4618 4619
4620 4621

Form 504

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

....., *Director*

State: Oregon and Washington

DESCRIPTIVE REPORT

~~*Topographic*~~ / *Hydrographic* Sheet No. 4618 4619 4620 4621

LOCALITY

Cape Disappointment and Cape Shoalwater

Columbia River to Grays Harbor

1926

CHIEF OF PARTY

T.J. Maher

4618 4619
4620 4621

U. S. COAST AND GEODETIC SURVEY

Col. E. Lester Jones, Director.

DESCRIPTIVE REPORT TO ACCOMPANY HYDROGRAPHIC LAUNCH SHEETS A, B, C, and D, of the COAST OF WASHINGTON FROM COLUMBIA RIVER TO GRAYS HARBOR.

1926

U. S. C. & G. S. S. "GUIDE"

Thos. J. Maher, Chief of Party.

DESCRIPTIVE REPORT TO ACCOMPANY HYDROGRAPHIC LAUNCH

SHEETS A, B, C, and D,

of the

COAST OF WASHINGTON FROM COLUMBIA RIVER TO GRAYS HARBOR.

AUTHORITY for this work is contained in orders from the Director, dated April 17, 1926.

LIMITS. The sheets are on a scale of 1/20,000 and extend from Lat.46° 11' North to 46° 54'.4 and out to the 12 fathom curve.

SHEET	"A"	from	46° 11'	to	46° 22'
"	"B"	"	46° 22'	to	46° 35'
"	"C"	"	46° 35'	to	46° 47'.8
"	"D"	"	46° 47'.8	to	46° 54'.4

GENERAL DESCRIPTION OF COAST. Cape Disappointment on the north side of the entrance to the Columbia River is a headland of rounding hills extending northward about 2 ½ miles. The seaward faces of these hills are precipitous cliffs with jagged rocky points. on the extreme southeastern point is Cape Disappointment light house and on the extreme western point is North Head light house. Near the light house is a United States Weather Bureau Station and a wireless mast. From Cape Disappointment the coast extends to Willapa Bay as a low sandy beach,- back of the beach the country is heavily wooded. There are numerous summer cottages and resorts situated along the beach.

About ten miles northward,(lat.46° 27'.9), from North Head is Klipsan Beach with Radio Compass and Coast Guard Station with two radio masts which can be seen for about ten miles offshore.

Leadbetter Point, the southern point at the entrance to Willapa Bay is low and sandy extending back to low wooded hills which are scarred on the south and westward and may be seen before the lighthouse is visible.

Willapa Bay Lighthouse is a low tower on top of a dwelling and on the southern point of a sand ridge about fifty feet high. The light house is hard to distinguish and the scars on the hills will be seen first.

From Cape Shoalwater to Point Chehalis the southern point at the entrance to Grays Harbor, the coast extends as a low sand beach backed by a heavy growth of timber.

Point Chehalis is low and sandy and about one and one-half

miles southward from the extremity is bare of trees. The south jetty at Grays Harbor projects out westward from the end of the point. It is sunken, in calmer weather sea does not break at all points over it. The end of it is not marked by a danger marking aid to navigation.

Grays Harbor light house is set inland about one-half mile on Point Chehalis and can easily be seen.

Radio Compass and fog horn are above the high water line, on sand beach west of the light house. Station "Radio" which is the cupola on the radio house marks it's position.

SURVEY METHODS. The prescribed method of launch hydrography was used. The hired launch RICHARD "M" of 21 net tons, 16½ feet beam, 66 feet length, furnished an admirable boat for hydrography. All soundings were by hand lead. For the work on the bars, and were considerable currents were experienced, an eighteen pound lead was used, and sounding done at the slacker water. The party had two very good leadsmen. All lines were crossed by north and south lines and very good crossings obtained, considering the heavy swell running.

SHEET "A" (4618)

DANGERS. The shoal area to the north of the Columbia River entrance, and extending for two miles in a southwesterly direction off North Head should not be crossed by vessels at any time. Small fishing vessels often round the end of the north jetty and run in a north westerly direction for about a mile, but only in the calmest weather with very little swell.

A special lookout was kept off North Head to discover indications of submerged rocks, during the progress of the sounding. Although a very heavy swell was running no such indications were found.

