

4044

Form 504

DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY

State: *California*

11-5613

DESCRIPTIVE REPORT.

*Hyd.* Sheet No. **4044**

LOCALITY:

*Morro Bay*

1919

CHIEF OF PARTY:

*E. B. Latham*

4044

Morro Bay, California

E B Latham, Chief of Party

1919

The instructions for this sheet and for the Topographic sheet of the same area are attached hereto.

The work done outside of the Bay, was in the approach, on the South side of Morro Rock, to the ten fathom curve and in the channel close to the Rock. Soundings were made on the North side of the rock, on the inshore end of the so called North channel. See the hydrographic sheet of this area, for supplemental information, made in 1916 by the party of E B Latham.

A reef is reported ten miles offshore, 275 degrees from Morro Rock. A reef with 3 fathoms, reported one and onehalf miles 140 degrees from triangulation station UP, abreast of the southern end of the Bay.

The entrance to the Bay on the south side of Morro Rock is impracticable for all vessels. The best water is within 50 feet of the Rock, and there is a sixty degree turn in the channel in the narrow part of it. The three foot curve approaches the Rock within 100 feet. There is no practicable channel for any boat on the North side of Morro Rock. It was impracticable to get through it.

The channels in the Bay are narrow, at the Southern end of the Bay they are also crooked. There is no traffic on the Bay at this time. The channels in the southern end of the Bay deepen from bare to 2 and 3 fathoms within a few meters. The entrance channel, on the south side of Morro Rock, is apparently stable in both depth and position. The channels in the bay, are stable in position but are shoaling. The bottom below triangulation station White, is sand, and extremely hard near the entrance. Above triangulation station White there are extensive mud flats, with grass in the upper ends of the Bay. The channels are sand in the greater part.

Much of the area, was covered by leveling, as the water did not cover the flats in sufficient depth to enable the party to get over them in a boat. Level lines were located by sextant angles, the sounding being spaced by paces between positions.

An automatic tide station was operated at Morro, during the progress of the work. A tide staff was read while soundings were being made. This station was placed offshore of a wharf near the head of the Bay on the west side. During current observations this staff was read for a period of 48 hours.

The Automatic station at Morro is to be continued to June 31st 1919. The field reduction of the Soundings was from the record of the Automatic gauge, uncorrected for time or range. The final reductions will show a difference from these reductions of one foot or more. Owing to the narrow and congested entrance the records of this gauge will give good results for the Bay only. The curve of the marigram was checked by readings of the staff at one minute intervals. See the record

Two current stations were occupied, for a series of 25 hours each.

Inexperienced men and a makeshift boat was used, as none other was available. The boat was frequently off course. In the field plotting the lines were bent as much as 29 meters of a direct line from position to position.

In plotting the lines, indicating quick change in depths, lines crossing the channels should be given preference. The skiff work in the narrow channels are the better determination.

It was impracticable to get more soundings in the entrance, as weather conditions prevented, going out of the Bay, on any but the days sounded. The soundings of 1919 fairly well indicate the extent and depths in the entrance. The soundings, by the party of E. B. Latham - made in 1916, will probably supplement the work of 1919.

Three boat sheets, a title sheet, table of statistics, a tracing scale 1 to 20000 with notes as to the material on the shores of the Bay, and the data from which the topographic stations were transferred to the hydrographic sheet, are attached hereto.



E B Latham

H & G Engineer,  
Chief of Party C & G Survey

Morro, Calif.  
April 2nd 1919

REFER TO NO. 12-HCC

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

January 10, 1919.

I N S T R U C T I O N S

Mr. E. B. Latham,  
Hydrographic and Geodetic Engineer,  
Office.

As soon as you have made the necessary arrangements, you will be detached from duty in this office, and will please proceed to Morro, California, and execute a topographic and hydrographic revision survey of Morro Bay and entrance channels on both sides of Morro Rock out to the 6-fathom curve.

2. Your triangulation will be tertiary in character, and will be sufficient to furnish control for the work. You will please pay particular attention to the marking of stations, to the furnishing of descriptions of stations on the regular records provided for the purpose, to picking out on the ground and locating prominent objects of a permanent nature for the chart, and to the location of objects which may be used for the off-shore hydrography.

