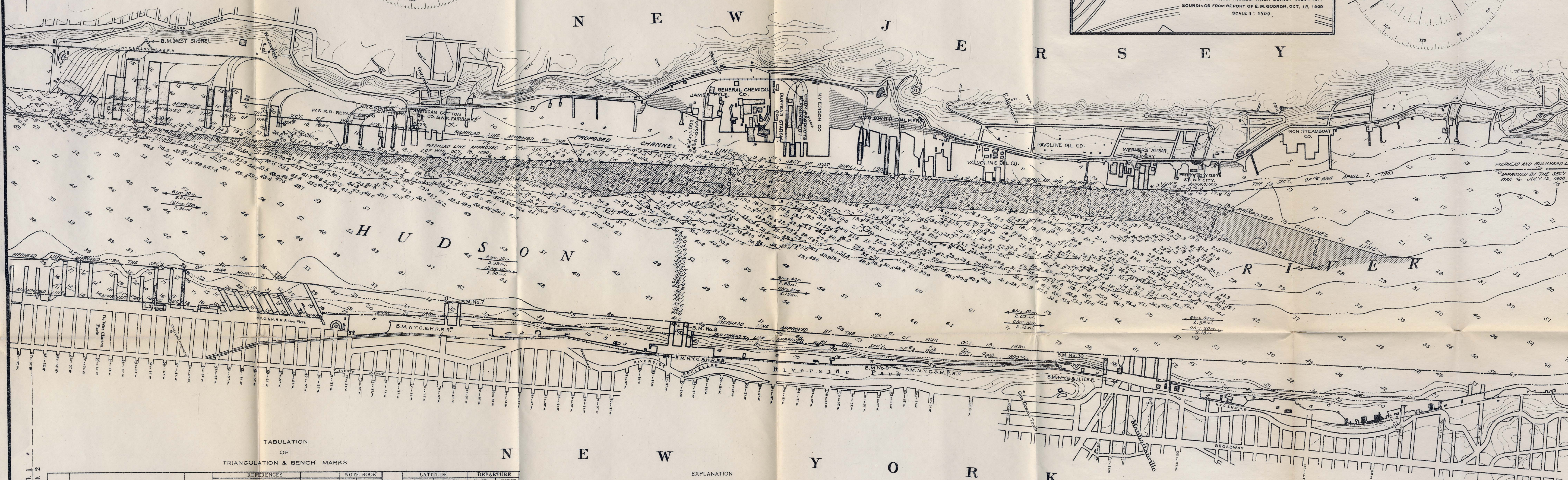
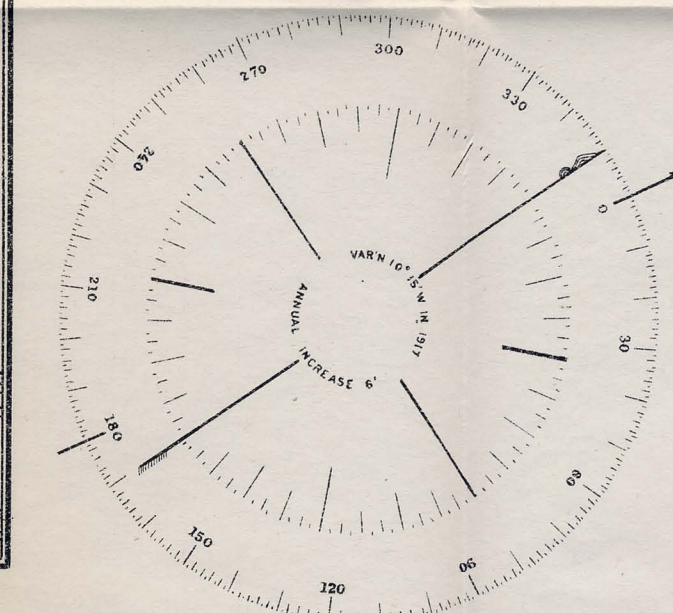
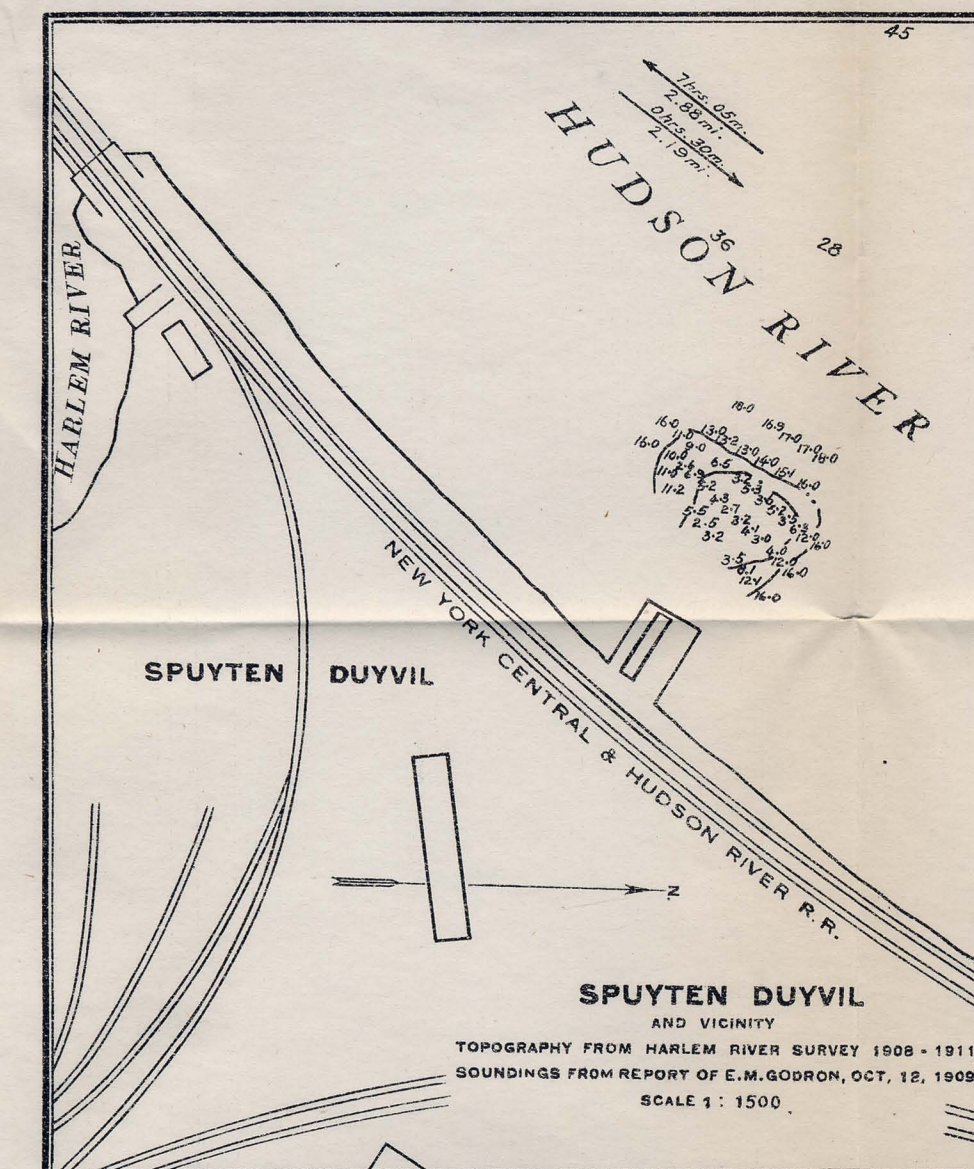