The north jetty is well above water and does not constitute a hidden danger. The end of the south jetty is submerged, but it's location is always recognizable, and it's end is marked by a danger buoy.

BARS AND CHANNELS. The Columbia River Bar can be crossed at all times except in severe storms, by all vessels and launches. The channel is well marked. Advantage can be taken of the swell which usually runs from the northwest, by rounding into the entrance near bouy #2.

It is believed that the regular channel entrance does never break. Enormous swells however are often in progress, and at the worst run out, tide rips of fair size develope well into the entrance.

CURRENTS. The currents sets fair with the channel. On the outside, a general southerly set is experienced most of the time.

At the bar the current runs out forty minutes after the time of low water. At this time it is strongest, and of course is the worst time to attempt to negotiate the bar.

ANCHORAGES. The Ship GUIDE anchored at numerous times to the west of, and about one and one-half miles off, North Head Light. The bottom is fine gray sand. The anchor held with no difficulty.

Small boats, waiting for a favorable tide, find quite good protection by anchoring to the south of and well inside the south jetty.

DEVELOPMENT. In the area south of the north jetty of the Columbia River lines were double spaced, because this work had been recently done by the U. S. Engineers.

SHEET "B" (4619)

There is nothing that need be especially mentioned on this sheet, except that unusual currents were experienced about two m miles off △ Sand, the current here evidently circling. It occured to me, that, at the times that the launch was trying to sound here, this may be the vicinity of the turning point between the tides of the Columbia River and Willapa Bay.

- -

SHEET "C" (4620)

Proper junction was made here with work done previously on Willapa Bar, according to instructions. Since the channel buoys had been relaid to their present position and since the area between latitudes 46° 39' and 46° 41' was only meagerly developed, this party covered this area with the regular spacing of lines.

Particular attention was paid to properly fixing the positions of all buoys.

DANGERS. The shoaler areas over the extensive Willapa Bay entrance break at all times. In fact it is only in very moderate weather that the bar does not break in the regular entrance.

A minimum of nineteen feet was found on this bar, (in mid-channel between buoys 1,3,2, & 4. The spot is marked on the sheet. It was found advantageous to favor buoys "1" and "3" in crossing the bar.

The old channel running southward from the lighthouse is of no use now. It's position is continually changing and it is so narrow in places that the slop running over adjacent shoals makes the water too turbulent for safety. The launch RICHARD "M" made this passage on three occasions but preferred the ship channel in all but the smoothest weather because at such times the shoals to the west of this channel kill the swell very much. There is an advantage in heading more directly into the sea, as is experienced when negotiating the ship channel.

SHEET "D" (4621)

BARS AND DANGERS. It was found that Grays Harbor bar heaped up more than expected, considering the depth of water found. Also it was found that the heavy swelling ran well inside to about buoy #8. It was possible to approach closely to buoy "2B" though, even when the bar was uncrossable.

The first range was being shifted at the time of the survey, but the new location was not yet determinable. The range indicated by stations "LIT" and "RANGE" does not hold good for the present channel.

The south jetty at Grays Harbor is sunken it's entire length. In an absolute calm sea it's position is not visible, and moreover it's end is not marked by a buoy. Ordinarily the sea breaks on this jetty.

The fog signal, indicated as coming from Grays Harbor Light on chart #6195, originates in the building indicated in position by station "RADIO".

A list of landmarks is included with the descriptions accompanying the topographic sheets covering this region.

See descriptions for topographic sheets, for this region done this season.

A table of statistics is appended.

ACCEPTED VALUES OF TIDES FOR REDUCTION OF SOUNDINGS.

For the reduction of soundings, the tides at the North Jetty of the Columbia River were accepted as being equivalent to open ocean conditions in that vicinity. Point Adams,(Fort Stevens), Oregon, was designated as the standard station.

For ship sheets "1", "1a", and "3", and launch sheets "A", North Jetty tides were used directly.

For launch sheet "B", the height of tide was taken the same as North Jetty and time was taken fifteen (15) minutes LATER than North Jetty.

For launch sheets "C" and "D", the height of tide was taken the same as North Jetty and the time taken thirty (30) minutes LATER than North Jetty.

