

3384

Diag. Cht. No. 6460-1

Form 504

U. S. COAST AND GEODETIC SURVEY

DEPARTMENT OF COMMERCE

DESCRIPTIVE REPORT

Type of Survey

Topographic

Field No.

Office No.

3384

LOCALITY

State

Washington

General locality

Water Front

Locality

Jacoma
& Vicinity

1943

CHIEF OF PARTY

R. B. Henderson

LIBRARY & ARCHIVES

DATE

April 2, 1912

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1913

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C. & G. SURVEY,
LIBRARY AND ARCHIVES
APR 2-1913
Acc. No. _____

Department of Commerce and Labor
COAST AND GEODETIC SURVEY

Superintendent.

State: *Wash*

DESCRIPTIVE REPORT.

Top. _____ Sheet No. *3384*

LOCALITY:

*Waterfront in Tacoma &
vicinity*

1913

CHIEF OF PARTY:

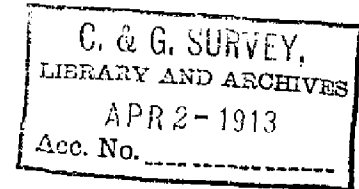
R. B. Herickson

11-4845

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Report to accompany Plane Table Sheet showing the
Water Front in Tacoma in the vicinity of the Milwaukee
and St. Paul Docks. Scale 1:5000



The object of this sheet and Plane Table survey is to locate sufficient points in order to develop the hydrography in the Milwaukee slips and approach to the St. Paul Lumber Co's dock at Tacoma.

This work was executed in December 1912 by Assistant Dailey. At the time of beginning this work and until the sheet was nearly completed there were no data at hand giving the Geographic Positions of points falling on the sheet. It was therefore necessary to measure a telemeter base and from this base all the flags and objects used were cut in. The Tacoma City Hall Clock Tower was cut in from this base. The base and traverse extended along the Milwaukee wharf from signal KEY to the vicinity of signal STACK. Telemeter and tape measurements were taken all along the wharves and plotted directly on the sheet; and outline of the wharves and approaches were made from the east side of the Milwaukee dock to the Tacoma water-way and as far south as 11th Street. This gives an area of one square mile.

The N.W. limits show the new light and fog signal station. This sheet now shows all the improvements in this locality. A similar sheet was executed in February 1909.

In order to properly orient this sheet, the City Hall having been located by cuts, a round of sextant angles were measured from the top of the City Hall tower, to check its position. Having received the Geographic positions of City Hall, St. Luke's Church Spire and signal Emerson,

angles were measured from the City Hall tower connecting these known points with flags and hydrographic signals on the plane table sheet. With this data the azimuth from City Hall to signal Cloth and signal Der were computed, also their geographic positions, and the projection was made from these computations which is given as part of this report.

Respectfully submitted,

R. B. Almon

Chief of Party, C. & G. Survey.

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Sextant angles taken at new Light Station,

Tacoma Harbor, Wash.

At Light Station:

Clock Tower to		
Pul.....	121°	26'
Der.....	73	14
Tan.Brown Point.....	30	56
Flour Mill Stack (called Elevator		
Stack on Photograph.....	39	45
Luthuran Church Spire.....	70	17
Clock Tower on City Hall.....	24	16
Pul to White House.....	58	05
Near Buoy to Flour Mill Stack.	31	39
Buoy to Flour Mill Stack.....	12	44

At Weather Signal Tower:

Pul.....	55	16
Der		
Clock Tower.....	75	38
Der to Tan.Brown Point.....	24	45
N.P. Building to Clock Tower...	12	09

At GULL:

White House.....	45	30
Draw of Bd. signal Pul		
Lumber Derrick.....	59	42

At signal DER.

Clock Tower to		
Pul.....	88	13
White House.....	81	08
Tan Brown Point.....	52	28
Big Stack.....	45	48
Flour Mill Stack.....	11	46
Luth.Church Spire.....	68	06
Clock Tower.....	12	29
Standpipe.....	05	29
Brown Pt. to Buoy #4.....	64	25
" " " " #3.....	45	23
" " " " #(?).....	43	52
" " " " #(?).....	45	08

Sextant Angles to locate buoys, Tacoma Harbor, Wash.

Standing on Buoy #1.