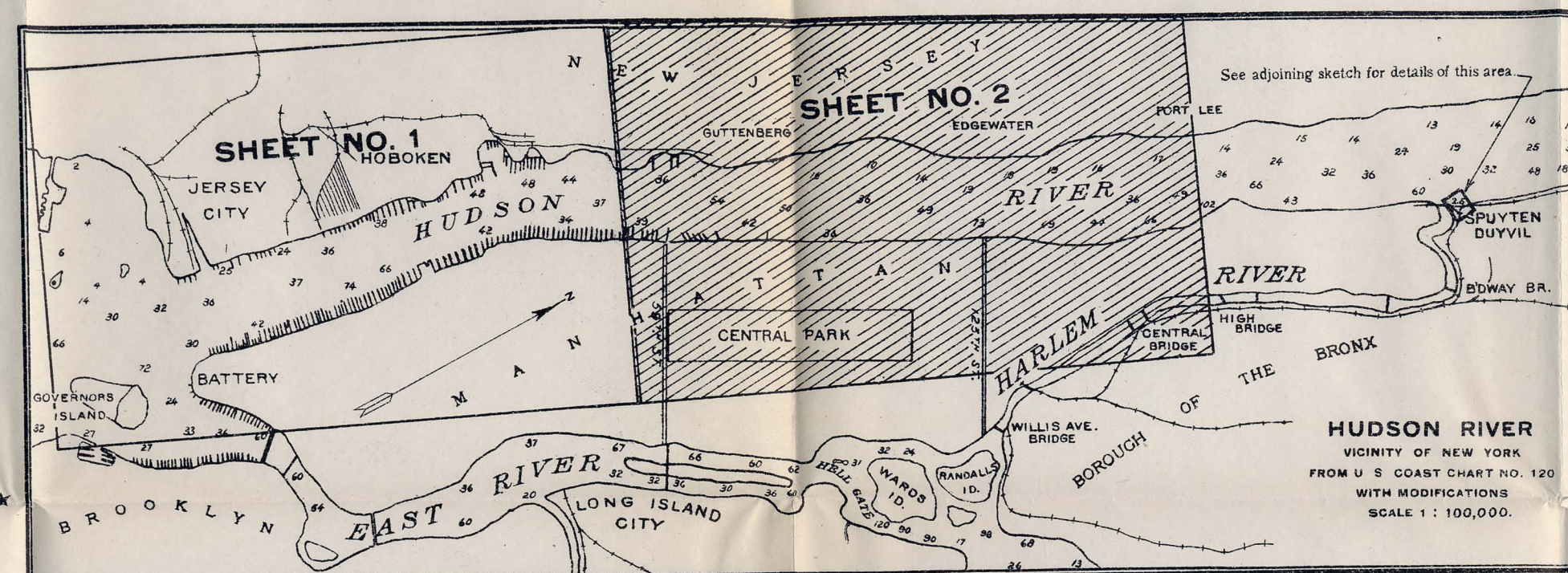
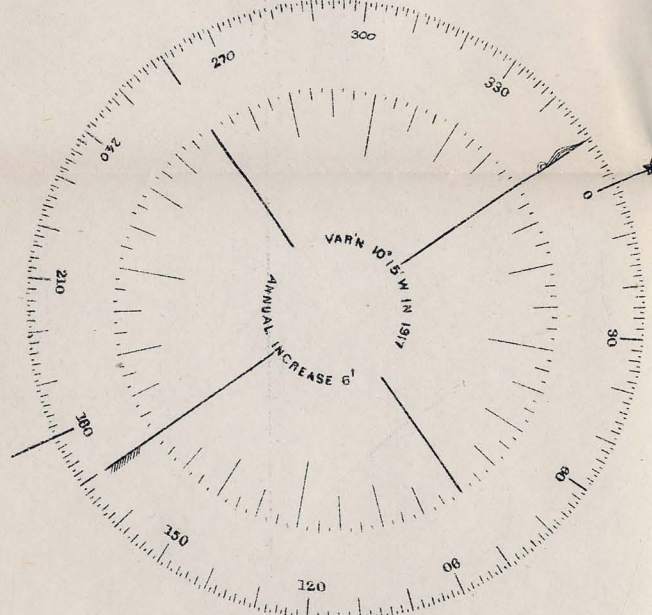


