6044

Graphic Control

Form 504
Ed. June, 1928

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
R. S. Patton Director

State: California.

DESCRIPTIVE REPORT

Topographic
~~*Hydrographic*~~ } *Sheet No.* 6044 6044

LOCALITY

Los Angeles Harbor

1934

CHIEF OF PARTY

R. W. Knox

U. S. GOVERNMENT PRINTING OFFICE: 1930

6044
Graphic Control

This sheet shows corrections to air photo sheet T5034 as obtained from the planetable survey in March 1934 by the party of Lieutenant R. W. Knox.

The corrections shown on this sheet have been applied to correction sheet T5034 A filed with sheet T5034.

A copy of the letter transmitting this sheet to the office is attached to this report.

The following stations shown on this sheet as triangulation stations were located by theodolite three point fix positions and the list of directions and compilations are attached to this report. These positions are not filed in the Division of Geodesy and are not described:

F.G. Bn. #1, 1934
F.R. Bn. #2, 1934
Tank SWSB Co., 1920
Bulkhead #2, 1934
Jetty #2, 1934.

Stations Jetty and Bulkhead are not marked.

B.G. Jones

B. G. Jones,
Assistant Cartographic Engineer.

26-AHH
1990 (9)

C O P Y

February 13, 1934.

To: Lieutenant Robert W. Knox,
U. S. Coast and Geodetic Survey,
P. O. Box 463,
Long Beach, California.

From: The Director,
U. S. Coast and Geodetic Survey.

Subject: Location of Fish Harbor Jetty.

A blue line print on a planetable size aluminum sheet of the lower section of air photo sheet T 5034 has been forwarded to you by express. The paper copy of T 5034 showing your sextant location of the Fish Harbor Jetty and lists of geographic positions for the triangulation stations in this vicinity have also been forwarded to you.

Recomputation of Mr. Pendleton's originial theodolite three-point fix location, with a check angle, of the Fish Harbor Jetty has failed to show the cause of the discrepancy between that position and your sextant location.

A strong position for this jetty is needed for its publication on the 1:10,000 scale chart of this area.

You will please relocate the jetty by planetable using the aluminum sheet. While relocating the jetty and as a check on the accuracy of the office compilation of this sheet, you will also please take a number of planetable cuts to corners of docks, buildings, prominent objects and any well defined topographic detail.

Your planetable work should be inked on the sheet in black, and forwarded to this office as soon as practicable.

(Sgd.) J. H. Hawley

Acting Director.

Applied to chart 5143
Jan 1935 HRC.

C O P Y

DEPARTMENT OF COMMERCE

U. S. Coast and Geodetic Survey

March 10, 1934.

To: The Director,
Coast and Geodetic Survey.

From: Lieutenant Robert W. Knox,
Coast and Geodetic Survey.

Subject: Transmission of records.

An aluminum plate and a metal mounted sheet showing corrections to be made to Sheet T- 5034 in the vicinity of Fish Harbor, has been expressed to you. All computations involved in these changes are inclosed with these sheets.

Plane-table work along the new Fish Harbor jetty indicated an error of a few meters both in latitude and longitude of the position of this jetty as shown on the photo-compiled sheet. The plane-table work was verified by two theodolite three-point fixes approximately in the positions used by Pendleton in his original location of the jetty at unmarked stations Jetty and Bulkhead.

Further inspection of the work in this area indicated desirable changes so the inspection was extended to include the location of Beacons FG"I" and FR "2" by triangulation, of the addition of a new street west of Fish Harbor and a change of a few meters in the position of the dock on the north side of the same harbor. These changes are shown on the metal mounted sheet as the projection on the aluminum plate was found to be slightly in error. Work done by plane-table has been shown in black and that resulting from triangulation or traverse is shown in green. The new road is shown in blue.

The beacons FG "I" and FR "2" were located by plane-table and checked by triangulation. The change in the dock line of Fish Harbor was determined by a graphic three-point fix and checked by taping south-east, parallel to the street system, from the Grey Tank, Terminal Island Waterworks.

The jetty northeast of station Jetty 2 has been changed to correspond to the new location of that station and a building up of the beach since the compilation of the sheet is also indicated.

The position of the Fl. Red light off the end of the new jetty was verified by plane-table and also by graphic intersections from theodolite stations.

The plane-table work in connection with these corrections was done by Lieutenant John C. Mathisson and the triangulation and traverse by T. P. Pendleton.

(Sgd.) Robert W. Knox
Robert W. Knox by J.C.W.
H. & G. Engineer

#5

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 24A
Rev. Oct., 1932

LIST OF DIRECTIONS

Station: Jetty 2 | State: California
Chief of party: R.W. Knox | Date: March 7 1934 | Computed by: T.P.P.
Observer: T.P. Pendleton | Instrument: 287 | Checked by: J.M.

