

2301

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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. *2301*

LOCALITY

State *California*
General locality *San Francisco*
Locality *Bay*

1895-7

194

CHIEF OF PARTY

J. A. Sears U.S.N.

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JUL 30 1897
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U. S. COAST AND GEODETIC SURVEY.

Gen. W. W. Duffield, Superintendent.

State: California

DESCRIPTIVE REPORT,

Hydrographic Sheet No. 2301.

LOCALITY:

San Francisco Bay.

1895-7.

CHIEF OF PARTY:

Lieut. J. H. Sears, U.S.N.

Lieut. J. M. Helm, U.S.N.

2301

JUL 17 1897 125360

Write me at:

Telegraph me at:

My Express Office is:

U. S. Coast and Geodetic Survey, Lt. "McArthur,"

1897

Gen. W. W. Duffield,

Superintendent, U. S. C. & G. Survey,
Washington, D. C.

Sir:

In accordance with par. 209,
Gen. "Instructions for Hydrographic Parties",
I have the honor to submit the follow-
ing Description Report to accompany
the finished projections and plans,
Proj. No. 4, (Office Number), "San Francisco
Bay"

The general limits of the projection, are,
on the north, a line agreed upon by
the Chief Officer of the "Geodet" and myself,
extending from a point to the southeast of
Alcatraz to Fort Berkeley, and including
the shoal north of Yerba Buena Island,
The Fort Berkeley shore and Brad Gauge

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Pier of the S. P. Railroad Company, thence
a line on the South, passing South
of Yerba Buena Island to near
Point Pt. San Francisco, thence to
connect with the Western limit, to the
eastward of Alcatraz. The southern
limit is the Western limit of proj.
#5, Office number, already forwarded,
to the Office.

This projection includes Blossom
Rock, the shore north of Yerba Buena
Is. a Fort Island, the channel to
the eastward and the Berkeley Flats.

The difficulties in the prosecution of
the work, were mainly those of weather,
and lack of good tides, owing
to haze and smoke. The currents
also in the deeper portions, surface and
subsurface, made it difficult to

get accurate soundings.

During a large portion of the year, the entrance weather, foul in the afternoon with frogs, thins on the flats to Bartley shore, creating a disagreeable and nasty sea on the flats, with which the boats then belonging to the vessel found it difficult to cope. Tink was begun Suly in the morning, and discontinued when the conditions became too un-
favorable. This sea, with the cross and contrary currents, seems to have cut the flats into ridges which are subject to change.

In no other way can I account for the discrepancies which have developed in the soundings in the shallow water. These ridges are quite apparent

at extreme low water on the broad
 portions. It is likely, also, that
 the currents pouring through the
 channel to the eastward of Yuba
 Buena, in combination with the
 set of the sea, may have some effect
 in filling the water up in localities,
 differing with different seasons.

It was impossible to wait for
 absolute, favoring circumstances, and
 discrepancies exist in spite of
 the utmost care, select lead lines,
 frequently checked being used. At
 any rate the depths have been found
 in practice to be different short
 distances apart. Tidal stations
 were maintained, on the North Western
 end of Yuba Buena, and in Port
 Berkeley, which were compared through

A station at Alcega with the standard gauge of the Survey at Sausalito. The two gauges were in continuous use while sounding.

As difficulty was experienced as regards signals, when once established and the work shined past without difficulty. The shore line, Berkeley, has receded a little, the correct shore line being furnished from the Sub-Office from recent surveys.

The currents in this section of the Bay are extremely peculiar, as they are in other portions. They are found running in opposite directions on either side of Fort Seward at the same time; first varying strength and regularity according to the seasons.

Of course one of the main causes of

Current irregularity is the varying influence of the tides at the head of the Bay acting upon the regular sequence of the tides.

It is certain that the ebb current setting down the Bay will sometimes pass to the Eastward of the Island flowing south, the natural ebb of the city making in the opposite direction, This must have a deflecting cause to make the current take this direction instead of passing to sea. Commodore Harrison, one of the old pilots here attributes it to the effect of the deep pocket between Fort Point and Lime Pt, which in expending the volume of water suddenly checks and backs up the outflow. The currents in the

Berkeley Flats are prominent and irregular

The ship current sometimes makes south to the westward of Goat, and again

will make directly to sea, and I think

the supposition is good that the dock off Fort Point is a former jetty

Where the discrepancies in the soundings have been so marked as to make our work

suspicious the ground has been revisited in order to reconcile them

as far as possible.

The changes in hydrography as shown by comparison with the

published chart appear to have been slight on the navigable portion,

since the most recent survey.