SHEET NO. 1
SHEET NO. 2

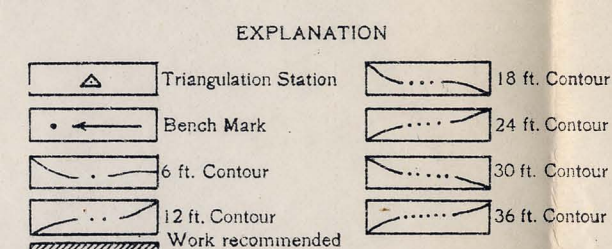
Data regarding currents in North and East Rivers excepting, as noted below, in the neighborhood of Corlears Hook and Hell Gate are taken from the U.S.C. & G.S. Tide Tables for 1911. Arrows indicate direction. The figures show the maximum surface currents in miles per hour for a mean tide and the number of hours after time of mean high water at Governors Island when they are found.

Data regarding current directions at Corlears Hook and current directions and velocities in Hell Gate at Negro Point, in Little Hell Gate and in Harlem Kill are from observations made by the Engineer Department.

The currents shown by the long lines at Corlears Hook were observed by the Engineer Department for direction and are not maximum surface currents.

TABULATION
OF
TRIANGULATION & BENCH MARKS

STA.	DESCRIPTION	ELEV.	REFERENCES			NOTE BOOK	PAGE	LATITUDE				DEPARTURE	
			FROM	TO	AZIMUTH	DISTANCE		NORTH	SOUTH	EAST	WEST		
1	Corner of Pier 1 at Battery	11.387						30.914.2				1.323.0	
2	Corner of Pier 2 at Battery	14.528						31.633.3				1.032.2	
3	Corner of Pier 3 at Battery	17.172						31.339.0				1.632.0	
4	Corner of Pier 4 at Battery	19.816						31.044.7				2.231.7	
5	Corner of Pier 5 at Battery	22.460						30.750.4				2.830.4	
6	Corner of Pier 6 at Battery	25.104						30.456.1				3.429.1	
7	Corner of Pier 7 at Battery	27.748						30.161.8				4.027.8	
8	Corner of Pier 8 at Battery	30.392						29.867.5				4.626.5	
9	Corner of Pier 9 at Battery	33.036						29.573.2				5.225.2	
10	Corner of Pier 10 at Battery	35.680						29.278.9				5.823.9	
11	Corner of Pier 11 at Battery	38.324						28.984.6				6.422.6	
12	Corner of Pier 12 at Battery	40.968						28.690.3				7.021.3	
13	Corner of Pier 13 at Battery	43.612						28.396.0				7.620.0	
14	Corner of Pier 14 at Battery	46.256						28.101.7				8.218.7	
15	Corner of Pier 15 at Battery	48.900						27.807.4				8.817.4	
16	Corner of Pier 16 at Battery	51.544						27.513.1				9.416.1	
17	Corner of Pier 17 at Battery	54.188						27.218.8				10.014.8	
18	Corner of Pier 18 at Battery	56.832						26.924.5				10.613.5	
19	Corner of Pier 19 at Battery	59.476						26.630.2				11.212.2	
20	Corner of Pier 20 at Battery	62.120						26.335.9				11.810.9	
21	Corner of Pier 21 at Battery	64.764						26.041.6				12.409.6	
22	Corner of Pier 22 at Battery	67.408						25.747.3				13.008.3	
23	Corner of Pier 23 at Battery	70.052						25.453.0				13.607.0	
24	Corner of Pier 24 at Battery	72.696						25.158.7				14.205.7	
25	Corner of Pier 25 at Battery	75.340						24.864.4				14.804.4	
26	Corner of Pier 26 at Battery	77.984						24.570.1				15.403.1	
27	Corner of Pier 27 at Battery	80.628						24.275.8				16.001.8	
28	Corner of Pier 28 at Battery	83.272						23.981.5				16.600.5	
29	Corner of Pier 29 at Battery	85.916						23.687.2				17.199.2	
30	Corner of Pier 30 at Battery	88.560						23.392.9				17.797.9	
31	Corner of Pier 31 at Battery	91.204						23.098.6				18.396.6	
32	Corner of Pier 32 at Battery	93.848						22.804.3				18.995.3	
33	Corner of Pier 33 at Battery	96.492						22.510.0				19.594.0	
34	Corner of Pier 34 at Battery	99.136						22.215.7				20.192.7	
35	Corner of Pier 35 at Battery	101.780						21.921.4				20.791.4	
36	Corner of Pier 36 at Battery	104.424						21.627.1				21.390.1	
37	Corner of Pier 37 at Battery	107.068						21.332.8				21.988.8	
38	Corner of Pier 38 at Battery	109.712						21.038.5				22.587.5	
39	Corner of Pier 39 at Battery	112.356						20.744.2				23.186.2	
40	Corner of Pier 40 at Battery	115.000						20.449.9				23.784.9	
41	Corner of Pier 41 at Battery	117.644						20.155.6				24.383.6	
42	Corner of Pier 42 at Battery	120.288						19.861.3				24.982.3	
43	Corner of Pier 43 at Battery	122.932						19.567.0				25.581.0	
