

4163

G. & EY  
FEB 3 1921  
NO. 1

4163

Form 504  
 DEPARTMENT OF COMMERCE  
 U. S. COAST AND GEODETIC SURVEY

State: California

11-5613

DESCRIPTIVE REPORT.

4163  
 Hydrographic Sheet No. (A) ~~and~~ (B)

LOCALITY:  
San Pedro Bay  
~~Los Angeles Harbor~~

~~San Pedro Bay~~

Los Angeles Harbor

1920

CHIEF OF PARTY:  
 F. G. ENGLE

1920 survey

DESCRIPTIVE REPORT

To accompany Hydrographic Sheets

(A) scale 1:10,000 Los Angeles Harbor

and

(B) scale 1:20,000 San Pedro Bay.

*All the 1920 work on Sheet A  
was registered except that done  
on L, M, N and O days.*

(1) The work on these sheets was done in accordance with instructions dated May 12, 1920, the sheets being outlined therein, and the spacing and position of the lines indicated on bromide copy of Hydrographic Sheet #1418 accompanying the instructions, as a minimum development. In the inner harbor or channel the instructions called for only sufficient work to verify the Army and Harbor Engineers' maps.

(2) The control consisted of prominent artificial objects and five new marked triangulation stations on which hydrographic signals were built, established between Long Beach and Huntington Beach, cut in from the recovered stations, Breakwater L. H., Solitary, Clarence Hotel Cupola, Los Cerritos, Deadmans Isl., Pt. Fermin L. H., and Pt. Fermin. The principal stacks, tanks, and prominent objects in the vicinity of San Pedro and Long Beach were cut in by theodolite. For the close inshore development some objects located by planstable were also used.

(3) That part of the outer harbor lying within the breakwater and westward of a line northerly from the breakwater together with the work in the inner harbor and the close inshore development of the coast extending to Long Beach was done with 24' motor sailing launch in charge of Mr. R. P. Eymann, H. & G. Engineer. The remainder of the work was done by the Natoma in charge of F. G. Engle, Chief of Party, using hand lead on all work on the 1:10,000 sheet and on that part of the 1:20,000 sheet eastward of the breakwater L. H. within 12 fathoms. Between 12 and 20 fathoms a trolley sounding apparatus was used and in the development of the submarine valley at the S.E. corner of the sheet, a hand leadline and a hand sounding machine were used, stopping to sound. On portions of the hand lead and trolley work, leadlines of hemp with wire cores were used and appeared to give more accurate soundings than the plain braided cotton lines used on the remainder of the work, due to the smaller stretch in the line when taking the the weight of lead on reaching bottom.

(4) Sounding lines eastward of the breakwater in general were run so as to split the spaces between the old sounding lines on sheet #1418, and crossing lines were also run, to test the accuracy of the work. Other lines were run over spots where discrepancies existed in the old work. A development was also made of the 10 fathom spot 135° from the breakwater light. Rocky and gravel bottom with least depth of 11 fathoms was encountered on the shoal spot and was the only rock or gravel bottom found in the area surveyed with the exception of one sounding in the

(2) 1920 survey

submarine valley. A few rocky bottom soundings were obtained off the Long Beach Harbor jetties but appeared to be rock accidentally dropped from barges in course of constructing the jetties.

(5) In accordance with instructions only sufficient lines were run in the inner harbor, channels, basins, and slips to verify city and Army Engineer maps. A blue print was obtained from the Harbor Engineer's Office showing results of their surveys. This is the latest information they have published and is identical with the print forwarded with the instructions, sub plan (2). The Army Engineers have published no map showing soundings in the harbor and in fact, have not made any regular survey outside of soundings from the dredges. Mr. D. E. Hughes, of the Army Engineers furnished me with the limits of the dredged channels, their widths and depths. This information is given in pencil on a copy of a map published by the Harbor Engineers, sub plan (#1). Referring to this plan. The channel between San Pedro and Long Beach has been dredged to a depth of twenty feet and the bottom of the cut is 200 feet wide and 100 feet from the Pierhead line. This channel was dredged by the Engineer Dept. dredge. Bp 12541

(6) Attention is called to a change in direction of the eastern part of the cut. It is  $72^{\circ}$  true approximately by our plane table survey and  $74^{\circ}$  as roughly corrected by Mr. Hughes in pencil on the plan instead of  $75\frac{1}{2}^{\circ}$  as shown on the plan. The soundings taken by this party verify the dredged depth.

