7168

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OF PAGE 24

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Form 504

U. S. COAST AND GEODETIC SURVEY

DEPARTMENT OF COMMERCE

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. ..... *Office No.* Field Examination

LOCALITY

State Washington

General locality Everett Harbor

Locality Pier B, ~~Everett G.D. and D.D. Co.~~ A and C

1946

CHIEF OF PARTY

R.F.A. Studds

LIBRARY & ARCHIVES

DATE FEB 25 1947

8-1870-1 (1)

7168

FEB 25 1947

Form 537
(Ed. Nov. 1941)

REG. NO. H7168

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

HYDROGRAPHIC TITLE SHEET

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

REGISTER No. _____

Field No. Field Examination

State Washington

General locality Everett Harbor

Locality Pier A and B, ~~Everett S.B. and D.D. Co.~~

Scale 1:600 Date of survey Feb. 17 and 18, 1946

Instructions dated Oral Instructions from the Supervisor, N.W. Dist.

Vessel R. DERICKSON

Chief of party R.F.A. Studds

Surveyed by W.H. Bainbridge

Soundings taken by fathometer, graphic recorder, hand lead, wire _____

Protracted by H.C. Parsons

Soundings penciled by H.C. Parsons

Soundings in ~~fathoms~~ feet at ~~MLW~~ MLLW

REMARKS: Processed in the Seattle Processing Office

U. S. GOVERNMENT PRINTING OFFICE 428975

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DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

7 March, 1946

To: The Supervisor NW District

Subject: Field investigation of depths on either side of Pier"B", Everett Pacific Shipbuilding and Drydock Co., Everett, Washington

INSTRUCTIONS

Verbal instructions were received for this work from the Supervisor, Northwestern District in response to an urgent request from the Navy.

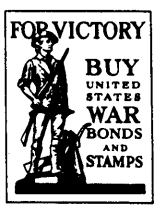
PURPOSE

The purpose of the investigation was to determine if depths on either side of Pier "B" were suitable for mooring four cruisers as part of the Navy inactivation program. This statement should be modified in that it was known a shoal existed on the south side of Pier "B" and one purpose of the survey was to determine the extent of dredging necessary to provide adequate depths.

METHODS

Upon receipt of the verbal instructions on Friday 15, February, two officers were immediately dispatched by truck to the area to consult with Navy representatives and do reconnaissance. The following morning, Saturday 16, February, a working party, consisting of three officers and a man left by truck to establish necessary control. The ship left shortly after, arriving in Everett that afternoon.

Buildings, flush with the bulkhead line, prevented establishing ranges on shore. Accordingly ranges were set up consisting of markers on the buildings and markers on a line stretched across the slipway some distance out from the bulkhead line. Intervals were marked on the sides of the pier and positions obtained while using the ranges by marking the fathogram as the launch came abeam of these intervals.



Supervisor NW District

Hydrography was accomplished on the 17th and 18th of February and the vessel returned to Seattle on the evening of the latter date.

TIDES & REDUCERS

A tide staff was erected on Pier 1 at Tide Station, "Everett, Possession Sound" and the staff read at 15 minute intervals while hydrography was in progress. The staff was connected to two bench marks for determining MLLW on the staff.

REMARKS

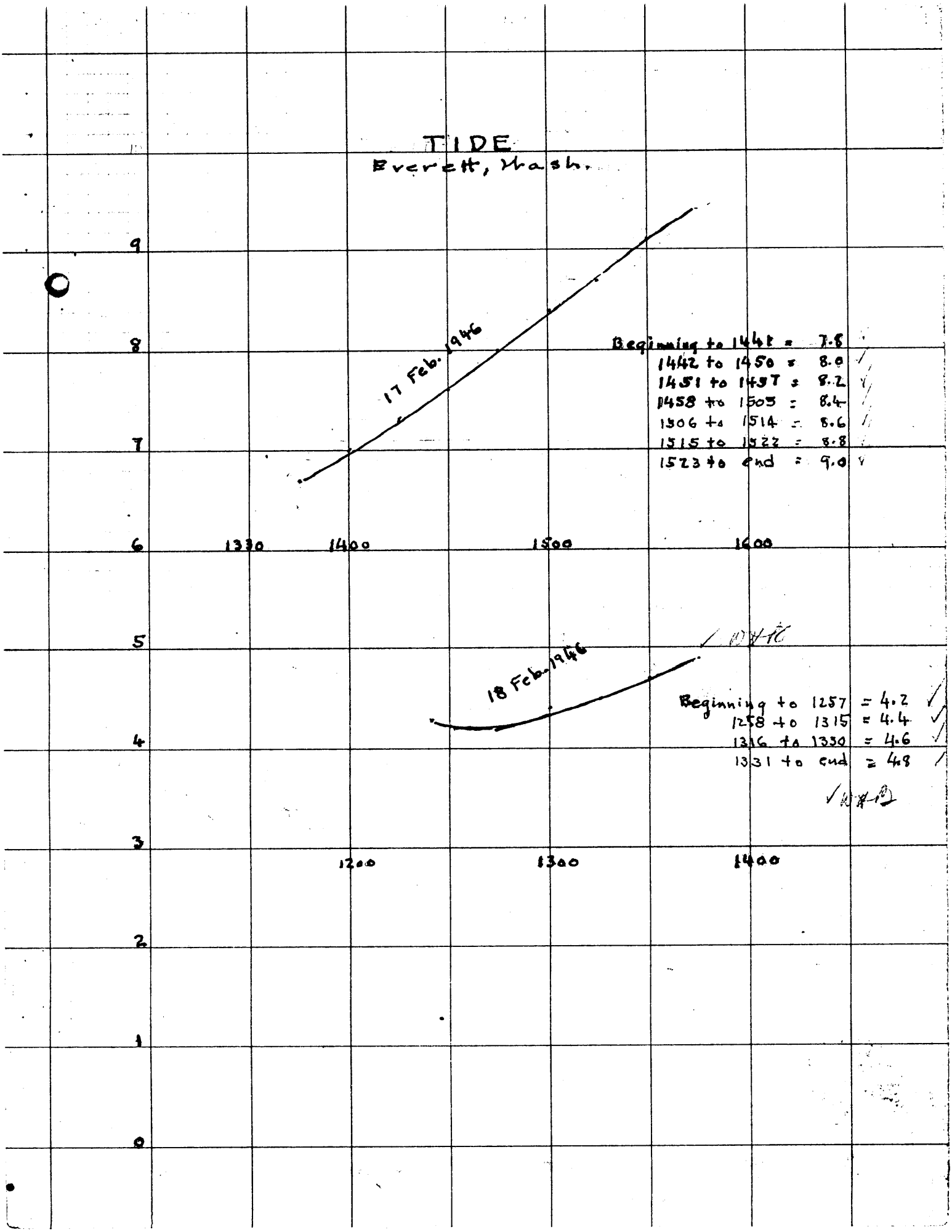
Navy authorities were notified by telephone on the night of 18th February that sufficient water was available for berthing cruisers, which was to be done the following day, on the north side of the pier. A tracing showing all results of the survey, copy of which is transmitted with the records was prepared and finished on 19 February. Transmitted with the record is *Drawing No. 7:06C showing general plant layout, which may be used for chart revision and for orienting the tracing of the survey. Attention is invited to the fact that immediate dredging is contemplated on the south side of Pier "B" and after** dredging soundings, which can probably be obtained from the Navy, should be used for chart revision rather than this survey.

