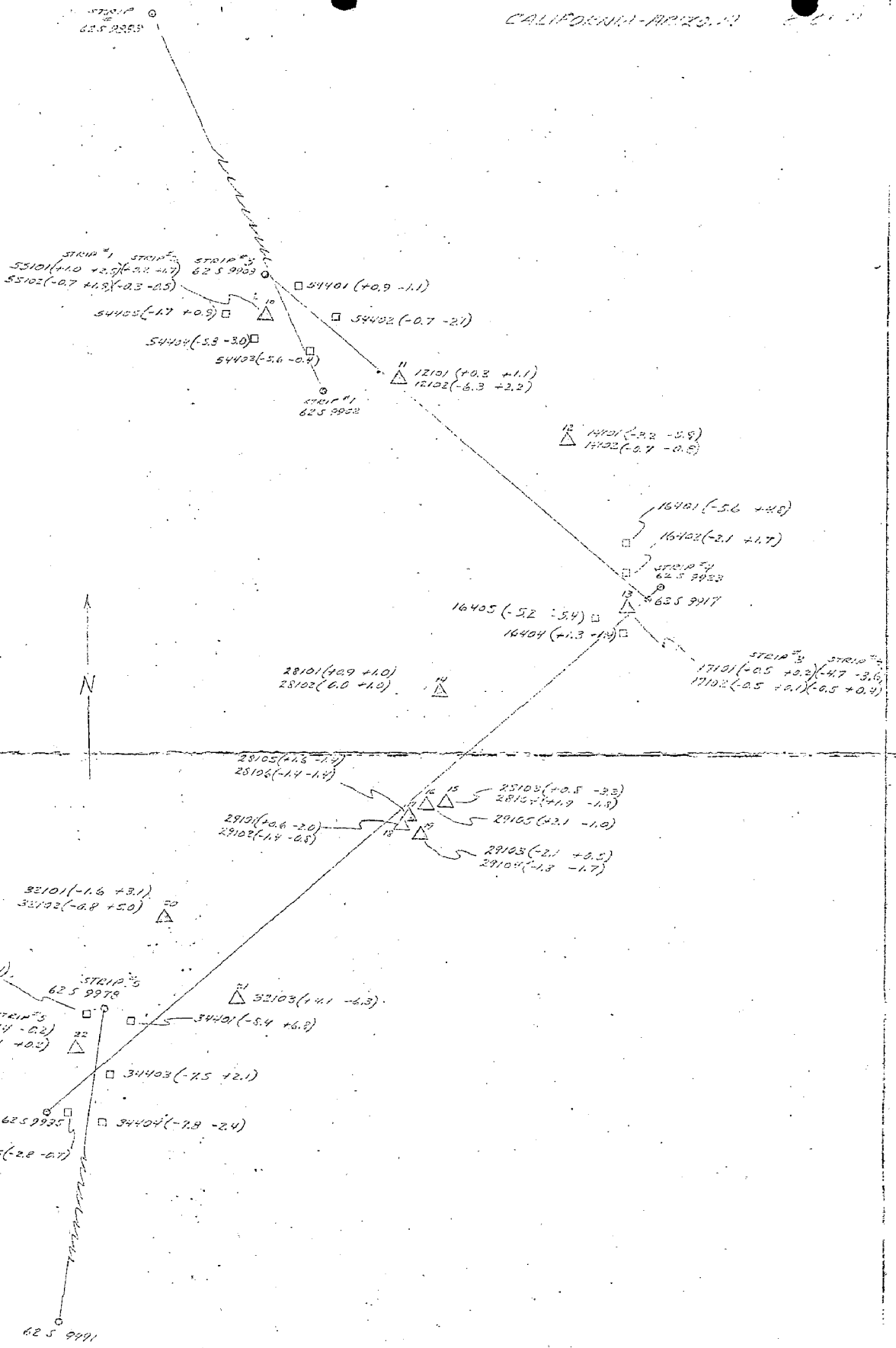

George M. Ball

Approved and Forwarded,

Henry P. Eichert
Acting Chief, Aerotriangulation Section

INDEX NO.	STATION	
1	Boundary Post 142,1900	△ Control used in adjustment
2	Fort Mohave,1934	
3	San,1964	
4	Rim,1934	△ Control used as a check
5	Needles,1935	
6	Field,1964	
7	Refuge,1964 -	
8	Arizona 97,1961	□ Tie points
9	Chem,1951	
10	Site 6,1948	
11	No.4 (USGS),1951	() Closure of bridge to control shown in parenthesis
12	Friant (USGS),1932	
13	Parker Dam,1964	
14	Cairn (MWD of SC),1932	
15	Dock,1964 -	
16	Wathen,1964	
17	Flat,1964 -	
18	View,1964 -	
19	Parker,1932	
20	Calzona,1935	
21	Vidal Water Tank,1951	
22	End,1935	
23	Plateau,1935	
24	Riverside No. 11 (USGS)	
25	Point No.12,1964	
26	Ehren,1964	
27	Heron,1948	
28	Ripley Water Tank,1935	
29	Cibola,1964	
30	Zon,1964	
31	Cib,1964	
32	Toofer,1935	
33	San Diego Cairn No.21	
34	White,1964	
35	Red (USGS),1933	
36	Inez,1964	
37	Squaw,1964 -	
38	Senator,1934	
39	Kool,1964	
40	T8S R22W S4-S9 (point no.20),1964	
41	Cal-Ariz (point no.21)BLM,1964	
42	Cal. Ariz (point no.22)BLM,1964	
43	W1/4 Sec (point no.26)BLM,1964	
44	Mission,1964 -	
45	Winter,1964	
46	S35-S22,BLM,1964	
47	Offset 207,1934	





51.811
6259761

STRIP #1
625 9958

63101 (-0.5 -0.7)
63102 (-0.4 +1.5)

69401 (+0.2 -2.0)

69403 (+0.4 +0.7)

69401 (-5.0 +2.5)

625 9970

69402 (-5.1 +3.0)

46101 (+3.4 +4.1)
46102 (+3.9 +5.6)

43101 (-0.6 -3.5)
43102 (+0.7 -5.0)

STRIP #7 STRIP #8
41102 (-6.5 0.0) (0.0 0.0)

39403 (+3.2 -1.6)

39404 (-1.9 +1.7)

STRIP #6
625 9780

39402 (+3.4 -2.0)

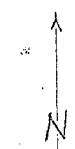
STRIP #9
625 9792

76101 (+1.2 -1.3) (-1.0 -1.0)

76102 0.0 0.0 (-1.9 -0.4)

76103 (+3.7 -1.8) (+3.2 0.0)

76104 (+0.3 -0.8) (-2.1 +0.7)



39401 (-1.0 -12.2)

625 9849

76105 (-1.9 +2.4)

625 9786

76101 (+5.8 +2.3)

76103 (+2.7 -5.2)

39101 (+3.8 +2.4) (+0.1 0.0)
39102 (+2.8 +2.7) (+2.1 +1.8)

53101 (+4.5 +2.6)
53102 (+3.7 +1.9)

54101 (+0.1 -6.4)
54102 (-5.5 -3.5)

55101 (-0.7 -2.0)
55102 (-1.1 +0.1)

STRIP #9 STRIP #10
11101 (-4.3 +1.8) (-3.7 +2.6)
11102 (-3.2 +0.3) (-2.8 +0.9)
11103 (-3.5 +1.1) (-3.4 +0.8)
11104 (-3.4 0.0) (-3.1 -0.1)

13103 (-2.6 -1.9)
13104 (0.0 -0.1)

58101 (-5.6 +1.4)
58102 (-2.6 +0.9)

59401 (+0.7 +2.4)

15103 (-1.3 +0.1)
15104 (0.0 0.0)

59403 (+2.4 -0.2)

59101 (+1.7 -0.5) (0.0 -0.1)
59102 (-0.4 +0.6) (-0.9 +1.0)

15101 (+1.3 +0.7)
15102 (+0.7 -0.1)

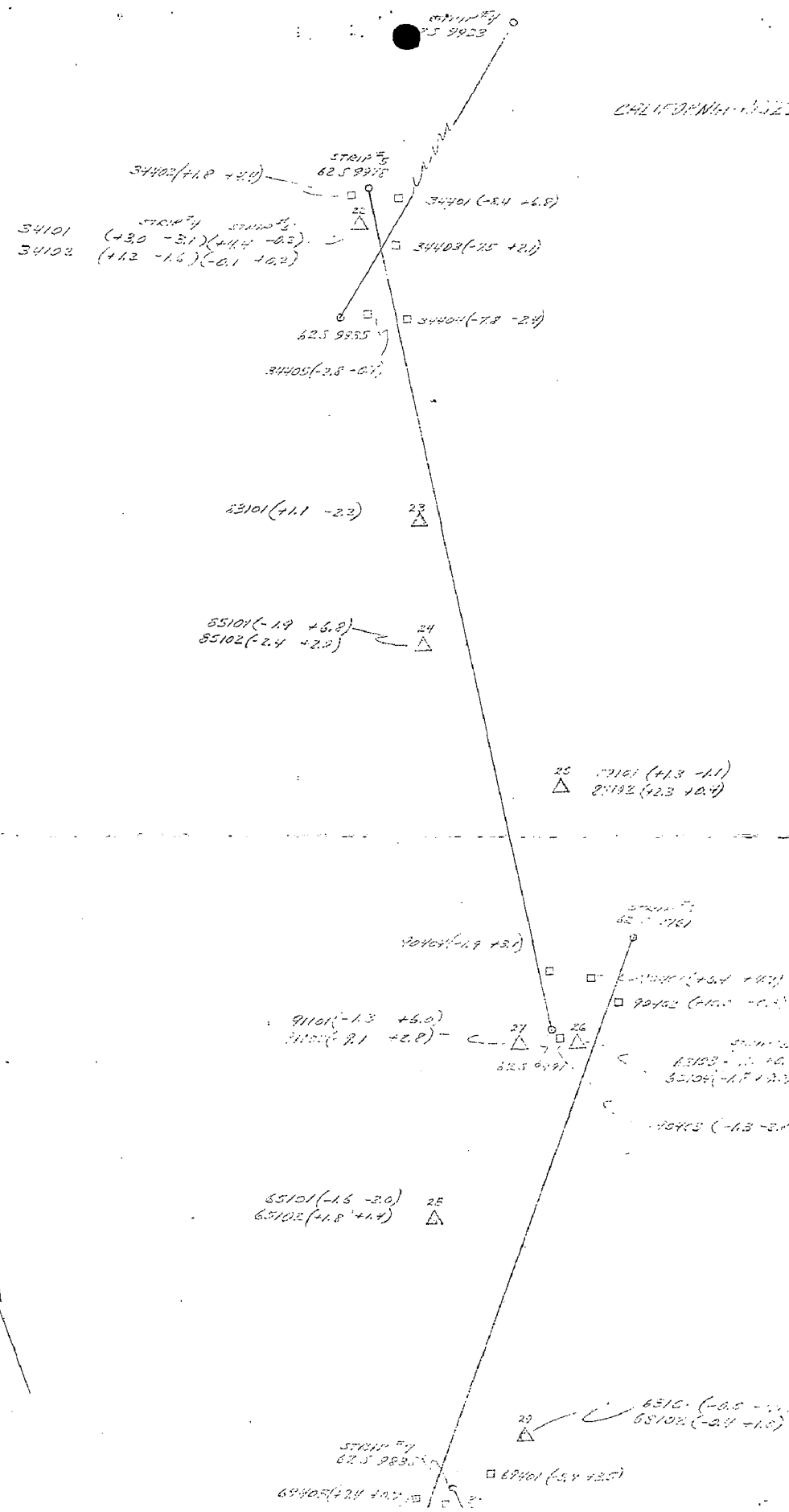
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STRIP #10
625 9801

59402 (-4.8 +1.4)

12101 (+0.3 -3.3)
12102 (+2.8 +1.4)

CALIFORNIA STATE



ARIZONA-CALIFORNIA BOUNDARY SURVEY
PROJECT 40,000-142 & 20,000-858
COMPILATION REPORT
MAY 1965

This project covers the Colorado River from the Arizona, California and Nevada boundary southward to the Mexican border. Twenty-five T-surveys, (T-12674 thru T-12689), were required to compile the project area. Compilation consisted of accurately delineating the river and plotting the California-Arizona boundary line between the river banks and boundary points. Planimetric features were also detailed within 4000 to 5000 feet of either bank of the river.

Thirty four triangulated boundary points and 215 subordinate points (located by the photogrammetric bridge) were plotted on the manuscripts.

31. Delineation

The entire project was compiled on the B-8 stereo-plotter. 1:40,000 scale panchromatic glass plates were used on the plotter. This photography was taken in July 1962 and September 1963.

32. Control

The identification, density and placement of control was adequate and complied with project instructions. The water level of the river and vertical control points used in the bridge were used to level the B-8 models.

33. Supplemental Data

The "Interstate Compact Defining the Boundary Between the States of Arizona and California" was studied carefully and used throughout the project to assure complete agreement between the compilation and the descriptions set forth in the Compact. U.S. Geological Survey quadrangles were used for geographic names and as an aid in road classification.

34. Contours and Drainage

Well defined washes and intermittent streams composed the major features on many of the surveys in this project.

35. Shoreline and Alongshore Details

The river shoreline and alongshore details were delineated from office interpretation of the stereo models.

36. Offshore Details

There are many areas delineated as mud flats in the Colorado River. These areas were interpreted as too low to support vegetation and subject to inundation with changes in the river level.

37. Landmarks and Aids

Inapplicable

38. Control for Future Surveys

Inapplicable

39. Junctions

Junctions were made with each adjoining sheet in the project.

40. Horizontal and Vertical Accuracy

All manuscripts within the project comply with the National Standards of Accuracy.

41. - 45.

None

46. Comparison with Existing Maps

U.S. Geological Survey quadrangle maps were compared and utilized as mentioned in paragraph 33.

47. Comparison with Nautical Charts

Inapplicable

Submitted by:

J. B. Phillips
J. B. Phillips

Approved by:

K. N. Maki

K. N. Maki
Chief, Compilation Section

ARIZONA-CALIFORNIA BOUNDARY SURVEY
PROJECT 40,000-142 & 20,000-858
REVIEW REPORT
MAY 1965

61. General Statement

(See page 1, Summary)

62. Comparison with Registered Topographic Surveys

None

63. Comparison with Maps of Other Agencies

A comparison was made with the U.S.G.S. quadrangles covering the project area. The majority of these quadrangles were compiled from 1947 aerial photographs and field edited in 1949. They were published at a scale of 1:62,500 with a few published at 1:24,000.

In many areas the Colorado River was diverted and re-channeled since publication of these quadrangles.

64. Comparison with Hydrographic Surveys

Inapplicable

65. Comparison with Nautical Charts

Inapplicable

66. Adequacy of Results and Future Surveys

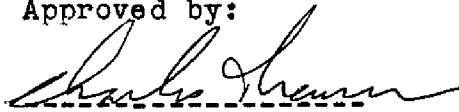
The 25 surveys of this project comply with project instructions. Excellent positioning of the 215 subordinate boundary points were realized by the method explained in Item 22 of the Plot Report.

The boundary line, as shown between the 34 triangulated boundary points and the 215 sub-points was compiled as described in the Interstate Compact. In most instances the boundary line between points is described as "down the Colorado River midway between the shorelines on the right and left banks". The meandering river with its irregular shoreline, mud flats and scattered islands called for more sub-points than were established. Measurements and interpretation

for the boundary line between widely separated sub-points were performed with care, but are debatable and subject to individual evaluation of intent and what constitutes the main river bank.

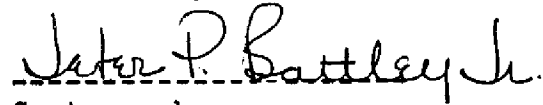
The 25 surveys of this project comply with the National Standards of Accuracy.

Approved by:

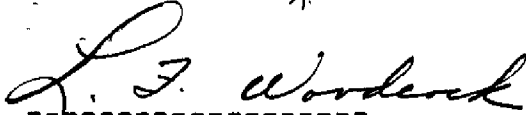


Chief, Photogrammetric
Branch

Reviewed by:



Cartographer



Chief, Division of
Photogrammetry

F-12674 -12698

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
Robert M. White, Administrator
COAST AND GEODETIC SURVEY
James C. Tison, Jr., Director

Survey of the Boundary Between Arizona and California

LANSING G. SIMMONS



TECHNICAL BULLETIN NO. 27

August 1965

UNITED STATES GOVERNMENT PRINTING OFFICE • WASHINGTON: 1965

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C., 20402 - Price 55 cents

Technical Bulletin Series

This series of Technical Bulletins was inaugurated to present primarily to the personnel of the Coast and Geodetic Survey and incidentally to others technical information related to the Bureau's scientific and technical activities. Since many of the bulletins deal with new practices and new techniques, the views expressed are those of the authors and do not necessarily represent final Bureau policy.

Technical Bulletin No. 27 describes the 1964 survey of the Colorado River Boundary between the States of Arizona and California. It also contains the geographic positions of all boundary points determined by this survey. The survey is unique in that geodetic and photogrammetric techniques have been combined in the demarcation of a State boundary. Inasmuch as the basic definition of most of this boundary is the middle of the channel of the river and since the middle of a river channel cannot be defined, let alone determined, with geodetic accuracy, it seems reasonable to assume that the photogrammetric determination of most river points is the optimum approach. The result is a boundary survey controlled basically by geodetic means and supplemented by a well-integrated aerotriangulation scheme for determining positions of the river points.

COAST AND GEODETIC SURVEY TECHNICAL BULLETINS

No. 6. The Tsunami of March 9, 1957, as Recorded at Tide Stations. Garrett G. Salsman, July 1959.....	Price 15¢
No. 7. Pantograph Adjustment. G. C. Tewinkel, July 1959.....	Price 5¢
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No. 21. Analytic Aerotriangulation. W. D. Harris, G. C. Tewinkel, and C. A. Whitten, July 1962, corrected July 1963	Price 30¢
No. 22. Tidal Current Surveys by Photogrammetric Methods. Morton Keller, October 1963	Price 20¢
No. 23. Aerotriangulation Strip Adjustment. M. Keller and G. C. Tewinkel, August 1964	Price 30¢
No. 24. Satellite Triangulation in the Coast and Geodetic Survey, February 1965	Price 20¢
No. 25. Aerotriangulation: Image Coordinate Refinement. M. Keller and G. C. Tewinkel, March 1965	Price 15¢
No. 26. Instrumented Telemetering Deep-Sea Buoys. H. W. Straub, J. M. Arthaber, A. L. Copeland, and D. T. Theodore, June 1965	Price 25¢

Coast and Geodetic Survey Technical Bulletins are available from the Superintendent of Documents, Government Printing Office, Washington, D.C., 20402.

Foreword

The 1964 survey of the Colorado River Boundary between the States of Arizona and California is unique, as far as the author is aware, in that it is the only survey of a State boundary which has combined geodetic and photogrammetric techniques. Inasmuch as the basic definition of most of this boundary is the middle of the channel of the river and since the middle of a river channel cannot be defined, let alone determined, with geodetic accuracy, it seems reasonable to assume that the photogrammetric determination of most river points is the optimum approach. The result is a boundary survey controlled basically by geodetic means and supplemented by a well-integrated aerotriangulation scheme for determining positions of the river points.

Acknowledgment is made of the services of several members of the Geodesy and Photogrammetry Divisions. Particular mention is made of Mr. Buford K. Meade, Chief of the Triangulation Branch, Geodesy Division and Mr. Bennett G. Jones, then Technical Assistant to the Chief of the Photogrammetry Division, and now under the Director's Office. Both of these men were consulted freely regarding technical aspects of the project.

Special mention is also made of Adm. L. O. Colbert, formerly Director of the Coast and Geodetic Survey. Under Public Law 1025, Chapter 1037, 84th Congress, Second Session, approved August 8, 1956, Admiral Colbert was appointed by the President as United States Representative to the Colorado River Boundary Commissions of Arizona and California. The effective date of this appointment was March 28, 1957. Admiral Colbert acted as consultant to the Boundary Commissions and liaison between the Commissions and the Coast and Geodetic Survey. It is largely through his efforts that the two Boundary Commissions agreed upon the methods finally adopted for the delineation of the Colorado River Boundary.

Survey of the Boundary Between Arizona and California

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HISTORICAL SKETCH

This Bulletin is concerned with the boundary between Arizona and California, which is delineated basically by the middle of the channel of the Colorado River.

Before the Mexican War, areas now included in the States of Arizona, California, and New Mexico, were a part of the Republic of Mexico. After the war and under the Treaty of Guadalupe Hidalgo of February 2, 1848, this area was ceded to the United States. In 1849, California was formed into a new State and its Constitution was adopted. Article XII of this Constitution defines that portion of the California boundary common to Arizona as follows:

"* * *; thence running in a straight line in a southeasterly direction to the river Colorado, at a point where it intersects the 35th degree of north latitude; thence down the middle of the channel of said river, to the boundary line between the United States and Mexico, as established by the treaty of May 30th, 1848; * * *"

There have been several treaties, statutes, and constitutional provisions relating to the boundary between Arizona and California. After the treaty of Guadalupe Hidalgo came the California Constitution approved in 1850; the Congressional Act creating the territory of New Mexico approved the same year; the Gadsden Purchase Treaty of 1853; and the Arizona Constitution which became effective in 1912. These several documents are not entirely consistent in regard to the Colorado River Boundary and have added to the uncertainty as to the true location.

Perhaps the greatest uncertainties arise from the meandering of Colorado River since the adoption of the California Constitution. When Arizona became a State in 1912, these uncertainties became an interstate concern and have introduced problems of governmental administration along the river boundary. Uncertainties have arisen as to which properties are to be included in county assessment and taxation, and as to the jurisdiction in administering the law in regard to detection and prosecution of criminal acts. Also involved are the administration of fish and game laws, health and sanitation ordi-

nances, and the apportionment of cost of roads, bridges, etc., between the counties and the states.

The character of the Colorado River channel, downstream from the 35th parallel, forming the common boundary between Arizona and California varies considerably (figs. 1, 2, and 3). The channel includes reservoirs, canyon sections, and stretches where meandering occurs. Those portions of the river between canyon walls, or where reservoirs now exist, create no problem as to the location of the interstate



FIG. 1.—Lake Havasu, looking northeast from Triangulation Station Power.



FIG. 2.—Lake Havasu and Parker Dam from Triangulation Station Power.

boundary line. The greatest difficulties arise where the river meanders. Such meandering of the river has caused many changes requiring channelization and other river control work in the Mohave Valley, Parker Valley, Palo Verde Valley, Cibola Valley, and Yuma Valley.

At these locations, the Colorado River channel may change again in the future due either to meandering or to additional channelization projects. It was agreed that no provisions should be made in any proposed legislation in regard to unknown future projects affecting the relocation of the channel.



FIG. 3.—Downstream from Parker Dam, housing area and Colorado River.

Because of the many administrative problems now existing due to the uncertainty of the river boundary and also because it was found that many portions of this boundary could not be defined in any practical way by retracement, it was decided to effect a solution under an agreement between the two states which would best serve the present and future needs.

FORMATION OF BOUNDARY COMMISSION AND ARRANGEMENTS FOR SURVEY

Accordingly, in 1953 each State provided legislation creating the Colorado River Boundary Commissions of Arizona and California. These two acts, Arizona Laws, 1953, Chapter 9, and Statutes of California, 1953, Chapter 1693, designated the state officials in each case, who were to form the boundary commissions and defined the duties thereof.

The two commissions met in the first joint session at Phoenix, Ariz., on September 10, 1953. A joint subcommittee was appointed, and instructed to examine all related information and to make recommendations regarding any surveying and mapping that might be needed, to prepare an estimate of costs of the required

professional services, and to suggest means of carrying out the purpose of the Joint Boundary Commission.

As a result, aerial photography of portions of the river was ordered and the necessary surveying and mapping contracted to the U.S. Geological Survey, to the extent that modern aerial photography and topographic maps for the entire length of the river boundary be made available. Engineering studies and historical and legal research were undertaken by the staffs of the two commissions and a total of nine joint sessions were conducted. Additionally, public hearings were held at Yuma, Ariz., and Blythe and Needles, Calif. These hearings were well attended and served the purpose of apprising the public of the plans for resurveying the boundary.

The results of the studies and research undertaken by the staffs of the two commissions formed the basis for the determination of the boundary agreed upon by the two commissions.

One plan consisted in determining geodetically certain relatively fixed portions of the channel such as those confined in canyon sections and those which are on structures across the river, such as bridges, dams, etc. It was suggested that in between these fixed points the boundary would be the present location of the middle of the channel of the river and would shift with the river.

The plan finally agreed upon, however, was that which fixes the entire length of the river boundary by the determination of geodetic positions of selected points and would be independent of any future meanderings of the river and of future artificial channelization. To avoid too many deviations from what tacitly has been considered by private property owners and public agencies as being the present boundary, this plan provides as far as practicable that the present course of the river, including artificial channels, be considered as the locus of the boundary line.

Early in 1957, Adm. L. O. Colbert, formerly Director of the Coast and Geodetic Survey, was appointed federal representative, Joint Boundary Commission, by the States of Arizona and California. The first contact with the Coast and Geodetic Survey in regard to a survey of the boundary was made in the latter part of March 1961 by Admiral Colbert and Mr. J. R. Teerink of the Colorado River Boundary Commission at the office of the Coast and Geodetic Survey. Originally, the plan was to fix 34 of the points along the boundary by geodetic surveys and supplement these with numerous points between by photogrammetric means. At the time of the visit of Admiral Colbert and Mr. Teerink, the plan had changed to the fixing of all boundary points by photogrammetric methods. However,

in July 1961 the thinking shifted back to the original plan of fixing 34 points by geodetic surveys.

RECONNAISSANCE SURVEY

Arrangements were soon underway, aimed toward the setting up of a cooperative project in which the States of Arizona and California and the Coast and Geodetic Survey would participate. It was agreed that a reasonable division of costs for the survey of this boundary would be a three-way equal distribution, that is, each organization would bear one-third of the total cost. Before firm estimates of the survey costs could be made, it was considered desirable that a reconnaissance survey be undertaken by the Coast and Geodetic Survey. On the assurance that the cost of this reconnaissance survey would be reimbursed by the States, instructions were issued to Mr. Garald C. Randall on September 21, 1961, to undertake this phase of the work. Accordingly, instructions were written Mr. Randall, the details of which follow:

INSTRUCTIONS

1. *General.*—The Coast and Geodetic Survey is cooperating with the States of Arizona and California to determine the position of certain fixed points along the Colorado River where the river forms the boundary between the states. The total project for the location of this boundary will include both geodetic and photogrammetric surveys. No later than October 15, 1961, you will discontinue work on your present assignment at Ellsworth AFB, South Dakota, and proceed to Los Angeles, California, where you will contact Mr. A. L. Hertz of the Colorado River Boundary Commission and discuss the geodetic surveys involved. You will transfer Mr. J. Dee Alford to Party 633 before proceeding to this project. After meeting with Mr. Hertz, you will advise this Office of the details involving the location of the fixed points by geodetic methods and proceed to the boundary area where you will undertake the reconnaissance survey necessary for the location of these points. Copies of pertinent correspondence are forwarded herewith.

2. *Description.*—The project calls for location of certain predetermined fixed points of the California-Arizona boundary by geodetic methods. You will plan the required control using existing stations of the national network and the most economical methods that will give the accuracy required. Single triangles and Tellurometer traverses should be utilized for most of the survey. The national network stations nearest the required points should be used; however,

work should be planned so that a minimum of old stations will be occupied.

3. *Specifications.*—Triangulation will conform to specifications for Second-Order, Class II Triangulation. Traverse will conform to specifications for Second-Order Traverse.

4. *Liason.*—Your contact is Mr. A. L. Hertz, Colorado River Boundary Commission, State of California, 302 State Building, Los Angeles 12, Calif.

Mr. Randall began travel from his work in South Dakota on October 16, 1961, and completed the reconnaissance project on February 21, 1962. The details, contained in the project report, follow:

REPORT

1. *Authority, Scope and Dates.*—Authority for this reconnaissance is contained in the Director's Instructions, dated September 21, 1961, Reconnaissance for a Survey along the Colorado River Boundary between Arizona and California, Project 40110 Job No. G-122R and Project 40000-980.

Work consists of recovery of existing control stations of the national network and planning of Second-Order, Class II Triangulation and Traverse for the determination of geodetic positioning for 33 boundary points along the Colorado River between the two States.

Travel and work activity on the project began October 16, 1961, and was completed by February 21, 1962.

2. *Chronology and Field Work.*—Party headquarters were established at Blythe, Calif., on October 24, 1961. After contacting Mr. A. L. Hertz, Consulting Engineer for Colorado River Boundary Commission, at Los Angeles, Calif., the field work activities were started in the northern limits of the assigned project and carried southward to completion.

By the end of November 1961, work was completed for the first 12 points, at which time the sketch was prepared and forwarded for approval just prior to beginning annual leave on December 1.

Work was resumed on January 8, 1962, at which date Mr. J. Dee Alford was assigned as assistant for the remainder of the project.

Work was completed in the vicinity of Blythe and party headquarters were moved to Yuma, Ariz., on January 23. Work was undertaken for *Points Nos. 15* through 33, which extend from a point approximately 1.5 miles north of Imperial Dam to the Mexico International Boundary. All field work in the Yuma area was completed by February 21. The sketch for this portion was prepared and forwarded to Washington for approval.

3. *Information and Remarks.*—A four-wheel drive Jeep was obtained on loan from the U.S. Army, Yuma Test Station, for travel into remote desert sand terrain in the Yuma area.

Point No. 21, described by Colorado River Boundary Commission as the northwest corner of Section 8, Township 8 South, Range 22 West, Gila and Salt River Meridian, does not exist by the original survey of the General Land Office in this area. The variation of section corners and section lines is created at this location by the change from the Gila and Salt River Meridian to the San Bernardino Meridian. This situation is also the case at *Point No. 22*, described as the quarter corner of Section 8.

Point No. 27, described by Colorado River Boundary Commission as 330 feet due east from the south sixteenth corner of the east line of Section 25, Township 16 South, Range 22 East, San Bernardino Meridian, must be determined after the sixteenth corner is defined. No mark exists at the described corner.

Point No. 28, described by Colorado River Boundary Commission as the northeast corner of the Fort Yuma Indian School reservation is not monumented by any existing mark or feature.

Point No. 25, described by Colorado River Boundary Commission as the southwest corner of Section 12, Township 8 South, Range 23 West, Gila and Salt River Meridian, was not recovered by the reconnaissance party; however, the section corner mark may exist and be buried several feet below the surface.

All the above listed section marks and the Fort Yuma Indian School reservation boundary should be established with certainty by the Bureau of Land Management before the Points can be established at the described positions as outlined by the Colorado River Boundary Commission, reference: file W.O. 1528.69.

Approximately 1/2 mile of tape traverse over rough broken terrain is necessary between *Point No. 27* and *Point No. 31*. Due to the ground conditions, the most suitable tape for measurements will be the standardized 200-foot steel tape. A steel tower erected at *Point No. 29* is recommended to permit measurement into *Point No. 30*.

A total of 7 stations require steel towers; 12 stations require wooden towers ranging in height from 8 to 25 feet.

TRIANGULATION SURVEYS

INSTRUCTIONS

Those parts of the instructions for the triangulation surveys, which deal with the technical aspects, dated December 10, 1963, and issued to Mr. L. Gilbert Burdine of the Coast and Geodetic Survey follow:

1. *General.*—As soon as is practicable, you will bring your work on Project 41024 in the vicinity of Ontario, Calif., to an orderly close and transfer your party to the vicinity of the Nevada, Arizona, and California boundaries where you will make a survey in accordance with these instructions. The purpose of the survey is to determine the positions of certain fixed points along the Colorado River where the river forms the boundary between Arizona and California. The total project for the location of the boundary will include both geodetic and photogrammetric surveys. A photogrammetrist from the Photogrammetry Division will be assigned to your party to select subpoints and identify them on aerial photographs. Supplemental instructions for this phase of the work will be forwarded separately. The reconnaissance for this project was made by Mr. G. C. Randall, Chief of Party 611 in the fall of 1961. Project sketches and descriptions of stations will be furnished you under separate cover. Single triangles and Tellurometer traverse should be utilized to the extent practicable. The national network stations nearest the required points should be used; however, the survey should be executed so that a minimum number of old stations will be occupied. You will determine the positions of all specified points if practicable. Some of the special techniques that will be necessary are indicated in Paragraph 2—Description Differences—below. Ties will be made to existing stations of other organizations such as U.S. Geological Survey, Corps of Engineers, etc.