(7) The Wilmington Channel as far as and including slip 5 was verified by two lines of soundings and the channel limits and depths shown on plans 1 and 2 are found correct. Above slip 5 no depths are shown on the plan and the sounding lines shows a gradually decreasing depth from 22 feet at slip 5 to 15 feet off the Consolidated Lumber Co's. wharf.

(8) In the West Basin dredging on the 30' channel from the Turning basin to the slip occupied by the 12,000 ton floating dry dock of Los Angeles S. B. & D. D. Co. was in progress at the time the soundings by this party were made. The details of this work are shown in pencil on plan #1 and at the time of writing the work has been completed with exception of the turn shown opposite the fitting out wharves. Work is still in progress on the channel on the east side of the west basin, this channel is indicated on Plan 1 and is to have the depth of 20' indicated.

(9) The depths and channel limits in the inner harbor channel and the outer harbor slips are shown on plan #1 supplemented by pencil notations by Mr. Hughes. The 26' spot in the 30' Watchorn Basin channel shown in pencil on plan 1, the 27' and 28' spots shown on Los Angeles Harbor Dept. Navigation chart (plan 2) and the 24' sounding on chart 5145 in the Watchorn Basin channel were not found in the work by this party. It is possible that they are small hummocks left by dredges and may have disappeared.

(10) Subsequent to the sounding a small amount of additional dredging has been done in the 30' channel outside of Reservation Pt. and east of Municipal pier #1 to restore the channel where shoaling had occurred on the east side of the channel. This shoaling is indicated by a 8' sounding

1920 Survey

about halfway between Reservation Pt. and the red beacon. After the dredging was completed additional lines were run in this locality and indicated that this shall had been removed. The dredgings were pumped to the north eastward about 200 yards but probably caused no appreciable shoaling on account of the small volume dredged.

(11) Four of the outer harbor sounding lines cross the dredged channel leading to the new fill at the U. S. Military Reservation verifying the depths shown on blueprint (plan #3) which was forwarded with the instructions. 724 17647

(12) A blueprint (plan #4) was obtained from the City Engineer of Long Beach showing depth curves in the entrance inside of the railroad bridge, the Turning basin and Channel #3 of the harbor at Long Beach. Sufficient sounding lines were run to verify this print and additional lines were run in channels #1 and #2, the blueprint having no depth curves for these channels. The sounding lines between the jetties of the entrance to Long Beach harbor show a controlling depth of 7 feet at M.L.L.W. the shallowest point being about 500 yards outside of the bridge. 724 17648

(13) The channel leading through the jetties is used by the Long Beach Shipbuilding Co. for taking out the 8800 ton vessels which have been built there although the depth through to the 20' dredged channel to San Pedro is 13 feet at M.L.L.W. This channel is however, crooked and has a sharp turn at the northern end where it meets the straight cut. The vessels built at Long Beach draw about 13 feet when leaving the yard and of course are compelled to leave at good high water, and require a tug. Heavy swells break across the entrance at the outer end of the jetties and at such times the passage is dangerous for all sizes of vessels.