* Sp. 41926
** Sp. 41925

W H Bainbridge
W. H. BAINBRIDGE, Lt. Comdr.
Executive Officer, USC&GSS DERICKSON
for R. F. A. STUDDS, Commanding.

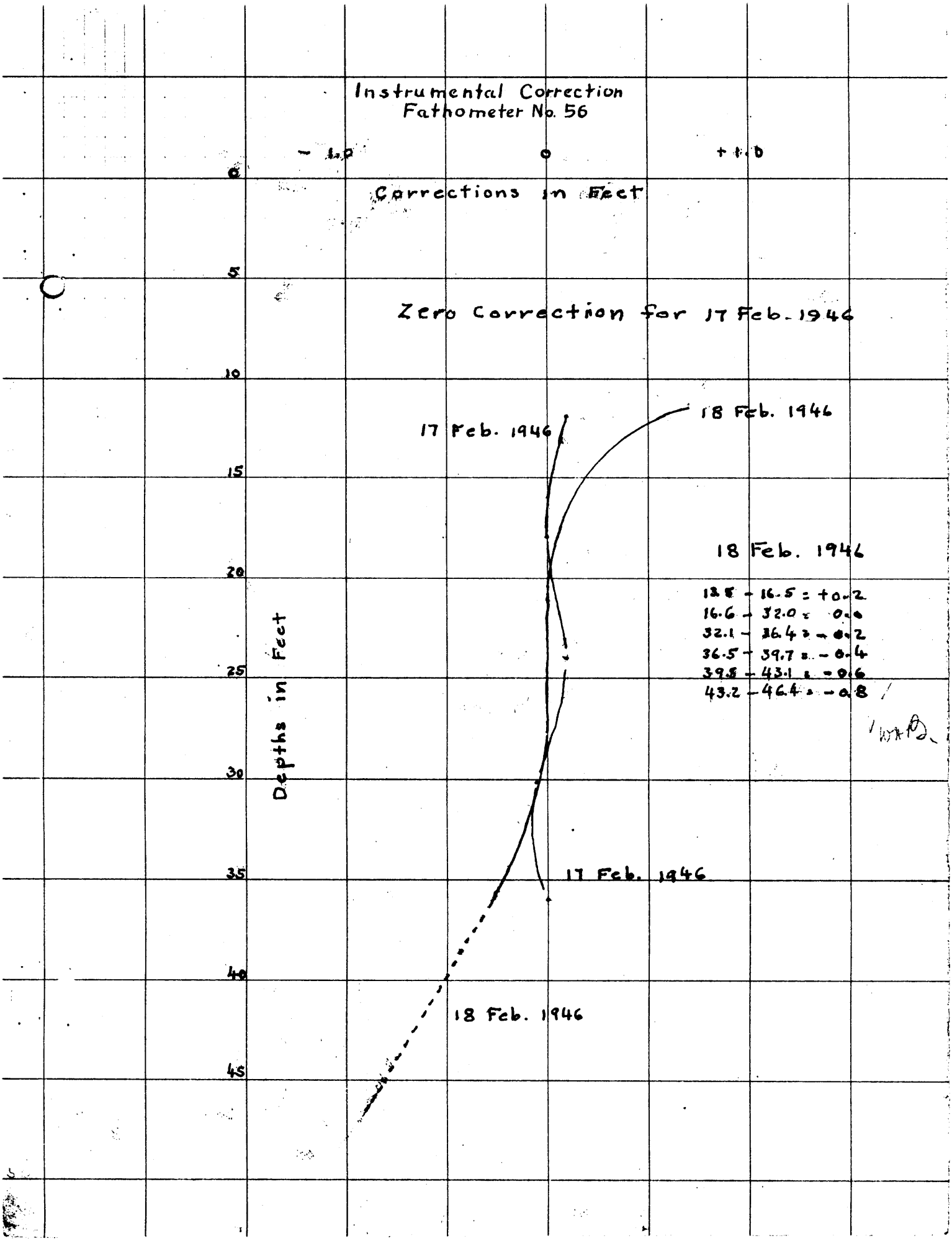
TIDE

Everett, Wash.



Beginning to 1441 = 7.8
1442 to 1450 = 8.0
1451 to 1457 = 8.2
1458 to 1505 = 8.4
1506 to 1514 = 8.6
1515 to 1522 = 8.8
1523 to end = 9.0

Beginning to 1257 = 4.2
1258 to 1315 = 4.4
1316 to 1330 = 4.6
1331 to end = 4.8


Instrumental Correction
Fathometer No. 56
- 1.0
0
+ 1.0
Corrections in Feet
0
5
10
15
20
25
30
35
40
45
Depths in Feet
Zero Correction for 17 Feb. 1946
17 Feb. 1946
18 Feb. 1946
18 Feb. 1946
12.8 - 16.5 = +0.2
16.6 - 32.0 = 0.0
32.1 - 36.4 = - 0.2
36.5 - 39.7 = - 0.4
39.8 - 43.1 = - 0.6
43.2 - 46.4 = - 0.8
17 Feb. 1946
18 Feb. 1946

Seattle Processing Office Notes

Pier "B" Everett, Washington

- - - - - - -

Smooth Sheet-

The projection is handmade on Whatman paper.