3. Your topography will be a revision, in conformity with the general instructions, but will include the entire shore line of Morro Bay, the inner and outer shore lines of the sand spit on the west side of the bay, and the extension of the shore line sufficiently far north and south of the bay to form a junction with the old work.

4. You will also run cross-sectional levels at intervals of one-quarter to one-half nautical mile across the sand spit on the west side of Morro Bay, and sketch in the contours between.

5. In order to furnish information for the possible use of the United States Engineers, you will please inspect the shores of the bay and entrance at low water, and furnish detailed information as to the localities where rock is in evidence. So far as practicable, without actually making borings, information of this character should also be furnished for the bottom of the bay and the entrance.

6. Your hydrography will consist of a general system of north and south lines one hundred meters apart, crossed by lines two hundred meters apart; and you will run additional lines as may be needed to thoroughly develop the channels and shoals. Your hydrography

should be done, so far as practicable, near high water, in order to obtain the elevations of the shoals which are bare at low water.

7. Your hydrographic work will be controlled by an automatic tide gauge to be installed by you in the vicinity of "Jordan", which should be maintained until the close of the fiscal year, so as to afford a good determination of the plane of reference. Staff gauge observations should be made during daylight at some point on the southern side of the bay, while the work is in progress.

8. The expense for the maintenance of the automatic tide gauge after the completion of your hydrographic work is chargeable to the appropriation "Tides", and you will please recommend a suitable person as soon as practicable to serve as tide observer at a salary of \$15.00 per month.

9. Currents should be observed in the channel just inside the narrowest part of the entrance, made hourly or half hourly, and maintained for about 25 hours. A short series of current observations should be made at the same time, to determine the velocity at strength of the current in the channel at "White".

#### INSPECTIONS OF TIDE STATION, SAN DIEGO.

10. Enroute to Morro Bay, you will please stop at San Diego, California, and inspect the automatic tide station at the Quarantine Station.

11. You will be governed by the "General Instructions for the Inspection of Tide Stations", a copy of which is attached. In connection with paragraph 2 of the above instructions, you will please remove the metal scale found on the gauge and return it to this office.

12. While inspecting the tide station at San Diego Quarantine, in case the float box or tide staffs need renewing, please obtain proposals on form 568 for the construction and installation of the repairs required. If necessary, you may direct that the proposals be sent to you at Morro Bay, so that no time may be lost while waiting for the bids.

13. When the bids have been received, forward them to this office, with a recommendation in regard to which bidder you consider best to accept.

14. It is intended that the tide observer at San Diego shall inspect the replacing of the new float box and tide staff, and that you, or a member of your party, or an officer from the San Francisco Field Station shall make final inspection of work for acceptance, and connect up the new staff with the bench marks. A recommendation as to who shall do this work should be made by you, having in mind paragraph 18 of these instructions.

15. The cost of the work at San Diego is chargeable to the allotment for the San Diego tide station, and you will please submit these accounts on a separate abstract.

16. The actual necessary expenses of travel and transportation incurred in the execution of these instructions are hereby authorized.

17. Please submit estimates promptly for the work at Morro Bay.

18. On the completion of the work outlined in these instructions it is intended that you shall revise the triangulation, mark the stations, and erect signals for offshore work to be done by a vessel of the Bureau in the vicinity of Cape Mendocino, the field work for which will commence about May, 1919, if practicable. Instructions for this work will be sent to you, but you will please make your plans to conform to this schedule.

*R. T. Jarvis*

Acting Superintendent.

ADDRESS THE SUPERINTENDENT  
U. S. COAST AND GEODETIC SURVEY

AND REFER TO NO. 41-~~BMK~~

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

FIELD RECORDS (C)  
MAY 1 1919

May 3, 1919.

Division of Hydrography and Topography: *HCS*

Division of Charts:

Tidal reductions are approved in  
7 volumes of sounding records for

HYDROGRAPHIC SHEET 4044

Morro Bay, California.  
E. B. Latham in 1919.