2. *Description Differences.*—After the reconnaissance was accomplished by Mr. Randall, the descriptions of some of the so-called fixed points were revised to some extent. The official descriptions of *Points Nos. 1* through *34* are those appearing in the pamphlet "Interstate Compact Defining the Boundary Between the States of Arizona and California," copies of which will be furnished you. *Point No. 32* in the Compact does not appear in Mr. Randall's reconnaissance. *Point No. 33* in the Compact is *Point No. 32* in the reconnaissance. *Point No. 34* in the Compact is *Point No. 33* in the reconnaissance. The descriptions of *Points Nos. 15, 19, 21, 22, 28, 29, 30, and 31* as they appear in the Compact differ from those in the reconnaissance, although some may be actually near the same point. *Points Nos. 21 and 22*, as described in the Compact, appear to be 1/2 mile east from those described in the reconnaissance. The descriptions in the Compact shall govern in all cases.

3. *Additional Reconnaissance.*—You should contact Mr. Wayne Forrest, Chief Engineer, Bureau of Land Management, Phoenix, Ariz., regarding *Points Nos. 20* through *31*. Most of these points are referred to section or township

corners, some of which may be lost or have been replaced by a recent survey of the Bureau of Land Management. If any of these points have been lost and have not been replaced, then the triangulation station called for in the reconnaissance should be physically close to the proposed section corner when it is established. In these cases it will be necessary to make a connection at a later date.

You shall plan the necessary reconnaissance required to establish eight additional triangulation stations needed by the Photogrammetry Division to control aerotriangulation. Approximate positions of these eight stations have been indicated on copies of Army Map Service (AMS) 1:250,000 scale maps. Select the most practicable site within the limits of each individual area as marked on contact prints of aerial photographs. Copies of the AMS maps and a set of contact prints will be furnished by the Photogrammetry Division. Mr. William M. Reynolds of that Division will photoidentify horizontal control required for aerotriangulation. Consult him as necessary to obtain his advice on the most advantageous site for each station.

4. *Special Requirements.*—*Point No. 1* must be established by actual surveys from Boundary Posts Nos. 141 and 142 of the California-Nevada oblique boundary. A careful recovery should be made of both of these boundary monuments which should include check measurements and angles to the reference marks and a check Tellurometer distance between the monuments. A reconnaissance should be made providing for a Tellurometer traverse survey extending southeasterly from *Boundary Monument 142* in an azimuth 180° from *Boundary Monument 141* ($314^\circ 27' 27''.6$). This traverse should be run in as straight a line as possible until it intersects the centerline of the channel of the Colorado River, as constructed by the Bureau of Reclamation. The geographic positions of the points where this line crosses each side of the channel shall be determined so that the intersection with the center can be computed. This traverse should be connected to triangulation station *Soto*. If for some reason this traverse cannot be run as a straight line along the designated azimuth, it will be necessary to determine where such a line crosses the channel by computation from a random traverse line. Also, any points along this traverse, including *Boundary Monument 142*, should be connected directly to *Soto* by distance and direction when possible.

There are about 11 points which are described as being at the center of some structure, such as a bridge or a dam across the Colorado River. The reconnaissance should be followed as closely as possible. In most cases the triangulation station is not at the center of the structure and

a short traverse will be necessary to connect the center of the structure to the triangulation station. In all cases some sort of mark should be established at the center of the structure. Preferably this should be a triangulation disk set in concrete, if possible, and stamped "*Point No.* ." If the mark must be made on a steel member of the structure, this can be done by punched marks set in some pattern such as three marks forming an equilateral triangle about 1 or 2 inches on the side and a larger mark indicating the center of the triangle. The center of the structure should be determined by actual taping, although a high degree of accuracy is not required. The use of a 300-foot tape for this purpose is permissible. Your records should indicate clearly what was done and the kind of a check employed. When the triangulation station and the center point of the structure are identical, which appears to be the case of *Point No. 12*, the station name shall be "*Point No.* ." Those points which are defined as being in the center of the river, with the exception of *Point No. 1*, will be determined by a photogrammetric process. Your responsibility in regard to these points is merely to occupy the triangulation station nearby called for in the reconnaissance. *Point No. 11A* in the reconnaissance should be omitted, since it does not appear in the Compact.

Point No. 17 which is near station *Mittry* in the reconnaissance might involve an unusual situation. It is understood that this point has been pricked on a photograph at a point acceptable to both States. However, to assure proper location of *Point No. 17* in case the photographic point is not accepted, it will be necessary to determine the azimuths of the longitudinal axes of the Imperial Dam and the Laguna Dam at *Points Nos. 16* and *18*. With these azimuths and the geographic positions of *Points Nos. 16* and *18* known, the position of *Point No. 17* can be computed and determined by offset from station *Mittry*.

Point No. 34 (*No. 33* in the reconnaissance) is the intersection of the centerline of the Colorado River and the International Boundary between California and Mexico. Near this point is triangulation station "BLM Sections 35 and 22" (Sections 15 and 22 on the reconnaissance sketch). *Boundary Monument No. 206* is near this triangulation station and visible from it. It should be connected directly to the triangulation station, probably by a direction and Tellurometer distance. It will also be necessary to photoidentify this boundary monument, or the triangulation station, or some point in the immediate vicinity. In any case, the geographic position of any point that is photoidentified must be determined.

Some sort of check measurement shall be

made to all points determined by a spur traverse which might consist of a single line. This can be done by another set of measurements taken from a point offset from the triangulation station. Sufficient computations must be made to determine the validity of the check.

If either or both *Boundary Monuments 141 and 142*, to be used in determining *Point No. 1*, cannot be recovered, or any other problems arise, feel free to contact this office for advice.

5. *Specifications*.—The horizontal-control stations will conform to specifications for Second-Order, Class II Triangulation or Second-Order Traverse.

6. *Liaison*.—Your contact is Mr. A. L. Hertz, Colorado River Boundary Commission, State of California, 302 State Building, Los Angeles 12, Calif.

7. *Vertical Angles*.—You will observe reciprocal vertical angles on all lines on this project. You will also observe the necessary ties to bench marks.

SURVEY REPORT

1. *Authority*.—Instructions dated December 11, 1963, signed James C. Tison, Jr., for H. Arnold Karo, Director.

2. *Dates*.—Work on the project was initiated January 10, 1964, and continued through March 17, 1964. The processing of field records and computations was completed and mailed April 2, 1964.

3. *Purpose and Scope*.—The purpose of this survey was to fix, by reference to existing triangulation stations in the national network, the location of the boundary line between California and Arizona on the Colorado River from the point where the oblique boundary between California and Nevada intersects the 35th degree of north latitude, said point being common to the boundaries of the States of Arizona, California, and Nevada, to a point on the International Boundary which is common to the boundaries of California-Arizona and the United Mexican States which are in accordance with 34 described points on the boundary as selected by Authorities of the States of Arizona, California—Colorado River Boundary Commission.

4. *Location*.—The area is within the latitudes of 32° 40' and 35° 05'; longitudes 114° 05' and 114° 45'.

The area includes Needles, Blythe, and Winterhaven, Calif., and Topock, Parker, and Yuma, Ariz.

Connections were made to existing control stations on both the California and Arizona sides of the boundary.

5. *Party Organization*.—Total personnel including the chief of party numbered 21 of which two were photogrammetrists. Employees of sufficient experience were available to permit the use of

multiple observing parties when this was desirable for efficient operation.

6. *Weather Conditions*.—Climate and weather conditions were ideal during the entire period except for one day when the wind caused the partial loss of one building schedule where steel towers were being erected.

7. *Transportation*.—Transportation for this project consisted entirely of Coast and Geodetic Survey trucks, the majority of which were transferred along with personnel from Field Party 604. The original vehicles on the party were, for the most part, old and with many miles. Seven of these trucks were sold to the highest bidder at the completion of the job.

The terrain was such that 4-wheel drive vehicles were necessary to reach many of the stations and several packs ranging up to two and one-half hours were necessary to connect to old stations. The majority of these packs were involved in the location of the eight additional stations required for photogrammetric control.

The drives to the extreme north and south ends of the project were long because the entire project was worked from the Blythe area. The drives could have been shortened by establishing a base of operations at Needles, Blythe, and Yuma, however, this was deemed impractical due to the small amount of work accessible to the individual locations.

8. *Equipment*.—Equipment included 22 trucks, ranging from one half-ton to one and one half-ton capacity. Many of these were old and seven were sold after completion of the project. All types of geodetic instruments were available to the party including several first-order theodolites and vertical collimators, base-measuring equipment, and electronic distance-measuring devices.

9. *Method, Procedures, and Field Work*.—Standard methods and procedures as outlined in Coast and Geodetic Survey Special Publication No. 247, *Manual of Geodetic Triangulation*, were used throughout the project.

There were a number of unusual situations encountered that required special techniques to fulfill the special requirements set forth in the instructions (fig. 6).

There were a few changes from the reconnaissance. These changes were due, largely, to the change in the descriptions of some of the fixed points after the reconnaissance was completed by Mr. Randall and Mr. Alford.

Many of the fixed points, marked by the U.S. Bureau of Land Management, where corners were involved, were occupied directly after the pipe marks established by them had been reinforced with concrete and referenced with two good reference marks. In these cases many of the named stations called for by the reconnaissance were eliminated.

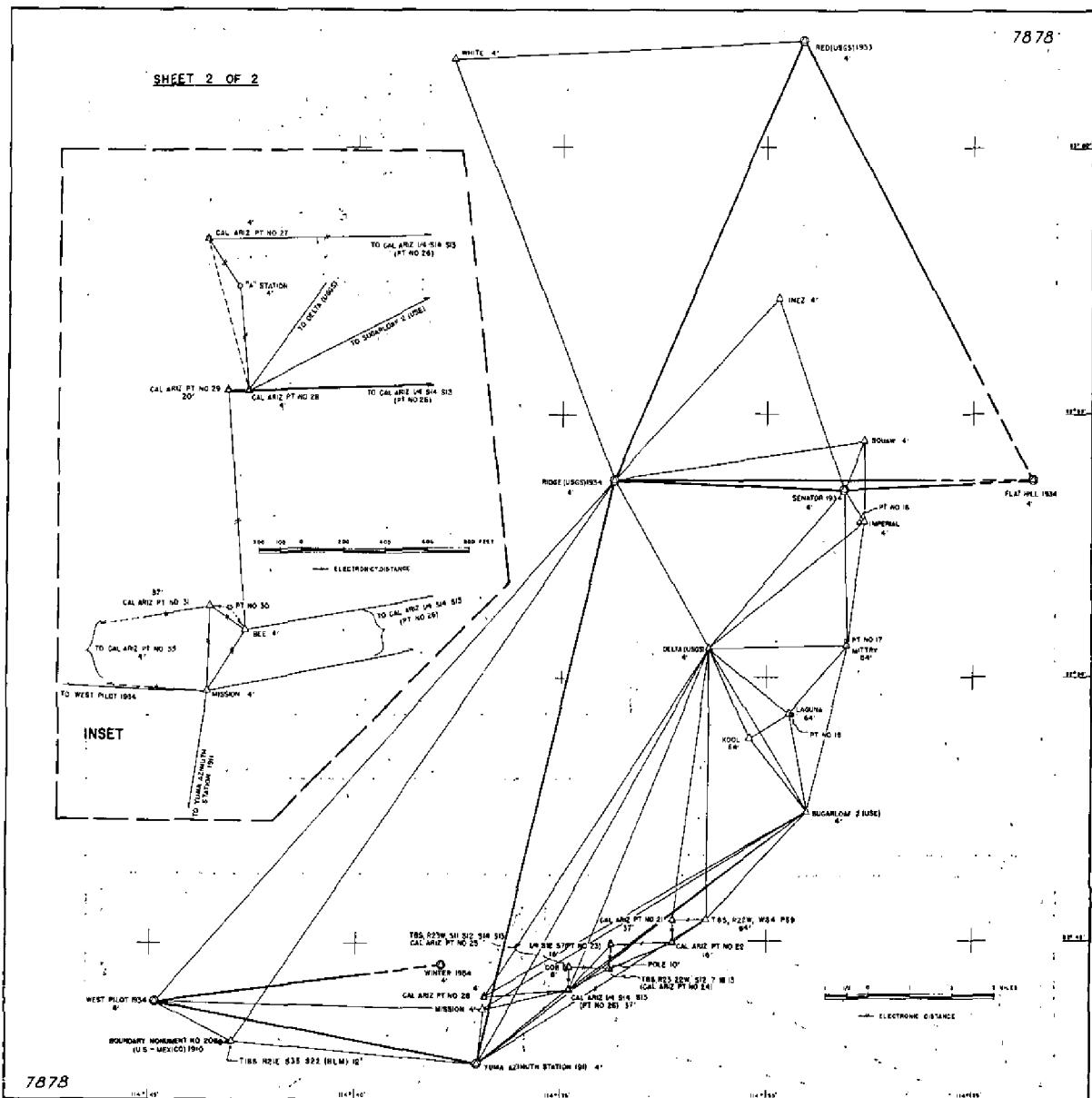


FIGURE 5.

In selecting sites for the eight additional stations required for photo control, several additional old stations most of which were packs had to be recovered and occupied. In fact, only seven additional stations were added, since a suitable location for an eighth station could not be found. This was called to the attention of the proper authorities, who authorized the elimination of that station.

Point No. 1, the intersection of the boundary line common to California and Nevada and the centerline of the channel of the Colorado River as constructed by the U.S. Bureau of Reclamation--this point being common to the boundaries of Arizona, California, and Nevada where the 35th degree of north latitude intersects the centerline

of the channel--was established by actual surveys from *Boundary Posts Nos. 141 and 142* of the California-Nevada oblique boundary.

A careful recovery was made of both monuments; this recovery included check measurements and angles to the reference marks and a check Electrotape distance between the monuments. An Electrotape traverse was made extending southeasterly from *Boundary Monument 142*, in an azimuth of 180 degrees from *Boundary Monument 141*, to triangulation station *Point 1A* situated on the west levee of the river approximately 100 feet back from the west bank of the channel--thence diagonally across the river, on the same azimuth, to triangulation station *Point 1B*

situated approximately 100 feet east of the east bank of the channel and at a point approximately 15 feet southwest of control station *Soto*. Temporary points were lined in, on the same azimuth, between *Point 1A* and *Point 1B* on both sides of the river at the edge of the rock fill which determines the limits of the channel as constructed by the U.S. Bureau of Reclamation. The distances from *Points 1A* and *1B* to these points were used in determining the center of the channel (*Point No. 1*) for which a position was computed.

Large discrepancies in the check angles at *Breeze 1934* and *Ariz 97 1961* involving *Site 5 1948* were noted and investigated. During this time, *Site 5 1948* was occupied to determine if there had been any local displacement relative to the station and reference marks. Also, since it was convenient and would constitute little or no additional expense, the angle *Ariz 97 1961* to *Breeze 1934* was measured and all data forwarded to the office for evaluation. The evaluation indicated the trouble was at *Ariz 97 1961* and that either the station, reference marks, and the area in general had moved approximately 4 inches northward, or that the station had been occupied and all lights had been shown from a point approximately 4 inches south of the present point.

There was some question in regard to the proper location of *Point No. 12*. In the reconnaissance it was given as at the center of the overflow section of the Palo Verde Diversion Dam; Mr. A. L. Hertz, Consulting Engineer with the Colorado River Boundary Commission, assured the reconnaissance party that the point was to be in the center of the concrete spillway of the diversion dam, while Mr. John Blakemore, District Engineer for the Palo Verde Irrigation District, was of the opinion that the boundary should fall at the center of the rock and earth-fill dam which is approximately 150 meters north-northeast from the diversion dam. In the Interstate Compact it was given as at the center of the earth-fill section of the Palo Verde Diversion Dam; both points were monumented and positioned and the point at the center of the earth-fill section was designated *Point No. 12A*.

Mr. Peter R. Kiernan, Chief Engineer Imperial Irrigation District, All-American Canal Section River Division, and his assistant Mr. William D. Sears were contacted in regard to any existing data or positioned points relative to the azimuth of the longitudinal axis at both Imperial and Laguna Dams. Little pertinent information was obtained but existing publications indicate that the length of the Imperial Dam is 3,485 feet; this includes a 490-foot dike (approximate) at the Arizona end. The length of the spillway section is 1,197.5 feet and the height ranges from 31 feet at the bottom of the base slab to 181.0 feet at the crest. The overflow section is a hollow shell—known as a



FIGURE 6.—Observation tent at Triangulation Station Power. Lake Havasu in the background.

floating weir—and is subject to some movement depending on water level etc.; however, there was no indication of movement during observations. The movement is not considered a floating, bouncing movement in general terms, but perhaps some movement could be expected in changing from a high-water level to a low-water level, or vice versa.

During the observations for establishing *Point No. 16* and the longitudinal axis of Imperial Dam, it was possible, through the cooperation of the Chief Engineer, to get the water level lowered to a point where there was no overflow and the rounded top surface of the weir remained dry. Although there were no monumented points to mark the longitudinal axis of the weir, there was a bolt or stud located about 2 feet in from either end of the weir and common to, if not on, the crest of the weir. These bolt heads were center punched and used in determining *Point No. 16* and the longitudinal axis from triangulation station *Imperial* located to the east on a portion of the non-overflow section of the dam.

Bolt A, located on the west end of the weir, was occupied with a Wild T-3 theodolite, and a 300-foot tape was used to establish *Point No. 16* in line between Bolt A and Bolt B and equidistant from both ends of the weir. The angles were measured from station *Imperial* to *Point No. 16* to Bolt B. *Point No. 16* was occupied and angle Bolt A—*Imperial* was measured. The sides *Imperial*—Bolt A and *Imperial*—*Point No. 16* were measured with an Electrotape, the side Bolt A to *Point No. 16* was measured with a steel tape. Station *Imperial* was occupied measuring the angles *Point No. 16*, Bolt A, *Senator 1934*, and *Squaw*, the latter two being held to insure an azimuth without error. All angles and all sides were measured. The U.S. Bureau of Reclamation furnished a boat and operator during this operation.

The overflow section of the Laguna Dam is approximately 4,880 feet long. It is a fixed concrete slab approximately 66 feet wide from the crest to the downstream edge with a 12-to-1 slope. The establishment of a longitudinal axis of this dam required considerable time and effort as no one was in position to identify the ends of the weir, and since the ends were covered with dirt and gravel, yards of this had to be moved, by hand, in order to determine where the concrete slab joined bed-rock. Water was flowing over large portions of the section, which caused a layer of slick moss to form; also a heavy, tough, jointed-type reed was growing from cracks in the slab; the moss and reeds had to be cleared before observations could be made. The U.S. Bureau of Reclamation was very cooperative during this operation even to the extent of furnishing a bulldozer and operator in an attempt to help clear the reeds.

When the ends of the weir were found, bolts were established several feet back from either end and designated Bolt A and Bolt B on the west and east ends, respectively. Triangulation station *Laguna* was located near the center of the weir.

The bolts were center punched and Bolt B was occupied and two points were marked on line between the bolts near the center of the weir. Bolt B and Bolt A were then occupied with Electrotapes and the distance measured. The Electrotape was then moved from Bolt A to station *Laguna* and the distance Bolt B—*Laguna* was measured. By simple computation, a temporary position for *Point No. 18* was established. The Electrotape was moved from station *Laguna* to the temporary point and after some checking *Point No. 18* was permanently monumented and the distance to Bolt B was measured. The side *Laguna—Point No. 18* was measured with a steel tape.

Bolt B was occupied and angles Bolt A, *Point No. 18*, and *Laguna* were measured. *Point No. 18* was occupied and the angle *Laguna—Bolt B* was measured. *Laguna* was occupied and angles Bolt B, *Point No. 18*, *Delta (USGS)* and *Sugarloaf 2 (USE)* were measured. The latter two stations were held to insure a proper azimuth. This operation provided, as on Imperial Dam, the measurement of all angles and all sides.

The establishment of the longitudinal azimuths for both the Imperial Dam overflow section and the Laguna Dam overflow section was required to determine *Point No. 17*, which was defined as the intersection of the normals to the longitudinal axes of the two dams, through *Points Nos. 16* and *18*. The intersection of these normals fell approximately 42 meters north of control station *Mittry*.

Points Nos. 27, 28, 29, 30, 31, and 33 were, for the most part, changed by the Interstate Compact from that of the reconnaissance and caused additional reconnaissance, higher signals, broken traverse, and other minor problems.

Point No. 27 was located by azimuth and Electrotape distance from the well-established *Point No. 26*. A broken Electrotape traverse was necessary to determine distance and direction to *Point No. 28*, with an inverse computation to verify same.

Point No. 28 was well located by triangulation as well as being in the traverse.

Point No. 29 was at the base of a 14-foot masonry wall across the road from *Point No. 28*. A 20-foot signal of a Rube Goldberg nature was required, as it had to be tied to the wall with only two legs extending to the ground level. This signal was necessary also to see a new, additional station (*Bee*) to the south, as the Indian School and Hospital obstructed the line to *Point No. 30* which was on the edge of a wood-constructed overpass and could not be occupied.

A *Point No. 30* reference mark was established by the U.S. Bureau of Land Management and occupied with direction and distance measured to *Point No. 30* which was marked by a heavy spike. It was properly positioned with the necessary checks for verification of azimuth and distance.

Point No. 31 was in a low spot and required a 37-foot steel tower to clear the lines.

Point No. 33 was located by intersection from station *Mission* and *Point No. 31* with all sides measured.

The entire area from *Point No. 27* to *Point No. 31* was revised and modified from the original reconnaissance. Most of the necessary changes were cleared with the computing section in Washington.

BOUNDARY POINTS DETERMINED GEODETICALLY

As called for in the pamphlet *Interstate Compact Defining the Boundary Between the States of Arizona and California*, 34 of the boundary points were determined essentially by geodetic methods. Of these 34 points, 12 are on existing structures over the river and 9 are described as the center of the river at some definite intersection or at some specified distance along the river. The remaining 13 are on land, off the course of the present river, and with one exception, were marked by either the U.S. Bureau of Land Management or by its predecessor, the General Land Office. *Point No. 17* was not marked as explained later.

The nine points defined as being at the center of the river were naturally not monumented, but identified on aerial photographs. However, in each case, a geodetic control station was established on one of the banks of the river near the boundary point and the position of the boundary point was determined photogrammetrically in relation to the nearby control station.

Of these 34 geodetically determined points 4 present unusual features which perhaps require some explanation and word of caution.

Boundary Point No. 1

Point No. 1 of the boundary between Arizona and California has special significance since it also involves the State of Nevada. It seems appropriate, therefore, to give some detail regarding the historical determination of this point.

The Interstate Compact Defining the Boundary Between the States of Arizona and California, defines *Point No. 1* as the intersection of the boundary line common to California and Nevada and the center line of the channel of the Colorado River as constructed by the U.S. Bureau of Reclamation, said point being common to the boundaries of Arizona, California, and Nevada, where the 35 degree of north latitude intersects the center line of said channel. First it should be made clear that the "35 degree of north latitude" refers to the astronomic parallel, not the geodetic. The authority for this statement appears in the Report of the Superintendent of the U.S. Coast and Geodetic Survey for 1900, Appendix No. 3, page 287. The Superintendent, in a letter to Prof. George Davidson, Assistant, Coast and Geodetic Survey, dated April 17, 1893, makes the following statement, "This boundary, as defined by Act of Congress, is a straight line joining two points. One of these points is astronomically defined, the other only partially so, it being dependent for its longitude on the location of the Colorado River." This reference is to the oblique boundary line between California and Nevada, the southeastern terminus of which is Point No. 1. It was necessary at that time to define the 35th parallel as astronomic, since there was no geodetic connection in that area to the triangulation existing in the United States at that time. The subsequent geodetic determination of this point on the North American Datum of 1927 indicates that the 35th astronomic parallel is approximately 650 feet north of the 35th geodetic parallel.

Actually, no astronomic latitude was observed at this point. The astronomic data available at the time of the 1893-99 survey of the oblique boundary included a latitude at Von Schmidt's 35° latitude post near the Colorado River (35° 00' 15".02), and another latitude about 10 nautical miles to the south at Needles (34° 50' 17".90). The difference between these astronomic latitudes is 0° 09' 57".12. The geodetic difference between these two points determined by triangulation at that time was 0° 10' 06".31. Thus, a change of 9".19 in the deflection of the vertical in the meridian, between the two points, was brought to light. Assuming that this change in the meridional deflection was uniform between Von Schmidt's 35° latitude post and

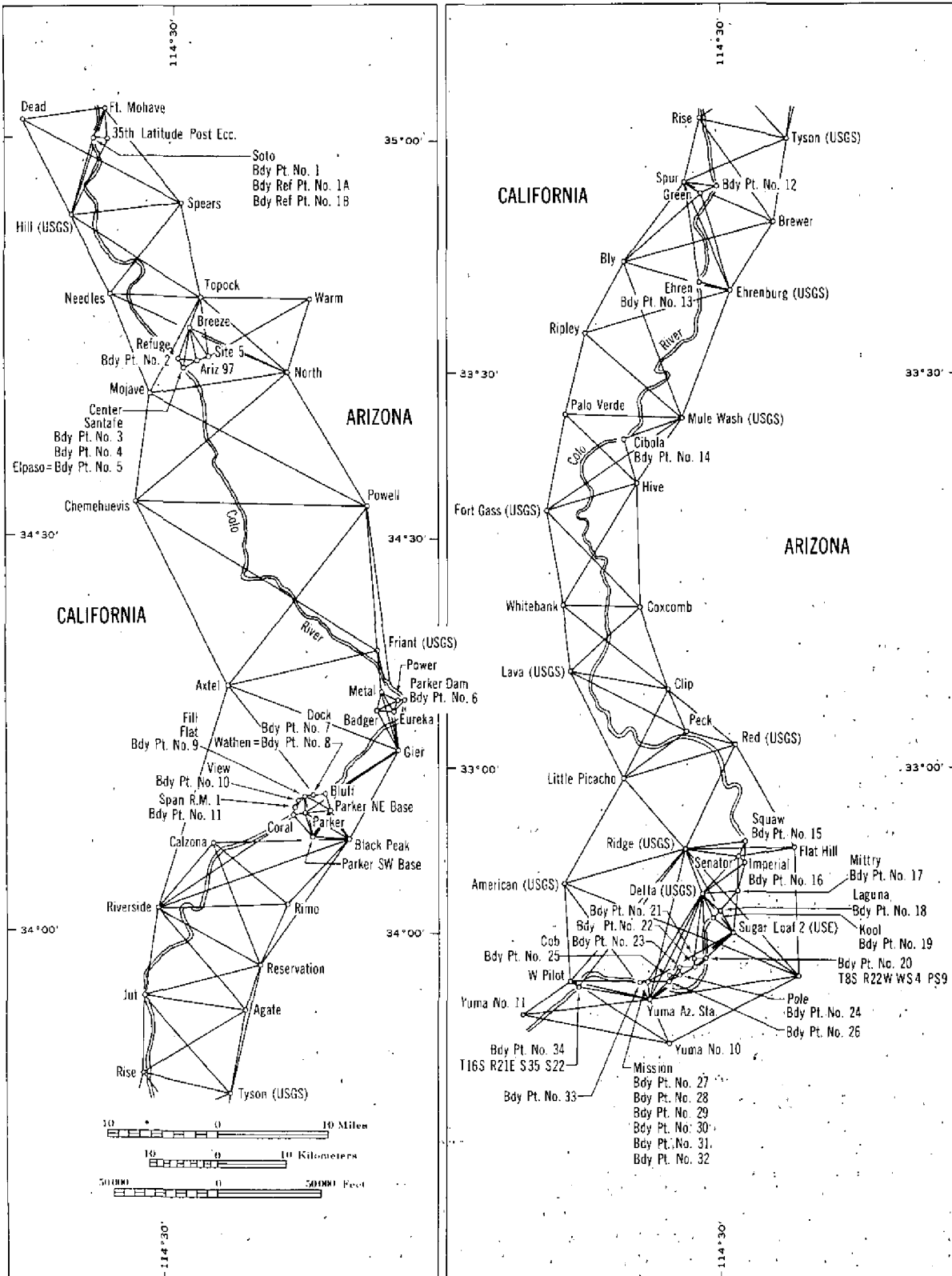
Needles (the only assumption we can make), we find that the rate is 0".92 per minute of latitude or per nautical mile. Now since the geodetic difference in latitude between these points exceeds the astronomic difference and since the 35th parallel is one-fourth nautical mile south of Von Schmidt's post, we can infer that the geodetic difference in latitude between Von Schmidt's post and the 35th astronomic parallel is 15'.02 + 0'.23 or 15'.25, which is 470 meters. This information, then, permitted the determination of the 35th astronomic parallel.

The longitude of *Point No. 1* was defined physically as the midchannel of the Colorado River where it intersects the 35th astronomic parallel. Owing to the meanderings of the river, this point constantly changes. The point selected, however, was that midway between the more stable bluffs on each side as they existed at the time of the 1893-99 survey.

When field instructions were issued for the recent survey of the Arizona-California boundary, no information was available to the effect that the U.S. Bureau of Reclamation, in constructing the Colorado River channel, planned for *Point No. 1* to fall in its center. At that time, the feeling was that a new position of *Point No. 1* must be determined which would depend on some unknown vagaries of engineering requirements in constructing a new channel. Accordingly, the field instructions called for an actual extension of the oblique boundary between California and Nevada to where it intersects with the center of the newly constructed channel. This was in conformance with the definition of *Point No. 1* in the Arizona-California Compact. In other words, the reference to the 35th degree parallel in the definition of this point was ignored since there was no assurance that the oblique boundary, the river channel, and the 35th parallel would meet at a single point and there can be but one point common to all three States.

Later it was learned that the channel was constructed to center on the point common to the three States and the recent survey bore this out. However, because of inevitable small errors in the channel construction and in extending the oblique boundary and also because of the acuteness of the angle with which the oblique boundary crosses the channel, the determination by the 1964 survey failed to check the original point exactly, but fell about 18 feet south and 3 feet east of it. All things considered, this constitutes a substantial check.

With no information contrary to the fact that the 1893-99 determination of *Point No. 1* had been agreed upon by all three States, there seemed to be no good reason why this determination should not still be valid. Thus, the Coast and Geodetic Survey has recommended that the 1893-99 determination of *Point No. 1* be accepted as official.



SURVEY OF THE ARIZONA-CALIFORNIA BOUNDARY.

FIGURE 7.

The geodetic position of *Point No. 1*, on the North American Datum of 1927, is latitude $35^{\circ} 00' 06''$.435; longitude $114^{\circ} 37' 55''$.668.

Boundary Point No. 12

There was some question in regard to the definition of *Point No. 12*. During the reconnaissance survey by Mr. Randall, it was assumed to be at the center of the overflow section of the Palo Verde Diversion Dam. However, there was another opinion that this boundary point should be at the center of the earth-fill section of this dam. Actually both points were monumented and their positions determined. The monument at the center of the earth-fill section was stamped *Point No. 12A* and the one at the center of the overflow section was stamped *Point No. 12*. Inasmuch as the Interstate Compact defines the point as the center of the earth-fill section, the result is that boundary *Point No. 12* actually was marked by a tablet stamped *Point No. 12A*. Boundary reference *Point No. 12* is 146.794 meters (481.61 feet) distant from boundary *Point No. 12* (stamped *Point No. 12A*) in geodetic azimuth $35^{\circ} 59' 32''$.

Boundary Point No. 17

Point No. 17 is defined as the intersection of the normal to the longitudinal axis of the Imperial Dam from *Point No. 16* with the normal to the longitudinal axis of the Laguna Dam from *Point No. 18*. Triangulation station *Mittry* was set near this intersection and its position determined by the survey. The geodetic position of boundary *Point No. 17* was computed from the data available and it was found to be 42.682 meters (140.03 feet) in geodetic azimuth $182^{\circ} 41' 54''$.1 (from the south from triangulation station *Mittry*. *This boundary point was not marked by the Coast and Geodetic Survey.*

Boundary Point No. 34

In the Interstate Compact, *Point No. 34* is defined as the intersection of the center line of the Colorado River and the International Boundary Line between California and the United Mexican States. The question arises as to what constitutes the center line of the river since it changes by small amounts from day to day and, of course, by larger amounts over a long period.