Topographic Detail-

References:

1. Blueprint 7:06C, Everett Pacific Ship Building and Dry Dock Company, scale 1" - 100'. 4/926
2. Blue line print No. E-2-8-65, Everett Harbor and Snohomish River, Washington. Condition Feb. to April 1946. U.S. Engineer Office, Seattle, Wash. Scale 1" - 400'. Sheet No. 1 40944
3. Ditto. Sheet No. 2. (Bp 40965)

In order to transfer the detail of Ref. 1 to the smooth sheet, it was necessary to refer it to detail and grid lines on Ref. 2.

On examining Ref. 2, three triangulation stations were found: U.S. Weather Tower, North Twin Stack, and Everett Jetty Light. Coordinates on the engineers local grid are given in feet for the first two points only.

The projection, scale 1:2,500, was prepared and the three triangulation points plotted. A difference between grid and geodetic was noted in the line N. TWIN - WEATHER BUREAU TOWER. On Ref. 3, the USED sheet to northward, the coordinates of "SEE" are given in feet. (Cement Stack. See T-4276 of 1927. This point is triangulation station EVERETT CONCRETE CHIMNEY, shown on page 647 of Washington State G.P.'s.)

Grid and geodetic inverses were computed using triangulation coordinates from list of G.P.'s and grid coordinates in feet as expressed on the prints. The results expressed in meters follow:

	Geodetic Meters	Grid Meters	Diff. in Length	Diff. in Azimuth
CONCRETE CHIMNEY - N. TWIN	1218.61	1218.64	0.04	50' 03".4
N. TWIN - WEATHER BUREAU	1305.3	1302.77	-2.53	39 33.8
CONCRETE CHIMNEY - WEATHER BUR.	2501.6	2498.5	-3.08	54 54.4

Since the geodetic and grid lengths of the first line agree very closely, the coordinates at its ends are presumed to be in harmony, and as the grid and geodetic lengths of the other two sides of the triangle do not agree, the grid position of the Weather Bureau Tower is presumed to have an error.

To adjust, the grid was drawn on an overlay. North Twin and Weather Bureau were plotted on the overlay from grid coordinates. Everett Jetty Light was scaled from the point and plotted on the grid. The overlay was then placed over the projection with N. Twin in contact. The grid was then swung over the projection to make a compromise with the grid positions of Jetty Light and Weather Bureau and the grid azimuth. The grid positions of the two stations are shown on the projection in small penciled circles.

The grid lines so placed were used to plot the pier head line, using the grid coordinates of points in the pier head line as given on the USED sheet.

The pier head line (on the General Plant Layout, Everett Pacific S.S. and D.D. Co.) was tested and found consistent with the pier head line on the smooth sheet. It was used as control lines for transferring topographic detail to the smooth sheet.

Soundings after dredging on Q 4:25-* (Bp. 41925)

After the sounding was done, part of the area was dredged to permit the berthing of naval vessels at the wharves. See Print *Q 4:25 of March 8, 1946, where the datum of new soundings is given as MLW.

This sounding datum was investigated by Mr. Quillian who found that the levels depend upon the elevation of the USED base line monument 8+00. This brass disc (see rubbing attached) has the elevation 14.14 stenciled thereon. The elevation stenciled on the mark depends on levels run in 1938. 8+00

The engineer at the ship yard, Mr. Colvin, now deputy City Engineer, Everett, re-ran the levels to Base Line Mon. 8+00 but did not check the stenciled elevation. He had it re-run again and again it did not check. He concluded that there was a transposition in the stenciling and used the elevation as 14.41 instead of 14.14 feet. Starting with 14.41 feet, he set two bench marks further out on the wharves and established an 18 ft. bench mark on the waling of the wharf contiguous to the area to be dredged. This point 18 ft. above MLLW was the reference point for correcting the soundings after dredging.

Mr. Colvin did not know that in 1939 the USED determined the new elevation of 14.69 feet above MLLW for Mon. 8+00. This new determination depended on a connection with USC&GS Bench Mark BMJ 7 using the elevation 29.44 ft. above MLLW. (See Tidal Bench Marks, State of Washington - Everett Tide Station.)

Conclusions-

1. The sounding datum is MLLW instead of MLW as stated on Bb. 41925 Print ℄ 4:25.

2. That the Bench Mark set for sounding corrections should be 18.28 ft. instead of 18.00 ft. above MLLW and therefore a deduction of 0.2 ft. would apply to the soundings after dredging as shown on ℄ 4:25 of 3/8/46.

3. The method of obtaining the soundings on ℄ 4:25 is explained by the letter of Mr. Ralph Shapley attached.

Box 544, Route 5
Everett, Washington
Jan. 31, 1947

Mr. C. G. Quillian
U. S. Coast & Geodetic Survey
Seattle, Wash.

Dear Mr. Quillian:

I found your note in my door when I got home last night.

The Blue Print Q-425 (Bp. 41925 which you have shows the depth of water based upon Mean Lower Low Water. (If the print says Mean Low Water, it should be changed to Mean Lower Low Water.) In making soundings at the E.P.S. & P.P. Co., the elevation of the surface of the water at the time of sounding was determined by measuring down to the surface of the water from a known structure or pre-determined elevation. For example: the soundings near piers A & B were calculated by measuring down to the surface of the water from the floor of Pier B which as I recall is 18.0' above Mean Lower Low Water. A temporary tide gauge was fastened to the pier to facilitate the making of readings. At the north part of the ship yard near piers D & E, the height of the water was determined from the permanent tide gauge located on Pier D.