(14) A flood control or diversion channel has been dredged between Anaheim St. and the sea to the eastward of Long Beach Harbor using a part of the bed of the old Los Cerritos Slough. North of Anaheim St. no dredging will be done as levees have been built by scooping and dragging material from the center of the channel to the levees on either side, making the center of the channel about three feet below the general level of the land for a width of about 200 feet with a gradually increasing slope to the top of the levees which are about 15' high. Rock has been placed on the levees to prevent the flood waters from breaking through. The channel is designed to drain the area to the northward of Signal Hill and Dominguez Hills and about three miles to the northward of Anaheim St. the levees separate, the western levee extending to the Dominguez Hills. At the present time although the channel south of Anaheim St. is filled with water, the opening to the sea has not yet been made. The diversion channel it is expected, will keep flood waters from the Long Beach and San Pedro harbors and prevent further silting. The Long Beach harbor dredging will be started shortly and the authorities expect to be able to accommodate shipping in the course of a year.

(15) Sounding lines were run in the vicinity of Weldt Rock. A least depth of 24 feet was obtained. No indication was found of the 26' spot shown on Chart 5145 200 m. 130° from Weldt Rock.

(16) Considerable discrepancies appear in the launch hydrography of the harbor between the 50 meter harbor development lines and the cross lines run later in the season, the later lines giving from one to three feet less depth than the original development. The later soundings are without doubt more reliable as greater care was taken, in checking leadline, a heavier lead was used and a more expert leadsman took the soundings. On August 30th I discovered that Mr. Eymen who was in charge of the launch work covering the harbor, was having the leadsman test the leadline without using a springbalance to show the tension. On the work done up to that time a six or eight pound lead was used and I believe that too much tension was placed on the line in testing. The repeated entries day after day of "leadline correct" in the sounding book lead me to inspect the testing of the leadlines and the above practice was what I found. The result of placing too much tension in testing the lines would be greater depth than really existed. On the first ship work after this time, I observed the work of the leadsman, G. M. Pittman who had taken the soundings on the launch work in the harbor and found that he had a double fault of not lifting the lead sufficiently off bottom and of reading the line always to the nearest foot mark above water. It was not thought necessary to rerun the entire harbor survey as the cross lines will serve as a correction on the 50 meter lines.

(17) A sounding of <sup>20'</sup> between positions 55 and 56 b day and a sounding of 22' between positions 147 and 148 b day of launch work in the outer harbor appear to be errors of one fathom in reading the line or in recording; they probably should be 14 feet and 16 feet respectively. A sounding of 15 feet between positions 122 and 123 b day, a sounding of 5' on position 104 F and a sounding of 9' on position 37 d of the launch work in the outer harbor appear to be errors of one fathom in reading the leadline or recording, they should probably be 21', 12', and 15' respectively. Lines run later over the positions failed to check the soundings as recorded. A sounding of 12 feet at position 21 m, launch 1/10,000 sheet, and soundings of 32 feet between position 29 and 30 H, and of 72 feet at position 60 C Ship 1:10,000 sheet, appear to be errors of reading leadline or of recording and should be 18', 38', and 66' respectively.

(18) No important changes have been noted in the area covered by the 1:10,000 sheet eastward of the harbor. Two piers off Long Beach not shown on the chart were located by plane table. No boats land at these piers. Surf usually breaks at the outer end of the amusement pier just to the westward of the Pine St. pier. The amusement pier has upon it a number of concessions among which a gravity racer and an aeroplane machine are prominent. The pier is built on wooden piling. The other new pier which is at the foot of 39th St. is built of concrete on concrete piling. It has two small pavilions, one on the outer end and one at the middle of its length. About 85 feet of the outer end of the old Pine St. pier has been washed away by storms and has been repaired, leaving it that much short of its original length. There are two boat landings on the eastern side near the outer end at which land a line of launches from San Pedro during daylight in fair weather.

White can buoy #1 shown off Pt. Fermin was not found. Nos. 2, 3, and 4 were located. Two white can buoys and five small spar buoys in a line with the stacks of the Southern California Edison Co. at W. Long Beach N. 11 W were located. They are used by the Submarine Base.