A letter in this regard was written the International Boundary and Water Commission, United States and Mexico, at El Paso, Tex. The reply, dated January 7, 1965, indicates that the International Boundary changes with the channel. This leaves in doubt the validity of defining such a point by geodetic means. The position determined by the 1964 survey is the center line of the river as it appeared on an aerial photograph taken July 23,

1962. Any future deposition of this problem is, of course, out of the hands of the Coast and Geodetic Survey.

STATISTICS ON ADJUSTMENT AND ACCURACY OF GEODETIC SURVEYS

The geodetic scheme for the 1964 boundary survey consisted mainly of triangulation. This was supplemented by some traverse surveys and connections to the triangulation in which the distances were measured by the Electrotape, an electronic microwave device. A total of 85 stations were established in the scheme in which 269 directions were observed and 46 distances were measured. Of the 85 stations, 34 were the geodetic points as defined in the Interstate Compact. Controlling this new geodetic scheme were 30 first- and second-order stations previously established by the Bureau. The 1964 geodetic survey was accomplished under the field specifications for Second-Order, Class II work.

A simultaneous least-squares adjustment was made using a total of 310 observation equations (269 direction and 41 length). The result of this adjustment indicates that all points were established well within the specified accuracy. Actually, Second-Order, Class I accuracy was achieved. The relative weight of the direction observations to the length observations was, in general, 1 to 0.36. There were a few instances where the length observations were given less weight due to the short length of the measured line. Statistics from the observations and the adjustment reflect the accuracy obtained. These are:

Average triangle closure, 1"18.

Maximum triangle closure, 3"79.

Average correction to an observed direction, 0"86.

Maximum correction to an observed direction, 4"48.

Average correction to a distance measurement, 1:160,000.

Maximum correction to a distance measurement, 1:39,000.

BOUNDARY POINTS DETERMINED PHOTOGRAMMETRICALLY

By far the larger number of boundary points were positioned photogrammetrically. These 215 points were selected and agreed upon by the two Boundary Commissions. These selections were made on ratio prints of the aerial photography at an approximate scale of 1:16,000, and were indicated by fine needle pricks on the photographs. All of these points are in the water with exception of a few that happen to fall on mud

flats or small islands in the river. It was not possible for the Boundary Commission representatives to prick these points closer than 15 or 20 feet of the exact center of the river due to limitations imposed by the scale of the ratio prints and visual acuity to judge the exact center of the river. The important thing is that these points were preselected and agreed upon by joint action of both Boundary Commissions. These points were thus official boundary points, and though they are not monumented, the position of each point has been determined on the North American Datum of 1927 defined by the geodetic triangulation in the area. Thus, these positions can be reproduced on the ground or even in the water, if the river should change its course appreciably, at some future time.

The Coast and Geodetic Survey photographed the area in 1963 from an altitude of about 20,000 feet (scale of photography 1:40,000). This photography was taken with Wild Aviogon cameras on panchromatic film. Ratio prints at an approximate scale of 1:16,000 were then furnished the Boundary Commissions for selection of the river points. The positions of these points were determined by precise analytic aerotriangulation methods.

The ground control for the analytic aerotriangulation was not premarked, but was identified on contact prints of the aerial photography. Identification was accomplished by standard procedures and two photo points were identified on opposite sides of the primary triangulation station. In all cases, the ground control points were connected to nearby geodetic triangulation or traverse stations.

The 215 photogrammetrically determined points selected and marked by the Boundary Commissions were transferred to glass diapositives of the aerial photographs. This was accomplished by making ratio film negatives of the prints showing the intermediate boundary points to the same scale as the diapositives. These negatives were then superimposed on the diapositives and the points transferred directly. After this transfer, these points were stereoscopically transferred to the overlapping photos by the use of the Wild PUG transfer device.

The plate coordinates of all passpoints, boundary points, and ground control points were then measured with a Mann Comparator. The aerotriangulation, or bridge, of each strip (including relative orientation, connecting of models, and fitting of the strip to ground control) was accomplished by analytic methods employing electronic computers. The ten strips were adjusted to the ground control by a new procedure for simultaneous horizontal and vertical adjustment. Elevations taken from the best existing topographic maps were used to provide approximate leveling of the strips of photography to insure horizontal accuracy. At least six elevations were used in

each strip and additional elevations were included as vertical floaters. The topography had been contoured at an interval of 40 feet and it was felt that the elevation data used in the process was generally good within 20 feet and always within 50 feet. Such elevation errors will have no significant effect on the accuracy of the determination of horizontal positions.

A block adjustment was not applicable and consequently not applied. The ten strips do not represent a block in the true sense of the word since there are no common pass points except for small overlapping areas at the ends of the strips.

The probable error of the horizontal position of these 215 photogrammetrically determined points resulting from the precise aerotriangulation is judged to be about 3 feet. This is to say that the chances are even for and against the proposition that the determination of any one position is within 3 feet of its true position as related to the North American Datum of 1927 defined by the geodetic triangulation in that area. The maximum error, from error theory, cannot exceed 4 or 5 times the probable error. In this case the maximum error would be of the order of 12 or 15 feet. Such a maximum error, if it exists at all, would be very rare. This is, as previously pointed out, within the accuracy of pricking the boundary points on the ratio prints.

Anticipating arguments of some who may read this, it may be well to point out that error theory is concerned only with random errors, that it cannot so nicely dispense with the problems of systematic or bias errors. But it is the feeling of those who have been in this work that errors other than random cannot persist or accumulate enough to alter significantly the accuracy statements given. This is principally due to the abundance and quality of ground control available on this project.

PLANIMETRIC MAPPING

In the early stages of the negotiation between the Coast and Geodetic Survey and the Colorado River Boundary Commissions of Arizona and California, the thought was that an aerial photographic mosaic of the river boundary be compiled. However, because of the limitations in accuracy of a mosaic and the difficulty of placing any geographic or State grid lines on such a portrayal, the thinking shifted to the preparation of planimetric maps.

At a joint meeting of the Boundary Commissions, held on May 23, 1964, a resolution was adopted providing that the Coast and Geodetic Survey be requested to prepare a series of planimetric maps of the river. The work would be performed under a service agreement between the Coast and Geodetic Survey and the States of Arizona and California. This agreement was additional to and

separate from that which provided for the determination of the positions of some 250 points along the boundary.

The Coast and Geodetic Survey prepared the service agreement, which called for the preparation of planimetric maps, scale 1:18,000, depicting the Colorado River from the common corner of the States of Arizona, California, and Nevada to the Mexican border. Other provisions of the service agreement were that the boundary between the States would be delineated between the boundary points and that the maps would also include the location of boundary and ground control points within the compilation limits along the Colorado River. The maps would show all planimetric detail, including the river shoreline, main drainage, and the road network within 4,000 to 5,000 feet of the river. Also indicated would be the Arizona and California State coordinate systems. On completion of the work, a transparency and 100 copies of each planimetric map would be furnished independently to the States of Arizona and California. The cost of this work would be shared equally between the two States. This was agreed upon and the work got underway in November 1964.

Twenty-five maps, each at scale ratio of 1:18,000, were compiled, engraved, and printed at the Washington, D.C., Office of the Coast and Geodetic Survey, see figure 8.

The manuscript maps were compiled by means of Wild B-8 stereoscopic plotting instruments. The aerotriangulation, or bridge, done for location of the 215 boundary points, mentioned earlier in this report, provided the control for the map compilation. The same diapositive plates used for the aerotriangulation were used for the map compilation.

All boundary points had previously been positioned by either field survey or by the aerotriangulation. The positions of the boundary points, and of the triangulation stations within the limits of the mapping, were plotted on the manuscript maps by means of a coordinatograph prior to the stereoscopic delineation of map details.

The river shoreline, drainage, roads, and other map details, exclusive of the boundary points, were compiled solely from an office interpretation of the photographs. Field inspection for the clarification of details on the photographs prior to map compilation had been limited to the areas immediately around control stations; that is, to the identification of control stations for the aerotriangulation, and provided very little information for interpretation of map details. No field edit of the maps was made after compilation. This procedure was discussed with representatives of the States and understood by them prior to signing the service agreement.

The compilation was completed in April 1965. The surveys were then scribed and printed. One

ARIZONA-CALIFORNIA BOUNDARY COMMISSION

BOUNDARY MAPS

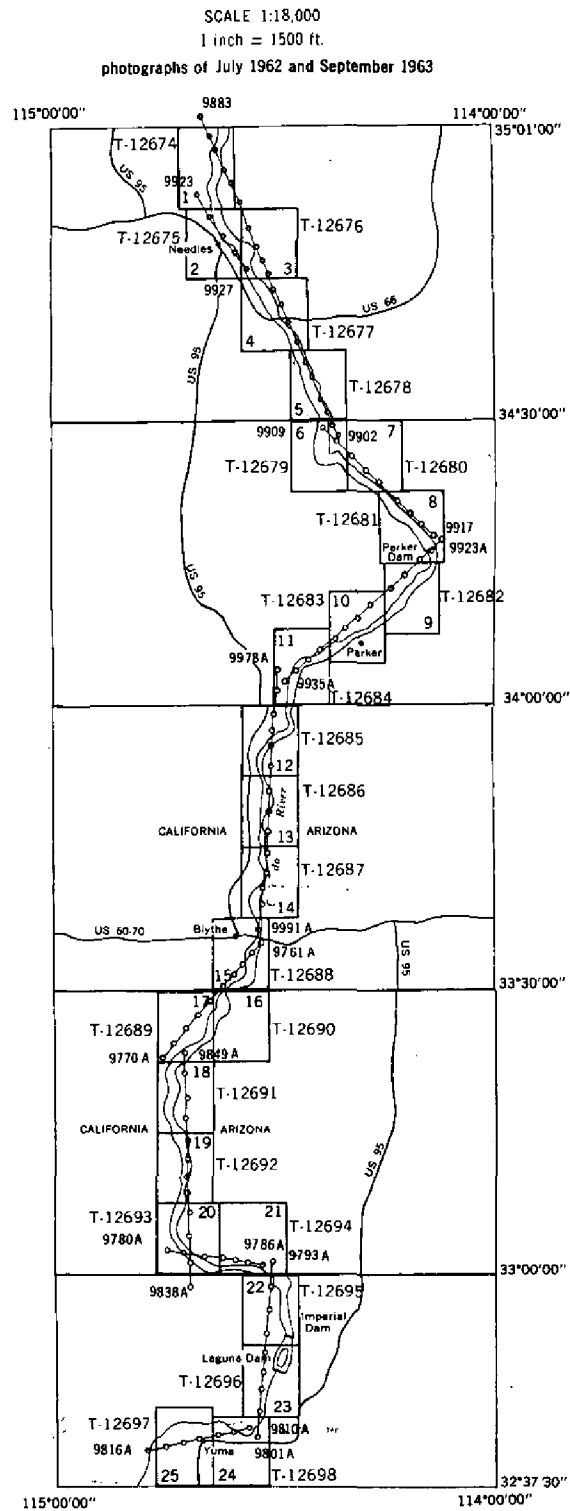


FIGURE 8.

negative, one cronaflex copy, and 100 ozalids of each map were supplied to the State of Arizona and to the State of California. A copy of the surveys will be registered in the Bureau Archives under numbers T-12674 through T-12698.

One set of negatives of the aerial photographs, and a set of prints from these negatives, showing the boundary points, were also furnished to each State. These negatives were made by photographing the set of ratio prints on which the Boundary Commissions had selected and marked the 215 boundary points that were positioned by aerotriangulation. The original set of ratio prints on which the Boundary Commissions marked these points is retained in the Archives of the Coast and Geodetic Survey.

DESCRIPTIONS AND POSITIONS OF BOUNDARY POINTS DETERMINED GEODETICALLY

On each of the following 46 pages is a detailed description of the boundary points determined

geodetically. Eleven of these boundary points fall in the river and are not monumented. These eleven points are referenced from monumented stations on the bank of the river nearby. Descriptions of these boundary reference points are also included. These immediately follow the boundary point which is referenced to it. Included for each of these points, besides the detailed description and on the same page, are the geographic positions and the State plane coordinates; the latter given for the appropriate zone in Arizona and California. Additionally, under each description of a boundary reference point is given the geodetic azimuth and distance to the boundary point itself.

Boundary Point No. 5 is identical to triangulation station El Paso.

Boundary Point No. 8 is identical to triangulation station Wathen.

HORIZONTAL CONTROL DATA

PUBLISHED AND PRINTED BY:
U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
WASHINGTON, D. C.

U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: BDRY. PT. NO. 1, Center of Colorado River, Calif.-Ariz.-Nev
Established by: C.H. Sinclair Year: 1893 State: Arizona-California-Nevada
Recovered by: L.G. Burdine Year: 1964 County: Mohave-San Bernardino-Clark

Detailed statement as to the status of the original description, including marks, found, dampings, changes made, and other pertinent facts:
Boundary Pt. No. 1 is at the intersection of the 35th astronomic parallel and the centerline of the channel of the Colorado River. This point was determined in the 1893-99 survey of the California-Nevada boundary and is common to the boundaries of Arizona, California, and Nevada.

Geodetic azimuth and distance from reference stations to BDRY. PT. NO. 1:

Station	Azimuth	Distance
BDRY. REF. PT. NO. 1B	135° 09' 51".8	feet 273,999 898.95
BDRY. REF. PT. NO. 1A	313 46 06.2	meters 268,348 880.41

* Name of party should be inserted here. The office who actually visited the station should sign the name at the end of the recovery note.
Note: Use of this form is subject to the usual conditions of sale.

CGS-DC 34314

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

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ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BDRY PT NO 1 CENTER OF COLORADO RIVER ARIZ-CALIF-NEV
STATE: ARIZ-CALIF-NEVADA YEAR: 1893, 1964 THIRD ORDER
LOCALITY: CALIFORNIA-NEVADA BOUNDARY
SOURCE: G-10055, G-13386 FIELD SKETCH: ARIZ 52-1

GEODETIC LATITUDE: 35 00 06.43500 GEODETIC LONGITUDE: 114 37 55.66800	ELEVATION: METERS FEET			
STATE COORDINATES (Fm)				
STATE & ZONE ARIZ. M. CALIF. V NEV. E.	CODE 0203 0403 2701	X 235,814.61 3,008,425.11 784,863.01	Y 1,457,113.99 563,423.29 92,987.90	θ (OR Δ) ANGLE + 00 30 22 + 01 55 11 + 00 32 44

TO STATION OR OBJECT	GEODETIC AZIMUTH (From meridian)	PLANE AZIMUTH (From meridian)	CODE

HORIZONTAL CONTROL DATA

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U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: BDRY. REF. PT. NO. 1A STATE: California COUNTY: San Bernardino
CHIEF OF PARTY: L.G. Burdick YEAR: 1964 DESCRIBED BY: D.R. Tomlinson

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK	1.61 METERS	HEIGHT OF LIGHT ABOVE STATION MARK	METERS
1a - SURFACE STATION MARK	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARK AND INSTRUMENT			
7b - UNDERGROUND STATION MARK	OBJECTS WHICH CAN BE SEEN FROM THE STATION			
	OBJECT	BEARING	FEET	DIRECTION
			METERS	
11b	SOTO	S	0 00	00.0
	R.M. 1	34.68	10.571	51 40 23
11b	R.M. 2	NW	34.63	10.556
	R.M. 1 to R.M. 2		58.68	167 20 45
	BDRY. REF. PT. NO. 1B		17.887	0 27 52.8

Station is about 11 miles north of Needles, near the state boundaries of Arizona, California and Nevada, and on the west bank of the Colorado River. This station was established to determine fixed point number one.

To reach the station from the intersection of Front and H Streets at the north-west corner of the city hall in Needles, go northwest on U. S. Highway 96 for 2.25 miles to a fork. Take the right fork, River Road and go 4.75 miles to a fork. Take the right fork, paved road and go north for 1.6 miles to a crossroad. Turn right, gravelled road and go easterly for 1.05 miles to a T-road. Turn left, on graded road and go northerly along the west bank of the river for 3.55 miles to a sign "STATE OF NEVADA" and the station on the left.

Station marks are standard disks, stamped POINT NO 1 A NO 2 1964. The surface disk is set in the top of a round concrete post projecting 8 inches. It is 51 feet north-west of the sign, 16 feet west of the centerline of the road and 3.5 feet west of a witness post. The underground disk is set in an irregular mass of concrete 38 inches below the ground surface.

Reference mark 1 is a standard disk, stamped POINT NO 1 A NO 1 1964, set in the top of a round concrete post projecting 6 inches. It is 54 feet west-northwest of the sign, 35 feet west of the centerline of the road and about 2 feet lower than the station mark.

Reference mark 2 is a standard disk, stamped POINT NO 1 A NO 2 1964, set in the top of a round concrete post projecting 4 inches. It is 37 feet west of the centerline of the road and about 2 feet lower than the station mark.

According to computations based on the position of BDRY. REF. PT. NO. 1, Center of Colorado River, BDRY. REF. PT. NO. 1A is 10.0 feet southwest and perpendicular to the line joining BDRY. REF. PT. NO. 1 and BOUNDARY POST 1A2 CALIF-NEV. 1893.

The geodetic azimuth and distance to BDRY. REF. PT. NO. 1 are:
Azimuth 313° 46' 06" 72
Distance meters 268.348
feet 880.41

*Refer to notes on sheets of triangulation and map publications of triangulation. (Directions-angle measured clockwise, referred to initial station.)
†To mark metric only, this is trigonometric leveling in being done.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BDRY REF PT NO 1A
STATE: CALIFORNIA-NEVADA YEAR: 1964 SECOND-ORDER
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: G-13386 FIELD SKETCH: ARIZ 52-1

GEODETIC LATITUDE:	35 00 12.45882	ELEVATION:	119.7
GEODETIC LONGITUDE:	114 38 03.31001		491

STATE COORDINATES (Feet)			
STATE & ZONE	CODE	X	Y
ARIZ. W.	0203	235,184.24	1,457,728.62
CALIF. V	0405	3,007,769.35	564,010.62
NEV. E.	2701	784,221.48	93,590.84

TO STATION OR OBJECT	GEODETIC AZIMUTH (From mark)		PLANE AZIMUTH (From mark)	CODE
	GEODETIC AZIMUTH	PLANE AZIMUTH	PLANE AZIMUTH	
BDRY REF PT NO 1B	314 28 20.7	314 28 20.7	314 28 47	0203
BDRY REF PT NO 1B	314 28 20.7	314 28 20.7	312 33 14	0405
BDRY REF PT NO 1B	314 28 20.7	314 28 20.7	313 55 41	2701

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 NORTH AMERICAN 1927 DATUM

FORM 5350
 (11-6-55)

U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: **EDRY, PT. NO. 2 CALLIP-ARIZ**

CHIEF OF PARTY: **L.G. Burdine** Year: **1964** STATE: **Arizona** County: **Mohave**
California San Bernardino

Description, including sketch of object:

Boundary Pt. No. 2 is located in the center of the channel of the Colorado River approximately one-half mile northerly from the A.T.&S.P. Railway Bridge at Topock.

EDRY, PT. NO. 2 is 247.195 meters or 811.01 feet in azimuth 234° 09' 34.9 from triangulation station REFUGE.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **EDRY PT NO 2 ARIZ-CALIF**

STATE: **ARIZONA-CALIFORNIA** YEAR: **1964** SECOND ORDER

LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**

SOURCE: **G-13386** FIELD SKETCH: *

GEODETIC LATITUDE: **34° 43' 28.68990** ELEVATION:
 GEODETIC LONGITUDE: **114° 29' 24.99080**

STATE COORDINATES (Fm)

STATE & ZONE	CODE	K	Y	θ (ON Δ G) ANGLE
ARIZ W. CALIF V	0203 0405	277,587.37 3,054,437.59	1,355,900.62 484,074.75	- 0 25 18 + 2 00 02

Described by _____

COM-5C 14313

TO STATION OR OBJECT	GEODETIC AZIMUTH (From Inset)	PLANE AZIMUTH (From Inset)	CODE
This station was determined by photogrammetric methods and is referenced from triangulation station REFUGE (*Ariz. 52-1).			

HORIZONTAL CONTROL DATA

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WASHINGTON D.C.

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: REFUGE
CHIEF OF PARTY: L.G. Burtline
STATE: California
COUNTY: Inyo
YEAR: 1964
DESCRIBED BY: D.J. Novak

HEIGHT OF TELESCOPE ABOVE STATION MARK	DISTANCE TO POINT FROM WHICH MEASUREMENT MADE	BEARING	DISTANCE	DIRECTION	METERS
12c	W	47.59	14.505	00 00	03.0
12c	NNW	74.43	23.017	261 39	24
				306 30	47

The station is located about 10 miles southeast of Needles, about 1 mile north-west of Topock and about 0.2 mile southwest of the Colorado River. To reach the station from the post office in Topock, go west on U.S. Highway 66 for 0.55 mile to a railroad underpass. Continue westerly on Highway 66 for 0.4 mile to the station on the left.

The station mark, a standard disk stamped "REFUGE 1964", is cemented in a hole in a boulder that is flush with the surface of the ground. It is 93 feet south-west of the center of U.S. Highway 66, 32 feet northwest of the southeast edge of a wash and 4 feet southeast of a metal witness post.

Reference mark 1, a standard disk stamped "R.FUGZ NO 1 1964", is cemented in a drill hole in a boulder that projects 10 inches above ground surface. It is 135 feet southwest of the center of U.S. Highway 66, 45 feet northwest of the southeast edge of the wash, 64 feet west of the metal witness post and about 4 feet higher in elevation than the station.

Reference mark 2, a standard disk stamped "REFUGE NO 2 1964", is cemented in a drill hole in a boulder that projects 1 foot above ground surface. It is 112 feet southwest of the center of U.S. Highway 66, 73.5 feet northwest of the metal witness post and about 3 feet higher in elevation than the station.

No azimuth mark was established at this station.

This station was used to locate BDRY, PT. NO. 2 CALIF-ARIZ which is in the center of the channel of the Colorado River.

*Refer to notes in manuals of triangulation and state publications of triangulation. Direction angle measured clockwise, referred to initial station.
†To nearest meter only, when no trigonometric leveling is being done.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: REFUGE
STATE: CALIFORNIA
YEAR: 1964
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: G-13386
FIELD SKETCH: ARIZ 52-I

GEODETIC LATITUDE:	34 43 23.99286	ELEVATION:	119.41
GEODETIC LONGITUDE:	114 29 32.46678		490
STATE COORDINATES (ft)			
STATE & ZONE	CODE	X	Y
ARIZ. W. CALIF. V	0203 0405	276,926.45 3,053,797.17	1,355,430.62 463,577.27
			- 00 25 22 + 01 59 58

TO STATION OR OBJECT	GEODETIC AZIMUTH (From mark)		PLANE AZIMUTH (From mark)		CODE
	1954	1964	1954	1964	
BREEZE	195 46 20.9	196 11 43	195 46 20.9	196 11 43	0203
BREEZE	195 46 20.9	193 46 23	195 46 20.9	193 46 23	0405

HORIZONTAL CONTROL DATA

PUBLISHED AND PRINTED BY:
U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
WASHINGTON D.C.

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

FORM 3230
(11-5-55)

U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

TRAVERSE DESCRIPTION OF STATION

NAME OF STATION: EDRY, PT. NO. 3 CALIF-ARIZ

CHIEF OF PARTY: L. G. Burdine YEAR: 1964 STATE: California COUNTY: San Bernardino
Arizona Mohave

Description, including sketch of object:
The station is the determined center of the railroad bridge at Topock, Arizona. The center of the bridge was determined with a 200 ft. tape and marked with a 3 X 6 inch iron plate, screwed to an 8 by 8 inch wood timber. The station is a punch hole, surrounded by a chiseled triangle, stamped POINT NO 3 1964.

A traverse connection was made to triangulation station SANTIAPA. The distance being 754.68 ft. (230.026 m.), east.
The geodetic azimuth from station SANTIAPA to EDRY PT. NO. 3 is 89° 40' 19.16.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BDRY PT NO 3 ARIZ-CALIF SECOND-ORDER
STATE: ARIZONA-CALIFORNIA YEAR: 1964

LOCALITY: ARIZONA-CALIFORNIA BOUNDARY FIELD SKETCH: ARIZ 52-1
SOURCE: G-13386

NO CHECK ON THIS POSITION
GEODETTIC LATITUDE: 34° 43' 05.36265 ELEVATION: 162.8 METERS
GEODETTIC LONGITUDE: 114° 29' 17.20339 53.4 FEET

STATE COORDINATES (Fm)			
STATE & ZONE	CODE	X	Y
ARIZ. M. CALIF. V	0203 0405	278,353.66 3,055,303.05	1,353,536.62 461,745.41
			- 00 25 12 + 02 00 08

TO STATION OR OBJECT	GEODETTIC AZIMUTH (From mtr)	PLANE AZIMUTH (From inch)	CODE
SANTIAPA SANTIAPA	269 40 14.5 269 40 14.5	270 05 27 267 40 07	0203 0405

Position determined by traverse
from station SANTIAPA.

Described by D. R. P.
COM-50 34313

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HORIZONTAL CONTROL DATA

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

Form 523a
(11-8-55)

U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: BDRY, PT. NO. 4 CALIF-ARIZ
CHIEF OF PARTY: L. G. Burdine
Year: 1964
State: California
County: San Bernardino
Mohave

Description, including sketch of object:
The station is 1/4 mile west of Topock, Arizona on the concrete center support of the U.S. Highway 66 bridge over the Colorado River. It is Point No. 4 of the interstate compact defining the boundary between the states of Arizona and California.

The mark is a standard triangulation disk stamped POINT NO 4 cemented in a drill hole in the concrete of the center pier. It is midway between the east and west edges of the pier and under the center of the roadway overhead. This is not the exact center of the steelwork of the bridge because the steel is not centered on the concrete pier.

A traverse connection was made through an eccentric point to triangulation station CENTER which is on the northeast corner of the center pier. The distance is 5.082 m. (16.67 ft.).
349° 10' 28". The geodetic azimuth from station CENTER to BDRY, PT. NO. 4 is

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BDRY PT NO 4 ARIZ-CALIF
STATE: ARIZONA-CALIFORNIA YEAR: 1964
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: C-13386
FIELD SKETCH: ARIZ 52-I
SECOND-ORDER

GEODETIC LATITUDE: 34 42 59.74271	ELEVATION:	METERS
GEODETIC LONGITUDE: 114 29 12.52097		FEET
STATE COORDINATES (F.M)		
STATE & ZONE	CODE	Y
ARIZ. W. CALIF. V	0203 0405	278,573.42 3,055,546.68
		1,352,966.84 461,185.46
		- 00 25 11 + 02 00 09

TO STATION OR OBJECT	GEODETIC AZIMUTH (from Azim)	PLANE AZIMUTH (from Azim)	CODE
Position determined by traverse from station CENTER and checked by additional observations.			

Described by G. M. Call
Comm-DC 34033

HORIZONTAL CONTROL DATA

PUBLISHED AND PRINTED BY:
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COAST AND GEODETIC SURVEY
WASHINGTON D.C.

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

DESCRIPTION OF TRIANGULATION STATION

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

NAME OF STATION: **ELPASO-BDRY, FT.** STATE: **ARIZONA** COUNTY: **Mohave**
NO. 5 CALIF-ARIZ CALIFORNIA DESCRIBED BY: **J.E.F.**
CHIEF OF PARTY: **L.G. Burdine** YEAR: **1964**

SURFACE-STATION MARK	DISTANCE	BEARING		HEIGHT OF TELESCOPE ABOVE STATION MARK	METERS
		FEET	METERS		
ARIZ 97 CENTER		0 00 00.0	229 08 03.5		

NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK 4.4 METERS. DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE STATION.

The station is near the center of a steel bridge which supports the El Paso Natural Gas Company and the Pacific Gas and Electric Company pipes crossing the Colorado River at Topock, Arizona. To reach the station from the post office in Topock, Arizona, go west on U.S. Highway 66, crossing the Colorado River Bridge for 0.5 mile to a side road sharp left, just before reaching the Santa Fe Railroad underpass, turn sharp left, double back and go southeast on a paved road for 0.2 mile to a side road left. Turn left and go southerly on a gravel road for 0.05 mile to a wire link gate. Pass through the gate and go southeasterly on the gravel road for 0.25 mile to the southwest end of the steel bridge which supports two large gas pipes. Pass through a wire link gate and pack along catwalk to the center of the bridge and the station. The station is marked by a center punch hole surrounded by a chiseled triangle that is approximately 1 1/2 inches on a side. The mark is equal distance from both ends of the bridge and near the center of the catwalk. It is stamped ELPASO 1964.

Notes: Reference marks or an azimuth mark were not set for this station.
Obtain keys to locked wire link gates at the compressor station on a hill about 3/4 mile west of Topock, Arizona.

Note: This station is also POINT NO 5 of the interstate compact defining the boundary between the states of Arizona and California.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **ELPASO = BDRY PT NO 5 ARIZ-CALIF**
STATE: **ARIZONA-CALIFORNIA** YEAR: **1964** SECOND-ORDER
LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**
SOURCE: **G-113386** FIELD SKETCH: **ARIZ 52-1**

GEODETIC LATITUDE: 34 42 54.70265	ELEVATION: 153.4
GEODETIC LONGITUDE: 116 29 02.04375	503

STATE COORDINATES (1964)			
STATE & ZONE	CODE	X	Y
ARIZ. W.	0203	279,444.33	1,352,450.93
CALIF. V	0405	3,056,438.56	460,766.86

TO STATION OR OBJECT	GEODETIC AZIMUTH (From north)		PLANE AZIMUTH (From north)		CODE
	ARIZ 97	ARIZ 97	251 47 34.9	252 12 40	
			251 47 34.9	249 47 20	0203
					0405

*Refers to areas of triangulation and state publications of triangulation. †Theremin-able measured check-sets, referred to initial station. ‡To nearest meter only, unless indicated otherwise in description.

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HORIZONTAL CONTROL DATA

by the
 Coast and Geodetic Survey
 NORTH AMERICAN 1927 DATUM

Form 523b
 (11-6-55)

U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

DESCRIPTION OF TRAVERSE STATION

NAME OF STATION: **BDRY PT. NO. 6 CALIF-ARIZ**

CHIEF OF PARTY: **L. G. Burdine** Year: 1964 STATE: **California**

Yuma County: **San Bernardino**

Description, including sketch of object:

The station is at the determined center, east and west, of the Parker Dam which lies across the Colorado River 18 miles north of Parker, Arizona. The station is marked by a standard station mark disk, stamped POINT NO. 6 1964, cemented in a drill hole in the center of the concrete walk along the north side of the top of the dam. It is situated at the measured center, east and west, of the center floodgate of the dam. A traverse connection was made to triangulation station PARKER DAM, the distance being 20.646 meters or 67.74 feet. The geodetic azimuth from station PARKER DAM to BDRY. PT. NO. 6 is $267^{\circ} 14' 37''$.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **BDRY PT NO 6 ARIZ-CALIF**

STATE: **ARIZONA-CALIFORNIA** YEAR: 1964

LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**

SOURCE: **G-13386** FIELD SKETCH: **ARIZ 52-1**

NO CHECK ON THIS POSITION

GEODETIC LATITUDE: **34 17 47.92195** ELEVATION: METERS
 GEODETIC LONGITUDE: **114 08 18.43732** FEET

SECOND-ORDER

STATE COORDINATES (Fm)			
STATE & ZONE	CODE	X	Y
ARIZ. N. CALIF. V	0203 0405	382,675.39 3,166,031.79	1,199,554.50 312,312.11
			θ (OP Δ) ANGLE
			- 00 13 08 + 02 12 04

TO STATION OR OBJECT	GEODETIC AZIMUTH (From party)	PLANE AZIMUTH (From party)	CODE
Position determined by traverse from station PARKER DAM.			

Described by L. G. Burdine
 Form DC 34313

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WASHINGTON D.C.