	OBSERVED STATION	Observed direction	Eccentric reduction	Sea level reduction*	Corrected direction with zero initial	Adjusted direction*
		° ′ ″	′ ″	″	° ′ ″	′ ″
	Tank, Municipal Pier	0 00 00.00	✓		0 00 00.00	37.9
FR "2"	Beacon 2 Fish Harbor	04 08 05.0				
FG "1"	Beacon 1 " "	09 03 15.0				
	Tank, S.W.S.B. Co.	09 24 22.6	✓			
	Tank, Cotton Compress	26 32 48.8	✓✓			76.8
	Tank, Pier 232	68 50 11.3	✓✓			03.8
	Tank, TIWW	73 15 11.3				
	Stack Hammond	135 27 08.8	✓✓			10.4
	Stack Borax	149 07 00.0	✓			
	Tank	161 29 02.6				
	Bulkhead #2 from azimuths	(344 45 24.7)				28.8

File with same report of sheet.

* These columns are for office use and should be left blank in the field.

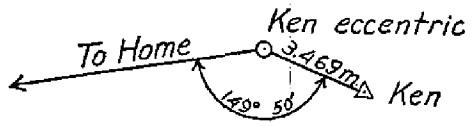
#5

Station: Ken | *State:* Maryland

Chief of party: C. V. H. | *Date:* 1917 | *Computed by:* O. P. S.

Observer: C. V. H. | *Instrument:* No. 168 | *Checked by:* W. F. R.

OBSERVED STATION	Observed direction	Eccentric reduction	Sea level reduction	Corrected direction with zero initial	Adjusted direction
	° ′ ″	′ ″	″	° ′ ″	′ ″
Chevy	0 00 00.00	− 7.31		0 00 00.00	
Tank west of △ Dulce	29 03 37.0	−1 09.8		29 02 34.5	
Ken (center), 3.469 meters	176 42				
Forest Glen standpipe	313 24 53.0	+3 01.2		313 28 01.5	
Home	326 31 30.21	+ 31.93		326 32 09.45	
Bureau of Standards, wireless pole	352 17 20.8	+ 5.7		352 17 33.8	
Reno	357 28 48.63	− 1.16		357 28 54.78	
Reference mark, 16.32 m	358 31 20				



This form, with the first three and fifth columns properly filled out and checked, must be furnished by field parties. *To be acceptable it must contain every direction observed at the station.*

It should be used for observations with both repeating and direction theodolites.

The directions at only one station should be placed on a page.

If a repeating theodolite is used, do not abstract the angles in tertiary triangulation. The local adjustment corrections (to close horizon only) are to be written in the Horizontal Angle Record, and the List of Directions is to be made from that record directly.

Choose as an initial for Form 24a some station involved in the local adjustment, and preferably one which has been used as an initial for a round of directions on objects not in the main scheme. Use but one initial at a station. Call the direction of the initial 0° 00′ 00.″ 00, and by applying the corrected angles to this, fill in opposite each station its direction reckoned *clockwise* around the whole circumference regardless of the direction of graduation of the instrument. The clockwise reckoning is necessary for uniformity and to make the directions comparable with azimuths.

If a station has been occupied eccentrically, reduce to the center and enter in this form, in ink, the resulting corrections to the observed directions in the column provided for them. If an eccentric reduction is necessary, but not made in the field, leave the column blank. If the station was occupied centrally, and no eccentric reduction is required, put dashes in the column to show that no corrections are necessary.

Directions in the main scheme should be entered to hundredths of seconds in first-order triangulation; otherwise to tenths only. Points observed upon but once, direct and reverse, should be carried to tenths in first-order and second-order triangulation, and to even seconds only in third-order triangulation. In general, but two uncertain figures should be given.

It is recommended that the following simple plan of observing be used with a repeating instrument: Measure each single angle in the scheme at each station and the outside angle necessary to close the horizon. *Measure no sum angles.* Follow each measurement of every angle immediately by a measurement of its explement. Six repetitions are to constitute a measurement. The local adjustment will consist simply of the distribution of the error of closure of the horizon.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 24A
Rev. Oct., 1932

LIST OF DIRECTIONS

Station Bulkhead 2 State California

Chief of party R.W. Knox Date March 7 1934 Computed by T.P.P.

Observer T. P. Pendleton Instrument 787 Checked by JCH.

OBSERVED STATION	Observed direction	Eccentric reduction	Sea level reduction*	Corrected direction with zero initial	Adjusted direction*
	° ′ ″	′ ″	″	° ′ ″	′ ″
S.P. Breakwater Light	0 00 00.00			0 00 00.00	
~~Tank~~ F.R. Light Fish Harbor	30 27 37.5				
Tank, Municipal Pier	59 16 02.5	✓			51.3
Tank, Cotton Compress	106 58 18.7	✓			34.9
Tank, S.W.S.B. Co ✓	138 48 51.2				
FG "1" Beacon 1 Fish Harbor	162 51 00.0	✓			
Tank, Pier 232	169 04 51.2	✓			31.7
FR "2" Beacon 2, Fish Harbor	170 23 01.2				
Tank, T.I.W.W.	191 35 16.2				
Stack Hammond	197 37 13.7	✓			28.2
Jetty #2 (from azimuths)	(212 25 ~~25.9~~)	✓			58.0
W.B. Tower	56 02				22.8

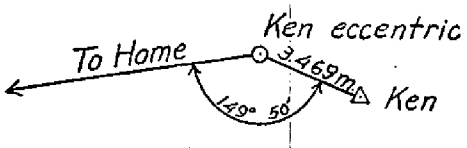
* These columns are for office use and should be left blank in the field.