OBSERVATIONS OBTAINED. A tide staff was established at the North Jetty of the Columbia River and observations taken from September 3 to September 29.

A copy of the tides recorded at Fort Stevens was obtained for the period from July 12 to December 10.

A portable guage was established at Fort Canby, Cape Disappointment, Washington, and was in operation from August 28 to December 14.

An automatic guage was established at Toke Point, Willapa Bay and in operation from October 23 to November 11.

Levels were run for all four stations.

SIMULTANEOUS COMPARISONS. A "simultaneous comparison " was made of the Fort Stevens staff with the staff at Tongue Point, Astoria, Ore., to check MLLW at Fort Stevens and to get the value of MTL. MTL by this comparison is 4.22 feet.

Another comparison was made of North Jetty with Fort Stevens. This "simultaneous comparison" established the values MLLW = 1.00 foot at North Jetty. Mean ratio of ranges = 0.92 of Fort Stevens, and time of tides thirty-three (33) minutes earlier than Fort Stevens.

CURVES CONSTRCUTED AND THEIR USE. All tide curves were plotted for all sounding days, and the deducers with their respective time limits scaled off and tabulated. These curves are to be found in three cahiers entitled, " TIDE REDUCTION CURVES, STEAMER "GUIDE", 1926, T. J. MAHER, COMMANDING." They are marked, respectively, "Ship's Sheets #1 and #1a", "Ship Sheet #3", "Launch 'RICHARD M',Sheets 'A', 'B','C', and 'D'."

In most cases, the Fort Stevens tides were plotted and a North Jetty curve then constrcuted by applying the time and range differences between Fort Stevens and North Jetty.

For the period during which observations were made at North Jetty, these were plotted directly, minus 1.00 feet. This made the curve refer directly to MLLW.

For four sounding days prior to July 12, Tongue Point tides were plotted and corrected to North Jetty conditions by using the time and range factors of the two simultaneous comparisons above mentioned.

Where possible, a duplication of curves was avoided, and the tabulations in one cahier taken from the curve of the same day in another cahier. In each case, a note at the top of the tabulation refers to the cahier and curve used.

The reducers were then transferred to the sounding volumes.

TABULATIONS AND COMPUTATIONS. Hourly heights were tabulated for North Jetty, Fort Stevens and Willapa Bay.

High and low waters were tabulated for North Jetty, one month at Fort Canby, and four and a half months at Fort Stevens.

COMPARATIVE READINGS were tabulated and computed for Willapa Bay.

SIMULTANEOUS COMPARISONS were made for Fort Stevens with Tongue Point, and North Jetty with Fort Stevens.

MLLW was figured for the 1926 tide staff at Willapa Bay by reference to the 1922 bench marks.

Respectfully submitted,

E. H. Bernstein

E. H. Bernstein, H & G E

V. M. Gibbens

V. M. Gibbens, Aid

March 24, 1927,
Approved and forwarded,

Thos. J. Maher

Thos. J. Maher,
Chief of Party,
Commanding Steamer GUIDE.

STATISTICS FOR LAUNCH.

SHEET "A"

Date 1926	Letter	Volume	Positions	Soundings	Statute Miles	Vessel
August 4	a	1	40	174	6	RICHARD "M"
" 19	a	1	99	458	19.5	"
" 20	b	1	148	672	34	"
" 23	c	1	58	263	12.6	"
" 24	d	1	70	310	13.6	"
" 28	e	2	114	549	29.3	"
" 30	f	2	99-	360	19.3	"
" 31	g	2	28	86	3.6	"
Sept. 1	h	2	139	451	24.8	"
" 2	j	2	79	264	13.4	"
" 2	j	3	35	116	6.2	"
" 3	k	3	120	403	21.6	"
" 7	l	3	99	300	17.7	"
" 8	m	3	103	309	19.2	"
" 9	n	3	41	146	7.5	"
TOTALS - - - - - - - - - -			1272	4861	248.4	- - - - - - -

SHEET "B"