Plane of reference is  
Mean lower low water, reading

0.9 ft. on tide staff at Morro, Northern end.  
4.2 ft. on tide staff at The Strand, Southern end.

*R. Luce*

Chief, Section of Tides  
and Currents.

4044

## TABLE OF STATISTICS: 014

Date 1919	Letter	Volume	positions	Soundings	Miles Statute	Vessels
Feb 24	✓ A	1	17	148	1.2	Wye Level
Feb 25	✓ B	1	45	214	3.2	Wye Level
Feb 27	✓ C	1	63	176	1.8	Wye Level
Feb 28	✓ A	2	33	249	2.9	Launch.
Mar 1	✓ B	2	49	369	6.3	Launch.
Mar 3	✓ C	2	40	324	10.3	Launch.
Mar 4	✓ D	2	61	479	10.9	Launch
Mar 6	✓ E	2	35	201	3.4	Launch.
Mar 6	✓ D	1	31	235	2.9	Wye Level
Mar 7	✓ E	1	31	232	3.0	Wye Level
Mar 8	✓ F	3	17	109	1.2	Wye Level
Mar 10	✓ G	3	62	328	3.6	Wye Level
Mar 11	F	4	108	560	6.6	Launch + Skiff
Mar 12	G	4	73	382	5.2	Launch.
Mar 13	H	4	09	60	0.8	Launch.
Mar 15	I	4+5	189	860	75.0	Launch.
Mar 17	J	5	97	690	10.5	Launch.
Mar 18	K	5	134	871	10.6	Launch + Skiff
Mar 21	L	6	143	949	14.9	Launch + Skiff
Mar 22	✓ H	3	32	216	4.6	Wye Level
Mar 24	✓ I	7	47	279	4.0	Wye Level
Mar 25	M	6	144	772	11.1	Launch + Skiff
Mar 25	✓ J	7	8	8	.2	Wye Level
Mar 29	✓ K	7	8	27	.4	Wye Level
Mar 31	✓ L	7	13	115	1.4	Wye Level
Apr 1	✓ N	7	54	302	2.2	Skiff
			1399	8856	136.0	



DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY

HYDROGRAPHIC TITLE SHEET

The finished Hydrographic Sheet is to be accompanied by the following title sheet, filled in as completely as possible, when the sheet is forwarded to the Office.

U. S. Coast and Geodetic Survey.

Register No. 4044

State . . . . . California

General locality . San Luis Obispo County

Locality . . . . . Morro Bay and approach

Chief of party . . . E. B. Latham

Surveyed by . . E. B. Latham and W. O. Hinkley

Date of survey . . February 28th to March 31st 1919

Scale . . . . . 1 to 5,000

Soundings in . . . . . Feet

Plane of reference . . Mean Lower Low Water

Protracted by Field Party Soundings in pencil by Field Party

Inked by . . . . . Verified by . . . . .

Records accompanying sheet (check those forwarded):

Des. report,  Tide books,  Marigrams,  Boat sheets,

31  Sounding books, 7  Wire-drag books,  Photographs.

Data from other sources affecting sheet . . . . .

Remarks: Consult 3 Boat Sheets, and descriptive Report of this sheet and the Topographic sheet of Morro Bay 1919

Hyd. Sheet No 4044

For work on such a large scale, the ground appears to be closely covered; yet there are a number of places in and adjacent to the channels which might have been further developed while much of the work covering the flats might have been dispensed with.

The grade of paper furnished the field party for the finished sheet was very poor. Even so they did not use it to the best advantage for the sheet showed every indication that it had been exposed to the weather and had absorbed the dampness to such an extent that it was worse than blotting paper to ink over. In plotting the soundings a hard pencil which indented the paper was used, the soundings were oriented in every direction and the pencil lines and dirt were smeared into the surface of the paper.

In the field work there were many discrepancies. On most of these no attempt had been made to straighten them out. Angles were questioned <sup>in the records</sup> which should have been accepted or rejected in the field. It was frequently necessary to arbitrarily reject a position or line on the evidence of several other lines and a great many of the lines required adjustment before they would cross.

Three boat sheets were turned in, but were of little help in the plotting, as only about sixty per cent of the work was shown on all three of them.