HORIZONTAL CONTROL DATA

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

FORM 3228
(11-8-55) U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

NAME OF STATION: EDRY, FT. NO. 7 CALIF-ARIZ

CHIEF OF PARTY: L.G. Burdine Year: 1964 STATE: Arizona COUNTY: Yuma
CALIFORNIA San Bernardino

Description, including sketch of object:
Boundary Ft. No. 7 lies in the center of the Colorado River
approximately 2,050 feet upstream from the earth fill of Head-
gate Rock Dam.

EDRY, FT. NO. 7 is 162.154 meters or 532.00 feet in azimuth
141° 12' 32.9" from triangulation station DOCK.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: EDRY FT NO 7 ARIZ-CALIF
STATE: ARIZONA-CALIFORNIA YEAR: 1964 SECOND-ORDER
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: G-13386 FIELD SKETCH: *

GEODETIC LATITUDE: 34 10 13.41020 METERS
GEODETIC LONGITUDE: 114 16 05.32480 FEET

STATE COORDINATES (FWS)			
STATE & ZONE	CODE	X	Y
ARIZ W. CALIF V	0203 0405	343,270.87 3,128,594.00	1,153,785.24 284,920.00
			θ (OR Δ TRIANGLE)
			- 0 17 28 + 2 07 38

TO STATION OR OBJECT	GEODETIC AZIMUTH (FROM THIS)	PLANE AZIMUTH (FROM THIS)	CODE
This station was determined by photogrammetric methods and is referenced from triangulation station station DOCK (ARIZ. 52-1).			

Determined by.....

COM-DC 24313

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COAST AND GEODETIC SURVEY
WASHINGTON D.C.

HORIZONTAL CONTROL DATA

By the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

FORM 525
(4-1959)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: DOCK STATE: ARIZONA COUNTY: YUMA

CHIEF OF PARTY: L. C. Burdine YEAR: 1964 DESCRIBED BY: B. R. Lewis

DESC.	SURFACE-STATION MARK	HEIGHT ABOVE STATION MARK	METERS
	UNDERGROUND-STATION MARK	DISTANCE TO MAXIMUM MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	
		BEARING	DIRECTION
		FEET	METERS
	FILL		
	Reference Mark No. 1	SE 21.16	0 00 00
	Reference Mark No. 2	WSW 21.10	245 49 01
			6.453 340 29 17

The station is located about 2 miles northeast of Parker, 2 miles east of Earp, California, and on the southeast shore line of the Colorado River. It is inside the fenced area of the Blue Water Marine Park on property of the Colorado River Indian Reservation.

To reach the station from the intersection of California Avenue and River Side Road (Spur 95 and State Highway 95) in Parker, go northeasterly on River Side Road (State Highway 95) for 1.95 miles to the west entrance gate of the Blue Water Marine Park on the left. Turn left, passing through the gate, and go northeast for 0.05 mile to the Judges Stand and the station on the northeast corner as described.

The station mark is a standard disk cemented in a drill hole, set flush with the concrete foundation and is stamped DOCK 1964. It is 2.6 feet north of the north corner of the Judges Stand, 1.8 feet southwest of the northeast edge and 1.8 feet southeast of the northwest edge of the foundation.

Reference mark No. 1 is a standard disk cemented in a drill hole, set flush with the concrete foundation and is stamped DOCK NO 1 1964. It is 3.8 feet east of the east corner of the Judges Stand, 1 foot southwest of the northeast edge and 1 foot northwest of the southeast edge of the foundation.

Reference mark No. 2 is a standard disk cemented in a drill hole, set flush with the concrete foundation and is stamped DOCK NO 2 1964. It is 3.8 feet west of the west corner of the Judges Stand, 1 foot southeast of the northwest edge and 1 foot northeast of the southwest edge of the foundation.

No azimuth mark was set for this station.

This station was used to locate EDRY. PT. NO. 7 CALIF-ARIZ which is in the center of the Colorado River.

Refers to notes in manuals of triangulation and state publications of triangulation. If direction-angle measured clockwise, referred to initial station. If to nearest meter only, when no trigonometric leveling is being done.

USCGM-DC 27171-P-59

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: DOCK STATE: ARIZONA YEAR: 1964 SECOND-ORDER

LOCALITY: ARIZONA-CALIFORNIA BOUNDARY

SOURCE: G-13386 FIELD SKETCH: ARIZ 52-1

GEODETIC LATITUDE: 34 10 09.30826	ELEVATION: 111.6	METERS
GEODETIC LONGITUDE: 114 16 01.35839	366	FEET

STATE COORDINATES (Fm)			
STATE & ZONE	CODE	X	Y
ARIZ. W. CALIF. V	0203 0405	343,602.04 3,128,942.45	1,153,368.91 264,518.02
			θ (ON Δ) ANGLE
			- 00 17 25 + 02 07 40

TO STATION OR OBJECT	GEODETIC AZIMUTH (From 1927)		PLANE AZIMUTH (From 1927)		CODE
	94 29 08.4	94 29 08.4	94 46 33	92 21 28	
FILL					0203
FILL					0405

HORIZONTAL CONTROL DATA

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WASHINGTON D. C.

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Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **WATHEN = BDRY. PT.** STATE: **ARIZONA** COUNTY: **TUMA**
NO. 8 CALIF-ARIZ STATE: **California** COUNTY: **San Bernardino**
 CHIEF OF PARTY: **L. G. Burdine** YEAR: **1964** DESCRIBED BY: **G. D. Banks**

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **WATHEN = BDRY PT NO 8 ARIZ-CALIF** SECOND ORDER
 STATE: **ARIZONA-CALIFORNIA** YEAR: **1964**
 LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**
 SOURCE: **G-13386** FIELD SKETCH: **ARIZ 52-1**

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
BLUFF				0 00 00.0
11a R.M. 1	SSW	55.75	16.377	112 19 37
11b R.M. 2	WNW	60.66	18.469	208 34 58
R.M. 1 to R.M. 2		85.28	25.994	

The station is fixed point No. 8 of the Arizona-California boundary. It is located at the center of the earth fill of the Headgate Rock Dam which is airline, about 2 miles north-northeast of Parker, Arizona. To reach the station from the intersection of Riverside Drive and California Avenue in Parker, go east on Riverside Drive for 0.9 mile to a fork and sign "DEAD END ROAD". Take the left fork and go north on a paved road for 0.55 mile to a locked cable across the road. (Key to the lock can be obtained from the caretakers residence which is the house to the north of the gate.) Continue north on the paved road, crossing the concrete spillway for 0.3 mile to the north end of the spillway. Turn right and go northeast on a track road for 0.3 mile to the center of the Headgate Rock Dam and the station. Station mark 1 is a bronze plate, stamped 21-0005 ILS BK BLY 389.91 CR1R, set in the top of an 8 by 14 inch concrete post flush with the ground surface. It is 25 feet east of the center of the dam and 3.48 feet west of a concrete monument which is about 8 feet high and has the letters WATHEN DAM USIS 1941 on the west side, CALIFORNIA on the north side and ARIZONA on the south side. Reference mark 1 is a standard disk, stamped WATHEN NO 1 1964, set in the top of a round concrete post, 10 inches in diameter and projects about 2 inches above the ground surface. It is 18 feet west of the center of the dam and about the same elevation as the station. Reference mark 2 is a standard disk, stamped WATHEN NO 2 1964, set in the top of a round concrete post, 10 inches in diameter and projects about 3 inches above the ground surface. It is 15 feet west of the center of the dam and about the same elevation as the station.

GEODETIC LATITUDE:	34 10 20.19675	ELEVATION:	118.8
GEODETIC LONGITUDE:	114 16 28.40019		390

STATE & ZONE	CODE	STATE COORDINATES (feet)		Y	θ (OR Δ) ANGLE
		X			
ARIZ. W. CALIF. V	0203 0405	341,335.53	3,126,631.00	1,154,481.15	- 00 17 41 + 02 07 25

TO STATION OR OBJECT	GEODETIC AZIMUTH (feet)		PLANE AZIMUTH (feet)		CODE
	(feet)	(feet)	(feet)	(feet)	
BLUFF	269 31 40.0	269 31 40.0	269 49 21	267 24 15	0203 0405

Refer to notes in manuals of triangulation and astral publications of triangulation. 1-Direction=angle measured clockwise, referred to initial station. 170 seconds west only, which is trigonometric leveling is being done. US-COM-GO-C 3171-1-58



U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
COAST AND GEODETIC SURVEY

Survey of the Boundary Between Arizona and California

By

LANSING G. SIMMONS

TECHNICAL BULLETIN NO. 27



HORIZONTAL CONTROL DATA

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COAST AND GEODETIC SURVEY
WASHINGTON D.C.

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: EDRY. PT. NO. 9 CALIF-ARIZ
CHIEF OF PARTY: L.O. Burdine **YEAR:** 1964 **STATE:** Arizona **COUNTY:** Yuma
California San Bernardino

Description, including sketch of object:
Boundary Pt. No. 9 lies on the centerline of the river approximately 3,625 feet westerly from Point No. 8.
EDRY PT. NO. 9 is 57.526 meters or 188.73 feet in azimuth 338° 55' 04.3 from triangulation station FLAT.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: EDRY PT NO 9 ARIZ-CALIF **SECOND ORDER**
STATE: ARIZONA-CALIFORNIA **YEAR:** 1964
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: G-13386 **FIELD SKETCH:** *

GEODETIC LATITUDE: 34 10 14.87530	ELEVATION:	METERS
GEODETIC LONGITUDE: 114 17 10.57050		FEET

STATE COORDINATES (ftm)			θ (OR Δ D) ANGLE
STATE & ZONE	CODE	X	
ARIZ. W. CALIF. V	0203 0405	337,789.49 3,123,110.00	1,153,961.67 264,865.00
			- 0° 18' 04" + 2 07 01

TO STATION OR OBJECT	GEODETIC AZIMUTH (From mark)	PLANE AZIMUTH (From mark)	CODE
This station was determined by photogrammetric methods and is referenced from triangulation station FLAT (*Ariz. 52-I).			

Described by
CGM-DC 34313

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HORIZONTAL CONTROL DATA

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

FORM 525
(8-15-59)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **FLAT** STATE: **California** COUNTY: **San Bernardino**
CHIEF OF PARTY: **L.G. Burdine** YEAR: **1964** DESCRIBED BY: **D. R. Tomlinson**

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **FLAT** YEAR: **1964** SECOND ORDER
STATE: **CALIFORNIA**
LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**
SOURCE: **G-13386** FIELD SKETCH: **ARIZ 52-1**

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK	DISTANCE TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE STATION	BEARING	DISTANCE	DIRECTION
1a	7.0				
1b			SE	50.63	0 00 00.0
1b			SW	55.20	54 14 23
				16.025	145 59 22

NOTE: Station is about 1-1/2 miles north of the center of Parker, Arizona, 1 mile north-east of Esrp, California, 1/2 mile west of the earth fill of Headgate Rock Dam and on a silt, grass and brush covered area of the Colorado River.

To reach from the Arizona Inspection Station in the northwest edge of Parker, Arizona, go northwest on State Highway 95 for 0.75 mile to a T-intersection. Turn right and go easterly on paved road for 1.0 mile to a track road right. Turn right and follow track road toward river for 0.1 mile to the end of track road at river bank and end of truck travel. The station is about 75 yards south in the old river bed.

Station marks are standard disks, stamped FLAT 1964. The surface disk is set in the top of a round concrete post projecting 8 inches. It is 2 feet west of a witness post. The underground disk is set in an irregular mass of concrete 38 inches below the ground surface.

Reference mark 1 is a standard disk, stamped FLAT NO 1 1964, set in the top of a round concrete post projecting 8 inches. It is about the same elevation as the station. Reference mark 2 is a standard disk, stamped FLAT NO 2 1964, set in the top of a round concrete post projecting 10 inches. It is about the same elevation as the station.

This station was used to locate **EDRY, FT. NO. 9 CALIF-ARIZ** which lies on the centerline of the Colorado River.

GEODETIC LATITUDE:	34 10 16.61734	ELEVATION:	106.8 METERS
GEODETIC LONGITUDE:	114 17 11.37843		350 FEET

STATE COORDINATES (ftm)			
STATE & ZONE	CODE	X	Y
ARIZ. W.	0203	337,722.53	1,154,138.12
CALIF. V	0405	3,123,035.66	265,038.47

TO STATION OR OBJECT	GEODETIC AZIMUTH (from north)		PLANE AZIMUTH (from north)		CODE
	GEODETIC AZIMUTH	PLANE AZIMUTH	GEODETIC AZIMUTH	PLANE AZIMUTH	
WATHEN	264 16 29.9	264 16 29.9	264 34 35	0203	
WATHEN	264 16 29.9	264 16 29.9	262 09 30	0405	

Refer to notes in manuals of triangulation and state publications of triangulation. 1 Direction-angle measured clockwise, referred to initial station. 2 To nearest meter only, when an trigonometric leveling is being done. USCOM-DC 2171-Pes

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HORIZONTAL CONTROL DATA

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NORTH AMERICAN 1927 DATUM

FORM 5250
(11-8-55) U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: **EDRY, PT. NO. 10 CALIF-ARIZ**
 CHIEF OF PARTY: **L.G. Burdine** YEAR: **1964** STATE: **Arizona** COUNTY: **Yuma**
California **San Bernardino**

Description, including sketch of object:
 Boundary Pt. No. 10 lies in the center of the Colorado River at a point where the parallel of 34° 10' north latitude intersects said centerline.

EDRY, PT. NO. 10 is 99.697 meters or 327.09 feet in azimuth 285° 07' 42.6 from triangulation station VIEW.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **EDRY PT NO 10 ARIZ-CALIF**
 STATE: **ARIZONA-CALIFORNIA** YEAR: **1964** SECOND ORDER
 LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**
 SOURCE: **0-13386** FIELD SKETCH: *

GEODETIC LATITUDE: **34° 10' 00.0000** ELEVATION: _____ METERS
 GEODETIC LONGITUDE: **114° 17' 31.46000** FEET

STATE COORDINATES (ftm)			
STATE & ZONE	CODE	X	Y
ARIZ W. CALIF V	0203 0405	336,026.30 3,121,411.41	1,152,467.31 263,297.57
			θ (ON L G) ANGLE - 0° 18' 16" + 2 06 49

TO STATION OR OBJECT	GEODETIC AZIMUTH (True north)	PLANE AZIMUTH (True north)	CODE
This station was determined by photogrammetric methods and is referenced from triangulation station VIEW (*Ariz. 52-I).			

Described by _____ Form-DC 34513

HORIZONTAL CONTROL DATA

PUBLISHED AND PRINTED BY:
U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
WASHINGTON D. C.

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: VIEW
STATE: California COUNTY: San Bernardino DESCRIBED BY: J.E.F.
CHIEF OF PARTY: L.G. Burdick YEAR: 1964

ID	SURFACE STATION MARK	DISTANCE	BEARING	HEIGHT OF TELESCOPE ABOVE STATION MARK		METERS
				FEET	METERS	
7A	UNDERGROUND-STATION MARK					
11A	FLAT	Approx. 2 miles	S	0 00	00.00'	
11B	Parker, Municipal Tank, elevated	44.46'	SW	13.552'	119 03 57.4'	
	Reference mark No. 1	50.50'	NW	15.331'	171 35 48'	
	Reference mark No. 2	73.50'		22.343'	272 45 30'	
	R.M. 1 - R.M. 2					

The station is about 1 1/4 miles north-northwest of Parker, Arizona, 0.1 mile northeast of the River View Trailer Park, on the crest of a low bluff at the northwest side of the Colorado River and on land of the Colorado River Indian Reservation.

To reach the station from the post office in Parker, Arizona, go northwest on Joshua Ave. for 50 yards to Arizona Ave.; turn right and go north on Arizona Ave. for 0.1 mile to California Ave. (State Highway 95). Turn left and go northwest on Highway 95 for 0.2 mile to where Highway 95 turns to the right; continue northwest on State Spur 98 for 0.8 mile to a bridge across the Colorado River. Cross the bridge and go northerly for 0.5 mile to a T-road. Turn right and go easterly on a paved road for 0.25 mile to the entrance to the River View Trailer Park on the right; continue easterly on the paved road for 0.3 mile to a track road on the right. Turn right and go southeast on the track road for 30 feet to a fork; take right fork and go 250 feet to a track road on the right. Turn right and go westerly on the track road for 0.05 mile to the northwest base of the bluff; turn left, go uphill and along the top of the bluff for 0.05 mile to the southeast end of the bluff and the station.

Station marks are standard disks stamped VIEW 1964. The surface disk is set in a round concrete post which projects 5 inches. It is 38 feet west of the southeast edge of the bluff and 4.2 feet north of a metal witness post. The underground disk is set in an irregular mass of concrete 40 inches below the surface of the ground.

Reference mark No. 1, a standard disk stamped VIEW NO 1 1964, is set in a round concrete post which projects 4 inches. It is 30 feet west of the southeast edge of the bluff and about the same elevation as the station.

Reference mark No. 2, a standard disk stamped VIEW NO 2 1964, is set in a round concrete post which projects 4 inches. It is 7 feet southwest of the north-northeast edge of the bluff and about the same elevation as the station.

Note: an azimuth mark was not set for this station.
Reference marks were measured using 5 kg. tape tension.

This station was used to locate EDRY, PT. NO. 10 CALIF-ARIZ which is in the center of the Colorado River.

*Refer to manual of triangulation and area publications of triangulation. †Direction-angle measured clockwise, referred to initial station. ‡To nearest meter only, when so trippometric leveling is being done.

USCGO-66-27131-P49

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: VIEW
STATE: CALIFORNIA YEAR: 1964 SECOND-ORDER
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: C-13386 FIELD SKETCH: ARIZ 52-1

GEODETIC LATITUDE:	34 10 00.84448	ELEVATION:	116.8
GEODETIC LONGITUDE:	114 17 35.21757		383
STATE COORDINATES (Fm)			
STATE & ZONE	CODE	X	Y
ARIZ. W. CALIF. V	0203 0405	335,711.02 3,121,092.73	1,152,554.35 263,371.22
			- 00 18 18 + 02 06 47

TO STATION OR OBJECT	GEODETIC AZIMUTH (Fm)		PLANE AZIMUTH (Fm)		CODE
	(Fm)	(Mm)	(Fm)	(Mm)	
FLAT	231 28 47.0		231 27 05		0203
FLAT	231 28 47.0		229 22 00		0405

HORIZONTAL CONTROL DATA

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Form 525b
(11-4-55)

U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

TRAVERSE
DESCRIPTION OF ~~TRAVERSE~~ STATION

NAME OF STATION: **EDRY, PT. NO. 11 CALIF-ARIZ** Yuma
 CHIEF OF PARTY: **L.G. Burdine** Arizona County, San Bernardino
 Year: **1964** State: California

Description, including sketch of object:

The station is located about 1 mile north of Parker, Arizona in the center of the auto bridge over the Colorado River. This is Point 11 of the interstate compact defining the boundary between the states of Arizona and California. The station is marked by a center punch hole surrounded by a chiseled triangle that is approximately 1 1/2-inches on a side. The mark is equal distance from both ends of the bridge and in the center line of Spur 95. It is stamped POINT 11 1964 on the metal expansion beam of the bridge. A traverse connection was made to SPAN RM 1 which is southeast and near the center of the walkway of the bridge. The distance being 8.474 meters, 27.80 feet.

The geodetic azimuth from station SPAN RM 1 to EDRY, PT. NO. 11 is 105° 18' 31"

Described by **J.M. Cassinberry**

844 Comm-DC 34313

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **BORY PT NO 11 ARIZ-CALIF** SECOND-ORDER
 STATE: **ARIZONA-CALIFORNIA** YEAR: 1964
 LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**
 SOURCE: **G-13386** FIELD SKETCH: ARIZ 52-1

NO CHECK ON THIS POSITION

GEODETIC LATITUDE: **34 09 34.34031** ELEVATION:
 GEODETIC LONGITUDE: **114 17 53.11631** METERS
FEET

STATE COORDINATES (Fm)			
STATE & ZONE	CODE	X	Y
ARIZ. M. CALIF. V	0203 0405	334,192.65 3,119,688.40	1,149,863.27 260,638.44
			θ (OR Δ) ANGLE - 00 18 28 + 02 06 37

TO STATION OR OBJECT	GEODETIC AZIMUTH (True Azim)	PLANE AZIMUTH (True Azim)	CODE
Position determined by traverse from station SPAN RM 1.			

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HORIZONTAL CONTROL DATA

by the
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NORTH AMERICAN 1927 DATUM

FORM 525
(2-19-53)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **BDRY. PT. NO. 12** STATE: **Ariz.-Calif.** COUNTY: **Yuma**
CALIF.-ARIZ DESCRIBED BY: **J.E. SUTTON**

CHIEF OF PARTY: **L.O. Burdine** YEAR: **1964**

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **BDRY PT NO 12 ARIZ-CALIF** SECOND-ORDER
 STATE: **ARIZONA-CALIFORNIA** YEAR: **1964**
 LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**

SOURCE: **G-13386** FIELD SKETCH: **ARIZ 52-1**

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK	1.65 METERS	HEIGHT OF LIGHT ABOVE STATION MARK	METERS
73	SURFACE STATION MARK	DISTANCES TO 2 AZIMUTH MARKS, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE STATION		
	OBJECT	BEARING	DISTANCE	DIRECTION
		FEET	METERS	
	SPUR 1935	SW	00 00	00.00
	BDRY. REF. PT. NO. 12		295 17	30.81

GEODETIC LATITUDE: **33 43 58.11276** ELEVATION: **90.6** METERS
 GEODETIC LONGITUDE: **114 30 36.04447** 297 FEET

STATE COORDINATES (Fm)				
STATE & ZONE	CODE	X	Y	θ (OR Δ) ANGLE
ARIZ. W. CALIF. VI	0203 0406	268,929.84 2,529,009.94	995,010.66 574,251.40	- 00 25 19 + 00 57 22

TO STATION OR OBJECT	GEODETIC AZIMUTH (From Party)		PLANE AZIMUTH (From Party)		CODE
	35 59 32.2	35 59 32.2	36 24 51	35 02 10	
BDRY REF PT NO 12					0203
BDRY REF PT NO 12					0406

The station is located at the center of the earth fill section of the Palo Verde Diversion Dam, which is about 10 miles northeast of Blythe, 0.25 mile east of U.S. Highway 95 and 0.05 mile northeast of the flood gates of the Palo Verde Diversion Dam. To reach the station from the junction of U.S. Highways 60,70 and 95, which is at the east edge of Blythe, go north on U.S. Highway 95 for 6.3 miles to where the highway turns east. Continue on U.S. Highway 95 east and north for 4.2 miles to a side road right, turn right, east on gravel road for 0.25 mile to a gate and small building on the left. Pass through the gate and turn left across the concrete dam for 0.05 mile to the station in the center of the road as described. The station mark is a standard disk set in the top of a 12-inch round concrete monument. It is set flush with the ground and is stamped POINT NO.12A 1964. It is in the center of the earth dam.

*Refer to notes in manuals of triangulation and state publications of triangulation. 1 Direction-angle measured clockwise, referred to local meridian. 1 To nearest meter only, when no trigonometric leveling is being done.

HORIZONTAL CONTROL DATA

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Form 5228
(11-8-55)

U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

TRAVERSE DESCRIPTION OF TRAVERSE OR SECTION STATION

Name of Station: **EDRY, FT. NO. 13 CALIF-ARIZ**
 Chief of Party: **L. G. Burdine** Year: **1964** State: **Arizona** Country: **Yuma**
 State: **California** County: **Riverside**

Description, including sketch of object:
 The station is at the measured center of the U.S. Highway 60-70 bridge spanning the Colorado River 3 miles east of Rhythe, California.
 The station is marked by a standard station mark disk, stamped POINT NO 13 1964, cemented in a drill hole in the center of the concrete roadbed at the center of the center span of the bridge.
 A traverse connection was made to triangulation station EHREN, the distance being 4,607 meters or 15,111 feet.
 The geodetic azimuth from station EHREN to EDRY, FT. NO. 13 is 30° 54' 01".

ADJUSTED HORIZONTAL CONTROL DATA

Name of Station: **BDRY PT NO 13 ARIZ-CALIF**
 State: **ARIZONA-CALIFORNIA** Year: **1964**
 Locality: **ARIZONA-CALIFORNIA BOUNDARY**
 SOURCE: **G-13386** FIELD SKETCH: **ARIZ 52-1**
 NO CHECK ON THIS POSITION

GEODETIC LATITUDE: **33 36 17.31038** ELEVATION: _____ METERS
 GEODETIC LONGITUDE: **114 31 48.52488** FEET

STATE & ZONE		STATE COORDINATES (Fm)			θ (OR Δ) ANGLE
ARIZ. W.	CALIF. VI	CODE	X	Y	
0203	0406		262,456.82	948,479.94	- 00 25 55
			2,523,657.56	527,579.67	+ 00 56 42

TO STATION OR OBJECT	GEODETIC AZIMUTH (From north)	PLANE AZIMUTH (From north)	CODE
Position determined by traverse from station EHREN.			

Observed by J.L.G.
 1058-UC 34313

HORIZONTAL CONTROL DATA

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U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
TRAVERSE
DESCRIPTION OF TRAVERSE
NAME OF STATION: EDRY. PT. NO. 14 CALIF-ARIZ

Chief of Party: L. G. Burdine / **Year:** 1964 / **State:** Arizona - **Country:** Yuma - **Imperial**
California

Description, including sketch of object:
This station was established as fixed point number 14. It is 8 miles south of Ripley, and at the determined center of the CIBOLA TOLL BRIDGE.
The station is a punch hole in the top of a 60 penny nail in a wooden plank in the bridge.
A traverse connection was made to triangulation CIBOLA, the distance being 25.649 meters - 84.15 feet, south.
The geodetic azimuth from station CIBOLA to EDRY. PT. NO. 14 is 177° 49' 52".

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: EDRY PT NO 14 ARIZ-CALIF
STATE: ARIZONA-CALIFORNIA **YEAR:** 1964 **SECOND-ORDER**
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: G-13386 **FIELD SKETCH:** ARIZ 52-I

NO CHECK ON THIS POSITION

GEODETIC LATITUDE: 33 24 46.54852 **ELEVATION:**
GEODETIC LONGITUDE: 114 39 24.79576 **METERS**
FEET

STATE COORDINATES (Fm)			
STATE & ZONE	CODE	X	Y
ARIZ. W. CALIF. VI	0203 0406	223,254.41 2,486,137.29	876,975.36 457,157.28
			θ (OR Δ) ANGLE + 00 29 58 + 00 52 32

TO STATION OR OBJECT	GEODETIC AZIMUTH (From Nail)	PLANE AZIMUTH (From Nail)	CODE
Position determined by traverse from station CIBOLA.			

Described by *[Signature]*
COM-DC 3413
1964

HORIZONTAL CONTROL DATA

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U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: BDRY. PT. NO. 15 CALIF-ARIZ
CHIEF OF PARTY: L.G. Burdine **YEAR:** 1964 **STATE:** Arizona **COUNTY:** Yuma
Imperial
DESCRIPTION, including sketch of object:
Boundary Pt. No. 15 lies on the centerline of the Colorado River approximately 8400 feet northward of the center of the overflow section of Imperial Dam.
BDRY. PT. NO. 15 is 265.335 meters or 870.52 feet in azimuth $10^{\circ} 06' 03.4''$ from triangulation station SQUAW.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BDRY PT NO 15 ARIZ-CALIF
STATE: ARIZONA-CALIFORNIA **YEAR:** 1964 **SECOND ORDER**
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: G-13386 **FIELD SKETCH:** *

GEODEIC LATITUDE: 32 54 22.35270	ELEVATION: METERS			
GEODEIC LONGITUDE: 114 27 43.15340	FEET			
STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ G) ANGLE
ARIZ W. CALIF VI	0203 0406	281,478.42 2,548,767.10	694,144.98 273,781.55	- 0 23 12 + 0 58 57

TO STATION OR OBJECT	GEODEIC AZIMUTH (from point)	PLANE AZIMUTH (from meridian)
This station was determined by photogrammetric methods and is referenced from triangulation station SQUAW (#ARIZ. 52-II).		

Described by
Com-DC 34315

HORIZONTAL CONTROL DATA

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NORTH AMERICAN 1927 DATUM

FORM 523
6-19-61

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: SQUAW STATE: Arizona COUNTY: YUMA

CHIEF OF PARTY: L. G. Burdine YEAR: 1964 DESCRIBED BY: C. M. Gail

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK	HEIGHT OF LIGHT ABOVE STATION MARK	METERS	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	
				FEET	DIRECTIONS
12 a	Reference Mark No. 2	NW	32.12	9.790	00 00 00.0
12 a	Reference Mark No. 1	E	44.89	13.683	140 52 15 273 43 02

The station is located 19 miles northwest of Laguna, 15 miles northeast of Yuma, and 1-3/4 miles north of Imperial Dam. It is on land of the Imperial National Wildlife Refuge, on a small island about 100 feet in diameter, in the Colorado River and nearer the Arizona shore.

To reach the station from the Bureau of Reclamation beathouse which is 0.1 mile north of the Water Control Communications Headquarters building at the west end of Imperial Dam, go north by boat by various river channels for 1-3/4 miles to the island on the starboard side. The best landing point is at an opening in the reeds on the northwest side of the island.

The station mark is a standard disk stamped SQUAW 1964 cemented in a drill hole in a depression in decomposed bedrock. It is about 4 inches below the surrounding surface and about 12 feet above the surface of the river.

Reference mark number one is a standard disk stamped SQUAW NO 1 1964 cemented in a drill hole in decomposed bedrock held together with cement flush with the surrounding surface. It is on the highest point of the island and is about 1 foot higher than station elevation.

Reference mark number two is a standard disk stamped SQUAW NO 2 1964 cemented in a drill hole in a little ridge of jagged bedrock. It is on the northwest slope of the island and about 2 feet lower than the station mark.

This station was used to locate HDRY, PT. NO. 15 CALIF-ARIZ which lies on the centerline of the Colorado River.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: SQUAW

STATE: ARIZONA

YEAR: 1964

SECOND ORDER

LOCALITY: ARIZONA-CALIFORNIA BOUNDARY

SOURCE: G-13386

FIELD SKETCH: ARIZ 52-11

GEODETTIC LATITUDE:	32 54 30.83248	ELEVATION:	59.1
GEODETTIC LONGITUDE:	114 27 41.36270		194

STATE COORDINATES (FPM)			
STATE & ZONE	CODE	X	Y
ARIZ. W. CALIF. VI	0203 0406	281,636.87 2,548,905.05	695,000.95 274,641.06
			- 00 23 12 + 00 58 58

TO STATION OR OBJECT	GEODETTIC AZIMUTH (FROM MARK)		PLANE AZIMUTH (FROM MARK)		CODE
	0 04 31.2	0 04 31.2	0 27 43	359 05 33	
IMPERIAL					0203
IMPERIAL					0406

*Refers to marks in manuals of triangulation and state publications of triangulation. †Direction-measure measured clockwise, referred to true meridian. ‡To nearest meter only, when so trigonometric leveling is being done.

HORIZONTAL CONTROL DATA

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WASHINGTON D.C.

Form 953b
(11-9-59) U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

TRaverse
DESCRIPTION OF TRIANGULATION TRANSVERSE SECTION STATION

NAME OF STATION: BDRY. PT. NO. 16 CALIF-ARIZ

CHIEF OF PARTY: L.G. Burdine **Year:** 1964 **State:** Arizona **County:** Yuma **Imperial -**

Description, including sketch of object:

This station was established as fixed point number 16. It is about 14 1/2 miles northeast of Yuma, 1 1/2 miles north of Kitiry Lake, 2 miles northwest of the Yuma Proving Grounds Headquarters and at the determined center of the crest of the concrete weir of Imperial Dam.

The center of the weir was determined with a 300 foot steel tape. The station is a standard station mark disk, stamped POINT NO 16 1964, cemented in a drill hole in the determined center of the crest of the concrete weir of Imperial Dam.

A traverse connection was made to triangulation station IMPERIAL, the distance being 227.998 meters, east-northeast.

The traverse connection was made with an Electrotape.