44	Corner of Pier 44 at Battery	125.576						19.272.7				26.179.7	
45	Corner of Pier 45 at Battery	128.220						18.978.4				26.778.4	
46	Corner of Pier 46 at Battery	130.864						18.684.1				27.377.1	
47	Corner of Pier 47 at Battery	133.508						18.389.8				27.975.8	
48	Corner of Pier 48 at Battery	136.152						18.095.5				28.574.5	
49	Corner of Pier 49 at Battery	138.796						17.801.2				29.173.2	
50	Corner of Pier 50 at Battery	141.440						17.506.9				29.771.9	
51	Corner of Pier 51 at Battery	144.084						17.212.6				30.370.6	
52	Corner of Pier 52 at Battery	146.728						16.918.3				30.969.3	
53	Corner of Pier 53 at Battery	149.372						16.624.0				31.568.0	
54	Corner of Pier 54 at Battery	152.016						16.329.7				32.166.7	
55	Corner of Pier 55 at Battery	154.660						16.035.4				32.765.4	
56	Corner of Pier 56 at Battery	157.304						15.741.1				33.364.1	
57	Corner of Pier 57 at Battery	160.000						15.446.8				33.962.8	
58	Corner of Pier 58 at Battery	162.644						15.152.5				34.561.5	
59	Corner of Pier 59 at Battery	165.288						14.858.2				35.160.2	
60	Corner of Pier 60 at Battery	167.932						14.563.9				35.758.9	
61	Corner of Pier 61 at Battery	170.576						14.269.6				36.357.6	
62	Corner of Pier 62 at Battery	173.220						13.975.3				36.956.3	
63	Corner of Pier 63 at Battery	175.864						13.681.0				37.555.0	
64	Corner of Pier 64 at Battery	178.508						13.386.7				38.153.7	
65	Corner of Pier 65 at Battery	181.152						13.092.4				38.752.4	
66	Corner of Pier 66 at Battery	183.796						12.798.1				39.351.1	
67	Corner of Pier 67 at Battery	186.440						12.503.8				39.949.8	
68	Corner of Pier 68 at Battery	189.084						12.209.5				40.548.5	
69	Corner of Pier 69 at Battery	191.728						11.915.2				41.147.2	
70	Corner of Pier 70 at Battery	194.372						11.620.9				41.745.9	
71	Corner of Pier 71 at Battery	197.016						11.326.6				42.344.6	
72	Corner of Pier 72 at Battery	199.660						11.032.3				42.943.3	
73	Corner of Pier 73 at Battery	202.304						10.738.0				43.542.0	
74	Corner of Pier 74 at Battery	204.948						10.443.7				44.140.7	
75	Corner of Pier 75 at Battery	207.592						10.149.4				44.739.4	
76	Corner of Pier 76 at Battery	210.236						9.855.1				45.338.1	
77	Corner of Pier 77 at Battery	212.880						9.560.8				45.936.8	
78	Corner of Pier 78 at Battery	215.524						9.266.5				46.535.5	
79	Corner of Pier 79 at Battery	218.168						8.972.2				47.134.2	
80	Corner of Pier 80 at Battery	220.812						8.677.9				47.732.9	
81	Corner of Pier 81 at Battery	223.456						8.383.6				48.331.6	
82	Corner of Pier 82 at Battery	226.100						8.089.3				48.930.3	
83	Corner of Pier 83 at Battery	228.744						7.795.0				49.529.0	
84	Corner of Pier 84 at Battery	231.388						7.500.7				50.127.7	
85	Corner of Pier 85 at Battery	234.032						7.206.4				50.726.4	
86	Corner of Pier 86 at Battery	236.676						6.912.1				51.325.1	
87	Corner of Pier 87 at Battery	239.320						6.617.8				51.923.8	
88	Corner of Pier 88 at Battery	241.964						6.323.5				52.522.5	
89	Corner of Pier 89 at Battery	244.608						6.029.2				53.121.2	
90	Corner of Pier 90 at Battery	247.252						5.734.9				53.720.9	
91	Corner of Pier 91 at Battery	249.896						5.440.6				54.319.6	
92	Corner of Pier 92 at Battery	252.540						5.146.3				54.918.3	
93	Corner of Pier 93 at Battery	255.184						4.852.0				55.517.0	
94	Corner of Pier 94 at Battery	257.828						4.557.7				56.115.7	
95	Corner of Pier 95 at Battery	260.472						4.263.4				56.714.4	
96	Corner of Pier 96 at Battery	263.116						3.969.1				57.313.1	
97	Corner of Pier 97 at Battery	265.760						3.674.8				57.911.8	
98	Corner of Pier 98 at Battery	268.404						3.380.5				58.510.5	
99	Corner of Pier 99 at Battery	271.048						3.086.2				59.109.2	
100	Corner of Pier 100 at Battery	273.692						2.791.9				59.707.9	