Date 1926	Letter	Volume	Positions	Soundings	Statute Miles	Vessel
Sept. 9	a	1	45	161	12.9	RICHARD "M"
" 10	b	1	189	423	25.6	"
" 13	c	1	108	343	24.0	"
" 14	d	1	148	438	32.1	"
" 15	e	1	57	199	11.1	"
" 15	e	2	45	144	8.4	"
" 16	f	2	97	287	13.5	"
" 20	g	2	52	183	13.0	"
" 21	h	2	26	81	4.2	"
" 23	j	2	159	483	38.9	"
" 24	k	2	120	324	26.3	"
" 24	k	3	35	135	13.1	"
" 27	l	3	100	270	25.2	"
" 29	m	3	74	216	21.6	"
October 1	n	3	127	351	28.8	"
13	p	3	18	58	1.5	"
" 20	q	3	19	62	4.0	"
TOTALS - - - - - - - - - -			1359	4158	304.2	- - - - - - -

STATISTICS FOR LAUNCH

SHEET "C"

Date 1926	Letter	Volume	Positions	Soundings	Statute Miles	Vessel
Sept. 20	a	1	9	36	3.0	RICHARD "M"
" 30	b	1	33	117	8.0	"
October 4	c	1	152	513	35.3	"
" 5	d	1	112	405	24.7	"
" 12	e	1	22	82	4.5	"
" 13	f	1	8	28	0.9	"
" 13	f	2	46	132	12.0	"
" 20	g	2	104	425	21.4	"
" 21	h	2	100	400	24.2	"
" 22	j	2	25	145	5.0	"
" 27	k	2	63	200	14.3	"
" 28	l	2	75	264	16.8	"
" 28	l	3	118	486	26.8	"
" 29	m	3	176	690	42.3	"
TOTALS - - - - - - - - - -			1043	3923	239.2	- - - - - - -

SHEET "D"

Date 1926	Letter	Volume	Positions	Soundings	Statute Miles	Vessel
October 22	a	1	43	224	10.0	RICHARD "M"
" 29	b	1	40	120	9.0	"
" 30	c	1	177	815	43.4	"
Novemb. 2	d	1	82	315	15.2	"
" 3	e	2	200	840	44.1	"
" 4	f	2	89	345	20.3	"
" 6	g	2	77	252	15.6	"
" 8	h	2	84	318	24.6	"
" 9	j	3	49	190	11.3	"
"						
TOTALS - - - - - - - - - -			741	3419	193.5	- - - - - - -

(11)

Copy for Records Section. June 4, 1927.

Division of Hydrography and Topography:

Division of Charts:

Tide reducers are approved in
4 volumes of sounding records for

HYDROGRAPHIC SHEET 4618

Locality: OREGON & WASHINGTON, near Columbia River Entrance.

Chief of Party: T. J. Maher , 1926.
Plane of reference is M L L W
0.8 ft. on tide staff at North Jetty
-0.2 ft. ------do------ Fort Stevens

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of each day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.

Chief, Division of Tides and Currents.

Copy for Records Section.

June 21, 1927.

(11)

Division of Hydrography and Topography:

Division of Charts:

Tide reducers are approved in
3 volumes of sounding records for

HYDROGRAPHIC SHEET 4619

Locality: WASHINGTON COAST

Chief of Party: T. J. Maher, 1926.
Plane of reference is M L L W
0.8 ft. on tide staff at North Jetty

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of each day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.

G Rude

Chief, Division of Tides and Currents.

Copy for Records Section.

T.H.

(11)

June 21, 1927.

Division of Hydrography and Topography:

Division of Charts:

Tide reducers are approved in
3 volumes of sounding records for

HYDROGRAPHIC SHEET 4620

Locality: COAST OF WASHINGTON.

Chief of Party: T. J. Maher, 1926.
Plane of reference is M L L W
0.8 ft. on tide staff at North Jetty

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of each day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.

Chief, Division of Tides and Currents.

Copy for Records Section.

June 21, 1927.

F.W.

(11)

Division of Hydrography and Topography:

Division of Charts:

Tide reducers are approved in
3 volumes of sounding records for

HYDROGRAPHIC SHEET 4621

Locality: WASHINGTON COAST.

Chief of Party: T. J. Maher, 1926.
Plane of reference is M L L W
0.8 ft. on tide staff at North Jetty.

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of each day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.