The geodetic azimuth from station IMPERIAL to BDRY. PT. NO. 16 is 95° 12' 47".0.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BDRY PT NO 16 ARIZ-CALIF **SECOND-ORDER**
STATE: ARIZONA-CALIFORNIA **YEAR:** 1964
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: G-13386 **FIELD SKETCH:** ARIZ 52-11

GEODETIC LATITUDE: 32 52 58.82283 **ELEVATION:** 55.0 METERS
GEODETIC LONGITUDE: 114 27 50.26191 **180 FEET**

STATE COORDINATES (PM)			
STATE & ZONE	CODE	X	Y
ARIZ. & CALIF. VI	0703 0406	280,816.94 2,548,307.43	685,707.23 265,330.45
			θ (OR Δ) ANGLE - 00 23 16 + 00 58 53

TO STATION OR OBJECT	GEODETIC AZIMUTH (from PM)	PLANE AZIMUTH (from IM)	CODE
IMPERIAL	275 12 42.2	275 35 58	0203
	275 12 42.2	274 13 49	0406

Described by J.R.T.
Com-NC 3412

HORIZONTAL CONTROL DATA

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U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: EDRY. PT. NO. 17 CALIF-ARIZ

CHIEF OF PARTY: L.G. Burdine Year: 1964 State: Arizona County: Yuma Imperial

Description, including sketch of object:

- Boundary Pt. No. 17 lies at the intersection of the two lines as follows:
- (1) A line through Boundary Pt. No. 16 and normal to the longitudinal axis of Imperial Dam.
 - (2) A line extending northeasterly from the center of the overflow section of Laguna Dam (Boundary Pt. No. 18) and normal to the longitudinal axis of the said Laguna Dam.

EDRY. PT. NO. 17 is 42.682 meters or 140.03 feet in azimuth 102° 41' 54" from triangulation station MITTRY.

This boundary point was not marked in the 1964 C&GS survey.

Described by _____
COM-DC 24312

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: 8DRY PT NO 17 ARIZ-CALIF SECOND-ORDER
STATE: ARIZONA-CALIFORNIA YEAR: 1964
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: G-13386 FIELD SKETCH: ARIZ 52-11

GEODETTIC LATITUDE: 32 50 39.81937	ELEVATION:
GEODETTIC LONGITUDE: 114 28 06.22867	METERS
	FEET

STATE COORDINATES (feet)			
STATE & ZONE	CODE	X	Y
ARIZ. H. CALIF. VI	0203 0406	279,358.06 2,547,184.20	671,574.42 251,266.81
			θ (OR Δ) ANGLE - 00 23 23 + 00 58 45

TO STATION OR OBJECT	GEODETTIC AZIMUTH (from station)	PLANE AZIMUTH (from station)	CODE
<p>This boundary point was not marked in the 1964 C&GS survey. The position is at the intersection of the lines normal to the longitudinal axis of the Imperial and Laguna dams. (See description)</p>			

HORIZONTAL CONTROL DATA

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ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MITTRY
CHIEF OF PARTY: L.G. Birdline
STATE: California
COUNTY: Imperial
YEAR: 1964
DESCRIBED BY: W.V. Mast

NAME OF STATION: MITTRY
STATE: CALIFORNIA
YEAR: 1964
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: G-13386
FIELD SKETCH: ARIZ 52-II

NO.	DESCRIPTION	HEIGHT OF TELESCOPE ABOVE STATION MARK	HEIGHT OF LIGHT ABOVE STATION MARK	METERS
1	SUGARLOAF 2 (US)	19.079	00 00	00.0
2	R.M. 2	17.834	125 57	36
3	BLM Sec. Mark T155 R24E (Azimuth Mark)	27.192	162 49	55.5
4	R.M. 1	42.682	220 48	36
5	R.M. 1 to R.M. 2			

The station is located in a sandy brush covered area between the All American Canal and the Colorado River. It is presently in California about 2.65 miles south-southwest of Imperial Dam. 2.15 miles northeast of the center of Laguna Dam, 2.0 miles southwest of the Yuma Proving Ground Headquarters and 1/2 mile west of the west bank of the Colorado River.

To reach the station from Imperial Dam, drive south along the west side of the Colorado River for 0.6 mile to a side road left. Turn left, go east and south along the west side of a canal for 0.5 mile to a side road right and a dike crossing the canal on the left. Turn left, cross the canal on the dike road, thence turn right and go south along the east side of the canal for 0.4 mile to a side road left. Turn left, go east and south on a track road through dense brush for 0.25 mile to a fork. Take the right fork, continue south on the track road for 0.35 mile to a fork. Take the left fork, continue south on the track road for 0.3 mile to a crossroad and the azimuth mark in the northwest angle. Continue south on the track road for 0.3 mile to a crossroad and the station in the southeast angle.

The station mark is a standard disk, stamped MITTRY 1964, brazed to the top of a 2-inch galvanized pipe which projects 10 inches above the ground surface. It is 70 feet south of the center of an east-west track road, 53 feet east of the center of a north-south track road and 2.6 feet northwest of a metal witness post with a sign attached.

Reference mark 1 is a standard disk, stamped MITTRY NO 1 1964, brazed to the top of a 2-inch galvanized pipe which projects 8 inches above the ground surface. It is 57.6 feet northeast of a metal witness post with a sign attached and 15 feet southwest of the center of the east-west track road.

Reference mark 2 is a standard disk, stamped MITTRY NO 2 1964, brazed to the top of a 2-inch galvanized pipe which projects 8 inches above the ground surface. It is 65 feet northwest of a metal witness post with a sign attached and 11 feet east of the center of the north-south track road.

The azimuth mark is a Bureau of Land Management pipe mark with the cap type disk riveted to the top of a 2-1/2 inch galvanized pipe which projects 8 inches above the ground surface. It is 14 feet north of an east-west track road, 8 feet west of the center of a north-south track road and 0.4 foot north of a 4 x 4 inch witness post. The disk is stamped T155 R24E S20 S21 S29 S28 1961.

This station was used as a reference for EDRY. PT. NO. 17 CALIF-ARIZ.
See description of EDRY. PT. 17.

GEODETIC LATITUDE: 32 50 38.49534	ELEVATION: 48.1			
GEODETIC LONGITUDE: 114 28 06.30594	158			
STATE COORDINATES (Fm)				
STATE & ZONE	CODE	X	Y	ANGLE
ARIZ. W. CALIF. VI	0203 0406	279,350.53	671,534.59	- 00 23 23
		2,547,186.01	251,126.83	+ 00 58 44

TO STATION OR OBJECT	GEODETIC AZIMUTH (true north)	PLANE AZIMUTH (true north)	CODE
AZIMUTH MARK T155 R24E BLM	177 45 28.7	178 08 52	0203
AZIMUTH MARK T155 R24E BLM	177 45 28.7	175 46 45	0406

*Refers to notes in manual of triangulation and state publications of triangulation. If description is measured clockwise, referred to initial station. If measured anticlockwise, referred to final station.

HORIZONTAL CONTROL DATA

PUBLISHED AND PRINTED BY:
U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
WASHINGTON D.C.

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

Form 5626
(11-5-53)

NAME OF STATION: **EDRY. FT. NO. 18 CALIF-ARIZ**

CHIEF OF PARTY: **L.G. Burdine** YEAR: **1964** STATE: **Arizona** COUNTY: **Imperial**

DESCRIPTION, including sketch of object:

This station was established as fixed point number 18. It is about 11 miles northeast of Yuma and 5 miles southwest of the Yuma Proving Grounds Headquarters. The station is a standard station mark disk, stamped POINT NO 18 1964, cemented in a drill-hole in the determined center of the crest of the concrete pier of Laguna Dam.

A traverse connection was made to triangulation station LAGUNA, the distance being 50.674 meters, east-southeast.

The center of the pier was determined by Electrolope.

The geodetic azimuth from station LAGUNA to EDRY. FT. NO. 18 is

142° 12' 45".5

Described by **D.R.T.**

FORM-DC 34019

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **BORY PT NO 18 ARIZ-CALIF** SECOND ORDER
STATE: **ARIZONA-CALIFORNIA** YEAR: **1964**
LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**
SOURCE: **G-13386** FIELD SKETCH: **ARIZ 52-II**

GEODETIC LATITUDE: 32 49 24.14592	ELEVATION: 145.8 METERS
GEODETIC LONGITUDE: 114 29 36.00955	150 FEET

STATE COORDINATES (ft)			
STATE & ZONE	CODE	X	Y
ARIZ. M. CALIF. VI	0203 0406	271,644.46 2,536,654.32	664,073.58 243,483.90
			θ (OR Δ OR ANGLE)
			- 00 24 11 + 00 57 55

TO STATION OR OBJECT	GEODETIC AZIMUTH (ft from north)	PLANE AZIMUTH (ft from north)	CODE
BORY REF PT BOLT B LAGUNA DAM	315 01 10.0	315 25 21	0203
BORY REF PT BOLT B LAGUNA DAM	315 01 10.0	314 03 13	0406

HORIZONTAL CONTROL DATA

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

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U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: **EDRY, PT. NO. 19 CALIF-ARIZ**

CHIEF OF PARTY: **L.G. Burdine** Year: **1964** State: **Arizona** County: **Yuma**
Imperial

Description, including sketch of object:

Boundary Pt. No. 19 lies on the centerline of the Colorado River approximately 5800 feet southwesterly of Point 18.

EDRY PT. NO. 19 is 296.126 meters or 971.54 feet in azimuth 114° 10' 19.6 from triangulation station KOOL

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **EDRY PT NO 19 ARIZ-CALIF**

STATE: **ARIZONA-CALIFORNIA** YEAR: **1964**

LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**

SOURCE: **G-13386**

FIELD SKETCH: *

SECOND -ORDER

GEODETTIC LATITUDE: 32° 48' 58.07760	ELEVATION: METERS
GEODETTIC LONGITUDE: 114° 30' 36.22870	FEET

STATE COORDINATES (feet)			
STATE & ZONE	CODE	X	Y
ARIZ W. CALIF VI	0203 0406	266,486.64 2,534,560.00	661,475.58 240,763.50
		θ (OP 1 θ) ANGLE - 0 24 43 + 0 57 22	

TO STATION OR OBJECT	GEODETTIC AZIMUTH (from station)	PLANE AZIMUTH (from station)	CODE
This station was determined by photogrammetric methods and is referenced from triangulation station KOOL (*Ariz. 52-II).			

Described by _____
FORM-DC 34313

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HORIZONTAL CONTROL DATA

by the
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NORTH AMERICAN 1927 DATUM

FORM 323
(6-18-53)

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: KOOL
STATE: Arizona
COUNTY: Yuma
CHIEF OF PARTY: L.G. Burtjns
YEAR: 1964
DESCRIBED BY: J.W. Quesinberry

USGS SURFACE STATION MARK DESCRIPTION	DISTANCE FROM THE GROUND AT THE STATION	HEIGHT OF TELESCOPE ABOVE STATION MARK		BEARING	DISTANCE		DIRECTION
		FEET	METERS		FEET	METERS	
DELTA (USGS) R. M. No. 1 Azimuth Mark R. M. No. 2	Approx. 1.0 mile	94.41	28.777	NE	0	00	00.00
				E	67	54	29
				SW	101.96	31.080	264 00 52

The station is located about 9 miles northeast of Yuma, 5 miles southwest of the Colorado River.

To reach the station from the main entrance to the Yuma Proving Ground Headquarters, go west on a black top road for 0.2 mile to a crossroad at the west end of a bridge over a canal. Turn left and go south along the west side of the canal on a gravel road for 6.0 miles to a flood gate on the right. Continue south on the gravel road for 0.15 mile to a side road and canal on the right. Turn right and go west along the north side of the canal on a dirt road for 0.25 mile to the azimuth mark on the right. Continue west on the dirt road for 0.65 mile to a side road and irrigation ditch on the right. (Note: In the event the field is flooded for irrigation it will be a pack from this point.) Turn right and go southwest along the top of a dike for 0.2 mile, thence south along the top of a sandy dike for 0.1 mile to the station on the left.

The station mark, a standard disk stamped KOOL 1964, is brazed to the top end of a 2-inch cast iron pipe set in concrete and projects 1 foot above the ground surface. It is 31 feet northwest of the northwest edge of a cultivated field, 17 feet southeast of the west edge of a bank and 1.6 feet south of a metal witness post.

Reference mark 1, a standard disk stamped KOOL NO 1 1964, is brazed to the top end of a 2-inch cast iron pipe set in concrete and projects 4 inches above the ground surface. It is 94.5 feet north of the metal witness post, 47 feet northwest of the northwest edge of the cultivated field, 7 feet southeast of the west edge of the bank and 1 foot northwest of a metal post.

Reference mark 2, a standard disk stamped KOOL NO 2 1964, is brazed to the top end of a 2-inch cast iron pipe set in concrete and projects 1 foot above the ground surface. It is 107 feet southwest of the metal witness post, 47 feet northwest of the northwest edge of the cultivated field, 10 feet southeast of the west edge of the bank and 1 foot northwest of a metal post.

Azimuth mark, a standard disk stamped KOOL 1964, is brazed to the top end of a 2-inch cast iron pipe set in concrete and projects 5 inches above the ground surface. It is 70 feet north of the north edge of a canal, 58 feet north of the center of a dirt road, 2 feet south of a telephone pole and 1.7 feet north of a metal witness post. Observation was made from a 64 foot tower.

Note: A four wheel drive vehicle required.

This station was used to locate EDRY. PT. NO. 19 CALIF-ARIZ which lies on the centerline of the Colorado River.

*Refers to notes in manuals of triangulation and state publications of triangulation. †Direction-angle measured clockwise, referred to initial station. ‡To nearest meter only, when no trigonometric leveling is being done.

USCGO-66-2717-1025

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KOOL
STATE: ARIZONA
YEAR: 1964
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: G-13386
FIELD SKETCH: ARIZ 52-II

SECOND-ORDER

GEODETIC LATITUDE: 32 48 54.14142	ELEVATION: 46.5 METERS
GEODETIC LONGITUDE: 114 30 25.84327	153 FEET

STATE & ZONE	CODE	STATE COORDINATES (fm)			θ (OR Δ O) ANGLE
		X	Y	Z	
ARIZ. W. CALIF. VI	0203 0406	267,370.11 2,535,452.87	661,071.42 240,360.55	- 00 24 37 + 00 57 28	

TO STATION OR OBJECT	GEODETIC AZIMUTH (From mark)		PLANE AZIMUTH (From mark)		CODE
	267 22 18-5	267 22 18-5	267 46 56	266 24 51	
AZIMUTH MARK					0203
AZIMUTH MARK					0406

HORIZONTAL CONTROL DATA

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U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

Form 3129
(11-9-55)

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

Name of Station: EDRY, PT. NO. 20 CALIF-ARIZ

Chief of Party: L.G. Burdine **Year:** 1964 **State:** Arizona **County:** Yuma
Imperial
California

Description, including sketch of object:
Boundary Pt. No. 20 lies on the centerline of the Colorado River where said centerline intersects the section line between Sections 4 and 9, Township 8 South, Range 22 West, G11a and Salt River Meridian.

EDRY, PT. NO. 20 is 146.176 meters or 479.58 feet in azimuth 89° 19' 51.6" from triangulation station TBS R22W WS4 FS9.

ADJUSTED HORIZONTAL CONTROL DATA

Name of Station: EDRY PT NO 20 ARIZ-CALIF **SECOND ORDER**
State: ARIZONA-CALIFORNIA **Year:** 1964
Locality: ARIZONA-CALIFORNIA BOUNDARY
Source: 0-13386 **Field Sketch:** *

Geodetic Latitude: 32 45 25.78660	Elevation:
Geodetic Longitude: 114 31 33.33340	Meters
	Feet

STATE COORDINATES (ftm)			
STATE & ZONE	CODE	X	Y
ARIZ W. CALIF VI	0203 0406	261,455.78 2,530,041.79	640,056.34 219,230.23
			θ (OR Δ) ANGLE - 0 25 12 + 0 56 51

TO STATION OR OBJECT	GEODETIC AZIMUTH (From north)	PLANE AZIMUTH (From north)	CODE
This station was determined by photogrammetric methods and is referenced from triangulation station TBS R22W WS4 FS9 (* Ariz. 52-II).			

Described by _____
COM-90 34313

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HORIZONTAL CONTROL DATA

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: T8S R22W W34 P39 (BLM) STATE: Arizona COUNTY: Yuma

CHIEF OF PARTY: L. J. Burdine YEAR: 1964 DESCRIBED BY: J. W. Quisenberry

CLASS.	SURFACE STATION MARK (UNLESS INDICATED OTHERWISE)	HEIGHT OF TELESCOPE ABOVE STATION MARK (IN METERS)	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM STATION	BEARING		DISTANCE		DIRECTION	
				BEARING	DISTANCE	BEARING	DISTANCE	BEARING	DISTANCE
11b	SUGARLOAF 2 (USE) R. M. No. 1	0	0 00 00.00	S	74.82	22.805	0 00 00.00		
11b	R. M. No. 2	0	59 31 02	NNW	88.70	27.034	300 25 38		

The station is located about 5 miles south-southwest of the main blacktop road leading to Laguna Dam, 4 miles north of U.S. Highway 97, at the section line between Section 4 and 9, E-W, Range 22 W of the Salt River and Gila Meridian and on the east bank of the Colorado River.

To reach the station from the junction of U.S. Highways 95 and 80 at the south edge of Yuma, go east on highway 95 for 6.6 miles to a crossroad at the Wims Gila Store. Turn left and go north on a blacktop road for 4.1 miles to a crossroad. Turn left and go west on a dirt road for 0.6 mile to side road left. Turn left cross over a canal, take left fork and go about 100 feet to a fork. Take left fork and go west on a gravel road for 0.05 mile to a earth bridge over a canal. Turn left cross the bridge thence west and south on a field road for 0.2 mile to the station near a dump area.

Station mark, a U.S. Dept. of the Interior Bur. of Land Management Cadastral survey disk, stamped T8S R22W W34 P39 1960, is riveted to the top end of a 2-inch cast iron pipe set in concrete and projects 5 inches above the ground surface. It is 62 feet north of the north edge of a canal, 59 feet west of the center of a track road and 50 feet east of the east edge of the river bank.

Reference mark 1, a standard disk stamped T8S R22W W34 P39 NO 1 1964, is set in the top of a 12-inch round concrete monument that projects 5 inches above the ground surface. It is 56 feet east of the center of the track road, 24 feet north of the north edge of the canal, 1.7 feet north of a metal witness post and about 2 feet higher in elevation than the station.

Reference mark 2, a standard disk stamped T8S R22W W34 P39 NO 2 1964, is set in the top of a 12-inch round concrete monument that projects 4 inches above the ground surface. It is 25 feet east of the west edge of the river bank, 6 feet west of the center of the track road, 1.7 feet south of a metal witness post and about the same elevation as the station.

Notes: No azimuth mark established at this station.

Observations were made from a 64 foot tower.

This station was used to locate BURY, PT. NO. 20 CALIF-ARIZ which lies on the centerline of the Colorado River.

* Refer to notes in manuals of triangulation and state publications of triangulation. (Direction-angle measured clockwise, referred to initial station. 170 nearest meter only, when no trigonometric leveling is being done.)

USCGM-DC 2117-1958

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: T8S R22W W34 P39

STATE: ARIZONA YEAR: 1964

SECOND-ORDER

LOCALITY: ARIZONA-CALIFORNIA BOUNDARY

SOURCE: G-13386

FIELD SKETCH: ARIZ 52-11

GEODETIC LATITUDE:	32 45 25.84204	ELEVATION:	42.7
GEODETIC LONGITUDE:	114 31 27.71824		110
STATE COORDINATES (Fm)			
STATE & ZONE	CODE	X	Y
ARIZ. W. CALIF. VI	0203 0406	261,935.36 2,530,521.19	640,058.43 219,243.76
			θ (OR Δ) ANGLE - 00 25 08 + 00 56 54

TO STATION OR OBJECT	GEODETIC AZIMUTH (From Initial)		PLANE AZIMUTH (From Initial)	CODE
	223 58 42.4	223 58 42.4		
SUGARLOAF 2 USE	223 58 42.4	224 23 50	0203	
SUGARLOAF 2 USE	223 58 42.4	223 01 48	0406	

HORIZONTAL CONTROL DATA

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ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BDRY PT NO 21 BLM ARIZ-CALIF

STATE: ARIZONA-CALIFORNIA YEAR: 1964

SECOND-ORDER

LOCALITY: ARIZONA-CALIFORNIA BOUNDARY

SOURCE: G-13386

FIELD SKETCH: ARIZ 52-11

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: BDRY, PT. NO. 21
(BLM) CALIF-ARIZ
CHIEF OF PARTY: L. G. Burdine
YEAR: 1964
DESCRIBED BY: C. M. Call

Imperial
California
COUNTY: Yuma

SP	SURFACE STATION MARK	OBJECT	BEARING	FEET	METERS	DIRECTION	METERS
11 b	DELTA (USGS)		N 67.25° W	67.25	20.498	00	00.0
11 b	Reference Mark No. 1		SSE	68.68	20.933	12	44.34
	Reference Mark No. 2		SSE	68.68	20.933	151	22.28
	Yuma, Southern Pacific Pipeline Inc.,		SSE	68.68	20.933	152	45.01.7
	West tower of suspension bridge						
	BDRY, PT. NO. 22 (BLM) CALIF-ARIZ					171	50.15.9

NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK 11.59 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.
SURFACE STATION MARK DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT UNDERGROUND STATION MARK OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

The station is located 4-3/4 miles northeast of Yuma, 2-1/2 miles south-southeast of Bard, and 0.65 mile west of the center of the Colorado river. It is in the edge of a field road between a cultivated field and the west bank of an irrigation canal. To reach the station from the post office in Bard, go north and east on paved road for 1.0 mile to a curve to the left with gravelled road straight ahead; continue straight east on gravelled road 0.8 mile to levee embankment. Turn left and go north 0.1 mile to road on right up to top of levee; turn right up on to levee then sharp right and go south along the top 1.8 miles to a fork. Take right fork and go southwest and west 0.8 mile to side road on left; turn left off levee and go south 0.8 mile to a side road on the left. Turn left and go east 0.1 mile to a corner and the station on right just after turning south.

The station mark is a U.S. Bureau of Land Management Cadastral Survey disk stamped CAL ARIZ PT NO 21 64 riveted to the top of a 2-inch iron pipe set in a mass of concrete. It is about 2 inches below the surface of the field road and is 39.4 feet west of the top of the west bank of the irrigation canal and 0.2 feet east of an unpainted, wooden 4x4 witness post.

Reference mark number one is a standard disk stamped CAL ARIZ PT NO 21 MC 1 BLM 1964 cemented in the top of a 12-inch cylindrical concrete monument projecting 5 inches above ground. It is 9 feet west of the top of the west bank of the irrigation canal and 1.4 feet southeast of a metal witness post with sign. It is about 2 feet higher than station elevation.

Reference mark number two is a standard disk stamped CAL ARIZ PT NO 21 MC 2 BLM 1964 cemented in the top of a 14-inch cylindrical monument projecting 3 inches above ground. It is 10 feet west of the top of the west bank of the irrigation canal, 1.7 feet north of a metal witness post with sign, and 18 inches higher than station elevation.

R.M. NO. 1 to R.M. NO. 2 is 127.19 feet (38.768 meters).

STATE & ZONE	CODE	X	Y	ELEVATION:	METERS	FEET
ARIZ. W.	0203	257,679.12	640,039.89		11.6	
CALIF. VI	0406	2,526,266.58	219,123.67		136	

TO STATION OR OBJECT	GEODETIC AZIMUTH (From mark)	PLANE AZIMUTH (From mark)	CODE
BDRY PT NO 22 BLM ARIZ-CALIF	0 00 45.0	0 26 20	0203
BDRY PT NO 22 BLM ARIZ-CALIF	0 00 45.0	359 04 19	0406

STATE COORDINATES (From)

* Refer to notes in manual of triangulation and other publications of triangulation. If there are any measurements, check with reference to initial station. If there are any other measurements, check with reference to initial station.

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WASHINGTON D. C.

FORM 525
12-13-58

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: BDRY PT. NO. 22 STATE: California-
(BLM) CALIF-ARIZ COUNTY: Imperial
Yuma
CHIEF OF PARTY: L. G. Burdine YEAR: 1964 DESCRIBED BY: W. V. M.

DESC.	HEIGHT OF TELESCOPE ABOVE STATION MARK	STATION MARK	HEIGHT OF LIGHT ABOVE STATION MARK	METERS	
				FEET	METERS
11b		POLE		00 00	00.0
		R.M. 1	32.45	9.891	
		R.M. 2	29.45	8.977	
11b		R.M. 1 to R.M. 2	64.80	13.655	
		BDRY PT. NO. 21 (BLM) CALIF-ARIZ		108 58	04.7
		TGS R22W W34 P59		166 47	42.1

The station is located in a very sandy area 6.0 miles southwest of Laguna Dam, 4-1/2 miles northeast of Yuma, 3.0 miles south of Bard and 1.0 mile west of the Colorado River. To reach the station from Imperial Dam, drive southerly on a paved road for 4.85 miles to Laguna Dam. Continue south on a paved road for 1.15 miles to a fork. Take the left fork, straight ahead, and drive southerly on a levee road for 3.65 miles to a fork. Take the right fork and drive southwest and west on a levee road for 0.85 mile to a side road left. Turn left, leaving the levee road, and drive south on a field road for 0.75 mile to road turning left. Turn left and follow the field road east for 0.05 mile to road turning south. Turn right and follow the road south along the east end of a cultivated field for 0.1 mile to an irrigation ditch along the east end of the cultivated field. Leave the road and drive south and west along the west and north side of the irrigation ditch for 0.2 mile to a small wooden bridge over the irrigation ditch. Turn left and drive south, crossing the bridge, thence turn left and drive east on a field road along the north side of a cultivated field for 0.1 mile to the northeast corner of a cultivated field. Turn right and drive south along the east end of a cultivated field 0.04 mile to the southeast corner of a cultivated field. Select way south through sand dunes for 0.25 mile to the station.

The station mark is a Bureau of Land Management cap mark riveted to the top of a 2-1/2 inch galvanized pipe which projects 4 inches above the ground surface. It is 1.5 feet northeast of a metal witness post with a sign attached.

Reference mark 1 is a standard disk, stamped CAL ARIZ PT NO 22 NO 1 1964, set in the top of a cylindrical concrete monument which is 12 inches in diameter and projects 4 inches above the ground surface. It is 33.0 feet north-northwest of a metal witness post with a sign attached.

Reference mark 2 is a standard disk, stamped CAL ARIZ PT NO 22 NO 1 1964, set in the top of a cylindrical concrete monument which is 12 inches in diameter and projects 5 inches above the ground surface. It is 31.0 feet east of a metal witness post with a sign attached.

*References in notes to manuals of triangulation and other publications of triangulation. If the circles-angle measured clockwise, referred to initial station. If the circles-angle measured clockwise, referred to initial station. If the circles-angle measured clockwise, referred to initial station. If the circles-angle measured clockwise, referred to initial station.

HORIZONTAL CONTROL DATA

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BDRY PT NO 22 BLM ARIZ-CALIF
STATE: ARIZONA-CALIFORNIA YEAR: 1964 SECOND-ORDER
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: G-13386 FIELD SKETCH: ARIZ 52-II

GEODETIC LATITUDE:	32 44 59.36240	ELEVATION:	42.8
GEODETIC LONGITUDE:	114 32 17.55954		140

STATE COORDINATES (Feet)

STATE & ZONE	CODE	X	Y	θ (ON Δ G) ANGLE
ARIZ. M. CALIF. VI	0203 0406	257,658.99 2,526,309.12	637,413.75 216,497.79	- 00 25 35 + 00 56 26

TO STATION, OR OBJECT	GEODETIC AZIMUTH (From mark)	PLANE AZIMUTH (From mark)	CODE
BDRY PT NO 21 BLM ARIZ-CALIF	180 00 45.0	180 26 20	0203
BDRY PT NO 21 BLM ARIZ-CALIF	180 00 45.0	179 04 19	0406

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HORIZONTAL CONTROL DATA

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Form 3228 U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY (11-3-55)

TRAVERSE

DESCRIPTION OF TRAVERSE: ~~TRANGULATION~~ ~~TRANGULATION~~ ~~TRANGULATION~~ STATION

NAME OF STATION: EDRY. PT. NO. 24 (GLO) CALIF-ARIZ

CHIEF OF PARTY: L.G. Burdine Year: 1964 State: California County: Imperial Arizona Yuma

Description, including sketch of object:

5 miles northeast of Yuma, Arizona, 3 1/2 miles east of the Government Indian School and the Purisima Concepcion Mission, in the northwest angle of a crossroad and 1 foot southwest of a power pole. A traverse connection was made to triangulation station POLE, distance being 26.26 feet 8.004 meters east of station POLE. The mark is a U.S. General Land Office Survey disk stamped T63 R22W R22N S12 57 S13 S18 CAL ARIZ PT NO 24 1964, and is riveted to the top of a 2 1/2 inch galvanized pipe flush with the surface of the ground. The geodetic azimuth from station POLE to EDRY. PT. NO. 24 (GLO) is 298° 00' 17".

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BORY PT NO 24 GLO ARIZ-CALIF

STATE: ARIZONA-CALIFORNIA YEAR: 1964

SECOND-ORDER

LOCALITY: ARIZONA-CALIFORNIA BOUNDARY

SOURCE: 6-13386 FIELD SKETCH: ARIZ 52-11

NO CHECK ON THIS POSITION

GEODETIC LATITUDE: 32 44 32.51389	ELEVATION:	METERS
GEODETIC LONGITUDE: 114 33 49.32668		FEET

STATE COORDINATES (ftm)			
STATE & ZONE	CODE	X	Y
ARIZ. W. CALIF. VI	0203 0406	249,800.58 2,518,516.23	634,759.66 213,656.98
			- 00 26 24 + 00 55 36

Described by: *ALLEN HARRIS*

COM-DC 3413

HORIZONTAL CONTROL DATA

PUBLISHED AND PRINTED BY:
U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
WASHINGTON D. C.

By the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

TRAVERSE

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: EDRY, PT. NO. 25 (GLO) CALIF-ARIZ

CHIEF OF PARTY: L. G. Burdine **Year:** 1964 **State:** California **Country:** Imperial

Description, including sketch of object:

The station is 3.7 miles south-southwest of Bard, 2.7 miles northeast of the county courthouse in Yuma, and 1 mile north of the Colorado River levee. It is on the east side of a field road at a fence corner in an area of irrigated farm land. The mark is a General Land Office Survey disk of bronze riveted to the top of a 2 1/2-inch iron pipe set in a mass of concrete and is supposed to be stamped CAL ARIZ PT NO 25 T85 R23W S14 T13 S11 512 49 64 but is partly mutilated and not completely legible. It is 10.5 feet east of the center of a field road level with the surface of the road, 1.5 feet west southwest of a fence corner post, 0.4 foot west of an unpainted 4x4 witness post.

A traverse connection was made to triangulation station COB. The distance is 15.447 meters or 50.68 feet.
The geodetic azimuth from station COB to EDRY, PT. NO. 25 (GLO) is 0° 26' 55".

Described by J. G. M. Call

CGM-DC 34313

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: EDRY PT NO 25 GLO ARIZ-CALIF

STATE: ARIZONA-CALIFORNIA **YEAR:** 1964

SECOND-ORDER

LOCALITY: ARIZONA-CALIFORNIA BOUNDARY

FIELD SKETCH: ARIZ 52-II

SOURCE: 6-13386

NO CHECK ON THIS POSITION

GEODETIC LATITUDE: 32 44 32.49666	ELEVATION:
GEODETIC LONGITUDE: 114 34 51.19491	METERS
	FEET

STATE COORDINATES (FAM)			
STATE & ZONE	CODE	X	Y
ARIZ. N. CALIF. V1	0203 0406	244,516.13 2,513,232.34	634,796.94 213,570.21

TO STATION OR OBJECT	GEODETIC AZIMUTH (From 0000)	PLANE AZIMUTH (From 0000)	CODE
Position determined by traverse from station COB.			