Horizontal measurements and altitudes "as obtained from Steamer U.S.S. 'Manitowish', New York Harbor Improvement Surveys, Jan. 22, 1905", are based on a line between triangulation stations 1 and 3 located on Castle William, Governors Island and on the Barge Office, New York City respectively.

Soundings expressed in FEET and TENTHS are from Survey 1911 - 12 made by this office; they are referred to the plane of mean low water see note below. They were taken with a lead line and located by intersection with two transits.

Soundings expressed in even feet were taken from U. S. C. S. Chart No. 369 (advance print) and are referred to the plane of mean low water as established by the United States Coast and Geodetic Survey.

Bench marks were established by "Y" level and are referred to the plane of mean low water of the Dock Dept. New York City at Pier North River.

Shore line, wharfs, buildings, etc. were taken from U. S. C. S. Chart No. 369 (advance print).

Pierhead and Bulkhead Lines from Guttenberg to Fort Lee, N.J. were taken from map entitled "Supplemental Sheet to the map of Pierhead and Bulkhead Lines for the waterfront of the City of New York and New Jersey shore" to show changes and modifications since original approval. Remaining Pierhead and Bulkhead Lines were taken from map entitled "Pierhead and Bulkhead Lines for the waterfronts of the City of New York and New Jersey Shore" as recommended by the New York Harbor Line Board "scale 1:10,000" approved by Secretary of War Feb. 15, 1902.

For a more complete description of triangulation stations, stadia stations, bench marks, etc. see office records.