(19) On the ship work of the 1:20,000 sheet and on all the work on the 1:20,000 sheet which was done entirely by ship, the work of plotting and directing the lines was done by Mr. R. P. Eyman while the Chief of Party supervised the sounding and instructed the leadsmen. By close observation and study of the subject and by personal experience in handling the lead I am convinced that the average leadman sounding from a vessel usually obtains a greater sounding than actually exists. This is due to the fact that the line is curved forward below the water when it is vertical above the water, that is the lead is then on the bottom in a position forward. By lifting the lead off bottom twice and reading it when it slants slightly aft, the least water is obtained and is very nearly correct. Few leadsmen appreciate this however, and it is difficult to make them believe it.

(20) Outside of the 12 fathom curve on the 1:20,000 sheet, a trolley apparatus was used. The apparatus was rigged by the ships force and for some time gave considerable trouble due to the difficulty of getting sufficient length and slant of the wire rope and due to stretch and breakage of the belt drive on the electric drum hauling reel which was constructed by ships force. Finally by perfecting a belt and by an alteration in the lead of the leading highly satisfactory results were obtained. That is soundings one minute apart in 14 fathoms and 1-1/4 minutes apart in 19 - 20 fathoms.

(21) The 10 fathom shoal three miles 138° true from the breakwater light was developed in accordance with instructions. It is a flat shoal of large area and the bottom is gravel as contrasted with the fine gray sand of San Pedro Bay. A few isolated kelp stems with leaves were observed scattered over the center of the shoal, they barely reach the surface. The least water found was 67 feet.

(22) The only important difference from the existing chart was found in the S. E. corner of the sheet where the lines laid out to develop the 20 fathom curve picked up a pronounced inward curve, and two no bottom at 27 fathom soundings were obtained with the trolley, on the outer end of the lines at this point. Subsequent development disclosed the existence of a submarine valley with its inshore end at about the 20 fathom curve. It was developed as far as the limits of the sheet with hand sounding machine, using a 30# lead. The greatest depth found was 89½ fathoms which indicated the 100 fathom curve to be close off shore and it was not thought necessary to extend the development further. Blue mud was found in the bottom of the ravine and a few yellow gravel specimens were picked up on the slopes.

(23) Coast Pilot Notes. The following additions and corrections to the present Coast Pilot are noted:

The channel leading from sea to Long Beach Harbor is crossed at the inner end of the jetties by a railroad Boscule Bridge, single leaf, 180' span.

Supplies: Fuel oil, Diesel oil, kerosene, and gasoline can be

1920 Survey

obtained in any quantity. There are four companies, The Standard Oil Co., Union Oil Co., Puente Oil Co., and General Petroleum Corp., the latter have pipe lines to a dock on the breakwater where the deepest draft vessels may load. There is a coal pile on the dock of the Outer Harbor Dock & Wharf Co. At times the amount on hand is small but any amount can be obtained at short notice. Utah coal of good quality can be obtained.

**Repairs.** The Los Angeles S. B. & D. D. Co. have a 12000 ton floating drydock and two 100 ton shear legs at their shipyard in the West Basin. The Long Beach S. B. Co. have a 3500 ton floating drydock at the plant in Long Beach and there are several small marine railways at Wilmington and at Fish Harbor for hauling launches.

The Weather Bureau now displays storm warnings from the steel tower on top of the City Warehouse on Pier 1, Outer Harbor.

Steam and gasoline tugs are available for handling vessels in the Inner Harbor. The City maintains a gasoline fire tug.

The Radio Corporation of America has a station at San Pedro. Telephone exchanges at Avalon, Catalina Isl., Los Angeles, and Long Beach are connected by wireless telephone for direct communication between individuals and these places.

The following booklets etc. are attached to this report. (See Description Report  
p. 3820)

Booklet: Los Angeles, the Great Seaport of the Southwest, by Board of Harbor Commissioners.