G Rude

Chief, Division of Tides and Currents.

IN REPLY ADDRESS THE DIRECTOR
U. S. COAST AND GEODETIC SURVEY
AND NOT THE SIGNER OF THIS LETTER

AND REFER TO No. 11-DRM

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

WASHINGTON

October 10, 1927.

SECTION OF FIELD RECORDS

Report on Hydrographic Sheet No. 4618

Approaches to Columbia River

Surveyed in 1926.

Chief of Party, Thos. J. Maher.

Surveyed by E. H. Bernstein and W. F. Malnate.

Protracted and soundings plotted by V. M. Gibbens.

Verified and inked by H. E. MacEwen.

1. The records conform to the requirements of the General Instructions.

2. The plan and character of the development fulfill the requirements of the General Instructions.

3. The plan and extent of the development satisfy the specific instructions.

4. The sounding line crossings are adequate. There are about eight instances of poor agreement where lines cross. This may be due to the heavy swell that the party reported as running most of the time, since no discrepancy could be found in the plotting of the work.

5. The usual depth curves can be completely drawn.

6. The field plotting was completed to the extent prescribed in the General Instructions.

7. The office draftsman did not have to do over any of the work done by the field party.

8. The junctions with adjacent sheets are satisfactory.

9. No further surveying is required to fully develop important areas within the limits of this sheet.

10. Remarks: A close development of North Head was apparently avoided because of the absence of indications of rocks during heavy swell.

		Disagreement	
Poor crossings	88 m and 94 m	9	feet
	97 m and 32 l	8	"
	16 l and 34 l	10	"
	82 a and 36 j	4	"
	51 a and 35 j	5	"
	114 j and 32 d	7	"
	16 a and 43 c	15	" steep slope - end of spit
	15 c and 53 b	7	" steep slope } A.L.S.

Questionable sounding (18 d - 50 foot) in shoal area averaging 37 feet omitted in view of note by E.H.B. in sounding record.

11. Rating of work:
a. Character and scope of surveying - excellent.
b. Field drafting - excellent.

Reviewed by H. E. MacEwen. Sheet inspected by A.L.S.

Approved:

_____
Chief, Section of Field Records (Charts)

_____
Chief, Section of Field Work (H. & T.)

IN REPLY ADDRESS THE DIRECTOR
U. S. COAST AND GEODETIC SURVEY
AND NOT THE SIGNER OF THIS LETTER

AND REFER TO No. 11-DRM

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

WASHINGTON October 17, 1927.

SECTION OF FIELD RECORDS

Report on Hydrographic Sheet No. 4619

North of Cape Disappointment, Washington

Surveyed in 1926

Instructions dated April 17, 1926 (GUIDE)

Chief of Party, T. J. Maher.

Surveyed by E. H. Bernstein, W. F. Malnate.

Protracted and soundings plotted by V. M. Gibbens.

Verified and inked by J. T. Jarman.

1. The records conform to the requirements of the General Instructions. The many notes in the remarks column were of material assistance to the verifier in properly interpreting the survey.

2. The plan and character of development fulfill the requirements of the General Instructions.

3. The plan and extent of development satisfy the specific instructions except that the work was not carried in to the beach. This was doubtless due to the necessity of using a large launch and to the sea conditions.

4. The sounding line crossings are for the most part within the allowable limit for this class of work. There are differences, however, ranging from 2 to 6 feet in depths of 30 to 60 feet. This seems to be characteristic of most of the sheets along this coast. The major portion of the differences is doubtless due to sea conditions, although there is evidence of a few leadline errors of 1 fathom.

5. The usual depth curves, with the exception of the 6 and 12 foot curves, could be completely drawn.

6. The field plotting was completed to the extent prescribed in the General Instructions but was only fairly well done. Numerous changes had to be made by the office cartographer due to careless protracting and faulty plotting of soundings wherever changes in time interval occurred. (For statistics see verifier's report.)

7. The junctionswith H. 4620 on the north and H. 4618 on the south are acceptable. Similar differences occur at the junctions as were found within the sheets. There was no way of reconciling these differences except by the explanation given above. No adjustments could therefore be made.

   The junction with the offshore sheet H. 4634 will be taken up when that sheet is completed.