/s/ Ralph Shapley

Method of Calculating Soundings after Dredging
between Piers A & B

B.M. (floor of Pier B) Elev. (MLLW)	18.0'
Surface of Water (Pier floor to surface)	12.5
Elev. of Surface of water above Surface at MLLW (difference)	5.5'
Sounding as shown by Lead	27.5
Elev. of Surface of water above Surface at MLLW	5.5
Sounding calculated or based on MLLW (difference)	22.0'

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 662
Rev. April, 1931

INVERSE POSITION COMPUTATION

$$s_1 \sin\left(\alpha+\frac{\Delta\alpha}{2}\right)=\frac{\Delta\lambda_1 \cos\phi_m}{A_m}$$

$$s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)=\frac{-\Delta\phi_1 \cos\frac{\Delta\lambda}{2}}{B_m}$$

$$-\Delta\alpha=\Delta\lambda \sin\phi_m \sec\frac{\Delta\phi}{2}+F(\Delta\lambda)^3$$

in which $\log \Delta\lambda_1 = \log(\lambda'-\lambda)$ − correction for arc to sin*; $\log \Delta\phi_1 = \log(\phi'-\phi)$ − correction for arc to sin*; and $\log s = \log s_1$ + correction for arc to sin*.

	NAME OF STATION							
	°	′	″			°	′	″
1. ϕ	47	59	27.752	N. TWIN STACK	λ	122	12	53.029
2. ϕ'	47	58	46.452	Weather Mast	λ'	122	13	06.376
$\Delta\phi\ (=\phi'-\phi)$		−	− 41.300		$\Delta\lambda\ (=\lambda'-\lambda)$			+ 13.347
$\frac{\Delta\phi}{2}$			− 20.650		$\frac{\Delta\lambda}{2}$			6.674
$\phi_m\left(=\phi+\frac{\Delta\phi}{2}\right)$	47	59	07.102					
$\Delta\phi$ (secs.)			− 41.300		$\Delta\lambda$ (secs.)			+ 13.347
log $\Delta\phi$	− 1.615 9501				**log** $\Delta\lambda$	1.125 3837		
cor. arc−sin	−				cor. arc−sin	−		
log $\Delta\phi_1$					log $\Delta\lambda_1$			
log cos $\frac{\Delta\lambda}{2}$					**log cos** ϕ_m	9.825 6346		
colog B_m	1.489 7624				**colog** A_m	1.491 0862		
log $\{s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	−3.105 7125			(opposite in sign to $\Delta\phi$)	**log** $\{s_1 \sin\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	2.442 1045		
					log $\{s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	+ 3.105 7125		
log $\Delta\lambda$	1.125 3837	3 log $\Delta\lambda$			**log tan** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	9.336 3920		
log sin ϕ_m	9.870 9732	log F			$\alpha+\frac{\Delta\alpha}{2}$	° 12	′ 14	″ 29.5
log sec $\frac{\Delta\phi}{2}$		log b			**log sin** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	9.326 4039		
log a	0.996 3569				**log cos** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	9.990 0012		
a					**log** s_1	3.115 0061		
b					cor. arc−sin	+		
$-\Delta\alpha$ **(secs.)**			″ 9.916		log s			
$-\frac{\Delta\alpha}{2}$	°	′	″ 4.958			1305.3		
			5.0					
$\alpha+\frac{\Delta\alpha}{2}$	12	14	29.5					
α **(1 to 2)**	12	14	34.5					
$\Delta\alpha$			10.0					
	180							
α' **(2 to 1)**	192	14	24.5					

* Use the table on the back of this form for correction of arc to sin.

NOTE.—For log s up to 4.52 and for $\Delta\phi$ or $\Delta\lambda$ (or both) up to 10′, omit all terms below the heavy line except those printed (in whole or in part) in heavy type or those underscored, if using logarithms to 6 decimal places. 11—9810

U. S. GOVERNMENT PRINTING OFFICE: 1931

Table of arc-sin corrections for inverse position computations

log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$	log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$	log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$
4. 177	1	2. 686	5. 223	124	3. 732	5. 525	497	4. 034
4. 327	2	2. 836	5. 234	130	3. 743	5. 530	508	4. 039
4. 415	3	2. 924	5. 243	136	3. 752	5. 534	519	4. 043
4. 478	4	2. 987	5. 253	142	3. 762	5. 539	530	4. 048
4. 526	5	3. 035	5. 260	147	3. 769	5. 543	541	4. 052
4. 566	6	3. 075	5. 269	153	3. 778	5. 548	553	4. 057
4. 599	7	3. 108	5. 279	160	3. 788	5. 553	565	4. 062
4. 628	8	3. 137	5. 287	166	3. 796	5. 557	577	4. 066
4. 654	9	3. 163	5. 294	172	3. 803	5. 561	588	4. 070
4. 677	10	3. 186	5. 303	179	3. 812	5. 566	600	4. 075
4. 697	11	3. 206	5. 311	186	3. 820	5. 570	613	4. 079
4. 716	12	3. 225	5. 318	192	3. 827	5. 575	625	4. 084
4. 734	13	3. 243	5. 326	199	3. 835	5. 579	637	4. 088
4. 750	14	3. 259	5. 334	206	3. 843	5. 583	650	4. 092
4. 765	15	3. 274	5. 341	213	3. 850	5. 587	663	4. 096
4. 779	16	3. 288	5. 349	221	3. 858	5. 591	674	4. 100
4. 792	17	3. 301	5. 356	228	3. 865	5. 595	687	4. 104
4. 804	18	3. 313	5. 363	236	3. 872	5. 600	702	4. 109
4. 827	20	3. 336	5. 369	243	3. 878	5. 604	716	4. 113
4. 857	23	3. 366	5. 376	251	3. 885	5. 608	729	4. 117
4. 876	25	3. 385	5. 383	259	3. 892	5. 612	743	4. 121
4. 892	27	3. 401	5. 390	267	3. 899	5. 616	757	4. 125
4. 915	30	3. 424	5. 396	275	3. 905	5. 620	771	4. 129
4. 936	33	3. 445	5. 403	284	3. 912	5. 624	785	4. 133
4. 955	36	3. 464	5. 409	292	3. 918	5. 628	800	4. 137
4. 972	39	3. 481	5. 415	300	3. 924	5. 632	814	4. 141
4. 988	42	3. 497	5. 422	309	3. 931	5. 636	829	4. 145
5. 003	45	3. 512	5. 428	318	3. 937	5. 640	845	4. 149
5. 017	48	3. 526	5. 434	327	3. 943	5. 644	861	4. 153
5. 035	52	3. 544	5. 440	336	3. 949	5. 648	877	4. 157
5. 051	56	3. 560	5. 446	345	3. 955	5. 652	893	4. 161
5. 062	59	3. 571	5. 451	354	3. 960	5. 656	909	4. 165
5. 076	63	3. 585	5. 457	364	3. 966	5. 660	925	4. 169
5. 090	67	3. 599	5. 462	373	3. 971	5. 663	941	4. 172
5. 102	71	3. 611	5. 468	383	3. 977	5. 667	957	4. 176
5. 114	75	3. 623	5. 473	392	3. 982	5. 671	973	4. 180
5. 128	80	3. 637	5. 479	402	3. 988	5. 674	989	4. 183
5. 139	84	3. 648	5. 484	412	3. 993	5. 678	1005	4. 187
5. 151	89	3. 660	5. 489	422	3. 998			
5. 163	94	3. 672	5. 495	433	4. 004			
5. 172	98	3. 681	5. 500	443	4. 009			
5. 183	103	3. 692	5. 505	453	4. 014			
5. 193	108	3. 702	5. 510	464	4. 019			
5. 205	114	3. 714	5. 515	474	4. 024			
5. 214	119	3. 723	5. 520	486	4. 029			