NOTE: To reduce depths to the plane of mean low water as determined by the Dock Dept. New York City at Pier A North River from 21 years observation 1887 - 1907 deduct 0.6 from all soundings expressed in feet and tenths.

MEAN RANGE OF TIDES
21 years observations 1887 - 1907, by the Dock Department at the Battery.
Highest observed 8.0 feet
Lowest observed -4.0 feet
Mean range 4.24 feet
Mean low water of the Dock Dept. at the Battery, is 2.08 ft. below mean sea level of the U.S.C.S. at Sandy Hook, N.J.

MEAN RANGE OF TIDES
Observations made during one lunation in 1907, and are referred to mean low water at Spuyten Duyvil R.R. Bridge.
Highest observed 4.88 feet
Lowest observed -1.28 feet
Mean range 3.71 feet
Extreme range 6.16 feet
Elev. of local M.L.W. referred to M.L.W. 1874 at 3rd Ave. Bridge +3.46 feet
Mean low water at Spuyten Duyvil R.R. Bridge is 1.625 ft. below mean sea level of U. S. C. S. at Sandy Hook, N.J.

UNITED STATES ENGINEER OFFICE, DISTRICT NO. 1, NEW YORK
ROOM 702 ARMY BUILDING
NEW YORK, N. Y., MARCH 4TH 1912.
RESPECTFULLY FORWARDED TO THE CHIEF OF ENGINEERS
WITH REPORT OF THIS DATE.
M. W. Black
COLONEL CORPS OF ENGINEERS U. S. ARMY

HUDSON RIVER NEW YORK HARBOR
BEDLOES ISLAND TO FORT LEE
SHEET NO. 2
48TH STREET TO FORT LEE
SURVEYED IN COMPLIANCE WITH RIVER AND HARBOR ACT OF JUNE 25, 1910.
FROM SURVEYS OF 1911 - 12

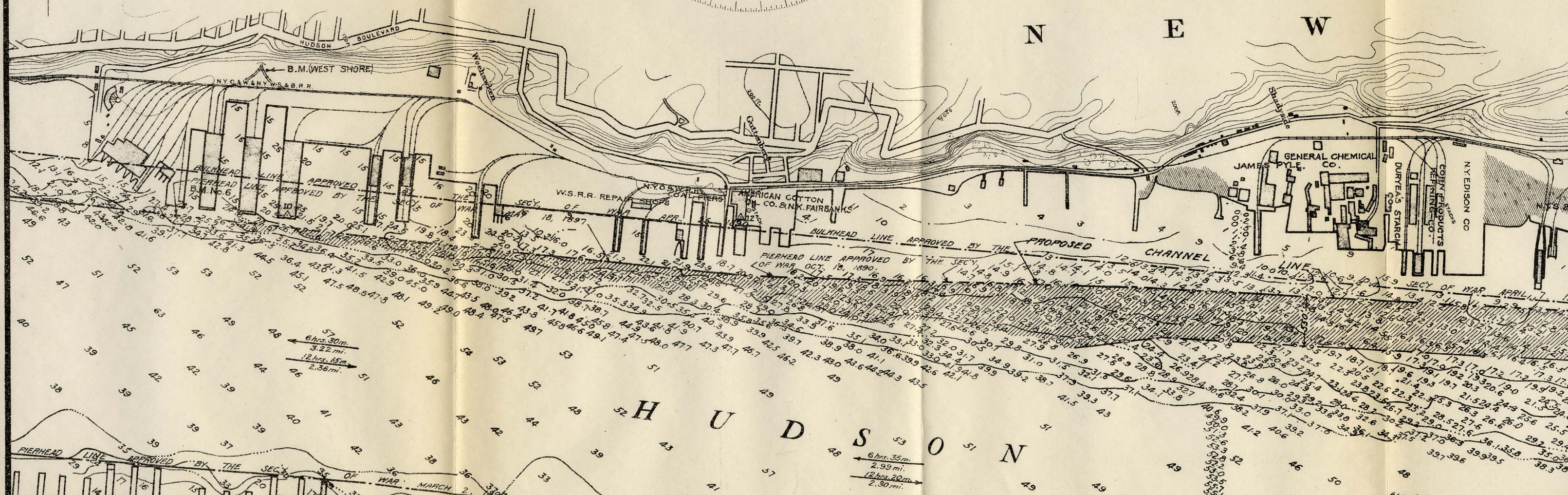
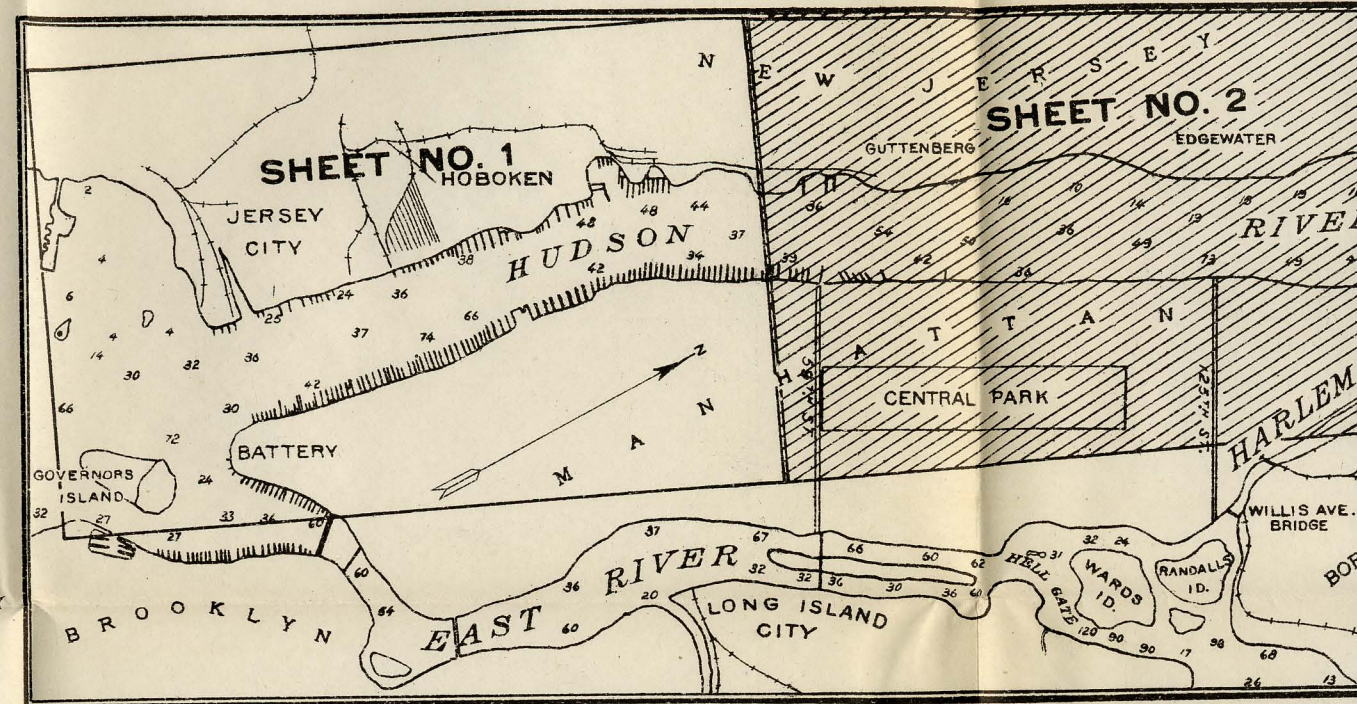
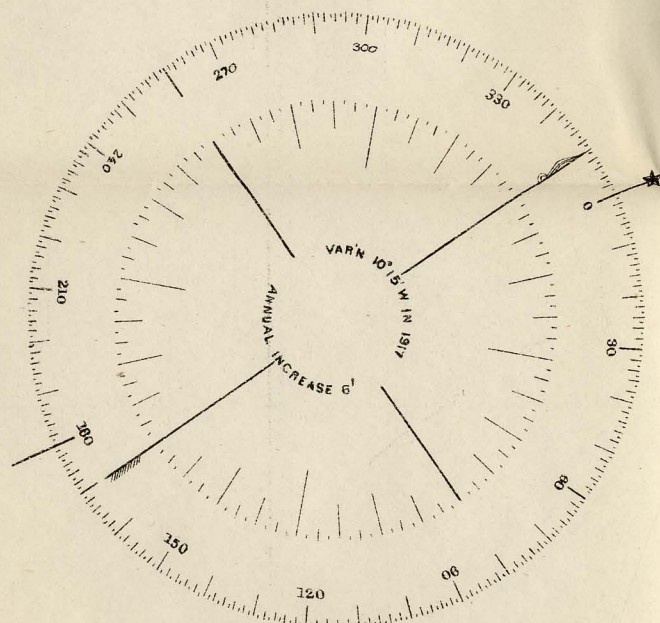
SCALE 12,500
PREPARED UNDER THE DIRECTION OF
COLONEL W. M. BLACK, CORPS OF ENGINEERS U. S. ARMY.
ASSISTANTS
J. H. ROSTOCK, PRIN. ASST. ENGR. A. P. MORRIS, CHIEF DRAFTSMAN
C. H. GARDNER, JUN. ENGR. IN CHARGE OF SURVEYS
DRAFTING BY
H. R. GLUTZBECK,