HORIZONTAL CONTROL DATA

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U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **BORY, PT. NO. 26** STATE: **Arizona** COUNTY: **Yuma-Imperial**
(**BLM**) **CALIF-ARIZ** STATE: **California** COUNTY: **Yuma-Imperial**
CHIEF OF PARTY: **L.C. Burdine** YEAR: **1964** DESCRIBED BY: **J.E. Sutton**

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **BORY PT NO 26 BLM ARIZ-CALIF** SECOND-ORDER
STATE: **ARIZONA-CALIFORNIA** YEAR: **1964**
LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**
SOURCE: **G-13386** FIELD SKETCH: **ARIZ 52-11**

OBJECT	BEARING	DISTANCE		DIRECTION	
		FEET	METERS		
BEE			00 00	00 00	00.0
11b Reference Mark No. 2	N 85.70	26.120	20 39	31	
11b Reference Mark No. 1	SW 104.61	(31.885)	320 53	28	
COB			100 45	03.0	

NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK **11.9** METERS; HEIGHT OF LIGHT ABOVE STATION MARK METERS.
D=0.0 SURFACE-STATION MARK. DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION.

The station is located about 2-1/2 miles northeast of Yuma and is located in the center of a crossroad.

To reach the station from the City Hall in north Yuma, go east on "1" Street for 0.4 mile to Penitentiary Avenue. Turn left, north on Penitentiary Avenue for 0.25 mile to a Y-fork. Turn right, up over railroad bridge and go north for 0.25 mile to a side road right. Turn right, east, down on to levee road for 2.05 mile to a side road left. Turn left, north, on bladed road for 0.5 mile to a crossroad and the station as described.

The station mark is a Bureau of Land Management mark. It is riveted to the top of a 3 inch galvanized pipe which is 14 inches underground. It is stamped CAL ARIZ PT NO 26 1/4 S14 S13 1949 1964. It is 19 feet east of the center of a north-south field road, 4 feet south of a 4 by 4 wooden witness post and is in the center of an east-west field road. Reference mark No. 1 is a standard disk set in the top of a 12-inch round concrete monument. It projects 7 inches and is stamped CAL ARIZ PT NO 26 1/4 S14 S13 NO 1 1964. It is 74 feet south of an east-west field road, 48 feet east of a north-south field road and 2.2 feet south of a metal witness post and sign. Reference mark No. 2 is a standard disk set in the top of a 12-inch round concrete monument. It projects 10 inches and is stamped CAL ARIZ PT NO 26 1/4 S14 S13 NO 2 1964. It is 66 feet west of a north-south field road, 22 feet north of an east-west field road and 1.7 feet east of a metal witness post and sign.

GEODETIC LATITUDE: 32 44 06.37650	ELEVATION: 38.5
GEODETIC LONGITUDE: 114 34 51.17612	FEET: 126

STATE COORDINATES (FWS)			
STATE & ZONE	CODE	X	Y
ARIZ. W. CALIF. VI	0203 0406	244,496.86 2,513,276.04	632,159.17 210,930.72

TO STATION OR OBJECT	GEODETIC AZIMUTH (From each)		PLANE AZIMUTH (From each)	CODE
	(From each)	(From each)		
COB	179 58 40.4	179 58 40.4	180 25 38	0203
COB	179 58 40.4	179 58 40.4	179 03 38	0406

*Refers to notes in annuals of triangulation and state publications of triangulation. 1-Direction-angle measured clockwise, referred to initial station, 175 degrees true only. *Data on trigonometric leveling is being done. U.S. COM-MDC 27171-998

HORIZONTAL CONTROL DATA

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NORTH AMERICAN 1927 DATUM

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BORY PT NO 27 BLM ARIZ-CALIF
STATE: ARIZONA-CALIFORNIA YEAR: 1964
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY
SOURCE: G-13386 FIELD SKETCH: ARIZ 52-II

NO.*	HEIGHT OF TELESCOPE ABOVE STATION MARK SURFACE STATION MARK HEIGHT OF INSTRUMENTATION MARK	OBJECT	BEARING		DISTANCE		METERS	DIRECTION†	METERS
			BEARING	DIRECTION	FEET	METERS			
11b	BORY PT. NO. 26 (BLM) CALIF-ARIZ	SSE	84.10'	25.635'	0 00 00.00"				
11b	Reference mark No. 1	WNW	58.667'	17.881'	94 32 50"				
11b	Reference mark No. 2				208 55 49"				

The station is located 1/3 mile north of the north edge of the city limits of Yuma, Arizona and the Colorado River, about 0.15 mile north of the buildings of the Government Indian School and the Purisima Concepcion Mission, and on the east shoulder of a paved road in the Yuma Indian Reservation.

To reach the station from the city hall in Yuma, go east on 1st Street to Penitentiary Avenue; turn left and go north on Penitentiary Avenue 0.2 mile to a fork at the north end of the Colorado River bridge. Take the right fork, cross a railroad overpass and go northerly on a paved road for 0.25 mile to a side road on the right; continue northerly on the paved road for 0.1 mile to the station on the right.

Station mark is a U.S. Dept. of the Interior Bur. of Land Management Cadastral Survey disk, stamped CAL ARIZ PT NO 27 1964, riveted to the top of a 2 inch galvanized iron pipe set in concrete and projects 4 inches. It is 18 feet east of the center of the road.

Reference mark No. 1, a standard disk stamped CAL ARIZ PT NO 27 NO 1 1964, set in top of a 12 inch concrete cylinder that projects 3 inches. It is 26.5 feet west of the center of the paved road and 1.5 feet west of a metal witness post with sign.

Reference mark No. 2, a standard disk stamped CAL ARIZ PT NO 27 NO 2 1964, set in top of a 12 inch concrete cylinder that projects 3 inches. It is 24.5 feet west of the center of the paved road and 3.5 feet north of a metal witness post with sign.

GEODETIC LATITUDE: 32 44 04.09639	ELEVATION: 41.2 METERS
GEODETIC LONGITUDE: 114 36 51.47272	135 FEET

STATE COORDINATES (Fm)			
STATE & ZONE	CODE	X	Y
ARIZ. W. CALIF. VI	0203 0406	234,219.23 2,503,004.89	532,010.94 210,537.46
			- 00 28 03 + 00 53 56

TO STATION OR OBJECT	GEODETIC AZIMUTH (From mark)		PLANE AZIMUTH (From mark)		CODE
	GEODETIC AZIMUTH	PLANE AZIMUTH	GEODETIC AZIMUTH	PLANE AZIMUTH	
BORY PT NO 26 BLM ARIZ-CALIF	268 42 22.8	269 10 26	268 42 22.8	269 10 26	0203
BORY PT NO 26 BLM ARIZ-CALIF	268 42 22.8	267 48 27	268 42 22.8	267 48 27	0406

*Refer to sketch in manual of classification and your publications of triangulation. † Direction-angle measured clockwise, referred to initial station. ‡ To nearest arc second only, when no instrument leveling is being used. U.S. GOVERNMENT PRINTING OFFICE: 1955

HORIZONTAL CONTROL DATA

PUBLISHED AND PRINTED BY:
U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
WASHINGTON D.C.

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **BDRY, PT. NO. 28** STATE: **California** COUNTY: **Imperial-Yuma**
(BLM) CALIF-ARIZ ARIZONS
CHIEF OF PARTY: **L.G. Burdino** YEAR: **1964** DESCRIBED BY: **D.J. Novak**

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK	DISTANCE	METERS		DIRECTIONS	METERS
			FEET	METERS		
12a	DELTA (USGS)	66.45	20.954	00 00	00.0	
12b	R.M. 1	48.17	14.662	101 22	26	
	CALIF. PT. NO. 29 (RM 2)	20.16	6.162	286 48	04	
	BDRY, PT. NO. 29 (BLM) CALIF-ARIZ		6.382	295 19	51.9	

The station is located at the Indian Mission Hospital in Yuma, east of the northeast corner of rock wall surrounding the hospital and on road right-of-way. To reach the station from the City Hall in Yuma, go east and north on First Street for 0.6 mile to a fork just after crossing the Colorado River bridge. Turn right and go north on a paved road crossing a wooden bridge for 0.25 mile to the station on the right.

The station mark, a U.S. Department of the Interior Bureau of Land Management Cadeserial survey disk, stamped "CALIF. ARIZ. PT. NO. 28 1964", is riveted to the top end of a 2-inch east iron pipe set in concrete and projects 3 inches above the ground surface. It is 112 feet south of the center of a T-road intersection, 45 feet southeast of power pole number 8725 D with a metal witness post sign, 29 feet east of the northeast corner of a rock wall and 14 feet east of the center of a paved road.

Reference mark 1, a standard disk stamped "CALIF. ARIZ. PT. NO. 28 NO. 1 1964", is cemented in a drill hole in an outcrop and flush with the surface. It is 89 feet southeast of the northeast corner of the rock wall, 66 feet southeast of the center of the paved road and 43 feet south of the center of a track road.

Reference mark 2, a standard disk stamped "CALIF. ARIZ. PT. NO. 29 NO. 1 1964", is cemented in a drill hole in an outcrop and flush with the surface. It is 37.5 feet south of the northeast corner of the rock wall, 19 feet west of the center of the paved road and 4 feet south of the power pole.

Note: No azimuth mark established at this station.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **BDRY PT NO 28 BLM ARIZ-CALIF**
STATE: **ARIZONA-CALIFORNIA** YEAR: **1964** SECOND ORDER
LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**
SOURCE: **G-13386** FIELD SHEET: **ARIZ 52-11**

GEODETTIC LATITUDE:	32 43 57.11177	ELEVATION:	52.3 METERS
GEODETTIC LONGITUDE:	114 36 50.73949		172 FEET

STATE & ZONE	CODE	STATE COORDINATES (Feet)		ELEVATION	θ (OR Δ) ANGLE
		X	Y		
ARIZ. W. CALIF. VI	0203 0406	234,276.11 2,503,078.59	631,304.55 209,832.63	- 00 28 02 + 00 53 56	

TO STATION OR OBJECT	GEODETTIC AZIMUTH (Feet 1916)		PLANE AZIMUTH (Feet 1916)		CODE
	214 37 53.4 214 37 53.4	214 37 53.4 214 37 53.4	215 05 55 213 43 57	215 05 55 213 43 57	
DELTA USGS					0203
DELTA USGS					0406

*Refer to notes in manuals of triangulation and wire publications of triangulation. Direction angle measured clockwise, referred to initial station. If to nearest meter only, when no trigonometric leveling is being done.

U.S. GOVERNMENT PRINTING OFFICE: 1964 O 311719

HORIZONTAL CONTROL DATA

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NORTH AMERICAN 1927 DATUM

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **BDRY. PT. NO. 29 (BLM) CALIF-ARIZ** STATE: **Ariz.-Calif.** COUNTY: **Yuma-Imperial**
 CHIEF OF PARTY: **L.G. Burdick** YEAR: **1964** DESCRIBED BY: **J.N. Questierberry**

NO.	OBJECT	BEARING	FEET	METERS	DIRECTION
12a	BDRY. PT. NO. 26 (BLM) CALIF-ARIZ R. M. No. 2	ESE	88.41	26.948	0 00 00.00
12a	BDRY. PT. NO. 28 (BLM) CALIF-ARIZ R. M. No. 1	N	37.09	11.306	276 16 37
			28.16	8.582	5 11 41

The station is located at the Indian Mission Hospital in Yuma, at the north-east corner of rock wall surrounding the hospital and on road right-of-way.

To reach the station from the City Hall in Yuma, go east and north on First Street for 0.6 mile to a fork just after crossing the Colorado River bridge. Turn right and go north on a paved road crossing a wooden bridge for 0.25 mile to the station on the left.

Station mark, a U.S. Dept. of the Interior Bur. of Land Management Geodetical survey disk, stamped CAL ARIZ PT NO 29 1964, is riveted to the top end of a 2-inch cast iron pipe set in concrete and projects 4 inches above the ground surface. It is 25 feet south of a power pole with a witness post sign, 14.5 feet west of the center of a blacktop road and 0.7 feet east of the northeast corner of a rock wall.

Reference mark 1, a standard disk stamped CAL ARIZ PT NO 29 NO 1 1964, is cemented in a drill hole in an outcrop and flush with the surface. It is 37.5 feet south of the northeast corner of the rock wall, 19 feet east of the center of the blacktop road and 4 feet south of the power pole.

Reference mark 2, a standard disk stamped CAL ARIZ PT NO 28 NO 1 1964, is cemented in a drill hole in an outcrop and flush with the surface. It is 89 feet south-east of the northeast corner of the rock wall, 88 feet southeast of the center of the blacktop road and 48 feet south of the center of a track road.

Note: No azimuth mark established at this station.
 Observations were made from a 20 foot stand.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **BDRY PT NO 29 BLM ARIZ-CALIF** SECOND ORDER
 STATE: **ARIZONA-CALIFORNIA** YEAR: **1964**
 LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**
 SOURCE: **G-13386** FIELD SKETCH: **ARIZ 52-II**

GEODETTIC LATITUDE: GEODETTIC LONGITUDE:	32 43 57.11158 114 36 51.06909	ELEVATION:	52.5 172	
STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ) ANGLE
ARIZ. W. CALIF. V1	0203 0406	234,247.96 2,503,050.43	631,304.76 209,832.17	- 00 28 02 + 00 53 56

TO STATION OR OBJECT	GEODETTIC AZIMUTH (from north)	PLANE AZIMUTH (from north)	CODE
BDRY PT NO 26 BLM ARIZ-CALIF	264 46 01.8	265 14 04	0203
BDRY PT NO 26 BLM ARIZ-CALIF	264 46 01.8	263 52 06	0406

*Refers to marks in manual of triangulation and other publications of triangulation. If direction-angle measured clockwise, referred to true station.
 †To nearest mark only, when no tribrachometric leveling is being done.

HORIZONTAL CONTROL DATA

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NORTH AMERICAN 1927 DATUM

Form 5828
(11-4-55)

U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

DESCRIPTION OF TRANSVERSE TRAVELER'S TRIANGULATION STATION

NAME OF STATION: **EDRY, PT. NO. 30 CALIF-ARIZ**

CHIEF OF PARTY: **L. G. Burdine** YEAR: **1964** STATE: **California** COUNTY: **Imperial**

YUMA

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **BDRY PT NO 30 ARIZ-CALIF**

STATE: **ARIZONA-CALIFORNIA** YEAR: **1964** SECOND ORDER

LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**

SOURCE: **G-13386** FIELD SKETCH: **ARIZ 52-11**

Description, including sketch of object:
The station is located about 0.1 mile north of the Colorado River and the north edge of the city of Yuma. It is in the west curb of the wooden bridge which carries the called road to the Yuma Indian Mission and School over the Southern Pacific Railroad tracks.

To reach the station from the city hall in Yuma, go east on 1st Street to Penitentiary Avenue; turn left and go north on Penitentiary Avenue for a combined distance of 0.6 mile to a fork at the north end of the Colorado River bridge. Take the right fork over the railroad bridge to the station on the left near the northeast end of the bridge.

The mark is a center-punched lag bolt screwed into the 6x6 timber forming the west curb of the bridge. It is marked by the letters 'PT NO 30' carved in the timber just south of the bolt.

A traverse connection was made to PT NO 30 RM (BLM) the distance being 9.2748 meters or 30.43 feet and the bolt is 0.61 meter higher than the RM.

This station is Point Number 30 of the Interstate Boundary Compact between the states of Arizona and California.

The geodetic azimuth from station EDRY, PT. NO. 30 RM to EDRY, PT. NO. 30 is 89° 43' 33".

Described by **G. M. Call**

44 Coast-DC 34313

GEODEIC LATITUDE: 32 43 47.74195	ELEVATION: METERS
GEODEIC LONGITUDE: 114 36 53.13628	FEET

STATE COORDINATES (Fm)			
STATE & ZONE	CODE	K	Y
ARIZ. M. CALIF. VI	0203 0406	234,063.64 2,502,688.71	630,359.28 200,1862.38
			θ (OR Δ) ANGLE - 00 28 03 + 00 53 55

TO STATION OR OBJECT	GEODEIC AZIMUTH (From mark)	PLANE AZIMUTH (From mark)	CODE

HORIZONTAL CONTROL DATA

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Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

Form 325
GPO 1957

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **EDRY. PT. NO. 31** STATE: **California-Aris.-county:Imperial-Yuma**
(**BUM**) **CALIF-ARIZ** OR
CHIEF OF PARTY: **L. G. Burdine** YEAR: **1964** DESCRIBED BY: **G. D. Brack**

OBJECT	MEASUREMENT	DISTANCE		DIRECTION	METERS
		FEET	METERS		
desc. RM 1	S	125.78	(57.728)	82 27 37	00 00 00
desc. RM 2	NNW	194.54	(59.296)	247 16 48	174 57 12.4

NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK 12.05 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.
G.S.S. SURFACE STATION MARK. DISTANCES AND DIRECTIONS TO AZIMUTH MARK. REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

The station is located airline, about 1/2 mile north-northeast of Yuma and 0.2 mile north of the Arizona Check Station on old U. S. Highway 80. To reach the station from the post office in Yuma, go north on Main Street for 0.25 mile to First Street. Turn right and go east and north on First Street (old U. S. Highway 80) for 0.4 mile to a fork at the north end of a bridge over the Colorado River. Take the left fork (old Highway 80) and continue north on the paved road for 0.05 mile to the south end of an old abandoned check station and the station on the right. Station mark is a U. S. Bureau of Land Management bronze disk, stamped CAL ARIZ PT NO 31 1964, brazed to the top of a 5-inch iron pipe which is set in an irregular mass of concrete flush with the surface of the ground. It is 62 feet east of the centerline of old U. S. Highway 80, 20 feet east-northeast of a wooden flagpole and 15 feet south-east of the southeast corner of a brick building. Reference mark 1 is a standard disk, stamped CAL ARIZ PT NO 31 NO 1 1964, cemented in a drill hole in the top of the north end of a concrete abutment which projects about 5 feet above the ground surface. It is 125 feet south of the southwest corner of the brick building, 19 feet east of the centerline of the highway and about 5 feet higher in elevation than the station. Reference mark 2 is a standard disk, stamped CAL ARIZ PT NO 31 NO 2 1964, cemented in a drill hole in the top of the southwest corner of a railroad signal foundation which projects about 2 feet above the ground surface. It is 87 feet east of the centerline of the highway, 55 feet east-northeast of the northeast corner of the brick building, 10 feet southwest of the southwest rail of a railroad track and about the same elevation as the station.

*Refer to notes in pamphlet "Observations and error publications of triangulation. 1 Direction-angle measured clockwise, referred to local meridian. 2 To nearest arc-min only, when an instrument is leveling in being done."
USCGM-DC 27171-104

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **SDRY PT NO 31 BLM ARIZ-CALIF** SECOND-ORDER
STATE: **ARIZONA-CALIFORNIA** YEAR: **1964**
LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**
SOURCE: **G-13386** FIELD SKETCH: **ARIZ 52-11**

GEODETIC LATITUDE:	32 43 47.74164	ELEVATION:	46.5
GEODETIC LONGITUDE:	114 36 54.06545		153

STATE & ZONE	CODE	STATE COORDINATES (Feet)		ELEVATION
		X	Y	
ARIZ. W. CALIF. VI	0203 0406	233,984.26 2,502,809.34	630,359.90 208,881.29	- 00 28 04 + 00 53 54

TO STATION OR OBJECT	GEODETIC AZIMUTH (From last)		PLANE AZIMUTH (From this)		CODE
	84 55 49.5	84 55 49.5	85 23 54	84 01 56	
SDRY PT NO 33 ARIZ-CALIF					0203
SDRY PT NO 33 ARIZ-CALIF					0406

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HORIZONTAL CONTROL DATA

by the
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NORTH AMERICAN 1927 DATUM

Form 5624
(11-3-55)

U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: **EDRY. PT. NO. 32 CALIF-ARIZ**

CHIEF OF PARTY: **L.G. Burdine**

STATE: **Arizona** Country: **Yuma**
CALIFORNIA Imperial

Year: **1964**

Description, including sketch of object:
Boundary Pt. No. 32 lies at the center of the Colorado River
i.e., midway between the north and south shore lines just down-
stream from the centerline of the old U.S. Highway 80 Bridge
across the Colorado River.

EDRY. PT. NO. 32 is 68.246 meters or 223.90 feet in azimuth
3° 17' 25" from triangulation station MISSION.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **EDRY PT NO 32 ARIZ-CALIF**

STATE: **ARIZONIA-CALIFORNIA** YEAR: **1964**

LOCALITY: **ARIZONIA-CALIFORNIA BOUNDARY**

SOURCE: **0-13386** FIELD SKETCH: *

SECOND ORDER

GEODETIC LATITUDE: 32 43 42.4360	ELEVATION:	METERS
GEODETIC LONGITUDE: 114 36 54.21480		FEET

STATE COORDINATES (Feet)			
STATE & ZONE	CODE	X	Y
ARIZ W. CALIF VI	0203 0406	233,967.12 2,502,805.00	629,823.86 208,345.00
			θ (DR & R) ANGLE - 0 28 04 + 0 53 54

TO STATION OR OBJECT	GEODETIC AZIMUTH (From north)	PLANE AZIMUTH (From north)	CODE
This station was determined by photogrammetric methods and is referenced from triangulation station MISSION (*ARIZ. 52-II).			

Described by

COMM-DC 24813

PUBLISHED AND PRINTED BY:
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COAST AND GEODETIC SURVEY
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HORIZONTAL CONTROL DATA

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

FORM 525
10-1-54
U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **MISSION** STATE: **Arizona** COUNTY: **Yuma**
CHIEF OF PARTY: **L. G. Burdine** YEAR: **1964** DESCRIBED BY: **C. M. Call**

OBJECT	BEARING	FEET	METERS	DIRECTION	HEIGHT OF TELESCOPE ABOVE STATION MARK	HEIGHT OF LIGHT ABOVE STATION MARK
SUGARLOAF 2 (USE)		26.32	8.022	00 00 00.0	1.7	0.0
Reference Mark No. 1	ESE	10.68	3.256	57 12 03		
TIGS R228 S35 S36	S	33.97	10.355	119 21 08		
Reference Mark No. 2	WSW			194 51 08		

The station is located at the north edge of the city of Yuma on top of a small, bare, flat-topped, gravel and rock knoll on land of the Yuma Indian Reservation. It is about 0.2 mile south of the buildings of the Government Indian School and the Purisima Conception Mission and on or close to the line between Points 31 and 32 of the Interstate Boundary Compact. The knoll is on the north side of the Colorado River about 80 feet above the water and is out on its east and north sides by the roadway of old U.S. Highway 80.

To reach the station from the city hall in Yuma, go east on 1st Street to Penitentiary Avenue; turn left and go north on Penitentiary Avenue 0.6 mile to a fork at the north end of the Colorado River bridge. Continue northwest 0.1 mile to the second side road on the left at an old building foundation; turn left and go south 100 feet to steep gravel road up onto knoll and the station.

The station mark is a standard disk stamped MISSION 1964 set in the top of a 12-inch cylindrical concrete monument set flush with the ground. It is 40.6 feet west of the east edge of the bluff and 10.7 feet north of a rock retaining wall.

Reference mark number one is a standard disk stamped MISSION NO 1 1964 cemented in a drill hole flush with the top of a rock retaining wall. It is 5.1 feet west of the east end of the wall, 0.9 foot north of the south edge of the wall, and at the same elevation as the station.

Reference mark number two is a standard disk stamped MISSION NO 2 1964 cemented in a drill hole flush with the top of a rock retaining wall. It is 3.2 feet east of the west end of the wall and at the same elevation as the station.

A General Land Office Survey disk stamped TIGS R228 S35 S36 MC MC 49 is cemented in a drill hole flush with the surface of the retaining wall. A distance was measured to the "T" on the disk but it was too close to focus for a closer angle measurement.

This station was used to locate HURY. PT. NO. 32 CALIF-ARIZ which is in the center of the Colorado River.

*References to marks in examples of computations and other publications of triangulation. (Direction-angle measured clockwise, referred to initial meridian. Station 110 degrees East only, also be understood bearing to being used.)
USCGO-65 2171-1-59

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **MISSION** YEAR: **1964** SECOND-ORDER
STATE: **ARIZONA**
LOCALITY: **ARIZONA-CALIFORNIA BOUNDARY**
SOURCE: **G-13386** FIELD SKETCH: **ARIZ 52-11**

GEODETIC LATITUDE:	32 43 44.64841	ELEVATION:	51.6
GEODETIC LONGITUDE:	114 36 54.06437		179
STATE COORDINATES (Feet)			
STATE & ZONE	CODE	X	Y
ARIZ. W. CALIF. VI	0203 0406	233,981.80 2,502,814.34	630,047.29 208,568.71
			θ (OP Δ O) ANGLE
			- 00 28 04 + 00 53 54

TO STATION OR OBJECT	GEODETIC AZIMUTH (From mark)	PLANE AZIMUTH (From mark)	CODE
	240 17 41.8 240 17 41.8	240 45 46 239 23 48	0203 0406
SUGARLOAF 2 USE			
SUGARLOAF 2 USE			

HORIZONTAL CONTROL DATA

PUBLISHED AND PRINTED BY:
U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
WASHINGTON D.C.

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

ADJUSTED HORIZONTAL CONTROL DATA

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: T165 R21E S35 S22 STATE: ARIZONA COUNTY: YUMA DESCRIBED BY: J.E.P.
CHIEF OF PARTY: L.G. Burdine YEAR: 1964

MARK	OBJECT	BEARING	DISTANCE	DIRECTION	METERS	FEET
WEST PILOT 1934					0 00 00.00	
11b	Reference mark No. 1 Yuma, Municipal Standpipe (Light)	E	57.13		152 23 03.4	
	Reference mark No. 2	E	6.0		157 50 00.5	
11b	BDRY. MON. NO. 206 US-MEXICO 1910	S	74.03		268 46 14.2	

The station is about 5 3/4 miles west of Yuma and on the east shore of the Colorado River, 80 feet east of a gauging station. To reach the station from the Yuma City Hall, go west on 1st street 0.2 mile to 4th Ave.; turn left and go south on 4th Ave. 0.8 mile to 8th street. Turn right and go west on 8th street 5.3 miles to a crossroad; continue west on a gravel road 0.6 mile to a railroad track. Cross the railroad track, then turn right and go northerly on a levee road 0.5 miles to a side road on the left; turn left and go west on a dirt road 0.2 miles to a 1-road, two large cottonwood trees on the left and the station west of the intersection. Station mark is a U.S. Bureau of Land Management Cadastral Survey Disk stamped T165, R21E, S35, MC/S35, MC/S32, T88, R24W, 61, riveted to a 1-1/2 inch galvanized pipe projecting 8 inches above the surface of the ground. It is 18 feet west of the center of a metal gate, 54.5 feet north of a wire fence, and 3 feet east of a telephone pole. Reference mark No. 1, a standard disk stamped S35 S22 BLM NO 1 1964, is set in a concrete cylinder 12 inches in diameter and projects 3 inches above the surface of the ground. It is 26 feet southeast of the road intersection, 1 foot southwest of a metal witness post with sign, and 6 inches northwest of a woven wire fence. Reference mark No. 2, a standard disk stamped S35 S22 BLM NO 2 1964, is set in a concrete cylinder 12 inches in diameter and projects 2 inches above the surface of the ground. It is 10 feet east of the center of a gravel road and 5 inches west of a wire fence.

This station was used to locate BDRY. PT. NO. 34 CALIF-ARIZ which lies on the centerline of the Colorado River.

NAME OF STATION: T165 R21E S35 S22 STATE: ARIZONA YEAR: 1964 SECOND-ORDER
LOCALITY: ARIZONA-CALIFORNIA BOUNDARY SOURCE: G-13386 FIELD SKETCH: ARIZ 52-II

GEODETTIC LATITUDE: 32 43 07.55671	ELEVATION: 37.2	METERS
GEODETTIC LONGITUDE: 114 43 03.89804		FEET

STATE COORDINATES (ftm)				
STATE & ZONE	CODE	X	Y	θ (OR Δ C) ANGLE
ARIZ. W. CALIF. VI	0203	202,353.44	626,571.91	- 00 31 23
	0406	2,471,278.22	206,340.59	+ 00 50 31

TO STATION OR OBJECT	GEODETTIC AZIMUTH (from mark)	PLANE AZIMUTH (from mark)	CODE
BOUNDARY MONUMENT NO 206	85 21 06.6	85 22 30	0203
BOUNDARY MONUMENT NO 206	85 21 06.6	84 30 36	0406

*Refers to marks in manuals of triangulation and state publications of triangulation. If direction-measured clockwise, referred to initial station. If to nearest meter only, when no trigonometric leveling is being done. UACOM-52 37,72,845

GEOGRAPHIC POSITIONS AND STATE PLANE COORDINATES OF ALL BOUNDARY POINTS

On the following 25 pages are listed the geographic positions and State plane coordinates of all boundary points determined geodetically and photogrammetrically. The 34 boundary points determined geodetically are given numbers in even hundreds, such as 100, 200, 300, etc. These numbers refer, respectively, to *Boundary Points Nos. 1, 2, 3*, etc. All other points are those determined photogrammetrically and are listed in their proper order between the geodetically determined points. The complete list is from stations 100 through 3400; all in their proper geographical order down river from *Boundary Point No. 1* through *Boundary Point No. 34*. The numbering

of the points corresponds to the system used on the planimetric maps.

All points are listed twice (*Point No. 1* is listed 3 times) in order that the State plane coordinates for both Arizona and California may be included. The capital *T* in the second column refers to the transverse Mercator projection. Where this letter does not appear, the Lambert conformal conic projection is indicated. The code number in the third column identifies the plane coordinate zone to which the listed coordinates refer. The code is explained on each page. The right hand column lists the mapping angle, θ or $\Delta\alpha$. This angle is the difference between the geodetic and grid azimuths at the point listed. Where the minus sign does not appear, a plus sign is to be understood. Minus indicates the geodetic azimuth is less than the grid azimuth; plus indicates the geodetic azimuth is greater than the grid azimuth.