There is little change to be noted in the 12' + 18' Com. At the middle point

5

in length of the shoal to the northeast
of Yuba Buena Island, the 19' shown
to the northeast shown upon the published
chart has disappeared, and our
examination shows less water directly
north of the Island, the chart gives 8'
as the least reduced depth. Our
investigation shows that not more
than 5' 9" can be carried through
at low water. Likewise the shallowest
point of the shoal just north of
the channel appears to have
raised from its former level. When
the surface of the water is just
at the plane of reference, the shoal
has just appeared, and at low
water quite an area is unmeasured.
Coincident with this, the water
has deepened in the channel along

the eastern face of the Island slightly.

A considerable change will be noted in the location of the 6' cum lying off the Berkeley shore, due without doubt to the influence of the & Louis Piers of the Southern Pacific Railroad Company.

This cum by the chart formerly extended along the shore at an average distance inside the 12' cum of about 600 yds, cutting the pier at about ~~the~~ thirds of its length inward.

It now has an average distance from the 12' cum of about 800 yds, an increase of 200 yds, but, at the pier, now passes at the extremity. In other words the bottom on the flats has been sanded, the material

having been deposited against the Pier.

Just off the Light House on Yerba Buena Island there is now over 18' of water between the mud shoal, shown upon the chart, and the shore, and the 13' spot has disappeared off the Light House wharf. This result may be due to a deflection of current caused by the filling in at the Broad Gauge Pier.

The foregoing was written by Lieut. J. H. Sears, U.S.N. whom I relieved April 14th last.

I have simply had some soundings re-crossed as indicated by him, and the plotting completed in compliance with his directions.

Respectfully submitted

J. H. Nelson
Chief of Party

San Francisco Bay Sheet 2301
Surveyed by Lt. Jas. H. Sears.

The tidal records are not complete for the following reasons:

At West Berkeley Gauge. There were 5 lows and 6 highs observed in May 1895. The lowest observed being 3.9th + highest 8.2th

Three lows (on doubtful) + two highs (both doubtful) observed in June 1896 = lowest observed 2.6 highest 6.7th

Fourteen lows (6 doubtful) + 15 highs (6 doubtful) observed in July 1896 = lowest observed 1.5th highest 8.8th

Four lows (3 doubtful) + 7 highs observed in August 1896 lowest observed 2.8th (doubtful) highest 8.0th

Not any lows and 4 highs (2 doubtful) observed in October 1896 - highest observed 9.5 (doubtful)

One low and one high observed in March 1897
Low 1.8th high 7.6th

One low + one high observed in April 1897
Low 2.6th high 7.3th

There is nothing ~~to~~ in the records to show

From J.C. Mann who plotted the work. P.S.

U. S. Coast and Geodetic Survey.

AWASHORE EGGED

FEB 14 1899

INSPECTOR OF CHARTS

HYDROGRAPHIC SECTION.

whether the same gauge was used or not for the different years, or if different gauges were used, whether or not they were placed at the same level or reading.

On April 5 1897. a comparison was made with the "bedney" without mentioning where the bedney gauge was located, or the plane of reference of same. The comparison was made during four hours, commencing after low water, and ending before high water. This record shows a difference of 0.3 ft

There is nothing in the records to show what the plane of reference is for this gauge. There was no complete series of highs and lows taken therefore it is not possible to get the means = high, low, & range.

The plane of reference can only be found from the records by using the tide books in connection with the sounding books - to find what constant was used in reduction.

At Goat Island gauge, there were 6 lows + 6 highs (one doubtful) observed during the month of May 1895 = lowest 7.4 highest 11.7

Six lows (2 doubtful) + 7 highs (one doubtful) observed during June 1896. Lowest 1.1 highest 6.2
 Fourteen lows (5 doubtful) + 12 highs (10 doubtful) observed during July 1896 - lowest 0.1 highest 6.3

Four lows (2 doubtful) + 7 highs (5 doubtful) observed during August 1896. - lowest observed 0.8 highest 6.3 (doubtful)

Four lows (1 doubtful) + 6 highs (3 doubtful) observed during March 1897 - lowest 0.0 highest 7.0 =

The level of the 1895 gauge was 5.1 ft below the gauge used in 1896.

There is no record to show that this tidal station was compared with any other station. From the recorded low waters it is not possible to find the plane of reference, but the plane of reference is given in the proper place in the book as 4.8 for 1895 + 1.0 for 1896 gauges.