Big Stack to
Wireless (right hand staff).....83° 50'
Flour Mill.....80 21
Lumber Derrick.....14 48
Brown Pt. L.H.....100 30
Big Stack.....80 39

Big Stack to Square Church Spire..105° 59'

Big Stack to Cor. Red Building....103 52

Standing on Buoy #2.

Big Stack to
Wireless (right hand staff).....74° 51'
Flour Mill.....55 05
H.S.Flag Staff.....23 32
Lumber Derrick.....23 32
White House.....48 46
Brown Pt. L.H.....56 01
Big Stack.....78 11

Standing on Buoy #3. Off Pyramid Flour Mill.

Big Stack to
Square Stack.....20° 09'
Flour Mill Stack.....43 33
Clock Tower.....76 20
Lumber Derrick.....39 31
White House.....61 42
Brown Pt.L.H.....58 01
Big Stack.....60 51

Flour Stack to N.Gable Flour Mill..10° 53'

White House to Buoy #1.....117 54

White House to Buoy #2.....115 08.

Standing on Buoy No.4.

Big Stack to
Flour Mill Stack.....10° 20'
Clock Tower.....105 18
Lumber Derrick.....83 46
White House.....57 27
Big Stack.....103 24
North Gable Flour Mill to Clock Tower...96° 45'

3384

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Field Observations and Computations

Made in connection with the survey in the vicinity of

Milwaukee Slip and St. Paul Lumber Dock

Tacoma, Wash.

December

1912.

Scale 1:5000

I.M. Dalley, Assistant.

Topographer.

R.B. Derickson, Asst., Comdg.

Chief of Party.

Seitant Angled from City Hall Tower A

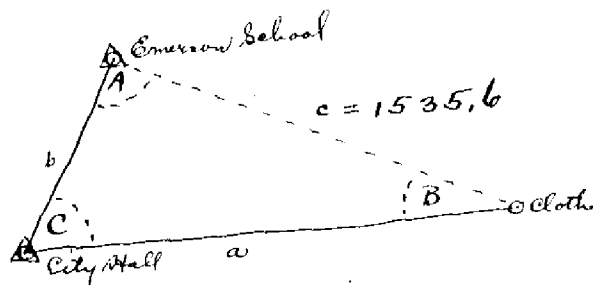
Seitant #338

Mar. 14, 1913

Al. Achino, Aid C. & G. S.
Observer

Objects	Obs. Angles	Corr.	Adjusted Angle
Emerson's to Cloth 0	82°-04'	+3	82°-07'
Emerson's to Dev 0	78°-52'	-3	78-49
Cloth 0 to mid 0	22-45	-2	22-43
Tang. Brown's Pt. to Pull 0	83-46	+9	83-55
" " " " Dev 0	33-30	+4	33-34
Walk 0 to Pull 0	24-24	-3	24-21
Cloth 0 to Walk 0	22-40	+1	22-41
Dev 0 to Pull 0	50 21	-1	50-20
Stat. Lt. to Pull 0	43-06	0	43-06
Cloth 0 to Pull 0	47-03	-1	47-02
Ray 0 to Pull 0	40 25	-4	40-21
Bar 0 to Pull 0	37-36	-5	37-31
mid 0 to Pull 0	24-20	-1	24-19
Ray 0 to mid 0	16-06	-4	16-02
Dev 0 to St. Luke's Ch.	79-30	-3	79-27
Cloth 0 to St. Luke's Ch.	82-43	+2	82-45