The records are in very poor condition.

It is hard to determine from this work just how much may be carried through the entrance south of Morro Rk.

In conclusion it seems hardly just to blame the chief of party for <sup>all of</sup> these faults. They are probably due to the lack

of experienced hydrographers in the supporting party.

R. L. Johnston

*Copies to be placed with Criticism  
on sheet 8/31*

Eureka, Calif., July 21, 1919.

To: The Superintendent, U.S.Coast and Geodetic Survey,  
Washington, D. C.

From: E.B.Latham, H.& G.Eng., U.S.Coast and Geodetic Survey,  
Box 176, Eureka, Calif.

Subject: SURVEY MORRO BAY, CALIFORNIA.

I am pleased to receive your letter of July 11, 1919, and will profit by the criticisms, etc. contained.

2. During the progress of the work at Morro Bay, I gave particular attention to the records and plotting on the smooth sheet, especially to the numbering of the positions, crossings, etc. The left angle is weak, but was the best I could obtain from the available observers with the party. In plotting the soundings in pencil, the soundings were plotted as would best indicate the crossings, and in the past I have adopted this system, expecting when the soundings were inked that the numbers would be placed in proper position and direction. I would be glad to have the opinion of the office in this matter, as my plan for plotting the soundings in pencil still appears to me to have merit. In the future especial care will be taken to have soundings penciled in conformity with paragraph 343 of the General Instructions.

3. The necessity for the adjustment of crossings is due to the left angle, and the omission in the notes is for the same reason. The lines were run as near as was practicable in conformity with the instructions. Owing to shoal water, it was impracticable to more closely conform to your instructions. You mention that negative soundings are shown over Grassy Island. These soundings are the result of lines of levels, and their plotting was good practice, in my opinion.

4. I cordially agree with your statement as to the value of bringing these matters to the attention of Chiefs of Parties, and it is of the greatest value back to the field officers and the Bureau. I gave great attention to the plotting of this sheet, and the area was thought to have been well

covered. Mr. W. O. Hinkley, Aid, ran the levels and his results were unsatisfactory, but with the available officers, were the best that could be obtained.

5. I submit tracings from the sheet with notes pertaining to them, which if I am not mistaken will greatly improve the sheet, when applied to it. My notes are from memory and may in cases be erroneous, if the records do not verify them. Care should be taken to apply all the data submitted to the sheet. The depth curves are indicated. There appears to be much data, consisting of detached soundings and sounding notes, bare, 0.0 feet 1.0 and 2.0 feet ahead in so many meters, right or left, from certain positions or soundings, that have not been plotted in ink, though as I remember, were plotted in pencil on the smooth sheet.

6. I will appreciate information as to the application of the additional data suggested, and will thank you to have me informed if they improve the sheet. It is noted that of the depth curves in doubt ~~it~~ is the curves of low water except for two or three cases. From the custom of soundings, to the nearest foot or half foot and applying the tide reducer, a reduced sounding may be in error by two feet. That is a perfectly accurate sounding to the nearest foot, 1.8 feet being recorded as 2 feet, and 1.7 feet being recorded as 1 foot, and the same fractions used in the tide reducers will, when applied, give a finished depth for the same place differing by 2 feet. As the low water line curve, on this sheet, is in almost all cases between soundings of zero or less than two feet, its apparent lack of accurate determination is largely a matter of opinion. A closer development in the upper part of Morro Bay would, in my opinion, have been a useless expenditure of time and unnecessary expense. There was at the time of the survey an urgent need for my party to proceed to the work on the Mendocino Project at the earliest possible time.