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 462
Rev. April, 1931

INVERSE POSITION COMPUTATION

$$s_1 \sin\left(\alpha+\frac{\Delta\alpha}{2}\right)=\frac{\Delta\lambda_1 \cos\phi_m}{A_m}$$

$$s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)=\frac{-\Delta\phi_1 \cos\frac{\Delta\lambda}{2}}{B_m}$$

$$-\Delta\alpha=\Delta\lambda \sin\phi_m \sec\frac{\Delta\phi}{2}+F(\Delta\lambda)^3$$

in which log $\Delta\lambda_1$=log $(\lambda'-\lambda)$−correction for arc to sin*; log $\Delta\phi_1$=log $(\phi'-\phi)$−correction for arc to sin*; and log s=log s_1+ correction for arc to sin*.

NAME OF STATION

1. ϕ	47	58	46.452	Weather Mast conc. stack 1927	λ	122	13	06.376
2. ϕ'	48	00	07.153		λ'	122	12	56.127
$\Delta\phi$ $(=\phi'-\phi)$		01	20.701		$\Delta\lambda$ $(=\lambda'-\lambda)$		−	10.249
$\frac{\Delta\phi}{2}$			40.350		$\frac{\Delta\lambda}{2}$		−	5.124
$\phi_m\left(=\phi+\frac{\Delta\phi}{2}\right)$	47	59	26.802					
$\Delta\phi$ (secs.)			80.701 +		$\Delta\lambda$ (secs.)			− 10.249

log $\Delta\phi$	1.906 8789 ✓			**log** $\Delta\lambda$	−1.010 6815 ✓		
cor. arc−sin	−			cor. arc−sin	−		
log $\Delta\phi_1$				log $\Delta\lambda_1$			
log cos $\frac{\Delta\lambda}{2}$				**log cos** ϕ_m	+9.825 5886 ✓		
colog B_m	1.489 7627			**colog** A_m	1.491 0863 ✓		
log $\{s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	3.396 6416		(opposite in sign to $\Delta\phi$)	**log** $\{s_1 \sin\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	−2.327 3564 ✓		
				log $\{s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	−3.396 6416		
log $\Delta\lambda$	−1.010 6815 ✓	3 log $\Delta\lambda$		**log tan** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	+8.930 7148 ✓		
log sin ϕ_m	9.870 9005	log F		$\alpha+\frac{\Delta\alpha}{2}$	° 4	' 52	" 22.482
log sec $\frac{\Delta\phi}{2}$		log b		**log sin** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	8.929 1422		
log a	0.880 6920 n			**log cos** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	9.998 4275		
a				**log** s_1	3.398 2142		
b				cor. arc−sin	+		
$-\Delta\alpha$ **(secs.)**		− 7.6		log s			
$-\frac{\Delta\alpha}{2}$	°	'	−3.8 "		2501.58		
$\alpha+\frac{\Delta\alpha}{2}$	4	52	22.482				
α **(1 to 2)**	4	52	18.7				
$\Delta\alpha$			7.6				
	180						
α' **(2 to 1)**	184	52	26.3				

* Use the table on the back of this form for correction of arc to sin.

NOTE.—For log s up to 4.52 and for $\Delta\phi$ or $\Delta\lambda$ (or both) up to 10′, omit all terms below the heavy line except those printed (in whole or in part) in heavy type or those underscored, if using logarithms to 6 decimal places. 11—9810