8. No further surveying is necessary to develop important areas within the limits of this survey. It should be borne in mind, however, that the inshore limit of this survey is approximately the 18 foot curve.

9. Character and scope of field operations - very good.
   Field drafting - fair.

10. Reviewed by A. L. Shalowitz, October, 1927.

Approved:

_____
Chief, Section of Field Records (Charts)

_____
Chief, Section of Field Work (H. & T.)

IN REPLY ADDRESS THE DIRECTOR
U. S. COAST AND GEODETIC SURVEY
AND NOT THE SIGNER OF THIS LETTER

AND REFER TO No. 11-DRM

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

WASHINGTON September 8, 1927.

SECTION OF FIELD RECORDS

Report on Hydrographic Sheet No. 4619

North of Cape Disappointment, Washington

Surveyed in 1926

Instructions dated April 17, 1926.

Chiefs of Party, T. J. Maher and W. F. Malnate.

Surveyed by E. H. Bernstein.

Protracted and soundings plotted by V. M. Gibben.

Verified and inked by J. T. Jarman.

1. The records conform to the requirements of the General Instructions.

2. The plan and character of the development fulfill the requirements of the General Instructions.

3. The sounding line crossings vary from one to seven feet over the entire survey. All positions surrounding crossings with major differences have been checked and found correct. An effort was made to check the crossings on the smooth sheet with those on the boat sheet but the result was not satisfactory on account of the boat sheet being plotted in fathoms and having a different tide reducer. Since the crossings are unsatisfactory *in a number of cases*, the differences are in all probability caused by the heavy sea and adverse currents encountered throughout the period of the survey.

See review by A.L.S.

4. The field plotting was completed to the extent prescribed in the General Instructions.

5. The field protracting was only fair as the following statistics will show:

Number of soundings	4158
Number of positions,	1359
Number checked	519
Number changed	55

Percent wrong $\frac{55}{519} \times 100 = 10.5$

Character of sheet: open work, hand soundings irregular time inteval.

The majority of the changes were of minor importance and due to careless protracting. About 25% of the changes made were errors of considerable magnitude and due to the use of the wrong signals in plotting. In every instance of the above case, the targets selected by the field party were surrounded by one or more nearby signals which not only made the plotting of the field draftsman liable to error but also caused the field party to list the wrong signal in several cases.

Numerous changes in the time interval occurred during the survey and these the field draftsman completely ignored. Over thirty such changes had to be noted by the office draftsman and the corresponding soundings replotted.

In many instances the field draftsman not only failed to observe "misses" as recorded in the records for a number of positions, but plotted a sounding there. Over twenty-five such errors were discovered and corrected.

6. The junctions of this sheet with H. 4618 and H. 4620 are not so good. The inshore work on the three sheets matches up fairly well as far out as the 30 foot curve. Beyond this curve and especially around the 60 foot curve, considerable differences in the soundings occur. These differences occurred on hand soundings in considerable depth of water, and the heavy sea running, strong currents encountered, adverse weather conditions existing during the period of the survey, all probably contributed to the discrepancies.

7. ~~Reviewed~~ Report by J. T. Jarman, September, 1927.
(See review by A.L.S.)

Approved:

Chief, Section of Field Records (Charts)

Chief, Section of Field Work (H. & T.)

IN REPLY ADDRESS THE DIRECTOR
U. S. COAST AND GEODETIC SURVEY
AND NOT THE SIGNER OF THIS LETTER

AND REFER TO No. 11-DRM

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

WASHINGTON

July 29, 1927.

SECTION OF FIELD RECORDS

Report on Hydrographic Sheet No. 4620

Off Entrance to Willapa Bay, Washington

Surveyed in 1926

Instructions dated April 17, 1926.

Chief of Party, T. J. Maher.

Surveyed by E. H. Bernstein.

Protracted and soundings plotted by V. M. Gibbens.

Verified and inked by R. C. Rowse.