Computations of Triangles



Given $\begin{cases} C = 82-07 \\ a = 1514.6 \\ b = 534.79 \end{cases}$

$$a + b = 3.31163$$

$$\cos \frac{1}{2}(A+B) = \frac{9.81745}{3.12908}$$

$$\cos \frac{1}{2}(A-B) = \frac{9.94281}{3.18627}$$

$$c = 1535.6 \text{ meters} = \text{Em.} - \text{Cloth.}$$

$$A+B = 97-53$$

$$\frac{1}{2}(A+B) = 48-56.5 \tan .05994$$

$$a-b = 979.8 \log \frac{2.99114}{3.05108}$$

$$a+b = 2049.4 \log 3.31163$$

$$\tan \frac{1}{2}(A-B) = 9.73945$$

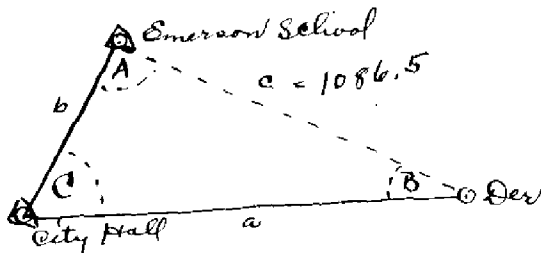
$$\frac{1}{2}(A-B) = 28-45-26$$

$$A-B = 57-30-52$$

$$A+B = 97-53$$

$$2A = 155-24-52$$

$$A = 77-42-26$$



Given $\begin{cases} C = 78-49 \\ a = 1055.2 \\ b = 534.79 \end{cases}$

$$a + b = 3.20140$$

$$\cos \frac{1}{2}(A+B) = \frac{9.80267}{3.00407}$$

$$\cos \frac{1}{2}(A-B) = \frac{9.96802}{3.03605}$$

$$c = 1086.5 \text{ meters, Em.} - \text{Der}$$

$$A+B = 101-11$$

$$\frac{1}{2}(A+B) = 50-35.5 \tan .08531$$

$$a-b = 520.4 \log \frac{2.71634}{2.80165}$$

$$a+b = 1590.0 \log 3.20140$$

$$\frac{1}{2}(A-B) = 21-43-10$$

$$A-B = 43-26-20$$

$$A+B = 101-11$$

$$2A = 144-37-20$$

$$A = 72-18-40$$

POSITION COMPUTATION, SECONDARY TRIANGULATION.

a	to			
$\angle$	&			
a 3	to 1			
Δa				
a' 1	to 3	180	00	00.00

φ				3	λ			
$\Delta\varphi$				$s=$	$\Delta\lambda$			
φ'				1	λ'			

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$\frac{1}{2}(\varphi+\varphi')$				s		s^2		
				$\cos a$		$\sin^2 a$		h'
				B	8.5	C		D
1st term				h				
2d and 3d terms	+							
$-\Delta\varphi$								

s				
$\sin a$				
A	8.50	$\Delta\lambda$		
$\sec \varphi'$	0.	$\sin \frac{1}{2}(\varphi+\varphi')$		
$\Delta\lambda$		$-\Delta a$		

N. B.—Take out A from table for φ' .

POSITION COMPUTATION, SECONDARY TRIANGULATION.

a	City Hall to Emerson	131	15	40.
L	Emerson & Cloth	+ 82	07	00.
a	2 to 1	213	22	40.
Δa		180	00	00.00
a'	1 to 2			

Third Angle of Triangle

φ	47	15	26.93	2 City Hall	λ	122	26	18.19
Δφ			40.95	s = 1514.6	Δλ	-		39.64
φ'	47	16	07.88	1 Cloth	λ'	122	25	38.55

$\frac{1}{2}(\varphi + \varphi')$		s	3.18029	S		h²	
		Cos a	9.92171	Sin² a		D	
		B	8.51029	C			
1st term	40.95	h	1.61229				
2d and 3d terms	+						
-Δφ							

s	3.18029		
Sin a	9.74050		
A	8.50893	Δλ	
sec φ'	0.16842	Sin $\frac{1}{2}(\varphi + \varphi')$	
	1.59814		
Δλ	39.64	-Δa	

N. B.—Take out A from table for φ'.

Do not write in this margin.

POSITION COMPUTATION, SECONDARY TRIANGULATION.

a	to			
$\angle$	&			
a	3	to 1		
Δa				
a'	1	to 3	1 8 0	0 0 0 0 0 0

φ				3	λ			
$\Delta\varphi$				$S=$	$\Delta\lambda$			
φ'				1	λ'			

Do not write in this margin.