U. S. GOVERNMENT PRINTING OFFICE: 1931

Table of arc-sin corrections for inverse position computations

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4. 566	6	3. 075	5. 269	153	3. 778	5. 548	553	4. 057
4. 599	7	3. 108	5. 279	160	3. 788	5. 553	565	4. 062
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4. 697	11	3. 206	5. 311	186	3. 820	5. 570	613	4. 079
4. 716	12	3. 225	5. 318	192	3. 827	5. 575	625	4. 084
4. 734	13	3. 243	5. 326	199	3. 835	5. 579	637	4. 088
4. 750	14	3. 259	5. 334	206	3. 843	5. 583	650	4. 092
4. 765	15	3. 274	5. 341	213	3. 850	5. 587	663	4. 096
4. 779	16	3. 288	5. 349	221	3. 858	5. 591	674	4. 100
4. 792	17	3. 301	5. 356	228	3. 865	5. 595	687	4. 104
4. 804	18	3. 313	5. 363	236	3. 872	5. 600	702	4. 109
4. 827	20	3. 336	5. 369	243	3. 878	5. 604	716	4. 113
4. 857	23	3. 366	5. 376	251	3. 885	5. 608	729	4. 117
4. 876	25	3. 385	5. 383	259	3. 892	5. 612	743	4. 121
4. 892	27	3. 401	5. 390	267	3. 899	5. 616	757	4. 125
4. 915	30	3. 424	5. 396	275	3. 905	5. 620	771	4. 129
4. 936	33	3. 445	5. 403	284	3. 912	5. 624	785	4. 133
4. 955	36	3. 464	5. 409	292	3. 918	5. 628	800	4. 137
4. 972	39	3. 481	5. 415	300	3. 924	5. 632	814	4. 141
4. 988	42	3. 497	5. 422	309	3. 931	5. 636	829	4. 145
5. 003	45	3. 512	5. 428	318	3. 937	5. 640	845	4. 149
5. 017	48	3. 526	5. 434	327	3. 943	5. 644	861	4. 153
5. 035	52	3. 544	5. 440	336	3. 949	5. 648	877	4. 157
5. 051	56	3. 560	5. 446	345	3. 955	5. 652	893	4. 161
5. 062	59	3. 571	5. 451	354	3. 960	5. 656	909	4. 165
5. 076	63	3. 585	5. 457	364	3. 966	5. 660	925	4. 169
5. 090	67	3. 599	5. 462	373	3. 971	5. 663	941	4. 172
5. 102	71	3. 611	5. 468	383	3. 977	5. 667	957	4. 176
5. 114	75	3. 623	5. 473	392	3. 982	5. 671	973	4. 180
5. 128	80	3. 637	5. 479	402	3. 988	5. 674	989	4. 183
5. 139	84	3. 648	5. 484	412	3. 993	5. 678	1005	4. 187
5. 151	89	3. 660	5. 489	422	3. 998			
5. 163	94	3. 672	5. 495	433	4. 004			
5. 172	98	3. 681	5. 500	443	4. 009			
5. 183	103	3. 692	5. 505	453	4. 014			
5. 193	108	3. 702	5. 510	464	4. 019			
5. 205	114	3. 714	5. 515	474	4. 024			
5. 214	119	3. 723	5. 520	486	4. 029			

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 662
Rev. April, 1931

INVERSE POSITION COMPUTATION

$$s_1 \sin\left(\alpha+\frac{\Delta\alpha}{2}\right)=\frac{\Delta\lambda_1 \cos\phi_m}{A_m}$$

$$s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)=\frac{-\Delta\phi_1 \cos\frac{\Delta\lambda}{2}}{B_m}$$

$$-\Delta\alpha=\Delta\lambda \sin\phi_m \sec\frac{\Delta\phi}{2}+F(\Delta\lambda)^3$$

in which log $\Delta\lambda_1$=log $(\lambda'-\lambda)$−correction for arc to sin*; log $\Delta\phi_1$=log $(\phi'-\phi)$−correction for arc to sin*; and log s=log s_1+ correction for arc to sin*.

NAME OF STATION

1. ϕ	47	59	27.752	N. TWIN STACK 1927	λ	122	12	53.029
2. ϕ'	48	00	07.153	Conc. CHY. 1927	λ'	122	12	56.127
$\Delta\phi$ $(=\phi'-\phi)$		+	39.401		$\Delta\lambda$ $(=\lambda'-\lambda)$		+	3.098
$\frac{\Delta\phi}{2}$			19.704		$\frac{\Delta\lambda}{2}$			1.549
$\phi_m\left(=\phi+\frac{\Delta\phi}{2}\right)$	47	59	47.452					
$\Delta\phi$ (secs.)			39.401		$\Delta\lambda$ (secs.)			3.098

log $\Delta\phi$	1.595 5072		**log** $\Delta\lambda$	0.491 0814	
cor. arc−sin	−		cor. arc−sin	−	
log $\Delta\phi_1$			log $\Delta\lambda_1$		
log cos $\frac{\Delta\lambda}{2}$			**log cos** ϕ_m	9.825 5403	
colog B_m	1.489 7633		**colog** A_m	1.491 0864	
log $\left\{s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)\right\}$	+3.085 2705	(opposite in sign to $\Delta\phi$)	**log** $\left\{s_1 \sin\left(\alpha+\frac{\Delta\alpha}{2}\right)\right\}$	+ 1.807 7089	
			log $\left\{s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)\right\}$	− 3.085 2705	
log $\Delta\lambda$	0.491 0814	3 log $\Delta\lambda$	**log tan** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	− 8.722 4376	
log sin ϕ_m	9.870 0435	log F	$\alpha+\frac{\Delta\alpha}{2}$	176 / 356 ° 58 ' 44.23 "	
log sec $\frac{\Delta\phi}{2}$		log b	**log sin** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	8.721 8316	
			log cos $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	9.999 3960	
log a	0.361 1249		**log** s_1	3.085 8745	
a	2.2968		cor. arc−sin	+ 45	
b			log s		
$-\Delta\alpha$ **(secs.)**	102.3				
$-\frac{\Delta\alpha}{2}$	° 01.15	1.2		1218.61	
$\alpha+\frac{\Delta\alpha}{2}$	176 / 356	58 44.2			
α **(1 to 2)**	176 / 356	58 45.4			
$\Delta\alpha$		2.3			
	180				
α' **(2 to 1)**	356 / 176	58 43.1			

*Use the table on the back of this form for correction of arc to sin.