1. The records conform to the requirements of the General Instructions.

2. The plan and character of development fulfill the requirements of the General Instructions.

3. The plan and extent of development satisfy the specific instructions.

4. The sounding line crossings are two to five feet out in many cases. This is probably due to the presence of a heavy swell at the time of sounding or to inaccurate reading of the leadline. An extreme case occurs about 300 meters southeast by south of the mid-channel buoy, where a sounding of 69 feet and one of 57 feet occur at the same spot. All boat positions and the spacing of the soundings in the immediate vicinity were verified and no errors found.

5. The usual depth curves can be completely drawn.

6. The field plotting was completed to the extent prescribed in the General Instructions.

7. Occasional boat positions had to be corrected.

8. Not all adjacent sheets are complete at the time of this report.

9. No further surveying is necessary to fully develop the important areas within the limits of the sheet.

10. The protracting was, in general, accurately done, as shown by the following statistics:

Number of positions	1043
Number tested	257
Number found wrong	52
Percent found wrong, 52/257 x 100 =	20.2
Percent of total found wrong, 52/1043 x 100 =	5.0

Three positions (14 j - 16 j) had to be rejected on account of bad fixes. The line 18 j - 25 j was salvaged in the office after being rejected by the field party and is entirely satisfactory.

For the whole of "e" day the channel buoys were used in the fixes, since the signals on shore were obscured by low mists. Consequently these positions are only approximate, but are of value in indicating the location of the channel. A survey of the area traversed by the channel was made earlier in the year (cf. sheet H. 4557). by Lt O S Reading

In checking the positions of the buoys as plotted in the field four of them were found wrong and had to be corrected. These were C3, C5, N4 and N6.

11. Character and scope of surveying, excellent.
Field drafting, very good.

12. Reviewed by R. C. Rowse, July, 1927.

Approved:

Chief, Section of Field Records (Charts)

L. O. Colbert

Chief, Section of Field Work (H. & T.)

IN REPLY ADDRESS THE DIRECTOR
U. S. COAST AND GEODETIC SURVEY
AND NOT THE SIGNER OF THIS LETTER

AND REFER TO No. 11-DRM

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

WASHINGTON

September 29, 1927.

SECTION OF FIELD RECORDS

Report on Hydrographic Sheet No. 4621

South Approaches to Grays Harbor, Washington

Surveyed in 1926

Instructions dated April 17, 1926 (GUIDE)

Chief of Party, T. J. Maher.

Surveyed by E. H. Bernstein, V. M. Gibbens.

Protracted and soundings plotted by V. M. G.

Verified and inked by F. B. Kelly.

1. The records conform to the requirements of the General Instructions.

2. The plan and character of development conform to the requirements of the General Instructions.

3. The plan and extent of development satisfy the requirements of the specific instructions with the exception that the work was not carried in to the beach. This was probably due to the condition of the sea.

4. The sounding line crossings differ in many cases by as much as 5 feet. This seems to be characteristic of most of the sheets in this area, and is probably due to the difficult conditions under which the work was done (see descriptive report). The largest discrepancy occurs near red buoy No. 2 in lat. 46° 54', long. 124° 12 3/4' where 42 and 44 foot soundings fall close to 53 and 56 foot soundings. The shoal soundings (position 77 g) having been obtained just before work was ended on account of being "too rough to continue", it would seem that in addition to the normal differences in crossings encountered on this sheet, an error of 1 fathom was probably made in reading the leadline. This seems to be generally borne out by the Engineers survey of June 1927 (blueprint 21310) although the exact spot is not covered by the Engineers survey. It is, however, recommended that these two shoal soundings be retained on the sheet in the absence of more detailed information.

5. The usual depth curves could be completely drawn except the 6 foot curve and portions of the 12 foot curve inshore. Also a portion of the 18 foot curve in the vicinity of South Jetty.

6. The usual field plotting was done by the field party. The protracting was well done, there being only a few accidental errors. The soundings, however, were not always plotted according to the time interval, whenever the interval changed between fixes.

7. The junction with H. 4620 is satisfactory except at position 42 - 43 a where a 28 foot sounding crosses a 23 foot sounding. It should be noted, however, that the entire line 13 a to 43 a is not consistent with the adjacent work on this sheet, it being uniformly deeper from 1 to 5 feet.

   The junctionswith the other adjacent sheets will be taken up when these sheets are completed.

8. No additional work is required within the limits of this survey. The area to the west and west-southwest of the South Jetty is taken care of by U. S. Engineers surveys, and no additional work is needed here.