$\frac{1}{2}(\varphi + \varphi')$				S		S^2			
				$\cos a$		$\sin^2 a$		h^2	
				B	8. 5	C		D	
1st term				h					
2d and 3d terms	+								
$-\Delta\varphi$									

S				
$\sin a$				
A	8. 5 0		$\Delta\lambda$	
$\sec \varphi'$	0.		$\sin \frac{1}{2}(\varphi + \varphi')$	
$\Delta\lambda$			$-\Delta a$	

N. B.—Take out A from table for φ' .

POSITION COMPUTATION, SECONDARY TRIANGULATION.

a	City Hall	to Emerson	131	15	40.0
L	Emerson	& Dev	+ 78	49	00.00
a	2	to 1	210	04	40.0
Δa					
			180	00	00.00
a'	1	Dev	to 2	City Hall	

Third Angle of Triangle

φ	47	15	26.93	2	City Hall	λ	122	26	18.19
Δφ			29.57	s =	1055.2	Δλ			25.16
φ'	47	15	56.50	1	Dev	λ'	122	25	53.08

$\frac{1}{2}(\varphi + \varphi')$	47-15	s	3.02333	s²	.	h²	.
		Cos a	9.93719	Sin² a	.	D	.
		B	8.51029	C	.		.
1st term	29.57	h	1.47081		.		.
2d and 3d terms	+				.		.
-Δφ					.		.

s	3.02333	Δλ	.
Sin a	9.69999	Sin $\frac{1}{2}(\varphi + \varphi')$	.
A	8.50892		.
sec φ'	0.16838		.
	1.40062		.
Δλ	25.16	-Δa	.

N. B.—Take out A from table for φ'.

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City Hall ϕ 47-15-26.93 λ 122-26-18.19

Emerson ϕ 47-15-38.35 λ 122-26-37.31

POSITION COMPUTATION, SECONDARY TRIANGULATION.

a	City Hall	to	Emerson	131	15	40.
$\angle$		&		-		.
a	3	to	1			.
Δa				-		14.
a'	1	Emerson	to	3	City Hall	
				180	00	00.00
				311	15	26.00

ϕ	47	15	26.93	3	City Hall	λ	122	26	18.19
$\Delta \phi$			11.42	$s =$	534.79	$\Delta \lambda$	+		19.12
ϕ'	47	15	38.35	1	Emerson	λ'	122	26	37.31

$\frac{1}{2}(\phi + \phi')$	47-15-32.6	$\cos a$	2.54738	$\sin^2 a$		h'	.
		B	8.51029	C		D	.
1st term	11.42	h	1.05767				.
2d and 3d terms	+						.
$-\Delta \phi$	11.42						.

$$s \sin \alpha = 2.60422$$

$$s \cos \alpha = 2.54738$$

$$\tan \alpha = 0.05684$$

$$\alpha = 131-1540$$

$$s = 534.79$$

$\sin a$	2.60422	$\Delta \lambda$	-1.28149
A	8.50893	$\sin \frac{1}{2}(\phi + \phi')$	9.86598
$\sec \phi'$	0.16834		
	1.28149		1.14747
$\Delta \lambda$	19.12	$-\Delta a$	-14.0

N. B.—Take out A from table for ϕ' .

POSITION COMPUTATION, SECONDARY TRIANGULATION.

a	to			
$\angle$	&	+		
a	2	to 1		
Δa				
a'	1	to 2	1 8 0	0 0 0 0 0 0

Third Angle of Triangle

φ				2	λ			
$\Delta \varphi$				$s =$	$\Delta \lambda$			
φ'				1	λ'			

$\frac{1}{2}(\varphi + \varphi')$				s		s^2		h^2
				$\cos a$		$\sin^2 a$		
				B	3. 5	C		D
1st term				h				
2d and 3d terms	+							
$-\Delta \varphi$								

s				
$\sin a$				
A	3. 5 0		$\Delta \lambda$	
$\sec \varphi'$	0.		$\sin \frac{1}{2}(\varphi + \varphi')$	
$\Delta \lambda$			$-\Delta a$	

N. B.—Take out A from table for φ' .

11-627

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POSITION COMPUTATION, SECONDARY TRIANGULATION.

a	Emerson	to	City Hall	311	15	26.0
$\angle$	Der	&	City Hall	- 72	18	40.0
a	3 Emerson	to 1	Der	238	56	46.0
Δa				180	00	00.00
a'	1 Der	to 3	Emerson			

φ	47	15	38.35	3 Emerson	λ	122	26	37.31
$\Delta \varphi$			18.15	$s = 1086.5$	$\Delta \lambda$			44.27
φ'	47	15	56.50	1 Der	λ'	122	25	53.04