Station: Ken | *State:* Maryland

Chief of party: C. V. H. | *Date:* 1917 | *Computed by:* O. P. S.

Observer: C. V. H. | *Instrument:* No. 168 | *Checked by:* W. F. R.

OBSERVED STATION	Observed direction	Eccentric reduction	Sea level reduction	Corrected direction with zero initial	Adjusted direction
	° ′ ″	′ ″	″	° ′ ″	′ ″
Chevy	0 00 00.00	− 7.31		0 00 00.00	
Tank west of △ Dulce	29 03 37.0	−1 09.8		29 02 34.5	
Ken (center), 3.469 meters	176 42				
Forest Glen standpipe	313 24 53.0	+3 01.2		313 28 01.5	
Home	326 31 30.21	+ 31.93		326 32 09.45	
Bureau of Standards, wireless pole	352 17 20.8	+ 5.7		352 17 33.8	
Reno	357 28 48.63	− 1.16		357 28 54.78	
Reference mark, 16.32 m	358 31 20				



This form, with the first three and fifth columns properly filled out and checked, must be furnished by field parties. *To be acceptable it must contain every direction observed at the station.*

It should be used for observations with both repeating and direction theodolites.

The directions at only one station should be placed on a page.

If a repeating theodolite is used, do not abstract the angles in tertiary triangulation. The local adjustment corrections (to close horizon only) are to be written in the Horizontal Angle Record, and the List of Directions is to be made from that record directly.

Choose as an initial for Form 24a some station involved in the local adjustment, and preferably one which has been used as an initial for a round of directions on objects not in the main scheme. Use but one initial at a station. Call the direction of the initial 0° 00′ 00.″ 00, and by applying the corrected angles to this, fill in opposite each station its direction reckoned *clockwise* around the whole circumference regardless of the direction of graduation of the instrument. The clockwise reckoning is necessary for uniformity and to make the directions comparable with azimuths.

If a station has been occupied eccentrically, reduce to the center and enter in this form, in ink, the resulting corrections to the observed directions in the column provided for them. If an eccentric reduction is necessary, but not made in the field, leave the column blank. If the station was occupied centrally, and no eccentric reduction is required, put dashes in the column to show that no corrections are necessary.

Directions in the main scheme should be entered to hundredths of seconds in first-order triangulation; otherwise to tenths only. Points observed upon but once, direct and reverse, should be carried to tenths in first-order and second-order triangulation, and to even seconds only in third-order triangulation. In general, but two uncertain figures should be given.

It is recommended that the following simple plan of observing be used with a repeating instrument: Measure each single angle in the scheme at each station and the outside angle necessary to close the horizon. *Measure no sum angles.* Follow each measurement of every angle immediately by a measurement of its explement. Six repetitions are to constitute a measurement. The local adjustment will consist simply of the distribution of the error of closure of the horizon.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″
α	2	to 3			
$2^d\angle$		&	+		
α	2	to 1	207	01	50.3
$\Delta\alpha$				+	10.2
			180	00	00.0
α'	1	to 2	27	02	00.5

			°	′	″
α	3	to 2			
$3^d\angle$		&	−		
α	3	to 1	359	25	12.6
$\Delta\alpha$				+	0.6
			180	00	00.0
α'	1	to 3	179	25	13.2

First Angle of Triangle

	°	′	″			°	′	″
ϕ	33	44	24.43	2 Tank 232	λ	118	16	17.88
$\Delta\phi$			+30.03		$\Delta\lambda$	−		18.34
ϕ'	33	44	54.46	1 Stack Hammond	λ'	118	15	59.54

	°	′	″			°	′	″
ϕ	33	44	24.43	3 Tank 232	λ	118	16	17.88
$\Delta\phi$	−	01	07.71		$\Delta\lambda$		−	00.82
ϕ'	33	43	16.72	1 Tank Harris Prof.	λ'	118	16	17.06

	Logarithms	Values in seconds	
s			
$-\cos\alpha$	2.966241		
B	8.511 314		
h	1.477 555	1st term	−30.03
s^2			
$\sin^2\alpha$			
C	1.229 85		
		2d term	+ −
h^3			
D			
		3d term	+
		$-\Delta\phi$	−30.03

	°	′	″
$\frac{1}{2}(\phi+\phi')$	39. F		

	Logarithms	Values in seconds
s		
$-\sin\alpha$	2.673981	
A′	8.509 272	
Sec ϕ'	0.080 146	
$\Delta\lambda$	1.263 399	−18.34
$\sin\frac{1}{2}(\phi+\phi')$	9.744 673	
$-\Delta\alpha$	1.008 072	−10.2