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude	Longitude	State Plane Coordinates x-feet	y-feet	θ or $\Delta\alpha$ Angle
100	T 203	35 00 06.43500	114 37 55.66800	235814.61	1457113.99	- 0 30 21.7
100	405	35 00 06.43500	114 37 55.66800	3008425.11	563423.29	1 55 11.0
100	T 2701	35 00 06.43500	114 37 55.66800	784863.01	92987.90	0 32 44.3
101	T 203	34 58 37.86770	114 37 48.88110	226300.34	1448154.91	- 0 30 16.7
101	405	34 58 37.86770	114 37 48.88110	3009289.50	554493.52	1 55 14.9
102	T 203	34 57 10.41010	114 37 54.04690	235792.47	1439316.84	- 0 30 18.5
102	405	34 57 10.41010	114 37 54.04690	3009156.10	545642.61	1 55 11.9
103	T 203	34 55 53.78900	114 37 51.86230	235906.09	1431568.95	- 0 30 16.3
103	405	34 55 53.78900	114 37 51.86230	3009597.40	537907.13	1 55 13.2
104	T 203	34 54 32.12610	114 37 46.71240	226262.33	1423309.20	- 0 30 12.3
104	405	34 54 32.12610	114 37 46.71240	3010302.70	529670.57	1 55 16.1
105	T 203	34 53 40.56690	114 38 04.69600	234718.48	1418109.87	- 0 30 22.0
105	405	34 53 40.56690	114 38 04.69600	3008980.30	524411.04	1 55 05.9
106	T 203	34 51 08.51660	114 36 34.88990	242067.53	1402672.86	- 0 29 28.7
106	405	34 51 08.51660	114 36 34.88990	3016975.00	509300.00	1 55 57.1
107	T 203	34 50 08.46970	114 35 09.61790	249123.79	1396542.22	- 0 28 39.3
107	405	34 50 08.46970	114 35 09.61790	3024283.60	503473.73	1 56 45.7
108	T 203	34 48 34.07910	114 34 28.02550	252512.53	1386971.00	- 0 28 14.4
108	405	34 48 34.07910	114 34 28.02550	3028073.70	494055.14	1 57 09.4

* Code 203 = Arizona West Zone
 Code 405 = California Zone V
 Code 406 = California Zone VI
 Code 2701 = Nevada East Zone

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	Code	Latitude		Longitude		State Plane Coordinates		θ or Δx Angle
		34 47 37.98290	114 34 12.25370	253781.35	1381289.14	-	0 28 04.7	
109	T	34 47 37.98290	114 34 12.25370	253781.35	1381289.14	-	0 28 04.7	
109	405	34 47 37.98290	114 34 12.25370	3029581.50	488432.46	1 57 18.4		
110	T	34 45 13.74100	114 32 02.63510	264478.00	1366620.65	-	0 26 49.1	
110	405	34 45 13.74100	114 32 02.63510	3040887.80	474230.38	1 58 32.2		
111	T	34 44 18.13840	114 31 02.72060	269434.49	1360960.96	-	0 26 14.3	
111	405	34 44 18.13840	114 31 02.72060	3046078.70	468785.66	1 59 06.4		
200	T	34 43 28.68990	114 29 24.59080	277587.37	1355900.62	-	0 25 17.9	
200	405	34 43 28.68990	114 29 24.59080	3054437.59	464074.75	2 00 02.3		
300	T	34 43 05.36265	114 29 15.20339	278353.66	1353536.62	-	0 25 12.3	
300	405	34 43 05.36265	114 29 15.20339	3055303.05	461745.41	2 00 07.7		
400	T	34 42 59.74271	114 29 12.52097	278573.42	1352966.84	-	0 25 10.7	
400	405	34 42 59.74271	114 29 12.52097	3055546.68	461185.46	2 00 09.2		
500	T	34 42 54.70265	114 29 02.04375	279444.33	1352450.93	-	0 25 04.7	
500	405	34 42 54.70265	114 29 02.04375	3056438.56	460706.86	2 00 15.2		
501	T	34 42 51.36720	114 28 27.35670	282337.61	1352092.75	-	0 24 44.9	
501	405	34 42 51.36720	114 28 27.35670	3059344.20	460471.29	2 00 35.0		
502	T	34 42 36.91500	114 28 08.64100	283889.59	1350620.52	-	0 24 34.1	
502	405	34 42 36.91500	114 28 08.64100	3060956.90	459066.04	2 00 45.6		
503	T	34 42 17.12330	114 28 02.48260	284389.46	1348616.04	-	0 24 30.4	
503	405	34 42 17.12330	114 28 02.48260	3061541.00	457084.61	2 00 49.1		

* Code 203 = Arizona West Zone
 Code 405 = California Zone V
 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude		Longitude		State Plane Coordinates		θ or Δ Angle
		x-foot	y-foot	x-foot	y-foot	x-foot	y-foot	
504	T 203	34 41 46.33460	114 27 57.18650	284809.50	1345500.37	-	0 24 27.1	
504	405	34 41 46.33460	114 27 57.18650	3062092.30	453989.67		2 00 52.2	
505	T 203	34 40 50.09540	114 27 25.64280	287403.45	1339796.37	-	0 24 08.5	
505	405	34 40 50.09540	114 27 25.64280	3064924.80	448400.74		2 01 10.1	
506	T 203	34 40 15.78900	114 27 12.33390	288490.73	1336320.46	-	0 24 00.6	
506	405	34 40 15.78900	114 27 12.33390	3066157.90	444974.08		2 01 17.7	
507	T 203	34 39 59.17780	114 26 59.49920	289551.07	1334633.72	-	0 23 53.1	
507	405	34 39 59.17780	114 26 59.49920	3067288.50	443333.76		2 01 25.0	
508	T 203	34 39 38.89460	114 27 18.10970	287982.20	1332594.08	-	0 24 03.5	
508	405	34 39 38.89460	114 27 18.10970	3065807.30	441229.79		2 01 14.4	
509	T 203	34 39 29.35100	114 27 26.50450	287274.16	1331634.21	-	0 24 08.2	
509	405	34 39 29.35100	114 27 26.50450	3065140.50	440240.92		2 01 09.6	
510	T 203	34 38 53.02320	114 26 44.65180	290745.09	1327937.41	-	0 23 44.0	
510	405	34 38 53.02320	114 26 44.65180	3068764.30	436694.28		2 01 33.5	
511	T 203	34 38 08.02660	114 26 23.70230	292464.24	1323376.58	-	0 23 31.7	
511	405	34 38 08.02660	114 26 23.70230	3070674.50	432210.42		2 01 45.4	
512	T 203	34 37 35.31020	114 26 20.76880	292686.76	1320067.54	-	0 23 29.7	
512	405	34 37 35.31020	114 26 20.76880	3071036.60	428913.94		2 01 47.1	
513	T 203	34 37 13.99340	114 26 14.15030	293225.17	1317906.82	-	0 23 25.7	
513	405	34 37 13.99340	114 26 14.15030	3071665.70	426780.00		2 01 50.9	

* Code 203 = Arizona West Zone
 Code 405 = California Zone V
 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude	Longitude	State Plane Coordinates X-feet	State Plane Coordinates Y-feet	θ or Δx Angle
514	T 203	34 36 57.47800	114 25 49.70920	295256.59	1316225.40	- 0 23 11.7
514	405	34 36 57.47800	114 25 49.70920	3073766.30	425183.99	2 02 04.8
515	T 203	34 36 26.14430	114 25 24.44210	297347.26	1313043.66	- 0 22 57.0
515	405	34 36 26.14430	114 25 24.44210	3075989.40	422093.59	2 02 19.2
516	T 203	34 35 58.45030	114 25 30.76460	296800.04	1310247.57	- 0 23 00.3
516	405	34 35 58.45030	114 25 30.76460	3075560.80	419277.04	2 02 15.6
517	T 203	34 35 41.93690	114 26 07.17530	293744.89	1308598.73	- 0 23 20.8
517	405	34 35 41.93690	114 26 07.17530	3072578.20	417500.72	2 01 54.9
518	T 203	34 35 30.56170	114 26 01.42510	294217.82	1307445.54	- 0 23 17.5
518	405	34 35 30.56170	114 26 01.42510	3073099.40	416368.58	2 01 58.1
519	T 203	34 34 15.75090	114 24 19.53190	302687.42	1299826.34	- 0 22 18.9
519	405	34 34 15.75090	114 24 19.53190	3081882.80	409114.34	2 02 56.2
520	T 203	34 33 00.37290	114 23 34.65610	306391.64	1292182.23	- 0 21 52.7
520	405	34 33 00.37290	114 23 34.65610	3085906.40	401633.89	2 03 21.8
521	T 203	34 31 52.93460	114 22 52.06560	309911.57	1285342.43	- 0 21 28.0
521	405	34 31 52.93460	114 22 52.06560	3089711.90	394949.18	2 03 46.1
522	T 203	34 30 22.62660	114 22 38.78730	310965.84	1276206.33	- 0 21 19.6
522	405	34 30 22.62660	114 22 38.78730	3091151.00	385866.14	2 03 53.6
523	T 203	34 28 29.81240	114 22 51.82030	309803.99	1264808.83	- 0 21 26.0
523	405	34 28 29.81240	114 22 51.82030	3090471.50	374430.24	2 03 46.2

* Code 203 = Arizona West Zone
 Code 405 = California Zone V
 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude	Longitude	x-feet	y-feet	θ or Δα Angle
524	T 203	34 27 00.26740	114 22 39.28140	310797.65	1255750.33	- 0 21 18.1
524	405	34 27 00.26740	114 22 39.28140	3091846.70	365422.13	2 03 53.4
525	T 203	34 26 52.30460	114 21 44.55680	315375.73	1254917.33	- 0 20 47.1
525	405	34 26 52.30460	114 21 44.55680	3096455.70	364783.20	2 04 24.6
526	T 203	34 26 59.51300	114 21 01.51350	318984.83	1255624.44	- 0 20 22.3
526	405	34 26 59.51300	114 21 01.51350	3100031.60	365642.03	2 04 49.1
527	T 203	34 26 57.14150	114 20 00.73400	324073.47	1255354.96	- 0 19 48.4
527	405	34 26 57.14150	114 20 00.73400	3105126.90	365587.64	2 05 23.7
528	T 203	34 26 14.03700	114 19 30.38920	326590.00	1250983.08	- 0 19 30.8
528	405	34 26 14.03700	114 19 30.38920	3107825.70	361326.07	2 05 41.0
529	T 203	34 25 48.23910	114 18 25.95950	331972.17	1248345.07	- 0 18 54.2
529	405	34 25 48.23910	114 18 25.95950	3113314.30	358917.73	2 06 17.8
530	T 203	34 25 26.10610	114 17 49.04530	335052.22	1246090.86	- 0 18 35.1
530	405	34 25 26.10610	114 17 49.04530	3116486.70	356795.65	2 06 38.6
531	T 203	34 24 56.55260	114 17 27.95920	336802.69	1243093.89	- 0 18 21.0
531	405	34 24 56.55260	114 17 27.95920	3118362.10	353875.34	2 06 50.8
532	T 203	34 24 20.70540	114 17 12.09150	338112.89	1239463.14	- 0 18 11.7
532	405	34 24 20.70540	114 17 12.09150	3119824.40	350303.23	2 06 59.9
533	T 203	34 24 10.97290	114 16 37.72480	340987.34	1238464.20	- 0 17 52.3
533	405	34 24 10.97290	114 16 37.72480	3122738.40	349426.57	2 07 19.5

* Code 203 - Arizona West Zone
 Code 405 - California Zone V
 Code 406 - California Zone VI

* Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	Code	Latitude	Longitude	State Plane Coordinates X-foot	State Plane Coordinates Y-foot	θ or $\Delta\alpha$ Angle
534	T 203	34 24 03.51250	114 15 47.53150	345189.32	1237688.48	- 0 17 23.8
534	405	34 24 03.51250	114 15 47.53150	3126969.30	348828.96	2 07 48.1
535	T 203	34 23 15.82140	114 14 53.23190	349715.63	1232844.86	- 0 16 52.8
535	405	34 23 15.82140	114 14 53.23190	3131696.00	344180.88	2 08 19.0
536	T 203	34 22 27.01050	114 13 56.33400	354460.62	1227887.70	- 0 16 20.3
536	405	34 22 27.01050	114 13 56.33400	3126646.00	339428.57	2 08 51.5
537	T 203	34 21 53.84760	114 13 30.98290	356569.87	1224525.37	- 0 16 05.8
537	405	34 21 53.84760	114 13 30.98290	3138895.30	336158.32	2 09 05.9
538	T 203	34 21 26.84710	114 11 50.66590	364967.39	1221757.78	- 0 15 09.0
538	405	34 21 26.84710	114 11 50.66590	3147402.10	333747.81	2 10 03.1
539	T 203	34 21 19.22150	114 11 05.00960	368791.78	1220970.31	- 0 14 43.2
539	405	34 21 19.22150	114 11 05.00960	3151256.30	333122.54	2 10 29.1
540	T 203	34 19 54.44690	114 10 01.68440	374065.72	1212378.57	- 0 14 06.9
540	405	34 19 54.44690	114 10 01.68440	3156888.30	324761.19	2 11 05.2
541	T 203	34 18 23.08830	114 08 21.19370	382457.75	1203110.16	- 0 13 09.7
541	405	34 18 23.08830	114 08 21.19370	3165664.20	315855.40	2 12 02.5
542	T 203	34 18 13.96660	114 08 12.18620	383209.86	1202185.21	- 0 13 04.6
542	405	34 18 13.96660	114 08 12.18620	3166454.70	314963.03	2 12 07.6
543	T 203	34 18 02.43690	114 08 14.50970	383010.49	1201020.48	- 0 13 05.9
543	405	34 18 02.43690	114 08 14.50970	3166304.70	313790.92	2 12 06.3

* Code 203 = Arizona West Zone
 Code 405 = California Zone V
 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	Code	Latitude		Longitude		State Plane Coordinates		θ or Δα Angle
		Code	Value	Code	Value	x-feet	y-feet	
600	T	203	34 17 47.92195	114 08 18.43732		382675.39	1199554.50	- 0 13 08.0
600		405	34 17 47.92195	114 08 18.43732		31666031.79	312312.11	2 12 04.1
601	T	203	34 16 51.64470	114 08 05.41550		383746.36	1193861.60	- 0 13 00.3
601		405	34 16 51.64470	114 08 05.41550		3167342.20	306669.45	2 12 11.5
602	T	203	34 16 30.02170	114 08 09.78260		383371.61	1191677.25	- 0 13 02.7
602		405	34 16 30.02170	114 08 09.78260		3167060.00	304471.22	2 12 09.0
603	T	203	34 15 47.61220	114 07 49.25030		385078.64	1187383.84	- 0 12 50.9
603		405	34 15 47.61220	114 07 49.25030		3168946.80	300253.67	2 12 20.7
604	T	203	34 15 29.89270	114 07 56.09790		384497.18	1185594.84	- 0 12 54.6
604		405	34 15 29.89270	114 07 56.09790		3163441.40	293441.71	2 12 16.8
605	T	203	34 15 29.72480	114 08 13.01660		383077.04	1185583.23	- 0 13 04.2
605		405	34 15 29.72480	114 08 13.01660		3167023.00	298370.16	2 12 07.1
606	T	203	34 15 34.43710	114 08 41.77520		380665.02	1186068.84	- 0 13 20.4
606		405	34 15 34.43710	114 08 41.77520		3164592.60	298753.48	2 11 50.8
607	T	203	34 15 28.19700	114 09 11.29010		378185.21	1185447.78	- 0 13 37.0
607		405	34 15 28.19700	114 09 11.29010		3162141.20	298028.28	2 11 33.9
608	T	203	34 15 34.46350	114 09 49.08670		375015.28	1186093.95	- 0 13 58.3
608		405	34 15 34.46350	114 09 49.08670		3158946.80	298540.05	2 11 12.4
609	T	203	34 15 04.39560	114 09 49.81240		374942.02	1183054.82	- 0 13 58.5
609		405	34 15 04.39560	114 09 49.81240		3159001.90	295500.50	2 11 12.0

* Code 203 = Arizona West Zone
 Code 405 = California Zone V
 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	Code	Latitude	Longitude	x-foot	y-foot	θ or Δx Angle
610	T	34 14 55.02230	114 10 08.12840	373400.62	1182113.62	- 0 14 08.8
610		34 14 55.02230	114 10 08.12840	3157501.60	294495.08	2 11 01.5
611	T	34 14 46.39880	114 10 28.82640	371659.49	1181249.12	- 0 14 20.4
611		34 14 46.39880	114 10 28.82640	3155798.50	293557.83	2 10 49.7
612	T	34 14 24.76230	114 10 35.88190	371058.03	1179064.50	- 0 14 24.2
612		34 14 24.76230	114 10 35.88190	3155289.80	291349.75	2 10 45.7
613	T	34 14 05.71080	114 11 02.76440	368792.94	1177148.24	- 0 14 39.2
613		34 14 05.71080	114 11 02.76440	3153107.60	289339.56	2 10 30.4
614	T	34 13 13.71570	114 12 04.78190	363562.73	1171915.03	- 0 15 13.8
614		34 13 13.71570	114 12 04.78190	3148102.90	283890.19	2 09 55.0
615	T	34 12 37.46530	114 12 43.84100	360266.18	1168265.42	- 0 15 35.5
615		34 12 37.46530	114 12 43.84100	3144963.30	280104.64	2 09 32.8
616	T	34 12 06.32830	114 13 31.16580	356277.00	1165136.27	- 0 16 01.9
616		34 12 06.32830	114 13 31.16580	3141109.70	276809.88	2 09 05.8
617	T	34 11 40.39650	114 13 26.41390	356663.94	1162513.14	- 0 15 59.0
617		34 11 40.39650	114 13 26.41390	3141607.00	274205.40	2 09 08.5
618	T	34 11 08.38720	114 13 53.73490	354353.71	1159288.29	- 0 16 14.2
618		34 11 08.38720	114 13 53.73490	3139434.90	270885.88	2 08 52.9
619	T	34 10 55.84070	114 14 28.13730	351457.53	1158033.84	- 0 16 33.4
619		34 10 55.84070	114 14 28.13730	3136594.20	269510.31	2 08 33.3

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 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	Code	Latitude			Longitude			State Plane Coordinates		θ or Az Angle
		34 10	30.21330	114 15	04.15890	X-feet	Y-feet			
620	T	203	34 10 30.21330	114 15 04.15890	348418.57	1155458.07	-	0 16 53.5		
620		405	34 10 30.21330	114 15 04.15890	3133666.60	266808.57		2 08 12.8		
700	T	203	34 10 13.41020	114 16 05.32480	343270.87	1153785.24	-	0 17 27.7		
700		405	34 10 13.41020	114 16 05.32480	3128594.00	264920.00		2 07 37.9		
800	T	203	34 10 20.19675	114 16 28.40019	341335.53	1154481.15	-	0 17 40.7		
800		405	34 10 20.19675	114 16 28.40019	3126631.00	265533.64		2 07 24.8		
900	T	203	34 10 14.87530	114 17 10.57050	337789.49	1153961.67	-	0 18 04.3		
900		405	34 10 14.87530	114 17 10.57050	3123110.00	264865.00		2 07 00.7		
1000	T	203	34 10 00.00000	114 17 31.46000	336026.30	1152467.31	-	0 18 16.0		
1000		405	34 10 00.00000	114 17 31.46000	3121411.41	263297.57		2 06 48.8		
1100	T	203	34 09 34.34031	114 17 53.11631	334192.65	1149883.27	-	0 18 27.9		
1100		405	34 09 34.34031	114 17 53.11631	3119688.40	260638.44		2 06 36.5		
1101	T	203	34 08 23.92880	114 19 06.19160	328012.19	1142799.46	-	0 19 08.4		
1101		405	34 08 23.92880	114 19 06.19160	3113812.20	253300.14		2 05 54.8		
1102	T	203	34 08 01.64340	114 20 18.59930	321913.07	1140581.27	-	0 19 48.8		
1102		405	34 08 01.64340	114 20 18.59930	3107812.00	250826.63		2 05 13.6		
1103	T	203	34 07 53.30370	114 21 15.82540	317097.65	1139766.37	-	0 20 20.9		
1103		405	34 07 53.30370	114 21 15.82540	3103035.20	249809.35		2 04 40.9		
1104	T	203	34 07 15.38710	114 21 46.01680	314536.70	1135948.78	-	0 20 37.5		
1104		405	34 07 15.38710	114 21 46.01680	3100637.50	245887.13		2 04 23.7		

* Code 203 = Arizona West Zone
 Code 405 = California Zone V
 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	* Code			State Plane Coordinates		θ or Δ Angle
		Latitude	Longitude	x-foot	y-foot		
1105	T	34 06 53.53670	114 22 52.43170	308939.36	1133774.08	- 0 21 14.5	
1105	405	34 06 53.53670	114 22 52.43170	3095136.80	243478.28	2 03 45.9	
1106	T	34 06 36.46020	114 23 23.30030	306333.15	1132064.09	- 0 21 31.7	
1106	405	34 06 36.46020	114 23 23.30030	3092605.00	241659.90	2 03 28.3	
1107	T	34 06 42.17970	114 24 02.70680	303023.39	1132663.16	- 0 21 53.8	
1107	405	34 06 42.17970	114 24 02.70680	3089272.90	242118.90	2 03 05.8	
1108	T	34 06 23.16770	114 24 59.26940	298254.94	1130772.03	- 0 22 25.4	
1108	405	34 06 23.16770	114 24 59.26940	3084588.40	240028.38	2 02 33.6	
1109	T	34 05 31.54810	114 25 39.72220	294818.77	1125576.55	- 0 22 47.6	
1109	405	34 05 31.54810	114 25 39.72220	3081374.30	234692.62	2 02 10.5	
1110	T	34 05 11.30460	114 26 00.90920	293023.22	1123542.14	- 0 22 59.2	
1110	405	34 05 11.30460	114 26 00.90920	3079566.10	232584.31	2 01 58.4	
1111	T	34 03 55.35910	114 26 15.72310	291725.63	1115873.73	- 0 23 06.8	
1111	405	34 03 55.35910	114 26 15.72310	3078692.90	224867.94	2 01 50.0	
1112	T	34 02 48.20460	114 26 09.92420	292167.96	1109082.32	- 0 23 02.9	
1112	405	34 02 48.20460	114 26 09.92420	3079421.10	218101.14	2 01 53.3	
1113	T	34 01 21.57940	114 26 13.91260	291773.57	1100328.33	- 0 23 04.3	
1113	405	34 01 21.57940	114 26 13.91260	3079396.00	209338.17	2 01 51.0	
1114	T	34 01 01.74070	114 26 31.25390	290300.40	1098332.83	- 0 23 13.8	
1114	405	34 01 01.74070	114 26 31.25390	3078008.20	207282.31	2 01 41.1	

* Code 203 = Arizona West Zone
 * Code 405 = California Zone V

* Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude		Longitude		State Plane Coordinates		θ or Δ Angle
		34 00	43.30630	114 27	47.15530	X-feet	Y-feet	
1115	T 203	34 00	43.30630	114 27	47.15530	283898.35	1096513.28	- 0 23 56.0
1115	405	34 00	43.30630	114 27	47.15530	3071688.40	205194.55	2 00 57.9
1116	T 203	34 00	20.78990	114 27	59.64860	282830.73	1094244.62	- 0 24 02.8
1116	405	34 00	20.78990	114 27	59.64860	3070717.30	202882.88	2 00 50.8
1117	T 203	34 00	01.55320	114 27	32.50160	285102.70	1092284.24	- 0 23 47.4
1117	405	34 00	01.55320	114 27	32.50160	3073069.90	201019.94	2 01 06.2
1118	T 203	33 59	38.09170	114 27	35.77500	284810.68	1089914.63	- 0 23 49.0
1118	406	33 59	38.09170	114 27	35.77500	2542601.60	669510.86	0 59 01.2
1119	T 203	33 59	33.84560	114 28	01.52860	282639.25	1089500.53	- 0 24 03.4
1119	406	33 59	33.84560	114 28	01.52860	2540440.70	669044.55	0 58 47.1
1120	T 203	33 59	06.84880	114 28	25.43920	280606.70	1086785.80	- 0 24 16.4
1120	406	33 59	06.84880	114 28	25.43920	2538474.10	666281.54	0 58 33.9
1121	T 203	33 58	36.43820	114 28	59.54470	277712.77	1083732.27	- 0 24 35.2
1121	406	33 58	36.43820	114 28	59.54470	2535654.50	663159.09	0 58 15.2
1122	T 203	33 58	01.53270	114 29	38.23230	274429.06	1080227.45	- 0 24 56.4
1122	406	33 58	01.53270	114 29	38.23230	2532456.10	659576.07	0 57 53.9
1123	T 203	33 57	27.58260	114 30	27.58930	270246.57	1076826.16	- 0 25 23.6
1123	406	33 57	27.58260	114 30	27.58930	2528356.70	656074.93	0 57 26.8
1124	T 203	33 57	28.24640	114 30	55.02560	267935.98	1076910.42	- 0 25 39.0
1124	406	33 57	28.24640	114 30	55.02560	2526044.70	656103.47	0 57 11.7

* Code 203 = Arizona West Zone
 Code 405 = California Zone V
 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude	Longitude	State Plane Coordinates		θ or Δα Angle
				X-feet	Y-feet	
1125	T 203	33 56 30.35980	114 31 50.30570	263234.93	1071094.26	- 0 26 09.2
1125	406	33 56 30.35980	114 31 50.30570	2521485.10	650175.64	0 56 41.3
1126	T 203	33 55 31.99380	114 32 03.09240	262112.56	1065202.77	- 0 26 15.7
1126	406	33 55 31.99380	114 32 03.09240	2520505.00	644258.74	0 56 34.3
1127	T 203	33 54 49.64440	114 30 48.17290	268393.96	1060874.47	- 0 25 33.4
1127	406	33 54 49.64440	114 30 48.17290	2526888.90	640082.99	0 57 15.5
1128	T 203	33 54 07.26460	114 30 27.16760	270132.66	1056577.59	- 0 25 21.2
1128	406	33 54 07.26460	114 30 27.16760	2528730.60	635829.20	0 57 27.0
1129	T 203	33 53 52.03320	114 30 57.38200	267574.41	1055056.89	- 0 25 37.9
1129	406	33 53 52.03320	114 30 57.38200	2526209.70	634247.29	0 57 10.4
1130	T 203	33 54 04.80570	114 31 29.17800	264903.93	1056368.04	- 0 25 55.8
1130	406	33 54 04.80570	114 31 29.17800	2523508.40	635493.74	0 56 53.0
1131	T 203	33 53 20.19900	114 31 06.60710	266772.72	1051844.88	- 0 25 42.7
1131	406	33 53 20.19900	114 31 06.60710	2525485.60	631016.89	0 57 05.4
1132	T 203	33 52 43.00250	114 30 20.51120	270631.08	1048056.23	- 0 25 16.6
1132	406	33 52 43.00250	114 30 20.51120	2529434.10	627322.24	0 57 30.7
1133	T 203	33 52 28.05980	114 30 09.49880	271548.50	1046539.01	- 0 25 10.3
1133	406	33 52 28.05980	114 30 09.49880	2530387.80	625827.54	0 57 36.7
1134	T 203	33 52 00.55740	114 30 09.16410	271556.37	1043758.87	- 0 25 09.8
1134	406	33 52 00.55740	114 30 09.16410	2530462.60	623048.38	0 57 36.9

* Code 203 = Arizona West Zone
Code 406 = California Zone VI

* Code 203 = Arizona West Zone
Code 405 = California Zone V

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude	Longitude	State Plane Coordinates x-feet	y-feet	θ or Δx Angle
1135	T 203	33 51 45.97930	114 30 28.54050	269911.61	1042297.32	- 0 25 20.4
1135	406	33 51 45.97930	114 30 28.54050	2528853.50	621547.66	0 57 26.3
1136	T 203	33 51 29.56820	114 30 53.10560	267927.73	1040653.83	- 0 25 33.9
1136	406	33 51 29.56820	114 30 53.10560	2526809.80	619854.46	0 57 12.8
1137	T 203	33 51 34.88050	114 31 31.23500	264616.22	1041214.88	- 0 25 55.2
1137	406	33 51 34.88050	114 31 31.23500	2523585.70	620338.03	0 56 51.8
1138	T 203	33 51 06.68510	114 31 45.82220	263364.45	1038374.19	- 0 26 03.0
1138	406	33 51 06.68510	114 31 45.82220	2522402.70	617468.02	0 56 43.8
1139	T 203	33 50 08.80050	114 31 22.35390	265299.80	1032508.31	- 0 25 49.3
1139	406	33 50 08.80050	114 31 22.35390	2524478.70	611650.44	0 56 56.7
1140	T 203	33 49 27.28370	114 31 09.58920	266345.19	1028303.75	- 0 25 41.7
1140	406	33 49 27.28370	114 31 09.58920	2525625.00	607472.30	0 57 03.7
1141	T 203	33 49 08.34900	114 31 18.82400	265551.74	1026395.68	- 0 25 46.7
1141	406	33 49 08.34900	114 31 18.82400	2524877.70	605545.69	0 56 58.6
1142	T 203	33 48 55.44640	114 31 37.32360	263981.04	1025103.24	- 0 25 56.8
1142	406	33 48 55.44640	114 31 37.32360	2523338.60	604215.82	0 56 48.5
1143	T 203	33 47 47.11890	114 31 04.46320	266702.15	1018175.97	- 0 25 37.8
1143	406	33 47 47.11890	114 31 04.46320	2526225.60	597356.11	0 57 06.5
1144	T 203	33 45 36.26200	114 30 14.49950	270821.98	1004918.02	- 0 25 08.6
1144	406	33 45 36.26200	114 30 14.49950	2530663.20	584201.27	0 57 34.0

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Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude	Longitude	x-feet	y-feet	θ or Δx Angle
1145	T 203	33 44 06.44270	114 30 41.04670	268513.59	995855.75	- 0 25 22.3
1145	406	33 44 06.44270	114 30 41.04670	2528573.50	575086.21	0 57 19.4
1200	T 203	33 43 58.11276	114 30 36.04447	268929.84	995010.66	- 0 25 19.4
1200	406	33 43 58.11276	114 30 36.04447	2529009.94	574251.40	0 57 22.2
1201	T 203	33 43 12.21920	114 29 46.88310	273048.26	990341.55	- 0 24 51.6
1201	406	33 43 12.21920	114 29 46.88310	2533239.40	569682.75	0 57 49.2
1202	T 203	33 41 56.77570	114 29 44.51980	273192.80	982714.49	- 0 24 49.5
1202	406	33 41 56.77570	114 29 44.51980	2533567.30	562061.51	0 57 50.5
1203	T 203	33 41 32.38680	114 30 24.28190	269815.28	980273.78	- 0 25 11.3
1203	406	33 41 32.38680	114 30 24.28190	2530249.50	559540.33	0 57 28.6
1204	T 203	33 41 09.55740	114 31 23.43260	264800.03	978003.27	- 0 25 43.9
1204	406	33 41 09.55740	114 31 23.43260	2525290.40	557149.96	0 56 56.1
1205	T 203	33 40 36.13440	114 31 48.82970	262628.41	974641.11	- 0 25 57.6
1205	406	33 40 36.13440	114 31 48.82970	2523200.30	553736.63	0 56 42.2
1206	T 203	33 40 03.31930	114 31 48.63810	262619.56	971324.14	- 0 25 57.1
1206	406	33 40 03.31930	114 31 48.63810	2523271.20	550420.50	0 56 42.3
1207	T 203	33 39 32.60410	114 30 47.92950	267727.72	968181.24	- 0 25 23.1
1207	406	33 39 32.60410	114 30 47.92950	2528453.30	547401.38	0 57 15.6
1208	T 203	33 39 21.50580	114 31 30.73590	264100.95	967086.39	- 0 25 46.7
1208	406	33 39 21.50580	114 31 30.73590	2524854.00	546219.70	0 56 52.1

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Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude	Longitude	State Plane Coordinates		θ or Δx Angle
				x-feet	y-feet	
1209	T 203	33 39 13.93110	114 31 51.49340	262340.51	966333.97	- 0 25 58.1
1209	406	33 39 13.93110	114 31 51.49340	2523112.20	545425.20	0 56 40.7
1210	T 203	33 39 02.22300	114 31 58.58370	261732.18	965155.09	- 0 26 01.9
1210	406	33 39 02.22300	114 31 58.58370	2522532.40	544232.07	0 56 36.8
1211	T 203	33 38 40.72130	114 31 45.05480	262859.49	962973.13	- 0 25 54.2
1211	406	33 38 40.72130	114 31 45.05480	2523711.80	542077.91	0 56 44.2
1212	T 203	33 38 17.21560	114 31 24.02280	264619.82	960583.92	- 0 25 42.3
1212	406	33 38 17.21560	114 31 24.02280	2525529.00	539731.76	0 56 55.8
1213	T 203	33 37 50.54480	114 31 31.40640	263975.34	957892.81	- 0 25 46.1
1213	406	33 37 50.54480	114 31 31.40640	2524949.40	537026.02	0 56 51.7
1214	T 203	33 37 45.61930	114 31 47.02430	262650.99	957404.89	- 0 25 54.6
1214	406	33 37 45.61930	114 31 47.02430	2523637.20	536506.41	0 56 43.1
1215	T 203	33 37 30.39850	114 31 49.89110	262396.98	955868.26	- 0 25 56.1
1215	406	33 37 30.39850	114 31 49.89110	2523420.20	534964.18	0 56 41.6
1216	T 203	33 37 12.28410	114 31 40.33620	263191.19	954031.24	- 0 25 50.6
1216	406	33 37 12.28410	114 31 40.33620	2524258.30	533146.83	0 56 46.8
1217	T 203	33 36 47.09550	114 31 16.95620	265149.38	951470.48	- 0 25 37.3
1217	406	33 36 47.09550	114 31 16.95620	2526277.40	530633.94	0 56 59.7
1218	T 203	33 36 37.79920	114 31 20.38290	264852.56	950533.01	- 0 25 39.1
1218	406	33 36 37.79920	114 31 20.38290	2526003.20	529689.65	0 56 57.8