There is a remark made on March 23, 1897
 "Put staff in gauge at 9.37 am, reading 0.0" without any reference to the tides ^{recorded} before that date. etc.
 It is impossible to find out whether the level was changed

Difference in Time Brooks + El Campes.

| | | | | |
|-----------|------|--------|--------|--|
| Brooks | Low | Oct 16 | 4.45 | |
| El Campes | Low | " 16 | 4.45 | .00 |
| Brooks | High | " 16 | 10.45 | |
| El Campes | High | " 16 | 11.00 | .15 ^m |
| Brooks | Low | " 17 | 4.45 | |
| El Campes | Low | " 17 | 4.525 | .075 ^m |
| Brooks | High | " 17 | 10.30 | |
| El Campes | High | " 17 | 11.15 | .45 ^m |
| Brooks | Low | " 17 | 5.225 | |
| El Campes | Low | " 17 | 5.375 | .15 ^m |
| | | | | 2.05 ^m (mean diff in time El later) |
| | | | | 16.5 |
| Quarry | Low | Oct 16 | 4.30 | |
| El Campes | Low | " 16 | 4.45 | .15 ^m |
| Quarry | High | " 16 | 10.45 | |
| El Campes | High | " 16 | 11.00 | .15 ^m |
| Quarry | Low | " 17 | 4.525 | |
| El Campes | Low | " 17 | 4.525 | .00 ^m |
| Quarry | High | " 17 | 10.525 | |
| El Campes | High | " 17 | 11.15 | .225 ^m |
| Quarry | Low | " 17 | 5.15 | |
| El Campes | Low | " 17 | 5.375 | .225 ^m |
| | | | | 1.5 ^m (mean diff - El Camp later) |

Difference in Time

| | | | | | | |
|--------|------|--------|---------|-------------------|--------------|------|
| Quarry | Low | Oct 16 | 4:30 | | | |
| Brooks | Low | " 16 | 4:45 | - 15 ^m | Brooks later | 22.5 |
| Quarry | High | " 16 | 10:45 | | | |
| Brooks | High | " 16 | 10:45 | 00 ^m | Brooks later | 1.5 |
| Quarry | Low | " 17 | 4:52.5 | 0.75 ^m | Quarry later | |
| Brooks | Low | " 17 | 4:45 | | | |
| Quarry | High | " 17 | 10:52.5 | 22.5 | Quarry later | |
| Brooks | High | " 17 | 10:30 | | | |
| Quarry | Low | " 17 | 5:15 | | | |
| Brooks | Low | " 17 | 5:22.5 | - 0.75 | Brooks later | |
| | | | | 0.75 | Quarry later | |

$$\begin{aligned}
 E - B &= 16.5 \\
 E - Q &= 15.0 \\
 Q - B &= 1.5
 \end{aligned}
 \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{JDU}$$

7-24-06

Average difference of heights

| Location | Condition | Date | Reading | PAR | Value | Diff |
|----------|-----------|--------|---------|------|-------|-------|
| Brooks | Low | Oct 16 | 110 ✓ | 110 | .00 | |
| El Campo | Low | " 16 | 2.73 | 2.43 | .30 | + .30 |
| Brooks | High | " 16 | 6.12 ✓ | 110 | 5.02 | |
| El Campo | High | " 16 | 7.20 | 2.43 | 4.77 | - .25 |
| Brooks | Low | " 17 | 1.60 ✓ | 110 | .50 | |
| El Campo | Low | " 17 | 3.15 | 2.43 | .72 | + .22 |
| Brooks | High | " 17 | 7.15 ✓ | 110 | 6.05 | |
| El Campo | High | " 17 | 8.20 | 2.43 | 5.77 | - .28 |
| Brooks | Low | " 17 | .62 ✓ | 110 | -.48 | |
| El Campo | Low | " 17 | 2.15 | 2.43 | -.28 | + .20 |

El 7

$$\begin{array}{r} 72 \\ 53 \\ \hline 19 \\ 5) 19 \\ \hline 3.8 \end{array}$$

$$\begin{array}{r} E-B = +19 \\ B \\ \hline E-B \end{array}$$

.25 Mean difference

| | | | | | | |
|--------|------|--------|--------|------|------|-------|
| Quarry | Low | Oct 16 | 2.70 ✓ | 2.50 | .20 | + .20 |
| Brooks | Low | " 16 | 1.10 ✓ | 110 | .00 | |
| Quarry | High | " 16 | 7.35 ✓ | 2.50 | 4.85 | |
| Brooks | High | " 16 | 6.12 ✓ | 110 | 5.02 | - .17 |
| Quarry | Low | " 17 | 3.25 ✓ | 2.50 | .75 | + .25 |
| Brooks | Low | " 17 | 1.60 ✓ | 110 | .50 | |
| Quarry | High | " 17 | 8.35 ✓ | 2.50 | 5.85 | |
| Brooks | High | " 17 | 7.15 ✓ | 110 | 6.05 | - .20 |
| Quarry | Low | " 17 | 2.20 ✓ | 2.50 | -.30 | |
| Brooks | Low | " 17 | .62 ✓ | 110 | -.48 | + .18 |