2.673981
2.966241
fx 9.707740 207° 01′ 50.3

	Logarithms	Values in seconds	
s			
$+\cos\alpha$	3.319339		
B	8.511 314		
h	1.830 653	1st term	+67.71
s^2			
$\sin^2\alpha$			
C	1.229.85		
		2d term	+ −
h^3			
D			
		3d term	+
		$-\Delta\phi$	+67.71

	°	′	″
$\frac{1}{2}(\phi+\phi')$	43	50	

	Logarithms	Values in seconds
s		
$-\sin\alpha$	1.324533	
A′	8.509273	
Sec ϕ'	0.080008	
$\Delta\lambda$	9.913 814	−00.82
$\sin\frac{1}{2}(\phi+\phi')$	9.744 518	
$-\Delta\alpha$	9.658 332	0.45

1.324533
3.319 339
8.005 194 359° 25′ 34 12.6

11—9302 U. S. GOVERNMENT PRINTING OFFICE, 1929

2.966241
9949762
3.016479

2.673981
9.657502
3.016479

comp T.P.P. gell.

3.319339
8.005173
5314466

3.319339
9.999978
3.319361

1.324533
9.999977
1.324556

1.324533
8.005173
3.319360

Inverse

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″
α	2	to 3			
2d ∠		&	+		
α	2	to 1	21	37	27.6
Δα					−10.1
			180	00	00.0
α′	1	to 2	201	37	17.5

			°	′	″
α	3	to 2			
3d ∠		&	−		
α	3	to 1			
Δα					
			180	00	00.0
α′	1	to 3			

First Angle of Triangle

	°	′	″			°	′	″
φ	33	44	24.43	2 Tank Prin 232	λ	118	16	17.88
Δφ		−	38.51		Δλ		+	18.27
φ′	33	43	45.92	1 Tank, Cotton Com	λ′	118	16	36.15

	°	′	″			°	′	″
φ				3	λ			
Δφ					Δλ			
φ′				1	λ′			

	Logarithms	Values in seconds
s		
Cos α (+)	3.076 260	
B	8.511 314	
h	1.585 574	1st term + 38.51
s²		
Sin² α		
C	1.72976	
		2d term +
h³		
D		
		3d term +
		−Δφ + 38.51

	°	′	″	Logarithms	Values in seconds
½(φ+φ′)	33	44	05		
s					
Sin α (+)				2.672 415	
A′				8.509 273	
Sec φ′				0.080 050	
Δλ				1.261 738	+ 18.27
Sin ½(φ+φ′)				9.744 566	
−Δα				1.006 304	10.14

tan = 2.672 415 / 3.076 260 / 9.898 356 − 21 37 27.6

	Logarithms	Values in seconds
s		
Cos α		
B		
h		1st term ″
s²		
Sin² α		
C		
		2d term +
h³		
D		
		3d term +
		−Δφ

	°	′	″	Logarithms	Values in seconds
½(φ+φ′)					
s					
Sin α					
A′					
Sec φ′					
Δλ					″
Sin ½(φ+φ′)					
−Δα					

3.074 260
9.968 305
3.105 955

2.672 415
9.566 460
3.105 955

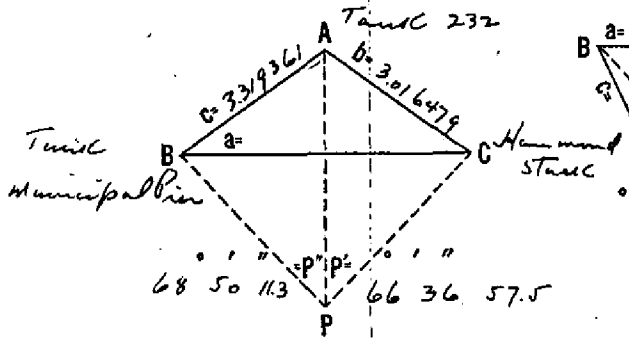
11—9362 U. S. GOVERNMENT PRINTING OFFICE 1929

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 655
Ed. Sept., 1929

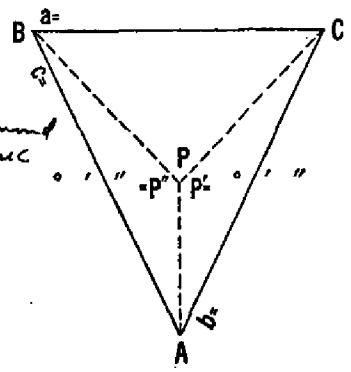
Jetty No 2

COMPUTATION OF THREE-POINT PROBLEM

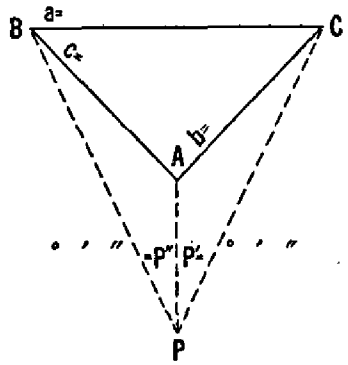
Case 1



Case 2



Case 3



Cases 1 and 2				Case 3	
P′	66	36	57.5	P′	
P″	68	50	11.3	P″	
A	152	23	23.3		
Sum	287	50	37.4	Sum A	
½ Sum	143	55	48.6		
S=180°−½ sum=	36	04	11.8	S=½ (A−sum)=	
Log c =	3.319	324			
Log sin P′ =	9.962	779			
Colog b =	6.983	351			
Colog sin P″ =	0.030	326			
Sum=log tan Z=	0.295	980			
Z=	63°	09	06.4		
Z+45°=	108	09	06.4		
Log cot (Z+45°) =	9.516	674	−		
Log tan S=	9.862	306	+		
Sum=log tan ϵ=	9.378	980	(sign −)		
ϵ	13°	28	53.2		
S	36	04	11.8		