*E. B. Latham*

E. B. LATHAM,  
Hyd. & Geod. Eng., U.S. Coast & Geodetic Survey,  
Chief of Party.

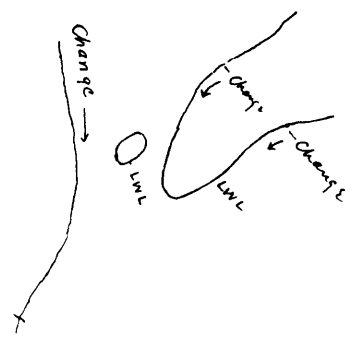
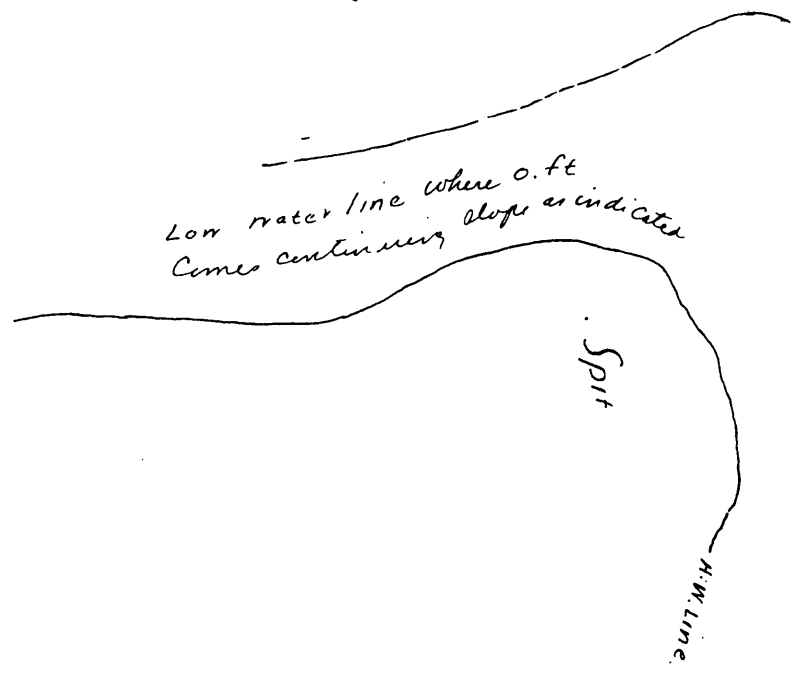
7 Enclosures.

In conversation with Mr. Christopherson and from my recollection, verified by that of Mr. Christopherson, the statement in the first paragraph of your letter that "and completed is so far as the data in the records accompanying it will permit," is erroneous, and much of the data contained in the sounding record has not been applied to the hydrographic sheet of Morro Bay.

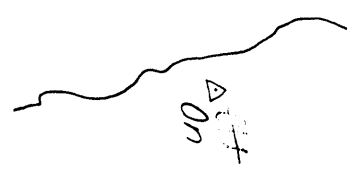
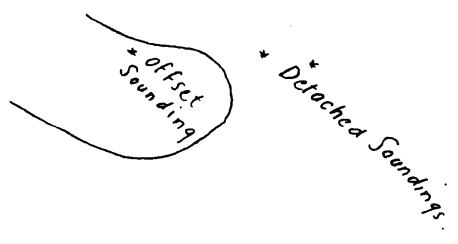
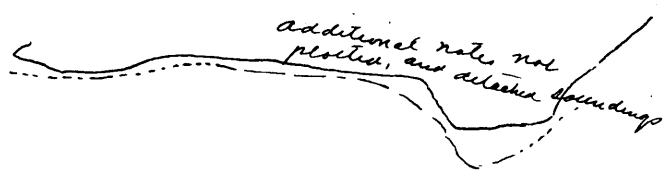
*E. B.*

6+2

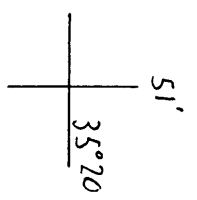
Low water line where 0. ft  
comes continuing slope as indicated



