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Treasury Department,
U. S. COAST AND GEODETIC SURVEY.

O. H. Tittmann
Superintendent.

State: *California*

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DESCRIPTIVE REPORT.

Hyd. C. Sheet No. *2621*

LOCALITY:

Two Mile Speed

Trial Course

San Francisco Bay

1903

CHIEF OF PARTY:

Frederick Morse

2621

JAN 6 - 1905

Acc. No.

DESCRIPTIVE REPORT.

(To accompany plane table sheet entitled "Treasury Department, U.S. Coast and Geodetic Survey, O.H. Tittmann, Superintendent. Two-Mile Speed Trial Course, San Francisco Bay Cal. Measured by Fremont Morse, Assistant. Scale of Sketch $\frac{1}{10,000}$, 1903.")

This course was measured for use in testing the speed of the two sub-marine torpedo boats "Grampus" and "Pike", built at the Union Iron Works, and the work was done at the request and expense of the Holland Torpedo Boat Company. The general location of the course was indicated on a blue print that accompanied the instructions directing me to lay out the course. It extends from a point about half a mile off Potrero Point South Easterly to a point about the same distance off Hunters Point, and is two miles long, the first mile being subdivided at the quarter and half mile.

As a base for starting the triangulation the old stations Stony Hill, ~~Points Avisadera and Visitacion~~ Knob were recovered, and from these, two stations, Bernal and Army, were established. Then with a plane table points were located approximately on the starting, quarter-mile, half-mile, mile, and two-mile ranges. Signals were erected at these points and determined by triangulation.

Owing to the fact that the upper mile of the course is off South San Francisco, or Butchertown, it was impracticable to place the half-mile range signal as nearly in its proper location as could be desired. The only available spot for the signal was down among the hog-pens of Butchertown, and a scaffold had to be built up some twenty feet in order to see over the sheds in the vicinity. With this exception the range signals were all located by the plane table reasonably close to their proper positions.

After completing the triangulation observations and computations, it was found that the first quarter mile was 0.06 metre too

long; the second quarter mile 8.68 metres too long, (caused by the location of the signal in Butchertown, as above explained); the second half mile 2.64 metres too short; and the total course 2.44 metres too long. It was found that owing to buildings &c in the vicinity of the quarter mile and half mile range points it would be impracticable to change the locations of these signals so as to make their positions exact, and it was therefore decided to lay out the ranges from the stations as originally established. These ranges were to be marked by piles driven in the shallow waters of the Bay about out to the three fathom line, as requested by the resident Superintendent of the Holland Company. Accordingly the angles at the shore stations from known signals to the various piles were computed and then the pile driver lined in by the theodolite. Of course it was hardly possible to get each pile in exact line; but by measuring the angle after the pile was driven, and knowing its distance off shore, it was a simple matter to determine the change of length in the various sections due to want of parallelism of the ranges. The greatest error measured in the angles to the range piles was 1' 10" which amounted to a change of 0.72 metre in the length of the course. At the contract speed of the boats to be tested, namely seven knots per hour, submerged, it would take the craft two-tenths of a second to go this distance, and hence even if uncorrected the want of parallelism of the ranges would be practically inappreciable. After the piles had been driven the course itself was marked by buoys, as shown on the sheet.

The depth of water along the course varies from five to ten fathoms, being least at the starting point, where the chart of San Francisco Bay and Entrance shows five and a half fathoms, and increasing gradually to ten fathoms near the end of the course. No

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obstructions were discovered during the subsequent trials that were made over the course.

The following table shows the lengths of the different sections.

| | Computed distances between theoretical ranges. | Correction to reduce to the actual ranges. | Distance on the course. | Decimal part of one naut- ical mile. |
|-------------------|--|--|-------------------------------|---|
| Start to Quarter | 463.37 | 0.00 | 463.37 | 0.25003 |
| Quarter to Half | 471.99 | +0.43 | 472.42 | 0.25491 |
| Start to Half | 935.36 | +0.43 | 935.79 | 0.50495 |
| Half to Mile | 922.97 | -1.15 | 921.82 | 0.49741 |
| Start to mile | 1858.33 | -0.72 | 1857.61 | 1.00235 |
| Mile to Two-Mile | 1850.61 | +0.24 | 1850.85 | 0.99870 |
| Start to Two-Mile | 3708.94 | -0.48 | 3708.46 | 2.00106 |

Fremont Morse,
Assistant.