NOTE.—For log s up to 4.52 and for $\Delta\phi$ or $\Delta\lambda$ (or both) up to 10′, omit all terms below the heavy line except those printed (in whole or in part) in heavy type or those underscored, if using logarithms to 6 decimal places. 11—9810

U. S. GOVERNMENT PRINTING OFFICE: 1931

Table of arc-sin corrections for inverse position computations

log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$	log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$	log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$
4. 177	1	2. 686	5. 223	124	3. 732	5. 525	497	4. 034
4. 327	2	2. 836	5. 234	130	3. 743	5. 530	508	4. 039
4. 415	3	2. 924	5. 243	136	3. 752	5. 534	519	4. 043
4. 478	4	2. 987	5. 253	142	3. 762	5. 539	530	4. 048
4. 526	5	3. 035	5. 260	147	3. 769	5. 543	541	4. 052
4. 566	6	3. 075	5. 269	153	3. 778	5. 548	553	4. 057
4. 599	7	3. 108	5. 279	160	3. 788	5. 553	565	4. 062
4. 628	8	3. 137	5. 287	166	3. 796	5. 557	577	4. 066
4. 654	9	3. 163	5. 294	172	3. 803	5. 561	588	4. 070
4. 677	10	3. 186	5. 303	179	3. 812	5. 566	600	4. 075
4. 697	11	3. 206	5. 311	186	3. 820	5. 570	613	4. 079
4. 716	12	3. 225	5. 318	192	3. 827	5. 575	625	4. 084
4. 734	13	3. 243	5. 326	199	3. 835	5. 579	637	4. 088
4. 750	14	3. 259	5. 334	206	3. 843	5. 583	650	4. 092
4. 765	15	3. 274	5. 341	213	3. 850	5. 587	663	4. 096
4. 779	16	3. 288	5. 349	221	3. 858	5. 591	674	4. 100
4. 792	17	3. 301	5. 356	228	3. 865	5. 595	687	4. 104
4. 804	18	3. 313	5. 363	236	3. 872	5. 600	702	4. 109
4. 827	20	3. 336	5. 369	243	3. 878	5. 604	716	4. 113
4. 857	23	3. 366	5. 376	251	3. 885	5. 608	729	4. 117
4. 876	25	3. 385	5. 383	259	3. 892	5. 612	743	4. 121
4. 892	27	3. 401	5. 390	267	3. 899	5. 616	757	4. 125
4. 915	30	3. 424	5. 396	275	3. 905	5. 620	771	4. 129
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4. 955	36	3. 464	5. 409	292	3. 918	5. 628	800	4. 137
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4. 988	42	3. 497	5. 422	309	3. 931	5. 636	829	4. 145
5. 003	45	3. 512	5. 428	318	3. 937	5. 640	845	4. 149
5. 017	48	3. 526	5. 434	327	3. 943	5. 644	861	4. 153
5. 035	52	3. 544	5. 440	336	3. 949	5. 648	877	4. 157
5. 051	56	3. 560	5. 446	345	3. 955	5. 652	893	4. 161
5. 062	59	3. 571	5. 451	354	3. 960	5. 656	909	4. 165
5. 076	63	3. 585	5. 457	364	3. 966	5. 660	925	4. 169
5. 090	67	3. 599	5. 462	373	3. 971	5. 663	941	4. 172
5. 102	71	3. 611	5. 468	383	3. 977	5. 667	957	4. 176
5. 114	75	3. 623	5. 473	392	3. 982	5. 671	973	4. 180
5. 128	80	3. 637	5. 479	402	3. 988	5. 674	989	4. 183
5. 139	84	3. 648	5. 484	412	3. 993	5. 678	1005	4. 187
5. 151	89	3. 660	5. 489	422	3. 998			
5. 163	94	3. 672	5. 495	433	4. 004			
5. 172	98	3. 681	5. 500	443	4. 009			
5. 183	103	3. 692	5. 505	453	4. 014			
5. 193	108	3. 702	5. 510	464	4. 019			
5. 205	114	3. 714	5. 515	474	4. 024			
5. 214	119	3. 723	5. 520	486	4. 029			

"SEE" CONCRETE CHY: N 9201.96
E 7,467.26

U.S. WEATHER MAST N 11,025.9
E 6877.8

N. TWIN STACK N. 15,213.03
E. 7,736.04

	feet	log	2 log	(side)²
N. TWIN STACK	N. 4187.13	3.621 9164	7.243 8328	17,532,050
U.S. WEATHER MAST	E. 858.24	2.933 6088	5.867 2176	736,567
INVERSE	4274.18	3.630 8528	7.261 7057	18,268,617

tan α = 9.311 6924
α = 11°-35'-00.7"

4274.18 ft. = 1302.77 meters

	feet	log	2 log	(side)²
CONC. CHY	N. 8176.06	3. 912 5494	7.825 0988	66,849,600
WEATHER MAST	E 589.46	2.770, 4543	5.540 9086	347, 463
INVERSE	8197.32	3.913 6751	7.827 3503	67,197,063

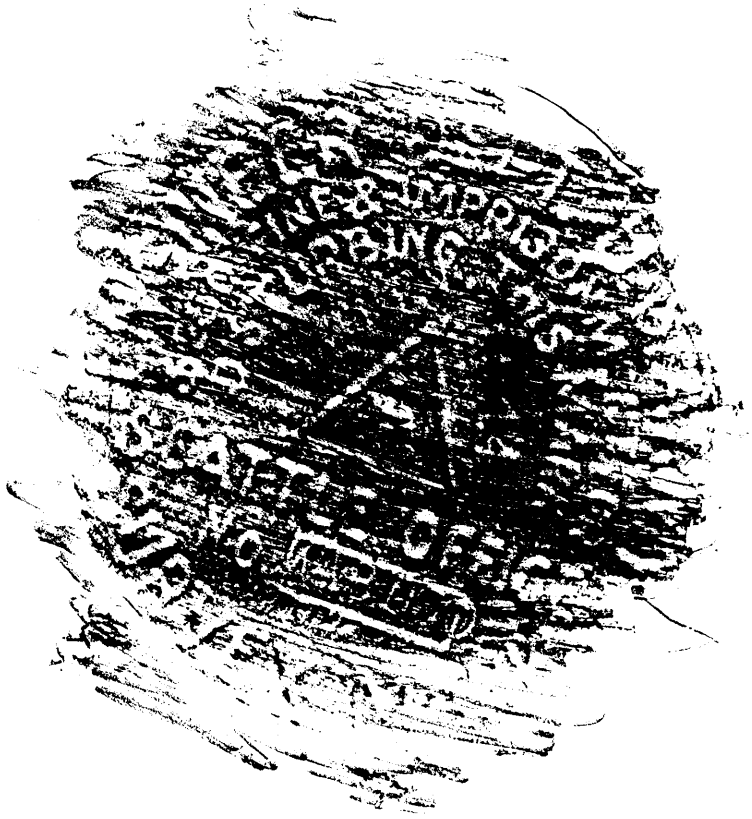
tan α = 8.857 9049
α = 4°-07'-24."03

8197.32 ft. = 2498.5 meters

	feet	log	2 log	(side)²
CONC. CHY	3,988.93	3.600 8563	7.201 7126	15,911,600
N. TWIN STACKS	286.78	2.429 3969	4.858 7938	72,242.7
INVERSE	3997.98	3.601 8406	7.203 6583	15,983,842.7