Booklet: Los Angeles Harbor Rules and Regulations, by Board of Harbor Commissioners.

Pamphlet: Facts about Los Angeles Harbor.

6 Blimp photographs, Los Angeles Harbor.

F. G. HOGLE,  
H. & G. Engineer,  
Chief of Party.

HYDROGRAPHY  
SAN PEDRO BAY CALIFORNIA

*1920 Survey*

Statistics Sheet No. A.

Date	1920	Letter	Volume	Positions	Soundings	Miles Statute	Vessels
Aug.	16	a	1	42	190	4.7	Motor Sailer
	18	b	1	172	698	17.7	"
	19	c	1	143	537	12.2	"
	20	d	1	83	330	8.5	"
	20	d	2	125	530	12.1	"
	21	e	2	108	523	11.9	"
	23	f	2	314	1126	22.1	"
	24	g	3	230	1092	24.0	"
	25	h	2	196	917	20.3	"
	26	i	3	21	118	2.0	"
	26	i	4	108	554	10.5	"
	27	k	4	119	609	11.5	"
	30	l	4	146	623	17.5	"
Sept.	2	A	1	99	425	21.3	Ship
	3	B	1	118	439	23.2	"
	8	C	1	124	504	23.3	"
	10	D	1	106	386	18.3	"
	17	D	2	26	129	4.8	"
	23	E	2	15	53	2.1	"
Oct.	4	F	2	197	661	34.1	"
	5	G	2	113	322	18.9	"
	8	H	2	33	95	6.0	"
	14	I	2	128	468	18.8	"
<b>TOTAL</b>				<b>2866</b>	<b>11,327</b>	<b>345.8</b>	



HYDROGRAPHY

1920 Survey

SAN PEDRO BAY CALIFORNIA

Statistics Sheet No. A. (continued)

Date	m 1920	Letter	Volume	Positions	Soundings	Miles	
						Statue	Vessels
				8685	11,327	345.8	
Oct.	14	I	3	31	120	4.6	Ship
	26	K	3	69	230	10.5	"
Nov.	3	m	5	179	739	21.3	Motor Sailer
Dec.	8	n	4	68	236	7.8	"
	8	n	6	93	316	9.2	"
	9	o	5	85	412	7.8	"
	13	L	3	9	9	0.0	Ship
<b>TOTAL</b>				<b>3200</b>	<b>13,378</b>	<b>407.0</b>	

Soundings in feet.

Plane of Reference: Mean Lower Low Water.

Tidal Note:

Automatic Tide gauge and Tide staff used at "Outer Harbor Wharf and Dock Co. San Pedro, Harbor.

Plain Tide staff only used at Long Beach  
San Pedro Harbor Tide Gauge

Plane of Reference, reading on gauge 3.8

Lowest Tide observed, reading on gauge 2.0

Highest Tide observed, reading on gauge 10.6

Long Beach Tide Staff

Plane of Reference, reading on gauge 3.45

Lowest Tide Observed, reading on gauge 2.9

Highest Tide observed, reading on gauge 9.1

Notes.

For days on which each gauge was used in tide reductions to soundings, see sounding records.

HYDROGRAPHY  
SAN PEDRO BAY CALIFORNIA

*1920 Survey*

Statistics Sheet No. B.

Date	1920	Letter	Volume	Positions	Soundings	Miles Statute	Vessels
Sept.	10	A	1	79	190	21.85	Ship
	15	B	1	83	145	18.3	"
	16	C	1	45	90	10.83	"
	20	D	1	84	150	16.6	"
	23	E	1	61	112	13.9	"
	24	F	1	122	175	33.8	"
Oct.	1	G	2	126	395	39.9	"
	5	H	2	44	153	9.9	"
	6	I	2	140	471	33.8	"
	8	K	2	117	343	20.6	"
	11	L	2	44	120	9.4	"
	11	L	3	70	98	15.0	"
	12	M	3	134	509	30.1	"
	13	N	3	148	440	31.1	"
	18	P	3	96	139	13.3	"
	20	Q	4	173	318	34.5	"
	21	R	4	165	238	34.0	"
	22	S	4	101	250	20.7	"
	25	T	4	53	138	11.3	"
	25	T	5	48	116	10.3	"
	26	U	5	99	284	21.8	"
Dec.	13	V	5	85	85	11.5	"
TOTAL				2110	4757	440.37	