O Run



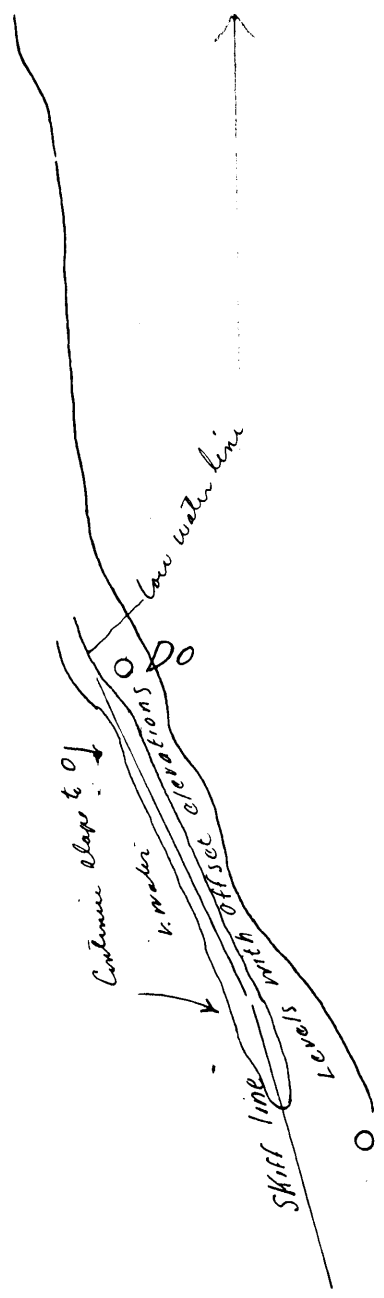
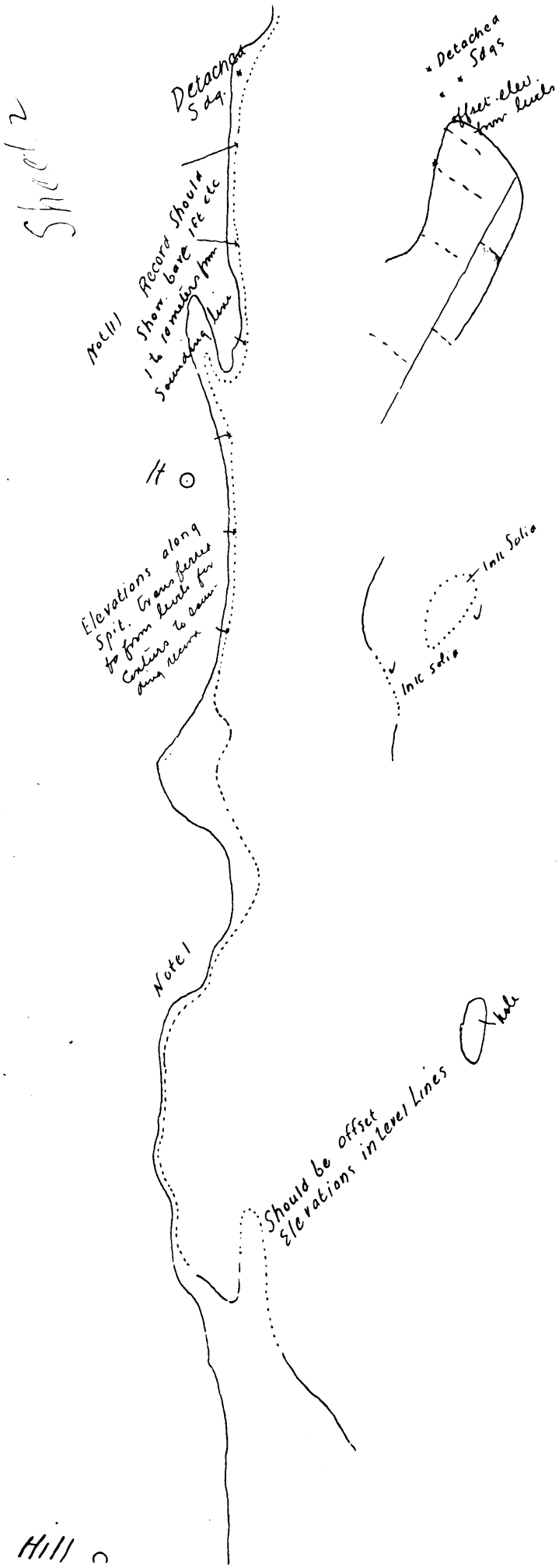
No 1



Sheet 2

No 2

51' Long.  
35°22'



Hill

Sheet 3

Notes as to base etc from boundary lines

Level lines with offset line into at 0.000  
There are notes on secondary base-196 etc Right or left 20 many meters