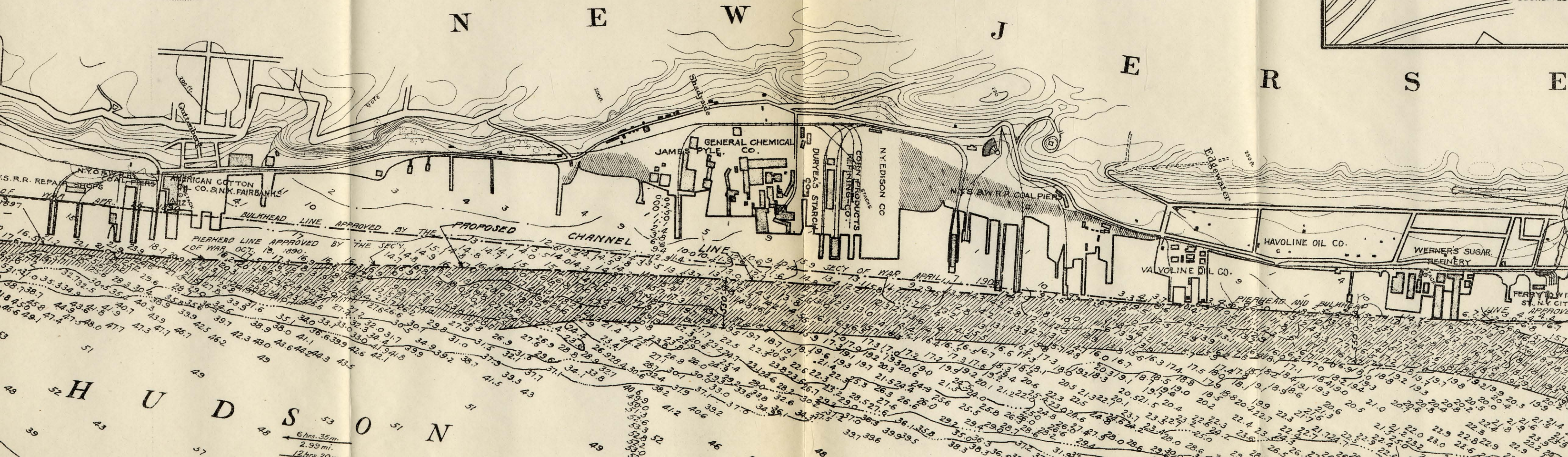
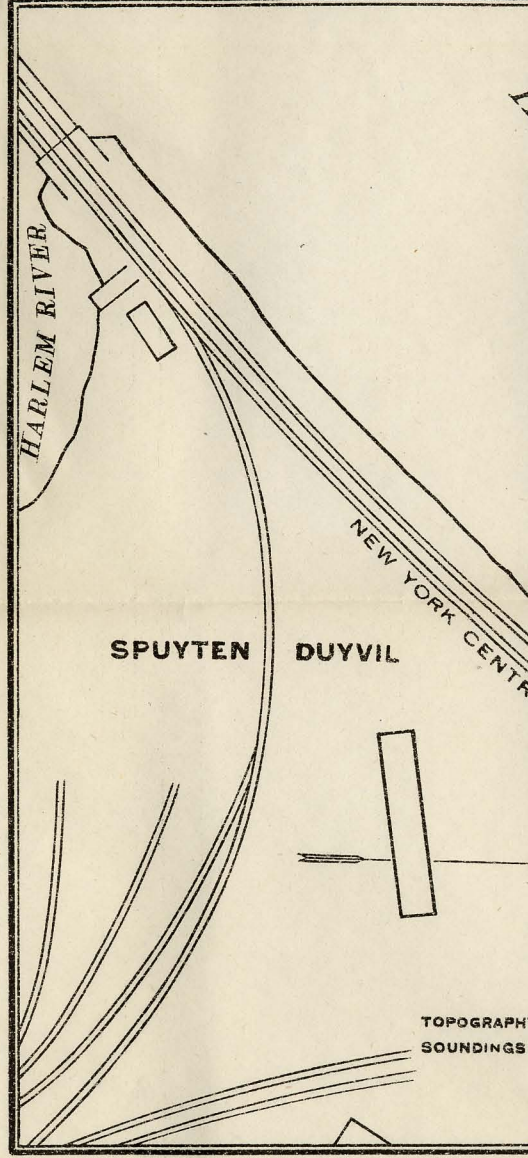
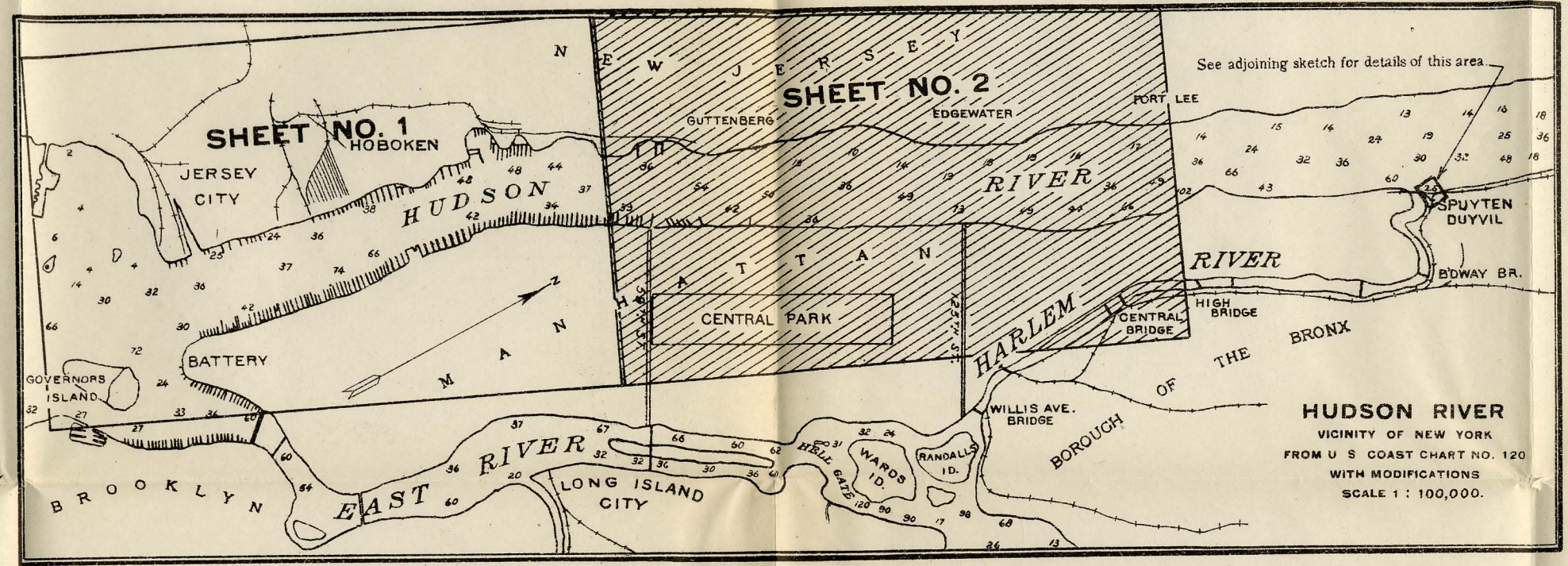
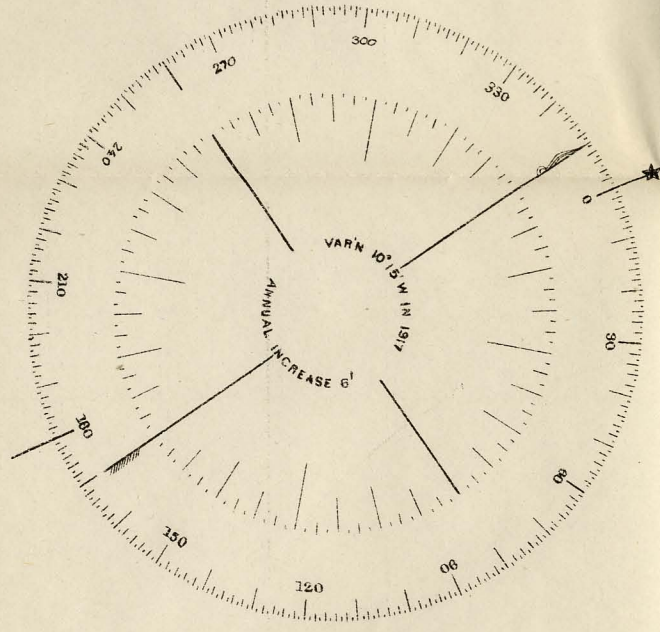
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SHEET NO. 2