(Tan ϵ+)				(Tan ϵ−)
S+ϵ=angle ABP	22°	37	52.2	S−ϵ=angle ABP
S−ϵ=angle ACP	49	31	36.6	S+ϵ=angle ACP

BPA	68	50	11.3	APC	66	36	57.5	PCB
ABP	22	37	52.2	PCA	49	31	36.6	CBP
PAB	88	31	56.5	CAP	163	51	25.9	BPC

T. P. P

(For explanation of this form see Special Publication No. 138, pages 191 and 192, or Special Publication No. 145, pages 98–100)

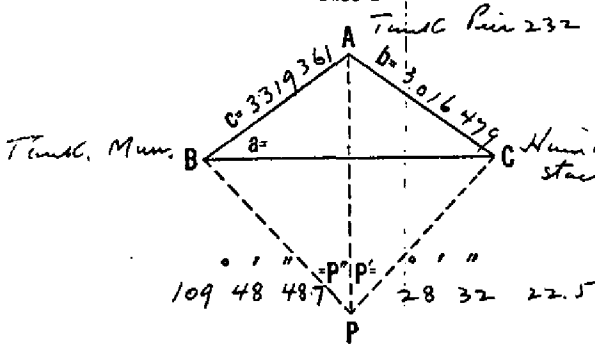
U. S. GOVERNMENT PRINTING OFFICE: 1929
11—9912

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 655
Ed. Sept., 1929

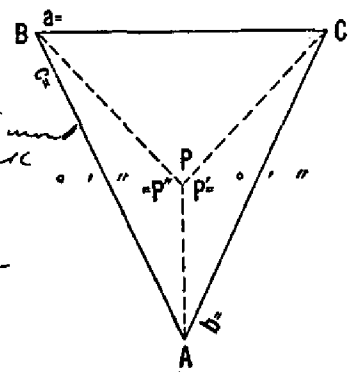
Breckenridge No. 2

COMPUTATION OF THREE-POINT PROBLEM

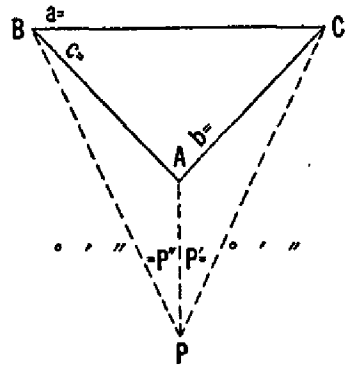
Case 1



Case 2



Case 3



Cases 1 and 2				Case 3	
P′	28	32	22.5	P′	
P″	109	48	48.7	P″	
A	152	23	29		
				Sum	
Sum	290	43	39.8	A	
½ Sum	145	22	46.8		
S=180°−½ sum=	34	37	43.2	S=½ (A−sum)=	A−sum

Log c =	3.319 36	24
Log sin P′ =	9.679 21	5
Colog b =	6.983 51	
Colog sin P″ =	0.026 50	2
Sum=log tan Z=	0.008 69	7
Z=	45 34	49
Z+45°=	90° 34	49
Log cot (Z+45°) =	7.99	834
Log tan S=	9.839	275
Sum=log tan ϵ=	7.834	846
ϵ	0°	21 39
S	34	37

ϵ = − (sign −)

(Tan ϵ+)				(Tan ϵ−)
S+ϵ=angle ABP	34°	14′	13.1″	S−ϵ=angle ABP
S−ϵ=angle ACP	35	04	59	S+ϵ=angle ACP

BPA	109	48	48.7	APC	28	32	22.5	PCB
ABP	34	14	13.1	PCA	35	01	13.3	CBP
PAB	(35	56	58.2)	CAP	(176	26	24.2)	BPC

T.P.P.

(For explanation of this form see Special Publication No. 138, pages 191 and 192, or Special Publication No. 145, pages 98–100)

U. S. GOVERNMENT PRINTING OFFICE: 1929
11—9912

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 25
Ed. Jan., 1929

11—0121

U. S. GOVERNMENT PRINTING OFFICE: 1930

COMPUTATION OF TRIANGLES

State: California

NO.	STATION	OBSERVED ANGLE	CORR'N	SPHER'L ANGLE	SPHER'L EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
	2-3						3.319 361
	1 Bulkhead No 2	109 48 48.7					0026 502
	2 Tank, Main Pier	34 14 13.1					9750 213
	3 Tank, Pier 232	35 56 58.2					9768 866
	1-3						3.096 076
	1-2						3.114 729
	2-3						3.016 479
	1 Bulkhead No 2	28 32 22.5					0.320 785
	2 Tank, Pier 232	116 26 24.2					9952 017
	3 Main Stack	35 01 13.3					9758 812
	1-3						3.289 281
	1-2					1247.6	3.096 076
	2-3						3.105 955
	1 Bulkhead No 2	62 06 32.5					0.053 627
	2 Tank, Cotton Comp.	(59 44 14.4)					9.936 375
	3 Tank, Pier 232	58 09 13.1					9929 146
	1-3					1247.3	3.095 957
	1-2						3.088 728
	2-3						
	1						
	2						
	3						
	1-3						
	1-2					T.P.P.	