Notes (later) when appropriate

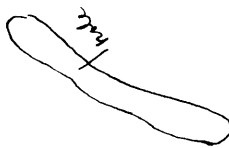
Additional notes  
any other notes  
Level of ground

Notes as to base etc from boundary lines

Examine adjacent  
boundary lines

Reasons for giving omitted  
0.000

→



1111 0

35° 21'

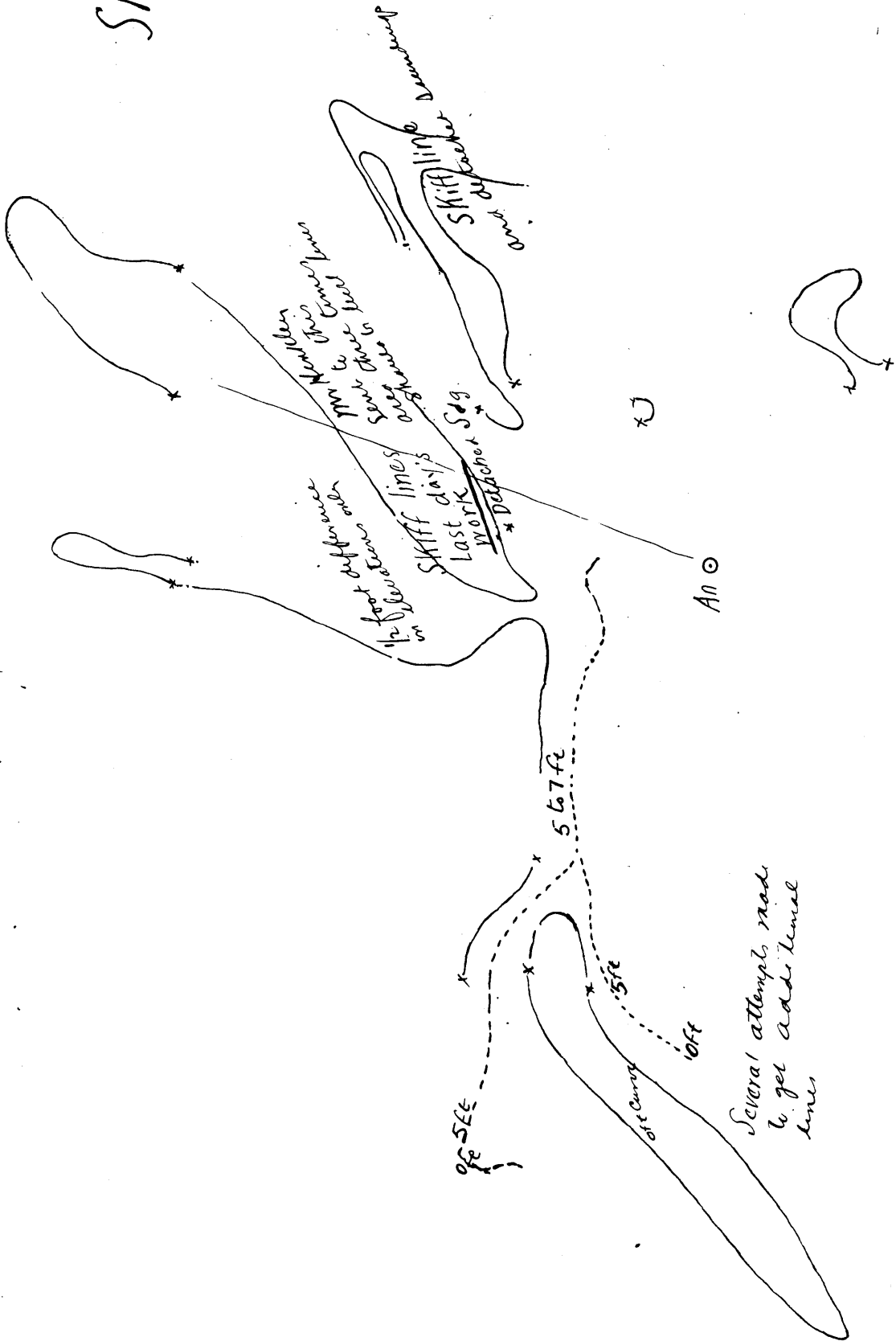
51' Long.