tan α = 8.828 5438
α = 3°-51'-18"

3,997.98 ft = 1218.58 meters



Base Line
Mon. 8+00

Respectfully submitted,

Edgar E. Smith

Edgar E. Smith
Cartographic Engineer
Seattle Processing Office

GEOGRAPHIC NAMES

Survey No. H7168

Name on Survey	A On Chart No.	B On previous survey No.	C On U. S. quadrangle Maps	D From local information	E On local Maps	F P. O. Guide or Map	G Rand McNally Atlas	H U. S. Light List	K	
Everett Harbor		(for title)								1
Port Gardner										2
East Waterway										3
										4
Everett										5
Pier A										6
Pier B										7
Pier C										8
										9
										10
		[names] identified and approved by L. Heck on 6/13/47								11
										12
										13
										14
Seattle		(location of tide staff)							USGS	15
										16
										17
										18
										19
										20
										21
										22
										23
										24
										25
										26
										27

M 234

Hydrographic Surveys (Chart Division)

HYDROGRAPHIC SURVEY NO. H7168

Records accompanying survey:

Boat sheets .....; sounding vols. 1....; wire drag vols. .....;

bomb vols. .....; graphic recorder rolls 1 envelope

special reports, etc. ..Leveling Record, Form 258 (T-7520 (30) to LeLacheur (Tides)

The following Prints received: FE-Everett SB&DD Co. by Ship Derickson; General Plant Layout, 7:06 C; E-2-8-65 (Everett Hbr. & Snohomish R., Wash. Conditio , Feb. to April 1946,) U. S. Engineer Office, Seattle, Sheet No.1 & Sheet No. 2; & Print ~~Q 4:2~~ Q 4:25 -

The following statistics will be submitted with the cartographer's report on the sheet:

Soundings - Piers A & B, Everett Pac. S.B & D.D. Co.

Number of positions on sheet		
Number of positions checked		11
Number of positions revised		0
Number of soundings revised (refers to depth only)		5
Number of soundings erroneously spaced		0
Number of signals erroneously plotted or transferred		0
Topographic details	Time	4
Junctions	Time	0
Verification of soundings from graphic record	Time	1

Verification by Herbert W. Burgoyne....Total time 21.... Date 3/24/47..

Reviewed by J. A. Jordan..... Time ..3.... Date May 6, 1947

M-2232-1

Hewy

Form 712
DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
Rev. June 1937

TIDE NOTE FOR HYDROGRAPHIC SHEET

~~Division of Hydrography and Topography~~:

Division of Charts: H. W. MURRAY

Plane of reference approved in
1 volumes of sounding records for

HYDROGRAPHIC SHEET 7168

Locality Everett, Washington

Chief of Party: R. F. A. Studds in 1946
Plane of reference is Mean lower low water, reading
7.4 ft. on tide staff at Seattle
23.0 ft. below B. M. 3 (1927)

Height of mean high water above plane of reference is 10.2 feet.

Condition of records satisfactory except as noted below:

E. C. McKay
Section
Chief, ~~Division~~ of Tides ~~and Currents.~~

U. S. GOVERNMENT PRINTING OFFICE 154327

DIVISION OF CHARTS

REVIEW SECTION - NAUTICAL CHART BRANCH

H-7168 (1946)

All matters pertinent to this survey are adequately discussed in the Descriptive Report and in the addendum written by the Processing Office.

In March 1946, subsequent to the present survey, the slip south of pier "B" was dredged. The after-dredging survey by the Everett Pacific Shipbuilding and Dry Dock Company has been filed as Bp. 41925.

Further consideration of this survey by the Review Section is considered unnecessary.

Reviewed by: G. F. Jordan May 6, 1947

Approved by: H. W. Murray


EVERETT SHIPBUILDING & DRYDOCK CO.
H7168
N
30 ft.
25 ft.
20 ft.
Dolphin
PIER 'A'
PIER 'B'
PIER 'C'
Add
Art
Abe
Ace
Bat
Box
Cab
Cut
Day
Dot
168'
140'
120'
100'
80'
59.3'
39.3'
20'

FIELD EXAMINATION
EVERETT SHIPBUILDING & DRYDOCK CO.
EVERETT, WASHINGTON

U.S. COAST & GEODETIC SURVEY
SHIP DERICKSON, R. F. A. STUDDS, COMDG.
Soundings in feet at M. L. L. W.
Scale: 1" = 50' Feb. 17 & 18, 1946

H7168

NAUTICAL CHARTS BRANCH

SURVEY NO. H7168

Record of Application to Charts

DATE	CHART	CARTOGRAPHER	REMARKS
3/13/47	6448	J F Walker	Partly superseded by BP 41925 applied 4½ fathy (28 feet) north of Pier B Before ~~After~~ Verification and Review Because of extremely large scale this sheet may be considered as completely applied after review-JFW
9/27/48	6450	Piccgari	~~Before~~ After Verification and Review Fully applied.
9/7/63	6441	D.L. Westbrook	~~Before~~ After Verification and Review Fully applied— Partly superceded by BP-41925.
7-11-74	6448	Ray Spencer	Considered completely applied through sheet 6441. Before After Verification and Review (16)
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review

M-2168-1

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.