## HYDROGRAPHY

1920 Survey

## SAN PEDRO BAY CALIFORNIA

Statistics Sheet No. 1 B. continued

Soundings in feet.

Plane of Reference: Mean Lower Low Water.

## Tidal Note:

Automatic Tide gauge and Tide staff used at "Outer Harbor Wharf and Dock Co. San Pedro, Harbor.  
Plain Tide Staff only used at Long Beach.

San Pedro harbor Tide Gauge  
Plane of reference, reading on gauge 5.8

Lowest Tide observed, reading on gauge 2.0

Highest tide observed, reading on gauge 10.6

Long Beach Tide Staff.

Plane of reference, reading on gauge 3.45

Lowest Tide observed, reading on gauge 2.9

Highest Tide observed, reading on gauge 9.1

## Note.

For days on which each gauge was used in tide reductions to soundings, see sounding records.

1920 Survey

June 4, 1921.

Division of Hydrography and Topography:

Division of Charts:

Tidal reductions are approved in  
6 volumes of sounding records for

HYDROGRAPHIC SHEET 4163

Locality: Off Los Angeles Harbor, Cal.

Chief of Party: F. G. Eagle in 1920

Plane of reference is mean lower low water, reading

2.8 ft. on tide staff at Long Beach

3.2 " " " " " Outer Harbor, San Pedro.

Condition of records: Satisfactory.



Chief, Division of Tides and Currents.

# 4163

Diag. Chart No. 5701-2

C. & G. SURVEY

L. & A.

AUG 20 1921

ADD. NO.

# 4163

Form 504	
DEPARTMENT OF COMMERCE	
U. S. COAST AND GEODETIC SURVEY	
State: <i>California</i>	
11-5813	
DESCRIPTIVE REPORT.	
Hyd. _____	Sheet No. <i>4163</i>
LOCALITY:	
<i>Los Angeles Harbour</i>	
<i>Resurvey in 1921</i>	
_____	
1921	
_____	
CHIEF OF PARTY:	
<i>F. G. Engle</i>	

DESCRIPTIVE REPORT.

To Accompany Hydrographic Sheet 4163.

*Resurveyed in 1921*

In accordance with instructions dated July 9th, the outer Harbor at San Pedro was resurveyed by a party from the NATOMA, consisting of two officers, recorder and leadsmen, using a 30 foot navy motor sailer borrowed from the Submarine Base. The engineer was assigned by the Submarine Base and hands were hired in San Pedro for observing tides, steering launch and hauling leadlines. Instruments, leadline, tide staff, sounding chair and plotting board were shipped from the NATOMA.

2. The party left San Francisco on July 20th, and the necessary preparations were made on the 21st, and the morning of the 22nd. The first sounding lines were run on the afternoon of the 22nd. The strong westerly winds which blow in this locality every afternoon necessitated stopping work after about one hour on the first day and the weather conditions combined with breaking in a new party made the results somewhat unsatisfactory. The line between positions 1 and 3 was rejected because no record of time was kept between positions 1 and 2 and because the depths and spacing indicated that position 2 was not taken on the sounding indicated on the record. Between positions 1 and 10a the boat was running with strong fair wind and the speed was excessive for good sounding although the engine was slowed to its minimum speed. From positions 10 to 22 the exact path of the boat between positions was uncertain on account of the effect of the head wind on the high bow of the launch. While the soundings on this day agree fairly well with other lines, they are for the reason stated above not as good as the remainder of the work.