SHEET  
4

W/HI

+ 35' 21'



AN O

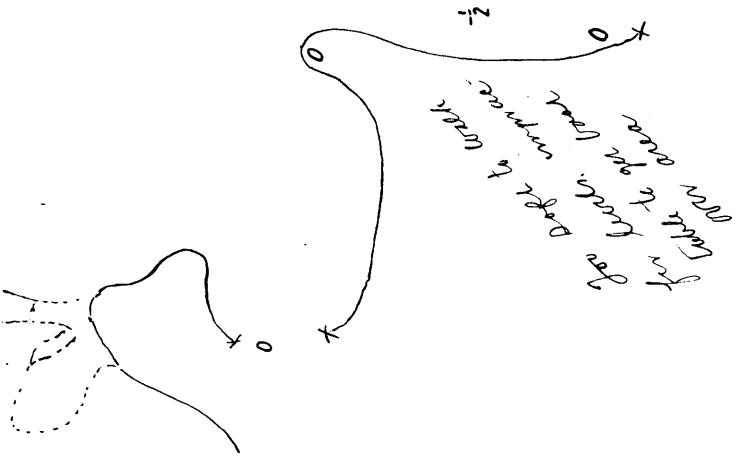
Several attempts made to get additional lines

157' long. L. Water

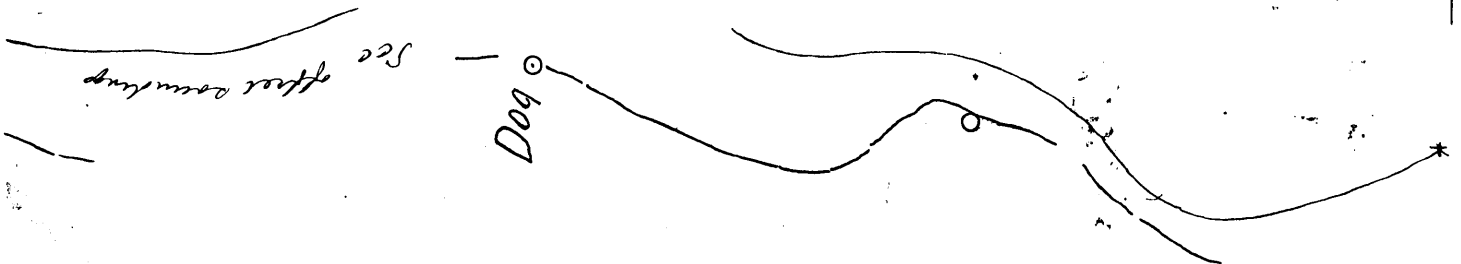
Levels by Wickett from notes to bounding lines  
 See notes on the line  
 notes  
 Mid

Sheet 5

12th

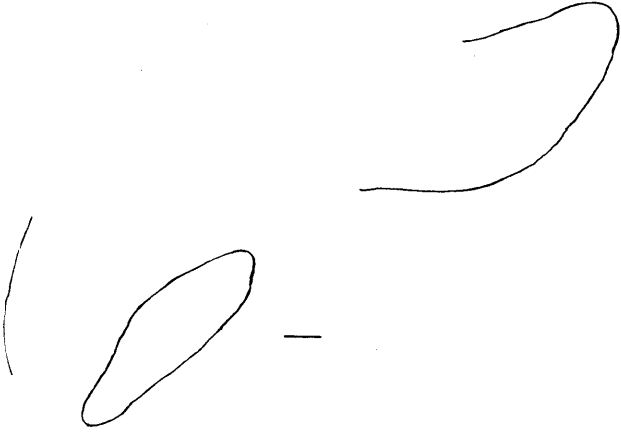


35° 20'  
+ 51'



Sheet 6

over



See notes as to edge of line  
 6ft  
 6ft

51' Long

See notes as to  
 edge of line  
 6ft  
 6ft

Nig  
 The Green development  
 The Green water  
 of the water  
 of the water

507

Tab  
 of surrounding  
 of surrounding

See water beginning  
 and end of

The water  
 G...  
 water  
 water