9. Character and scope of field operations - very good.
   Field drafting - good.

10. Reviewed by A. L. Shalowitz, September, 1927.

Approved:

_____

Chief, Section of Field Records (Charts)

_____

Chief, Section of Field Work (H. & T.)

Form 537
11—5812

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

C. & G. SURVEY
L. & A.
APR 6 1927
Acc. No.

REG. NO. 4618

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.

Field No. A

REGISTER NO. 4618

State ~~Washington~~ Oregon and Washington

General locality ~~Pacific Coast~~ Cape Disappointment

Locality ~~Off of Columbia River~~ Columbia River Approaches

Scale 1/20,000 Date of survey Aug 19, to Sept 9, 1926

Vessel Richard M.

Chief of Party Thos. J. Maher

Surveyed by E.H. Bernstein and W.F. Malnate

Protracted by V.M. Gibbens

Soundings penciled by V.M. Gibbens

Soundings in fathoms feet ✓

Plane of reference M.L.L.W.

Subdivision of wire dragged areas by

Inked by

Verified by

Instructions dated April 17, 1926

Remarks: To accompany sheet, 1 ~~Sheet~~ Cahier of tide reduction curves for sheet A, B, C and D, 4 vol. sounding records, 1 boat sheet, 1 descriptive report for sheets A, B, C, and D. ✓

GPO

Form 537
11—5812

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

C. & G. SURVEY
L. & A.
APR 8 1927
Acc. No.

REG. NO. 4619

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.

Field No. B

REGISTER NO. 4619

State Washington

General locality ~~Washington Coast~~ North of Cape Disappointment

Locality ~~North of Columbia River~~ Vicinity of Klipsan Beach

Scale 1/20,000 Date of survey Sept 9 to Oct 20, 1926

Vessel Richard M

Chief of Party Thos. J. Maher ~~and W.F. Malnate~~

Surveyed by E.H. Bernstein, W.F. Malnate

Protracted by V.M. Gibbens

Soundings penciled by V.M. Gibbens

Soundings in fathoms feet ✓

Plane of reference M.L.L.W.

Subdivision of wire dragged areas by

Inked by

Verified by

Instructions dated April 17, 1926

Remarks: To accompany smooth sheet, 3 Vol. Sounding records. 1 boat sheet, 1 descriptive report for sheets A, B, C and D.

GPO

Form 537
11—5812

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

REG. NO. 4620

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.

Field No. C

REGISTER NO. 4620

State Washington

General locality ~~Coast of Washington~~ Cape Shoalwater

Locality ~~Off of Willapa Bar~~ Willapa Bay Approaches

Scale 1/20,000 Date of survey Sept 20 to Oct 29, 1926

Vessel Richard M.

Chief of Party Thos J. Maher

Surveyed by E.H. Bernstein and V.M. Gibbens

Protracted by V.M. Gibbens

Soundings penciled by V.M. Gibbens

Soundings in fathoms feet ✓

Plane of reference M.L.L.W.

Subdivision of wire dragged areas by

Inked by

Verified by

Instructions dated April 17, 1926

Remarks: To accompany smooth sheet, 3 Vol. Sounding records
1 boat sheet, 1 descriptive report for sheet A, B, C and D.

GPO

Form 537
11—5812

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

REG. NO. 4621

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.

Field No. D

REGISTER NO. 4621

State Washington

General locality ~~Washington Coast~~ Pt. Chehalis

Locality ~~South of Grays Harbor~~ South Approaches to Grays Harbor

Scale 1/20,000 Date of survey Oct 22 to Nov 9, 1926

Vessel Richard M.

Chief of Party Thos. J. Maher

Surveyed by E.H. Bernstein and V.M. Gibbens

Protracted by V.M. Gibbens

Soundings penciled by V.M. Gibbens

Soundings in fathoms feet ✓

Plane of reference M.L.L.W.

Subdivision of wire dragged areas by

Inked by

Verified by

Instructions dated April 17, 1926

Remarks: To accompany smooth sheet, 3 Vol. Sounding record, 1 boat sheet, 1 descriptive report for sheets A, B, C and D.

GPO