Do not write in this margin

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 25
Ed. Jan., 1929

11—9121

COMPUTATION OF TRIANGLES

State: California

NO.	STATION	OBSERVED ANGLE	CORR'N	SPHER'L ANGLE	SPHER'L EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
	2-3						3.319 361
	1 Jetty # 2	68 50 11.3					0.030 326
	2 Tank, Mun. Pier	22 37 52.2					9.585 234
	3 Tank, Pier 232	88 31 56.5					9999 858
	1-3						2.934 921
	1-2						3.349 545
	2-3						3.016 479
	1 Jetty # 2	66 36 57.5					0037 221
	2 Tank, Pier 232	63 51 25.9					9953 130
	3 Hammond Stack	49 31 36.6					9881 219
	1-3						3.006 830
	1-2					860.8 m	2934 919
	2-3						3.105 955
	1 Jetty # 2	47 17 22.5					0.172 064
	2 Tank, Cotton Compress	26 58 26.1					9.656 658
	3 Tank, Pier 232	110 44 11.4					9970 913
	1-3					860.4 m	2.934 677
	1-2						3.248 932
	2-3						
	1						
	2						
	3						
	1-3						
	1-2						

Do not write in this margin

T. P. P.
Comp.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″
α	2	to 3	207	01	50.3
2d ∠		&	+ 63	51	25.9
α	2	to 1	270	53	16.2
Δα				+	18.6
			180	00	00.0
α′	1	to 2	90	53	34.8 (2)
		FIRST ANGLE OF TRIANGLE	66	36	57.5

	°	′	″			°	′	″
φ	33	44	24.43	2 Tank Pier 232	λ	118	16	17.88
Δφ			0.43		Δλ		−	33.44
φ′	33	44	24.00	1 Jetty #2	λ′	118	15	44.44

	Logarithms	Values in seconds
s	2.934 919	739.4 (1109.1)
Cos α	8.190 167	
B	8.511 314	
h	9.636 400	1st term 0.″433
s²		
Sin² α		
C	1.229 85	
		2d term + −
h²		
D		
		3d term +
		−Δφ + 0.43

	°	′	″	Values in seconds
½(φ+φ′)	44	24.2		
	Logarithms			
s	2.934 919			
Sin α″	9.999 952			
A′	8.509 273			
Sec φ′	0.080 103			
Δλ	1.524 247			−33.″638
Sin ½(φ+φ′)	9.744 626			
−Δα	1.268 873			18.57

			°	′	″
α	3	to 2	27	02	00.5
3d ∠		&	− 49	31	36.6
α	3	to 1	337	30	23.9
Δα				+	8.3
			180	00	00.0
α′	1	to 3	157	30	32.2

	°	′	″			°	′	″
φ	33	44	54.46	3 Hammond Stack	λ	118	15	59.54
Δφ		−	30.46		Δλ		−	15.10
φ′	33	44	24.00	1 Jetty #2	λ′	118	15	44.44

	Logarithms	Values in seconds
s	3.006 830	
Cos α	9.965 636	
B	8.511 314	
h	1.483 780	1st term 30.″464
s²		
Sin² α		
C	1.229 99	
		2d term + −
h²		
D		
		3d term +
		−Δφ + 30.46

	°	′	″	Values in seconds
½(φ+φ′)	39.2			
	Logarithms			
s	3.006 830			
Sin α″	9.582 718			
A′	8.509 273			
Sec φ′	0.080 103			
Δλ	1.178 924			15.″098
Sin ½(φ+φ′)	9.744 673			
−Δα	0.923 597			8.28

11—9362 U. S. GOVERNMENT PRINTING OFFICE: 1935

J.C.W.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	'	"				°	'	"
α	2 to 3		207	01	50.3	α	3 to 2		27	02	00.5
2d ∠	&		+ 116	26	24.2	3d ∠	&		− 35	01	13.3
α	2 to 1		323	28	14.5	α	3 to 1		352	00	47.2
$\Delta\alpha$					−16.0	$\Delta\alpha$					−5.8
			180	00	00.0				180	00	00.0
α'	1 to 2		143	28	30.5	α'	1 to 3		172	00	53.0
	First Angle of Triangle		28	32	22.5						