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 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude	Longitude	State Plane Coordinates		θ or Δ Angle
				X-foot	Y-foot	
1300	T	33 36 17.31038	114 31 48.52488	262456.82	948479.94	- 0 25 54.5
1300	406	33 36 17.31038	114 31 48.52488	2523657.56	527579.67	0 56 42.3
1301	T	33 35 45.45530	114 32 09.98750	260617.03	945273.90	- 0 26 06.0
1301	406	33 35 45.45530	114 32 09.98750	2521895.40	524330.44	0 56 30.5
1302	T	33 35 14.37820	114 32 21.72730	259600.02	942140.32	- 0 26 12.1
1302	406	33 35 14.37820	114 32 21.72730	2520954.00	521173.44	0 56 24.1
1303	T	33 34 47.93800	114 32 21.71360	259580.81	939467.85	- 0 26 11.8
1303	406	33 34 47.93800	114 32 21.71360	2520999.00	518501.38	0 56 24.1
1304	T	33 34 14.81510	114 32 09.50750	260588.11	936112.09	- 0 26 04.7
1304	406	33 34 14.81510	114 32 09.50750	2522086.60	515170.92	0 56 30.8
1305	T	33 33 43.98420	114 31 52.28060	262022.27	932984.83	- 0 25 54.8
1305	406	33 33 43.98420	114 31 52.28060	2523595.40	512079.13	0 56 40.3
1306	T	33 33 12.45770	114 31 24.98460	264308.35	929780.96	- 0 25 39.4
1306	406	33 33 12.45770	114 31 24.98460	2525957.70	508931.21	0 56 55.3
1307	T	33 33 02.37600	114 31 42.69710	262801.66	928773.18	- 0 25 49.0
1307	406	33 33 02.37600	114 31 42.69710	2524475.70	507887.55	0 56 45.5
1308	T	33 32 52.97290	114 31 50.66870	262119.84	927827.84	- 0 25 53.3
1308	406	33 32 52.97290	114 31 50.66870	2523816.80	506926.15	0 56 41.1
1309	T	33 32 07.28380	114 33 10.03990	255366.36	923261.12	- 0 26 36.7
1309	406	33 32 07.28380	114 33 10.03990	2517175.20	502198.74	0 55 57.5

* Code 203 = Arizona West Zone Code 406 = California Zone VI

Code 405 = California Zone V

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude	Longitude	State Plane Coordinates x-feet	y-feet	θ or Az Angle
1310	T 203	33 31 49.24730	114 33 31.74160	253515.10	921452.36	- 0 26 48.5
1310	406	33 31 49.24730	114 33 31.74160	2515368.00	500346.12	0 55 45.6
1311	T 203	33 31 25.59040	114 33 35.83360	253150.02	919063.95	- 0 26 50.4
1311	406	33 31 25.59040	114 33 35.83360	2515060.40	497949.74	0 55 43.4
1312	T 203	33 31 02.64840	114 33 35.85120	253130.43	916745.11	- 0 26 50.2
1312	406	33 31 02.64840	114 33 35.85120	2515096.50	495631.19	0 55 43.3
1313	T 203	33 30 50.22270	114 33 47.33920	252147.94	915496.79	- 0 26 56.4
1313	406	33 30 50.22270	114 33 47.33920	2514144.30	494359.69	0 55 37.0
1314	T 203	33 30 21.66290	114 34 50.67410	246762.24	912652.60	- 0 27 31.0
1314	406	33 30 21.66290	114 34 50.67410	2508828.70	491387.14	0 55 02.2
1315	T 203	33 29 40.50210	114 35 38.10490	242712.06	908524.69	- 0 27 56.7
1315	406	33 29 40.50210	114 35 38.10490	2504879.00	487163.38	0 54 36.2
1316	T 203	33 28 40.36460	114 36 15.89690	239461.46	902472.51	- 0 28 16.8
1316	406	33 28 40.36460	114 36 15.89690	2501774.80	481035.21	0 54 15.4
1317	T 203	33 28 13.98310	114 36 42.01450	237227.03	899824.29	- 0 28 30.9
1317	406	33 28 13.98310	114 36 42.01450	2499604.70	478334.27	0 54 01.0
1318	T 203	33 27 56.42060	114 36 53.21910	236263.08	898057.06	- 0 28 36.8
1318	406	33 27 56.42060	114 36 53.21910	2498683.50	476544.50	0 53 54.9
1319	T 203	33 26 54.62830	114 37 17.95820	234114.85	891828.96	- 0 28 49.7
1319	406	33 26 54.62830	114 37 17.95820	2496685.50	470267.00	0 53 41.3

* Code 203 = Arizona West Zone
 Code 405 = California Zone V
 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude	Longitude	State Plane Coordinates		θ or Δ Angle
				X-feet	Y-feet	
1320	T 203	33 25 15.85180	114 38 10.92770	229541.40	881883.18	- 0 29 17.6
1320	406	33 25 15.85180	114 38 10.92770	2492352.30	460214.93	0 53 12.2
1400	T 203	33 24 46.54852	114 39 24.79576	223254.41	878975.36	- 0 29 57.9
1400	406	33 24 46.54852	114 39 24.79576	2486137.29	457157.28	0 52 31.6
1401	T 203	33 25 02.45130	114 40 12.60470	219215.90	880618.30	- 0 30 24.5
1401	406	33 25 02.45130	114 40 12.60470	2482060.80	458702.75	0 52 05.3
1402	T 203	33 25 04.30910	114 40 35.65590	217263.63	880823.42	- 0 30 37.2
1402	406	33 25 04.30910	114 40 35.65590	2480104.30	458860.96	0 51 52.7
1403	T 203	33 25 04.46000	114 41 06.20210	214674.52	880861.85	- 0 30 54.0
1403	406	33 25 04.46000	114 41 06.20210	2477515.20	458837.23	0 51 35.9
1404	T 203	33 24 59.84790	114 41 28.68240	212764.76	880412.87	- 0 31 06.3
1404	406	33 24 59.84790	114 41 28.68240	2475616.90	458342.60	0 51 23.5
1405	T 203	33 24 34.24500	114 41 57.35940	210310.31	877847.16	- 0 31 21.8
1405	406	33 24 34.24500	114 41 57.35940	2473224.90	455718.92	0 51 07.8
1406	T 203	33 24 26.72130	114 42 28.55940	207658.40	877110.95	- 0 31 38.9
1406	406	33 24 26.72130	114 42 28.55940	2470591.60	454919.26	0 50 50.6
1407	T 203	33 24 29.51590	114 43 13.13490	203882.13	877428.43	- 0 32 03.4
1407	406	33 24 29.51590	114 43 13.13490	2466809.10	455146.11	0 50 26.1
1408	T 203	33 24 18.01410	114 43 28.74080	202548.25	876278.25	- 0 32 11.9
1408	406	33 24 18.01410	114 43 28.74080	2465503.30	453964.35	0 50 17.5

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 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude		Longitude		State Plane Coordinates		θ or Δx Angle
		33 23	44.02880	114 43	09.31820	x-feet	y-feet	
1409	T 203	33 23	44.02880	114 43	09.31820	204162.86	872827.83	- 0 32 00.7
1409	406	33 23	44.02880	114 43	09.31820	2467200.10	450553.95	0 50 28.2
1410	T 203	33 23	02.93000	114 42	27.47250	207672.61	868640.96	- 0 31 37.1
1410	406	33 23	02.93000	114 42	27.47250	2470809.00	446452.78	0 50 51.2
1411	T 203	33 21	39.22520	114 41	53.39260	210485.49	860154.15	- 0 31 17.2
1411	406	33 21	39.22520	114 41	53.39260	2473824.40	438036.53	0 51 09.9
1412	T 203	33 20	18.23090	114 41	58.60570	209968.72	851971.81	- 0 31 18.9
1412	406	33 20	18.23090	114 41	58.60570	2473504.00	429844.78	0 51 07.1
1413	T 203	33 19	09.98790	114 42	38.72030	206501.76	845105.46	- 0 31 40.0
1413	406	33 19	09.98790	114 42	38.72030	2470202.90	422897.80	0 50 45.0
1414	T 203	33 18	53.55310	114 43	06.13390	204160.00	843465.86	- 0 31 54.9
1414	406	33 18	53.55310	114 43	06.13390	2467901.30	421202.67	0 50 30.0
1415	T 203	33 18	34.77410	114 43	25.01460	202539.97	841582.73	- 0 32 05.0
1415	406	33 18	34.77410	114 43	25.01460	2466327.00	419281.41	0 50 19.6
1416	T 203	33 18	11.35160	114 43	49.62980	200428.62	839234.91	- 0 32 18.1
1416	406	33 18	11.35160	114 43	49.62980	2464272.70	416883.85	0 50 06.1
1417	T 203	33 17	10.98100	114 43	11.83230	203580.03	833103.10	- 0 31 56.5
1417	406	33 17	10.98100	114 43	11.83230	2467569.90	410829.81	0 50 26.8
1418	T 203	33 16	37.81720	114 41	10.36920	213861.29	829657.01	- 0 30 49.4
1418	406	33 16	37.81720	114 41	10.36920	2477930.00	407631.32	0 51 33.6

* Code 203 = Arizona West Zone
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 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude	Longitude	State Plane Coordinates x-feet	State Plane Coordinates y-feet	θ or $\Delta\alpha$ Angle
1419	T 203	33 15 27.35510	114 40 18.09850	218236.29	822495.80	- 0 30 19.8
1419	406	33 15 27.35510	114 40 18.09850	2482475.00	400577.50	0 52 02.3
1420	T 203	33 14 48.41350	114 41 18.14400	213101.86	818605.30	- 0 30 52.2
1420	406	33 14 48.41350	114 41 18.14400	2477435.60	396565.41	0 51 29.3
1421	T 203	33 13 36.96550	114 40 27.02600	217379.51	811345.27	- 0 30 23.2
1421	406	33 13 36.96550	114 40 27.02600	2481885.60	389410.42	0 51 57.4
1422	T 203	33 13 18.16830	114 40 20.37700	217927.58	809440.43	- 0 30 19.3
1422	406	33 13 18.16830	114 40 20.37700	2482479.10	387519.38	0 52 01.1
1423	T 203	33 12 31.03300	114 40 34.16390	216714.13	804686.77	- 0 30 26.2
1423	406	33 12 31.03300	114 40 34.16390	2481379.90	382738.36	0 51 53.5
1424	T 203	33 12 15.42350	114 40 40.08810	216196.77	803113.57	- 0 30 29.2
1424	406	33 12 15.42350	114 40 40.08810	2480900.40	381153.32	0 51 50.2
1425	T 203	33 11 47.08670	114 40 35.34840	216574.15	800245.98	- 0 30 26.3
1425	406	33 11 47.08670	114 40 35.34840	2481346.30	378295.78	0 51 52.8
1426	T 203	33 11 05.29010	114 40 29.20270	217059.08	796016.95	- 0 30 22.3
1426	406	33 11 05.29010	114 40 29.20270	2481932.30	374079.87	0 51 56.2
1427	T 203	33 10 06.44600	114 40 43.63130	215780.02	790080.41	- 0 30 29.4
1427	406	33 10 06.44600	114 40 43.63130	2480795.80	368114.81	0 51 48.3
1428	T 203	33 09 19.35060	114 40 52.66020	214970.18	785327.29	- 0 30 33.7
1428	406	33 09 19.35060	114 40 52.66020	2480100.00	363344.00	0 51 43.3

* Code 203 = Arizona West Zone
Code 405 = California Zone V

Code 406 = California Zone VI

* Code 203 = Arizona West Zone
Code 405 = California Zone V

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	Code	Latitude	Longitude	State Plane Coordinates		θ or $\Delta\alpha$ Angle
				x-foot	y-foot	
1429	T	33 07 54.81100	114 41 43.68400	210555.09	776821.73	- 0 31 00.5
1429	406	33 07 54.81100	114 41 43.68400	2475890.00	354735.79	0 51 15.3
1430	T	33 05 41.42570	114 42 25.70530	206858.48	763372.96	- 0 31 21.6
1430	406	33 05 41.42570	114 42 25.70530	2472516.40	341203.38	0 50 52.2
1431	T	33 05 12.96750	114 42 11.25380	208061.85	760485.51	- 0 31 13.3
1431	406	33 05 12.96750	114 42 11.25380	2473788.40	338345.73	0 51 00.1
1432	T	33 04 56.17960	114 41 17.19140	212646.59	758747.32	- 0 30 43.5
1432	406	33 04 56.17960	114 41 17.19140	2478413.10	336717.79	0 51 29.8
1433	T	33 03 56.78680	114 40 53.23920	214631.41	752726.41	- 0 30 29.6
1433	406	33 03 56.78680	114 40 53.23920	2480541.20	330746.45	0 51 43.0
1434	T	33 03 18.62730	114 40 23.92360	217092.42	748847.66	- 0 30 13.1
1434	406	33 03 18.62730	114 40 23.92360	2483094.10	326927.87	0 51 59.1
1435	T	33 02 25.66830	114 40 17.61740	217582.22	743490.47	- 0 30 09.0
1435	406	33 02 25.66830	114 40 17.61740	2483711.80	321584.24	0 52 02.6
1436	T	33 01 56.96320	114 39 36.19080	221083.74	740558.57	- 0 29 46.0
1436	406	33 01 56.96320	114 39 36.19080	2487282.20	318737.05	0 52 25.3
1437	T	33 02 56.05980	114 38 42.83420	225677.25	746492.31	- 0 29 17.7
1437	406	33 02 56.05980	114 38 42.83420	2491732.30	324778.60	0 52 54.7
1438	T	33 02 37.94620	114 38 14.80700	228047.49	744641.37	- 0 29 02.2
1438	406	33 02 37.94620	114 38 14.80700	2494146.00	322984.95	0 53 10.1

* Code 203 = Arizona West Zone
 Code 405 = California Zone V
 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude		Longitude		State Plane Coordinates		θ or Δα Angle
		x-feet	y-feet	x-feet	y-feet	x-feet	y-feet	
1439	T 203	33 02 02.13060	114 37 46.75010	230405.56	741001.49	-	0 28 46.4	
1439	406	33 02 02.13060	114 37 46.75010	2496590.30	319402.66	0	53 25.5	
1440	T 203	33 01 38.99950	114 37 05.88490	233865.34	738634.75	-	0 28 23.8	
1440	406	33 01 38.99950	114 37 05.88490	2500105.50	317119.43	0	53 47.9	
1441	T 203	33 01 31.34830	114 35 56.27420	239785.85	737813.05	-	0 27 45.8	
1441	406	33 01 31.34830	114 35 56.27420	2506043.70	316439.55	0	54 26.2	
1442	T 203	33 01 49.20840	114 34 55.44780	244979.11	739576.71	-	0 27 12.8	
1442	406	33 01 49.20840	114 34 55.44780	2511193.10	318326.80	0	54 59.6	
1443	T 203	33 02 11.46000	114 34 21.61510	247877.18	741802.93	-	0 26 54.7	
1443	406	33 02 11.46000	114 34 21.61510	2514037.00	320621.59	0	55 18.2	
1444	T 203	33 02 03.10200	114 33 12.90610	253720.08	740912.95	-	0 26 17.1	
1444	406	33 02 03.10200	114 33 12.90610	2519899.30	319871.61	0	55 56.0	
1445	T 203	33 01 49.45550	114 31 15.92280	263669.28	739459.14	-	0 25 13.2	
1445	406	33 01 49.45550	114 31 15.92280	2529880.10	318656.20	0	57 00.2	
1446	T 203	33 01 13.53990	114 30 27.39190	267774.95	735799.24	-	0 24 46.3	
1446	406	33 01 13.53990	114 30 27.39190	2534072.00	315095.63	0	57 26.9	
1447	T 203	32 59 23.40010	114 29 46.19200	271204.04	724642.79	-	0 24 22.7	
1447	406	32 59 23.40010	114 29 46.19200	2537766.80	304024.62	0	57 49.5	
1448	T 203	32 58 15.57160	114 29 29.64070	272565.53	717777.72	-	0 24 12.9	
1448	406	32 58 15.57160	114 29 29.64070	2539292.00	297194.22	0	57 58.6	

* Code 203 = Arizona West Zone
 Code 405 = California Zone V
 Code 406 = California Zone VI

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	* Code	Latitude	Longitude	State Plane Coordinates		θ or Δ Angle
				x-feet	y-feet	
1449	T 203	32 58 16.76060	114 29 02.11500	274911.42	717881.45	- 0 23 57.9
1449	406	32 58 16.76060	114 29 02.11500	2541634.70	297354.01	0 58 13.8
1450	T 203	32 58 28.41780	114 28 17.18690	278747.11	719033.13	- 0 23 33.6
1450	406	32 58 28.41780	114 28 17.18690	2545441.70	298597.03	0 58 38.5
1451	T 203	32 57 51.00240	114 27 58.27500	280332.51	715240.75	- 0 23 22.9
1451	406	32 57 51.00240	114 27 58.27500	2547117.30	294843.68	0 58 48.9
1452	T 203	32 56 53.89230	114 28 15.20880	278850.23	709478.78	- 0 23 31.5
1452	406	32 56 53.89230	114 28 15.20880	2545773.20	289048.01	0 58 39.5
1453	T 203	32 56 06.43700	114 28 48.89930	275946.00	704702.50	- 0 23 49.4
1453	406	32 56 06.43700	114 28 48.89930	2542984.00	284203.75	0 58 21.0
1454	T 203	32 55 24.92470	114 28 33.71210	277211.49	700498.15	- 0 23 40.7
1454	406	32 55 24.92470	114 28 33.71210	2544349.60	280030.88	0 58 29.4
1500	T 203	32 54 22.35270	114 27 43.15340	281478.42	694144.98	- 0 23 12.5
1500	406	32 54 22.35270	114 27 43.15340	2548767.10	273781.55	0 58 57.2
1600	T 203	32 52 58.82283	114 27 50.24197	280816.94	685707.23	- 0 23 15.5
1600	406	32 52 58.82283	114 27 50.24197	2548307.43	265330.45	0 58 53.3
1700	T 203	32 50 39.87937	114 28 06.22867	279358.06	671674.42	- 0 23 22.7
1700	406	32 50 39.87937	114 28 06.22867	2547184.20	251266.81	0 58 44.5
1800	T 203	32 49 24.14592	114 29 36.00955	271644.46	664073.58	- 0 24 10.6
1800	406	32 49 24.14592	114 29 36.00955	2539654.32	243483.90	0 57 55.1

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 Code 406 = California Zone VI

* Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	Code	Latitude	Longitude	State Plane Coordinates		θ or Δz Angle
				x-feet	y-feet	
1900	T 203	32 48 58.07760	114 30 36.22870	266486.64	661475.58	- 0 24 42.9
1900	406	32 48 58.07760	114 30 36.22870	2534560.00	240763.50	0 57 22.1
1901	T 203	32 47 55.34660	114 31 28.16970	262007.38	655167.99	- 0 25 10.4
1901	406	32 47 55.34660	114 31 28.16970	2530232.60	234350.79	0 56 53.5
1902	T 203	32 47 32.07770	114 31 49.15930	260198.35	652829.54	- 0 25 21.5
1902	406	32 47 32.07770	114 31 49.15930	2528479.90	231969.83	0 56 42.0
1903	T 203	32 46 56.00810	114 31 51.27750	259990.62	649185.59	- 0 25 22.2
1903	406	32 46 56.00810	114 31 51.27750	2528359.20	228321.94	0 56 40.8
1904	T 203	32 46 11.39480	114 31 45.28700	260468.87	644673.10	- 0 25 18.5
1904	406	32 46 11.39480	114 31 45.28700	2528945.00	223822.15	0 56 44.1
2000	T 203	32 45 25.78660	114 31 33.33340	261455.78	640056.34	- 0 25 11.5
2000	406	32 45 25.78660	114 31 33.33340	2530041.79	219230.23	0 56 50.7
2100	T 203	32 45 25.34781	114 32 17.55283	257679.12	640039.89	- 0 25 35.4
2100	406	32 45 25.34781	114 32 17.55283	2526266.58	219123.67	0 56 26.4
2200	T 203	32 44 59.36240	114 32 17.55954	257658.99	637413.75	- 0 25 35.1
2200	406	32 44 59.36240	114 32 17.55954	2526309.12	216497.79	0 56 26.4
2300	T 203	32 44 58.63083	114 33 49.33745	249819.94	637399.10	- 0 26 24.8
2300	406	32 44 58.63083	114 33 49.33745	2518472.62	216296.13	0 55 35.9
2400	T 203	32 44 32.51389	114 33 49.32668	249800.58	634759.66	- 0 26 24.4
2400	406	32 44 32.51389	114 33 49.32668	2518516.23	213656.98	0 55 35.9

* Code 203 = Arizona West Zone Code 406 = California Zone VI
 Code 405 = California Zone V

Arizona-California Boundary, Final Geographic Positions and Plane Coordinates

Station Number	Code	Latitude	Longitude	x-feet	y-feet	θ or Δα Angle
2500	T 203	32 44 32.49666	114 34 51.19491	244516.13	634798.94	- 0 26 57.9
2500	406	32 44 32.49666	114 34 51.19491	2513232.34	213570.21	0 55 01.9
2600	T 203	32 44 06.37650	114 34 51.17812	244496.86	632159.17	- 0 26 57.6
2600	406	32 44 06.37650	114 34 51.17812	2513276.04	210930.72	0 55 02.0
2700	T 203	32 44 04.09639	114 36 51.47272	234219.23	632010.94	- 0 28 02.6
2700	406	32 44 04.09639	114 36 51.47272	2503004.89	210537.46	0 53 55.8
2800	T 203	32 43 57.11177	114 36 50.73949	234276.11	631304.55	- 0 28 02.1
2800	406	32 43 57.11177	114 36 50.73949	2503078.59	209832.63	0 53 56.3
2900	T 203	32 43 57.11158	114 36 51.06909	234247.96	631304.76	- 0 28 02.3
2900	406	32 43 57.11158	114 36 51.06909	2503050.43	209832.17	0 53 56.1
3000	T 203	32 43 47.74195	114 36 53.13628	234063.64	630359.28	- 0 28 03.3
3000	406	32 43 47.74195	114 36 53.13628	2502888.71	208882.58	0 53 54.9
3100	T 203	32 43 47.74164	114 36 54.06545	233984.26	630359.90	- 0 28 03.8
3100	406	32 43 47.74164	114 36 54.06545	2502809.34	208881.29	0 53 54.4
3200	T 203	32 43 42.43660	114 36 54.21480	233967.12	629823.86	- 0 28 03.8
3200	406	32 43 42.43660	114 36 54.21480	2502805.00	208345.00	0 53 54.3
3300	T 203	32 43 45.37941	114 37 25.55221	231292.48	630143.24	- 0 26 20.8
3300	406	32 43 45.37941	114 37 25.55221	2500123.51	208600.51	0 53 37.1
3400	T 203	32 43 07.28790	114 43 07.25030	202058.22	626547.44	- 0 31 25.1
3400	406	32 43 07.28790	114 43 07.25030	2470983.68	204309.08	0 50 29.3

* Code 203 = Arizona West Zone
 Code 405 = California Zone V
 Code 406 = California Zone VI

Appendix

Interstate Compact Defining the Boundary Between the States of Arizona and California

INTERSTATE COMPACT DEFINING THE BOUNDARY BETWEEN THE STATES OF ARIZONA AND CALIFORNIA

Article I. Purpose.

The boundary between the States of Arizona and California on the Colorado River has become indefinite and uncertain because of meanderings in the main channel of the Colorado River with the result that a state of confusion exists as to the true and correct location of the boundary, and the enforcement and administration of the laws of the two states and of the United States have been rendered difficult.

The purpose of this compact is to fix by reference to stations of longitude and latitude the location of the boundary line between Arizona and California on the Colorado river from the southern boundary of the state of Nevada to the point on the international boundary which is common to the boundaries of Arizona and California and the United Mexican States.

Article II. Description.

The boundary between the states of Arizona and California on the Colorado river from the point where the oblique boundary between California and Nevada intersects the thirty-fifth degree of north latitude, said point being common to the boundaries of the states of Arizona, California and Nevada, to the point on the international boundary which is common to the boundaries of Arizona, California and the United Mexican States, shall be in accordance with the following description in general terms of 34 points on the boundary:

General Description of Boundary Between Arizona and California

Point No. 1. The intersection of the boundary line common to California and Nevada and the centerline of the channel of the Colorado River as constructed by the U. S. Bureau of Reclamation, said point being common to the boundaries of Arizona, California, and Nevada, where the 35th degree of north latitude intersects the centerline of said channel; thence downstream along and with the centerline of said channel to the southerly end of said construction to

Point No. 2, which is located in the center of the channel of the Colorado River approximately one-half mile northerly from the A.T.&S.F. Railway Bridge at Topock; thence downstream on a straight line to

Point No. 3, which lies in the Colorado River vertically below the centerline of the A.T.&S.F. Railway tracks at a point midway face-to-face of abutments of the A.T.&S.F. Railway Bridge at Topock, Arizona; thence on a straight line downstream to

Point No. 4, which lies in the Colorado River vertically below the centerline of U. S. Highway 66 at a point where said centerline intersects the center of the center pier of the highway bridge; thence on a straight line to

Point No. 5, which lies in the Colorado River vertically below the center of the span of the gas line bridge owned by the El Paso Natural Gas Co. and the Pacific Gas and Electric Co., crossing the Colorado River at Topock, Arizona; thence downstream in a southerly direction through Havasu Lake along a line midway between the right and left shore lines of said lake as they exist at mean operating level (elevation 448.00 above Mean Sea Level), as controlled at Parker Dam to

Point No. 6, which is the center of the overflow section of Parker Dam across the Colorado River; thence downstream midway between the shore lines on the right and left banks of the Colorado River to

Point No. 7, which lies in the center of the Colorado River approximately 2,050 feet upstream from the earth fill of Headgate Rock Dam; thence on a straight line to

Point No. 8, which is the center of the earth fill of Headgate Rock Dam; thence on a straight line to

Point No. 9, which lies on the centerline of the river approximately 3,625 feet westerly from Point No. 8; thence on a straight line to

Point No. 10, which lies in the center of the Colorado River at a point where the parallel of $34^{\circ} 10'$ north latitude intersects said centerline; thence on a straight line to

Point No. 11, which lies in the Colorado River vertically below the centerline of Arizona Highway No. 72 midway between the abutments of the highway bridge; then down the Colorado River midway between the right and left shore lines across islands which may exist between those water lines to

Point No. 12, which is at the center of the earth fill section of the Palo Verde Diversion Dam; thence down the Colorado River midway between the shore lines on the right and left banks to

Point No. 13, which is vertically below the center of the center span of the highway bridge across the Colorado River at Ehrenberg, Arizona (U. S. Highway 60-70); thence down the Colorado River midway between the shore lines on the right and left banks to

Point No. 14, which is the center of the Cibola Bridge midway between abutments; thence down the Colorado River midway between the shore lines on the right and left banks, ignoring future channelization by the U. S. Bureau of Reclamation to

Point No. 15, which lies on the centerline of the Colorado River approximately 8400 feet northward of the center of the overflow section of Imperial Dam; thence on a straight line to

Point No. 16, which is the center of the overflow section of Imperial Dam; thence on a straight line normal to the longitudinal axis of Imperial Dam to

Point No. 17, which lies at the intersection of the last described line with a line extending northeasterly from the center of the overflow section of Laguna Dam and normal to the longitudinal axis of the said Laguna Dam; thence southeasterly on a straight line to

Point No. 18, which is at the center of the overflow section of Laguna Dam; thence on a straight line to

Point No. 19, which lies on the centerline of the Colorado River approximately 5800 feet southwesterly of Point 18; thence down the Colorado River midway between the shore lines on the right and left banks, around a curve to the eastward to

Point No. 20, which lies on the centerline of the Colorado River where said centerline intersects the section line between Sections 4 and 9, Township 8 South, Range 22 West, Gila and Salt River Meridian; thence departing from the river on a westerly course along the extension of the above-mentioned section line about 0.65 mile to

Point No. 21, which will be the northwest corner of the northeast quarter of Section 8, Township 8 South, Range 22 West, Gila and Salt River Meridian, which shall be resurveyed in establishing this boundary; thence southerly along the centerline of said Section 8 about one-half mile to

Point No. 22, which is the northeast corner of the southwest quarter of Section 8, Township 8 South, Range 22 West, Gila and Salt River Meridian; thence westerly about one and one-half miles to

Point No. 23, which is the west quarter corner of Section 7, Township 8 South, Range 22 West, Gila and Salt River Meridian; thence southerly about one-half mile to

Point No. 24, which is the southwest corner of Section 7, Township 8 South, Range 22 West, Gila and Salt River Meridian; thence westerly about one mile to

Point No. 25, which is the southwest corner of Section 12, Township 8 South, Range 23 West, Gila and Salt River Meridian, thence southerly about one-half mile to

Point No. 26, which is the west quarter corner of Section 13, Township 8 South, Range 23 West, Gila and Salt River Meridian; thence westerly about 1.93 miles to

Point No. 27, which lies on the east shoulder of the north-south road through the Indian School approximately 370 feet due east of the northwest corner of the southwest quarter of the southwest quarter of Section 25, Township 16 South, Range 22 East, San Bernardino Meridian; thence southerly along and with the easterly shoulder line of the said north-south road approximately 700 feet to

Point No. 28, which lies on the easterly shoulder line of said north-south road due east of the northeast corner of the stone

retaining wall around the Indian School Hospital; thence due west to

Point No. 29, which is the base of the northeast corner of said retaining wall; thence southerly along and with the westerly shoulder of said north-south road to

Point No. 30, which lies on the westerly shoulder line of said north-south road 330 feet south of and approximately 110 feet east of the northeast corner of Section 35, Township 16 South, Range 22 East, San Bernardino Meridian; thence due west approximately 110 feet to

Point No. 31, which lies on the east line of Section 35, Township 16 South, Range 22 East, San Bernardino Meridian, exactly 330 feet south of the northeast corner of said Section 35; thence southerly along the east line of said Section 35 to

Point No. 32, which lies at the center of the Colorado River, i.e., midway between the north and south shore lines just downstream from the centerline of the old U. S. Highway 80 Bridge across the Colorado River; thence down the center line of the Colorado River midway between the shore lines on the right and left banks to

Point No. 33, which is a point in the Colorado River vertically below the center of the new U. S. Highway 80 Bridge; thence down the centerline of the Colorado River midway between the shore lines on the right and left banks to

Point No. 34, which is the intersection of the centerline of the Colorado River and the International Boundary Line between California and the United Mexican States, which point is common to the boundaries of Arizona, the United Mexican States, and California.

These points will be marked on existing bridges and dams and where appropriate will be monumented. Between each of these points will be a number of subpoints not monumented. The total number of points and subpoints will approximate 234. The United States Coast and Geodetic Survey will locate the above mentioned 34 points on the boundary by precise geodetic surveys. The Coast and Geodetic Survey will locate the remaining approximately 200 unmonumented subpoints by precise photogrammetric methods and will provide a list of the geographic positions and state coordinate positions (transverse Mercator system for Arizona and Lambert system for California) of each of the 234 points on the boundary. The approximately 200 unmonumented subpoints will be identified on copies of the aerial photographs by the State of Arizona and California to define the boundary; the Coast and Geodetic Survey will then locate the points so identified by analytic aerotriangulation (photogrammetric methods).

When the survey and boundary description has been completed by the United States Coast and Geodetic Survey and the Boundary Commissions of Arizona and California have each certified that it

is in conformity with the General Description of Boundary between Arizona and California set forth herein, it shall be attached hereto and marked Exhibit "A" and made a part hereof as though fully incorporated herein as the permanent description of the boundary between the states of Arizona and California.

Article III. Ratification and Effective Date.

This compact shall become operative when it has been ratified and approved by the legislatures of the states of Arizona and California, and approved by the Congress of the United States.

Executed in duplicate this 12th day of March, A.D., One Thousand Nine Hundred and Sixty-three, at Sacramento, California.

FOR THE STATE OF
ARIZONA

WAYNE M. AKIN
Chairman of the Arizona
Interstate Stream Commission,
Chairman

ROBERT W. PICKRELL
Attorney General,
Member

OBED M. LASSEN
State Land Commissioner,
Member

ATTESTED:

HOWARD F. THOMPSON
Executive Secretary
Colorado River Boundary
Commission of Arizona

FOR THE STATE OF
CALIFORNIA

F. J. HORTIG
Executive Officer,
State Lands Commission,
Chairman

STANLEY MOSK
Attorney General,
Member

WILLIAM E. WARNE
Director,
Department of Water Resources,
Member

ATTESTED:

BERRIEN E. MOORE,
Executive Secretary
Colorado River Boundary
Commission of California