$$\begin{array}{r} E-B = 0.52 \\ B = 1.038 \\ \hline E-B = 1.014 \end{array}$$

.20 Mean difference

Difference of levels bet. El Campo + Brooks Camp

| | |
|-------------------------------|----------|
| El Campo Mean of 100 readings | 5.298 ft |
| Brooks | 3.964 " |
| difference | 1.334 |
| Plan of Ref Brooks | 1.100 |
| " " El Campo | 2.734 |

Difference in Level bet Quarry + El Campo

| | |
|-----------------------------|----------|
| Quarry Mean of 100 readings | 5.369 ft |
| El Campo | 5.298 |
| difference | 0.069 |
| Plan of Ref Quarry | 2.500 |
| " " El Campo | 2.431 |

Average difference of heights

| | | | Reading | P.R. | diff | diff |
|----------|------|--------|---------|------|--------|-----------|
| Quarry | Low | Oct 16 | 2.70 ✓ | 2.50 | + .20 | |
| El Campo | Low | " 16 | 2.73 ✓ | 2.43 | + .30 | .10 + .10 |
| Quarry | High | " 16 | 7.35 ✓ | 2.50 | + 4.85 | |
| El Campo | High | " 16 | 7.20 ✓ | 2.43 | + 4.77 | .08 - .08 |
| Quarry | Low | " 17 | 3.25 ✓ | 2.50 | + .75 | |
| El Campo | Low | " 17 | 3.25 ✓ | 2.43 | + .72 | .02 - .03 |
| Quarry | High | " 17 | 8.35 ✓ | 2.50 | + 5.85 | |
| El Campo | High | " 17 | 8.20 ✓ | 2.43 | + 5.77 | - .08 |
| Quarry | Low | " 17 | 2.20 ✓ | 2.50 | - .30 | |
| El Campo | Low | " 17 | 2.15 ✓ | 2.43 | - .28 | + .02 |

$$\begin{array}{r} 19 \\ 12 \\ \hline 75 \\ \hline 75 \\ \hline .070 \\ \hline .014 \\ \hline \end{array}$$

$$\begin{array}{r} 8 - 2 \\ + 15 \\ \hline 19 \\ \hline .04 \\ \hline .008 \\ \hline \end{array}$$

$$\begin{array}{r} + 17 \\ - 16 \\ \hline + 1 \\ \hline + .02 \\ \hline \end{array}$$

$$\begin{array}{r} \varepsilon - a \\ \hline .06 \text{ Mean difference} \end{array}$$

Cross lines N.E. & S.W.

| | | | Red. fortide | S. CLK. Seq. | Other Gauge |
|--------|--------------|--------------|--------------|--------------|-------------|
| Blue a | Sept 26 1895 | Quarry Gauge | OK | OK | No |
| " b | " 27 " | do | " | " | " |
| " W | Oct 10 " | do | " | " | " |
| " W | April 7 1897 | El Campes | " | " | " |
| " J | " 9 " | do | " | " | " |

These lines show a depth of from $\frac{1}{4}$ to 1 ft. more than the Wp down 1 or N.W. & S.E. lines

Lines Running Wp & down Bay or N.W. & S.E.

| | | | | | |
|--------|---------------|-----------|----|----|----|
| Red N | Oct 25 1895 | El Campes | OK | OK | No |
| " P | Nov 1 " | Brooks | " | " | " |
| " O | Oct 30 " | Quarry | " | " | " |
| " Q | Nov 6 " | do | " | " | " |
| " R | " 11 " | Brooks | " | " | " |
| Blue P | " 7 " | Quarry | " | " | " |
| " C | April 20 1897 | El Campes | " | " | " |
| " B | " 22 " | do | " | " | " |
| " H | May 7 " | Brooks | " | " | " |

The lines running N.W. & S.E. show less water by $\frac{1}{4}$ to 1 ft. than N.E. & S.W. lines

The reduction for tides for different days were compared with tides taken at Sansalito self rig-gauge and found correct

The positions were verified in enough cases to prove their correctness of projecting, etc.