	°	'	"			°	'	"			°	'	"
ϕ	33	44	24.43	2 Tank Prin r32	λ	118	16	17.88	ϕ	33	44	54.46	3 Hammond Tank	λ	118	15	59.54
$\Delta\phi$		−	32.53		$\Delta\lambda$		−	28.85	$\Delta\phi$		−	62.57		$\Delta\lambda$		−	10.51
ϕ'	33	43	51.90	1 Buelchead 2	λ'	118	15	49.03	ϕ'	33	43	51.89	1 Buelchead 2	λ'	118	15	49.03

	Logarithms	Values in seconds
s	3.096 076	1598.9 (249.6)
Cos α	9.905 014	
B	8.511 314	
h	1.512 404	1st term + 32".53
s^2		
$\sin^2\alpha$		
C		
		2d term +
h^3		
D		
		3d term +
		$-\Delta\phi$ + 32.53

° ' "

$\frac{1}{2}(\phi+\phi')$ 44 08.2

	Logarithms	Values in seconds
s	3.096 076	1262.2 (2824)
Sin α	9.774 688	
A'	8.509 273	
Sec ϕ'	0.080 058	
$\Delta\lambda$	1.460 095	− 28".847
$\sin\frac{1}{2}(\phi+\phi')$	9.744 575	
$-\Delta\alpha$	1.204 670	− 16.02

	Logarithms	Values in seconds
s	3.289 281	
Cos α	9.995 767	
B	8.511 314	
h	1.796 362	1st term + 62".57
s^2		
$\sin^2\alpha$		
C		
		2d term +
h^3		
D		
		3d term +
		$-\Delta\phi$ + 62.57

° ' "

$\frac{1}{2}(\phi+\phi')$ 44 23.2

	Logarithms	Values in seconds
s	3.289 281	
Sin α	9.142 848	
A'	8.509 273	
Sec ϕ'	0.080 058	
$\Delta\lambda$	1.021 460	− 10".507
$\sin\frac{1}{2}(\phi+\phi')$	9.744 622	
$-\Delta\alpha$	0.766 082	− 5.8

11—9362 U. S. GOVERNMENT PRINTING OFFICE 1929

T.P.P.

Inverse.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″
α	2 to 3				
2d ∠	&		+		
α	2 to 1		06	48	48.1 ✓
Δα				−	−2.5 ✓
			180	00	00.0
α′	1 to 2		186	48	45.6 ✓

			°	′	″
α	3 to 2				
3d ∠	&		−		
α	3 to 1				
Δα					
			180	00	00.0
α′	1 to 3				

First Angle of Triangle

	°	′	″			°	′	″
φ	33	44	24.00	2 Jetty #2	λ	118	15	44.44 ✓
Δφ		−	32.10 ✓		Δλ		+	04.59 ✓
φ′	33	43	51.90 ✓	1 Bulkhead #2	λ′	118	15	49.03 ✓

				°	′	″
φ			3	λ		
Δφ				Δλ		
φ′			1	λ′		

	Logarithms	Values in seconds
s		
Cos α	2.995 190 ✓	
B	8.511 315	
h	1.506 505 ✓	1st term 32.10
s^2		
$\sin^2\alpha$		
C		
		2d term + —
h^3		
D		
		3d term +
		−Δφ + 32.10 ✓

	°	′	″	8,0
½(φ+φ′)	33	44	04.0	

	Logarithms	Values in seconds
s		
Sin α	2.072 482 ✓	
A′	8.509 273	
Sec φ′	0.080 058 ✓	
Δλ	0.661 813 ✓	+ 04.59 ✓
Sin ½(φ+φ′)	9.744 562	
−Δα	0.406 375	+ 2.54 ✓

2.072 482
2.995 190
tan − 9.077 292 − 6 48 48.1 ✓

	Logarithms	Values in seconds
s		
Cos α		
B		
h		1st term ″
s^2		
$\sin^2\alpha$		
C		
		2d term +
h^3		
D		
		3d term +
		−Δφ

	°	′	″
½(φ+φ′)			

	Logarithms	Values in seconds
s		
Sin α		
A′		
Sec φ′		
Δλ		″
Sin ½(φ+φ′)		
−Δα		

2.995 190
9.996 922 ✓
2.998 268

2.072 482
9.074 214
2.998 268 ✓ TPP

11—9362 U. S. GOVERNMENT PRINTING OFFICE: 1929

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 25
Ed. Jan., 1929

11—9121

U. S. GOVERNMENT PRINTING OFFICE: 1930

COMPUTATION OF TRIANGLES

State: California

NO.	STATION	OBSERVED ANGLE	CORR'N	SPHER'L ANGLE	SPHER'L EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
	2-3						2.998 269
	1 Beacon #2 F.H.	(118 35 15)					0.056 462
	2 Jetty #2	19 22 40					9.520 870
	3 Bulkhead #2	42 02 05					9.825 803
	1-3						2.575 601
	1-2						2.880 534
	2-3						2.998 269
	1 Beacon #1 F.H.	(106 08 04)					0.017 452
	2 Jetty #2	24 17 50					9.614 338
	3 Bulkhead #2	49 34 06					9.881 487
	1-3						2.630 059
	1-2		b heeled				2.897 208
	2-3						
	1						
	2						
	3						
	1-3						
	1-2						
	2-3						
	1						
	2						
	3						
	1-3						
	1-2						