$\frac{1}{2}(\varphi + \varphi')$		s	3.03603	s^2		h'	
		$\cos a$	9.71251	$\sin^2 a$			
		B	8.51029	C		D	
1st term	18.15	h	1.25883				
2d and 3d terms	+						
$-J\varphi$							

s	3.03603		
$\sin a$	9.93281		
A	8.50892	$\Delta \lambda$	
$\sec \varphi'$	0.16838	$\sin \frac{1}{2}(\varphi + \varphi')$	
	1.64614		
$\Delta \lambda$	44.27	$-\Delta a$	

N. B.—Take out A from table for φ' .

Do not write in this margin.

POSITION COMPUTATION, SECONDARY TRIANGULATION.

α	to			
$\angle$	&	+		
α	2	to 1		
$\Delta \alpha$				
			1 8 0	0 0
α'	1	to 2		

Third Angle of Triangle

φ				2	λ			
$\Delta \varphi$				$s =$	$\Delta \lambda$			
φ'				1	λ'			

$\frac{1}{2}(\varphi + \varphi')$				s		s^2		
				$\cos \alpha$		$\sin^2 \alpha$		h^2
				B	8. 5	C		D
1st term				h				
2d and 3d terms	+							
$-\Delta \varphi$								

s				
$\sin \alpha$				
A	8. 5 0		$\Delta \lambda$	
$\sec \varphi'$	0.		$\sin \frac{1}{2}(\varphi + \varphi')$	
$\Delta \lambda$			$-\Delta \alpha$	

N. B.—Take out A from table for φ' .

11-627

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POSITION COMPUTATION, SECONDARY TRIANGULATION.

a	Emerson	to	City Hall	311	15	26.0
$\angle$	Cloth	&	City Hall	- 77	42	26.0
a	3 Emerson	to	1 Cloth	233	33	00.0
Δa				180	00	00.00
a'	1		to 3			

φ	47	15	38.35	3 Emerson	λ	122	26	37.31
$\Delta \varphi$		+	29.54	$s = 1535.6$	$\Delta \lambda$		-	58.76
φ'	47	16	07.89	1 Cloth	λ'	122	25	38.55

$\frac{1}{2}(\varphi + \varphi')$		s	3.18627	s^2	6.37254	h'	
		$\cos a$	9.77387	$\sin^2 a$	9.81092	D	
		B	8.51029	C	1.43792		
1st term	29.54	h	1.47043		7.62138		
2d and 3d terms	+				.00		
$-\Delta \varphi$	-29.54						

s	3.18627		
$\sin a$	9.90546		
A	8.50893	$\Delta \lambda$	- 58.76
$\sec \varphi'$	0.16842	$\sin \frac{1}{2}(\varphi + \varphi')$	
	1.76908		
$\Delta \lambda$	- 58.76	$-\Delta a$	

N. B.—Take out A from table for φ' .

Do not write in this margin.

POSITION COMPUTATION, SECONDARY TRIANGULATION.

a		to			
$\angle$		&		+	
a	2	to 1			
Δa					
				180	00
					00.00
a'	1	to 2			

Third Angle of Triangle

φ				2	λ			
$\Delta \varphi$				$s =$	$\Delta \lambda$			
φ'				1	λ'			

$\frac{1}{2}(\varphi + \varphi')$				s		s^2		
				$\cos a$		$\sin^2 a$		h^2
				B	8.5	C		D
1st term				h				
2d and 3d terms	+							
$-\Delta \varphi$								

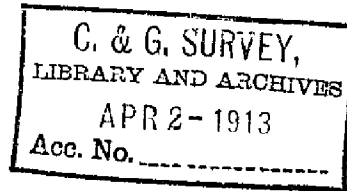
s					
$\sin a$					
A	8.50		$\Delta \lambda$		
$\sec \varphi'$	0.		$\sin \frac{1}{2}(\varphi + \varphi')$		
$\Delta \lambda$			$-\Delta a$		

N. B.—Take out A from table for φ' .

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Topographic Sheet of *3384*

Tacoma Waterfront,

Washington.

December 1912.

Scale 1:5000

R.B.Derickson, Asst., Comdg.

I.M.Dailey, Assistant,

Chief of Party.

Topographer.