3. Fifty meter lines in a north and south direction and cross lines sufficient to test the work were run and as assumed by me in the descriptive report covering the previous work by R.P. Hyman, the depths on his north and south lines were in error. Good agreement was found with his cross lines. Less water was found than shown on chart over practically the entire area of the outer harbor the greatest difference being close to the breakwater where 51 and 55 feet maximum depths are shown on chart whereas 47 feet is the maximum found in the recent survey. Whether this is due to sedimentation or error in the old work I cannot say. It is likely that some sedimentation has taken place in flood periods.

4. A 24 foot sounding on position 134 e day and a 24 foot sounding between positions 25 and 26 e day were investigated and checked, 23 foot soundings being obtained in the vicinity. The bottom here is sticky and these spots, which are small in extent, are probably lumps left in dredging. A sounding of 40 feet between positions 17 and 18 f day, a second between positions 16 and 17 f day and a third at position 81 c day were checked these soundings being deeper than surrounding bottom. The vicinity of the 21 foot sounding between 76 and 77 f day was investigated and the least water found was 25 feet. The record shows the sounding recorded as four-fathoms between

soundings of four-three and four-four and one half. It is likely that this is an error in recording. The 28 foot sounding position 149 and 150 c was investigated but the least water found was 30 feet. A sounding of 24 feet between positions 110 and 111 c day and another between positions 58 and 59 b day, appear to be errors in recording and should be 20 feet. ✓

5. Lines were run over the position of the rock on which the Arkansas grounded. No shoal soundings were found. I was informed by Lieut. Cortez who was in charge of the investigation of the Arkansas rock that the rock, which was a two ton block of granite evidently dropped from a barge in building the breakwater, was found by diver. A sling was attached and the rock hoisted by the U.S. Engineers derrick barge. ✓

Letter 98, 1921

6. Some soundings were taken in the vicinity of Weldt Rock on which a sounding of 21 feet was obtained on one of the sounding lines. This rock appears to be small in extent and should be inexpensive to remove by blasting. ✓

7. Between positions 65 and 67 c in Fish Harbor several soundings were read apparently one fathom too shallow and were corrected accordingly. ✓

8. A blue print in 3 sections of a recent survey of Channel #3 and the Turning Basin at Long Beach were obtained from the City Engineer at Long Beach also a tracing showing foot contours in the Eastern end of the San Pedro - Long Beach Channel. No additional work was done here as the previous work agreed well with the blue prints. It is suggested that the office request the City Engineer of Long Beach to furnish blueprints of surveys when made.

9. Soundings in this resurvey were made with a Sampson Mahogany cotton braid over flexible phosphor bronze tiller rope size #8. The agreement between cross lines and the regular system is good. As there is no current in the outer harbor the swell which enters from the sea is the only factor affecting the accuracy of soundings. It seldom amounted to as much as a foot during the time soundings were taken.


10. The plotting of the lines was done on boatsheet at the time the lines were run and the reduced soundings plotted in ink as soon as the soundings were reduced. The path of the boat is drawn on the boatsheet between positions as it actually ran taking into account the fact that course was changed about one minute after each position or midway between positions. In plotting the smooth sheet the boatsheet should be consulted for the location of the line between positions. Under no circumstances should the positions be arbitrarily connected by straight lines even though several positions lie in line unless this is indicated by the boat sheet. The course changes are indicated in the record in points but it is possible that all the course changes were not recorded and the boatsheet is therefore the better guide.

11. The boat used on this work was quite satisfactory with the exception of the engine. This is the standard Navy two cylinder 10 H.P..

two cycle engine, which at best is unsuitable for hydrography on account of poor speed regulation and noise. The particular engine used on this work was badly worn and extremely noisy. This accounts for the errors of recording and made the work difficult for all concerned.