Do not write in this margin

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″
α	2	to 3	06	48	48
2d ∠		&	+ 19	22	40
α	2	to 1	26	11	28
Δα					
			180	00	00.0
α′	1	to 2			

			°	′	″
α	3	to 2	186	48	46
3d ∠		&	− 42	02	05
α	3	to 1	144	46	41
Δα					
			180	00	00.0
α′	1	to 3			

First Angle of Triangle

	°	′	″			°	′	″
φ	33	44	24.00	2 Jetty 2	λ	118	15	44.44
Δφ		−	22.12		Δλ		+	13.02
φ′	33	44	01.88	1 Beacon Fish Harbor 2	λ′	118	15	57.46

	°	′	″			°	′	″
φ	33	43	51.90	3 Buelchead 2	λ	118	15	49.03
Δφ		+	09.98		Δλ		+	08.43
φ′	33	44	01.88	1 Beacon 2	λ′	118	15	57.46

	Logarithms	Values in seconds
s	2.880 534	58.0
Cos α	9952951	(1790.6)
B	8.511 314	
h	1.344799	1st term +22.12
s²		
Sin²α		
C		
		2d term +
h³		
D		
		3d term +
		−Δφ +22.12

°	′	″
½(φ+φ′)		

	Logarithms	Values in seconds
s	2.880534	1479.1
Sin α	9644800	(65.4)
A′	8.509273	
Sec φ′	0080072	
Δλ	1.114679	+13.022
Sin ½(φ+φ′)		
−Δα		

	Logarithms	Values in seconds
s	2.575 601	
Cos α	9912 182	
B	8.511 314	
h	0.999097	1st term −09.979
s²		
Sin²α		
C		
		2d term +
h³		
D		
		3d term +
		−Δφ −09.98

°	′	″
½(φ+φ′)		

	Logarithms	Values in seconds
s	2.575601	
Sin α	9760984	
A′	8.509273	
Sec φ′	0080072	
Δλ	0925930	+08.432
Sin ½(φ+φ′)		
−Δα		

11—9362 U. S. GOVERNMENT PRINTING OFFICE 1935

T.P.P.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

		°	′	″
α	2 to 3	06	48	48
2d ∠	&	+ 24	17	50
α	2 to 1	332	06	38
Δα				
		180	00	00.0
α′	1 to 2			

		°	′	″
α	3 to 2	186	48	46
3d ∠	&	− 49	34	06
α	3 to 1	137	14	40
Δα				
		180	00	00.0
α′	1 to 3			

First Angle of Triangle

	°	′	″			°	′	″
φ	33	44	24.00	2 Jetty #2	λ	118	15	44.44
Δφ		+	21.93		Δλ		+	15.84
φ′	33	44	02.07	1 Beacon #1 Fish Harbor	λ′	118	16	00.28

	°	′	″			°	′	″
φ	33	43	51.90	3 Bulkhead #2	λ	118	15	49.03
Δφ		+	10.17		Δλ		+	11.25
φ′	33	44	02.07	1 Beacon #1	λ′	118	16	00.28

	Logarithms	Values in seconds
s	2.897 208	63.8
Cos α (+)	9.932 561	1784.7
B	8.511 315	
h	1.341 084	1st term 21.″93
s^2		
$\sin^2\alpha$		
C		
		2d term +
h^2		
D		
		3d term +
		−Δφ 21.93

½(φ+φ′)	°	′	″	Logarithms	Values in seconds
s				2.897 208	7.2
Sin α (+)				9.713 231	(1537.4)
A′				8.509 273	
Sec φ′				0.080 072	
Δλ				1.199 784	15.″84
Sin ½(φ+φ′)					
−Δα					

	Logarithms	Values in seconds
s	2.630 059	
Cos α (−)	9.865 848	
B	8.511 315	
h	1.007 222	1st term 10.″17
s^2		
$\sin^2\alpha$		
C		
		2d term +
h^2		
D		
		3d term +
		−Δφ −10.17

½(φ+φ′)	°	′	″	Logarithms	Values in seconds
s				2.630 059	
Sin α (+)				9.831 788	
A′				8.509 273	
Sec φ′				0.080 072	
Δλ				1.051 192	11.″25
Sin ½(φ+φ′)					
−Δα					

11—9362 U. S. GOVERNMENT PRINTING OFFICE: 1929

Glen.

Form 537a
Ed. Nov., 1929

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

REG. NO.

TOPOGRAPHIC TITLE SHEET

The Topographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

Field No.

REGISTER NO. 6044

State California

General locality San Pedro Bay.

Locality Fish Harbor

Scale 1:10,000 Date of survey March, 1934

Vessel Shore Party

Chief of party R. W. Knox

Surveyed by J. C. Mathisson and T. P. Pendleton

Inked by

Heights in feet above ------- to ground to tops of trees

Contour, Approximate contour, Form line interval feet

Instructions dated Director's Letter of February 13, 1934

Remarks: Photo control sheet.