12. Organization of Party:

F. G. Engle, H & G Engineer, in charge R<sup>✓</sup> and plotting.  
R.F.A. Studds, Jr. H & G Engineer, in charge L<sup>✓</sup>  
Ralph E. Walker, W.O. lcl. Recording.  
C.P. Monaghan, S.M. 2cl. Leadsman.

  
F. G. Engle,  
H & G Engr.,  
Chief of party.



STATISTICS SHEET NO. 4163 (Reunney)

Date	Letter	Volume	Positions	Soundings	Miles Statute	Vessels
July 22	a	1	22	88	2.6	<sup>38'</sup> Navy Motor Sailer
23	b	1	84	287	11.0	" " "
25	c	1	186	797	21.8	" " "
26	d	1	177	653	20.7	" " "
27	e	2	179	614	17.7	" " "
29	f	2	149	553	17.1	" " "
30	g	2	103	368	11.0	" " "
Aug. 1	h	3	101	388	11.2	" " "
4	j	3	27	27	0.0	" " "
5	k	3	50	112	2.0	" " "
Total			1078	3887	115.0	

October 10, 1921.

To: The Chief of Section of Field Records

From: A. L. Shalwitz, Draftsman, C. & G. Survey

Subject: Verification of Hydrographic Sheet #4103

The records for this sheet were good and well kept. The time intervals were carefully recorded and notes covered practically all doubtful places.

The plotting was well executed. The plotting of the soundings was carefully done, the time interval being adhered to.

A. L. Shalwitz

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

SECTION OF FIELD RECORDS.

REPORT ON HYDROGRAPHIC SHEET No. 4163.

Surveyed in 1920 & 1921.

Chief of Party: F. G. Engle.

Surveyed by F. G. Engle and  
R. P. Hyman.

Protracted and soundings plotted by A. Baer.

Verified and inked by A. L. Shalowitz.

1. The records conform to the requirements of the General Instructions except that practically no bottom characteristics were given. The handling of the sounding volumes would have been facilitated by noting on the label the day letter (in its proper color) as well as the number of the angle.
2. The plan and character of the 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 adequate.
5. The information is sufficient to permit the usual depth curves to be drawn.
6. The junction with sheet 4162 is satisfactory.
7. The plotting usually done in the field was done by office draftsmen.
8. As stated in paragraph 5 of the descriptive report the 29 foot rock reported by the Arkansas has been removed and it should be expunged from the charts. This recommendation is based upon the assumption that there was but one block of stone dropped by the barge. It appears possible that additional blocks of stone may have been dropped and their existence can only be determined by the drag.  
The survey failed to disclose any indications of the 26 foot spot 200 meters southeast of Weldt Rock. The 1920 survey also failed to show indications of this 26 foot spot or the 29 foot rock noted above.
9. No further surveying is required within the limits of the sheet unless

Hyd. 4163 (con)

it be thought necessary to drag over the 26 and 29 foot spots noted in the preceding paragraph.

10. This area was surveyee by Capt. Engle in 1920, but the bulk of the work was found to be defective and was rejected and a re-survey was made. L, M, N and O days' work of the 1920 survey was considered up to standard and was plotted with the 1921 survey with which it agreed well.
11. The character and scope of the surveying is excellent.
12. Reviewed by E. P. Ellis, October, 1921.

*E.H.L.*

COPY TO FIELD RECORDS.

41/VTB

Sept. 6, 1921.

Division of Hydrography and Topography:

✓ Division of Charts:

Tide reducers are approved in  
3 volumes of sounding records for

HYDROGRAPHIC SHEET 4163a

Locality: Los Angeles Harbor, Cal. (Resurvey)

Chief of Party: P. G. Engle in 1921

Plane of reference is mean lower low water, reading

3.6 ft. on tide staff at Outer Harbor Wharf.

Condition of records: Satisfactory

*Hanneman*

Acting Chief, Division of Tides and Currents.