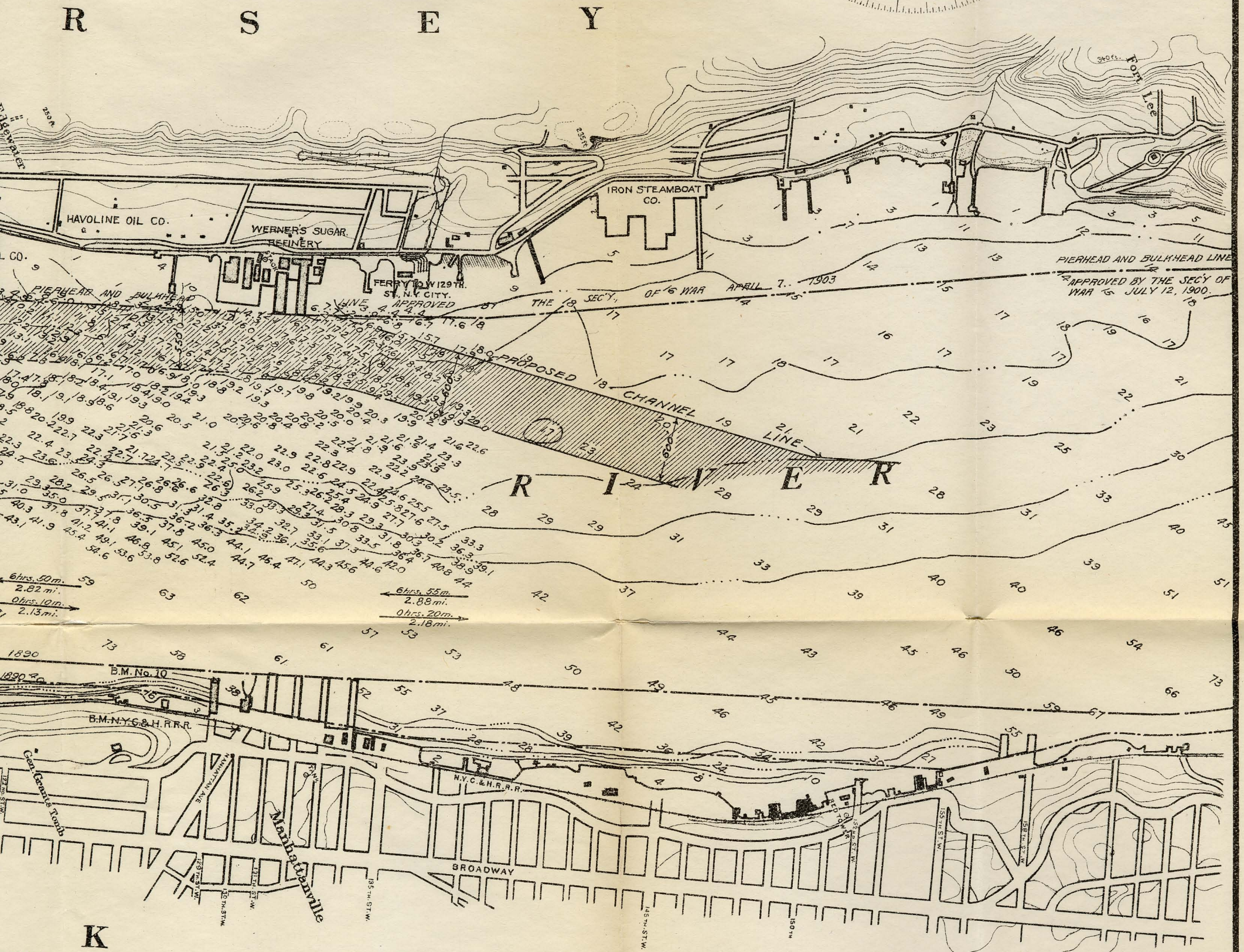
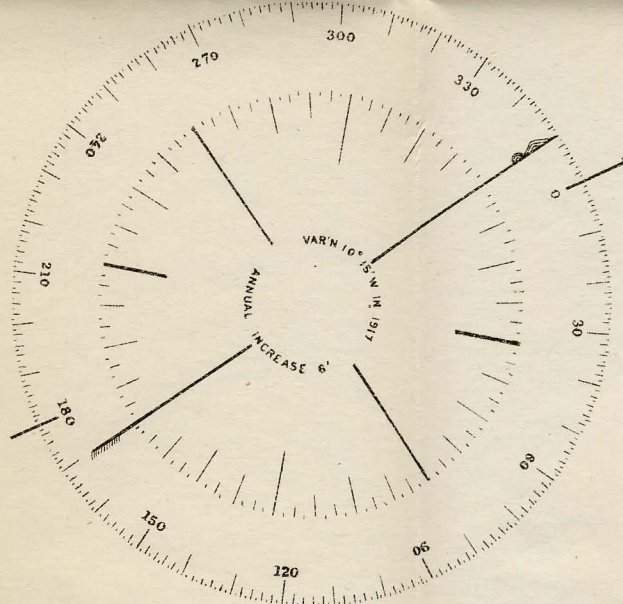
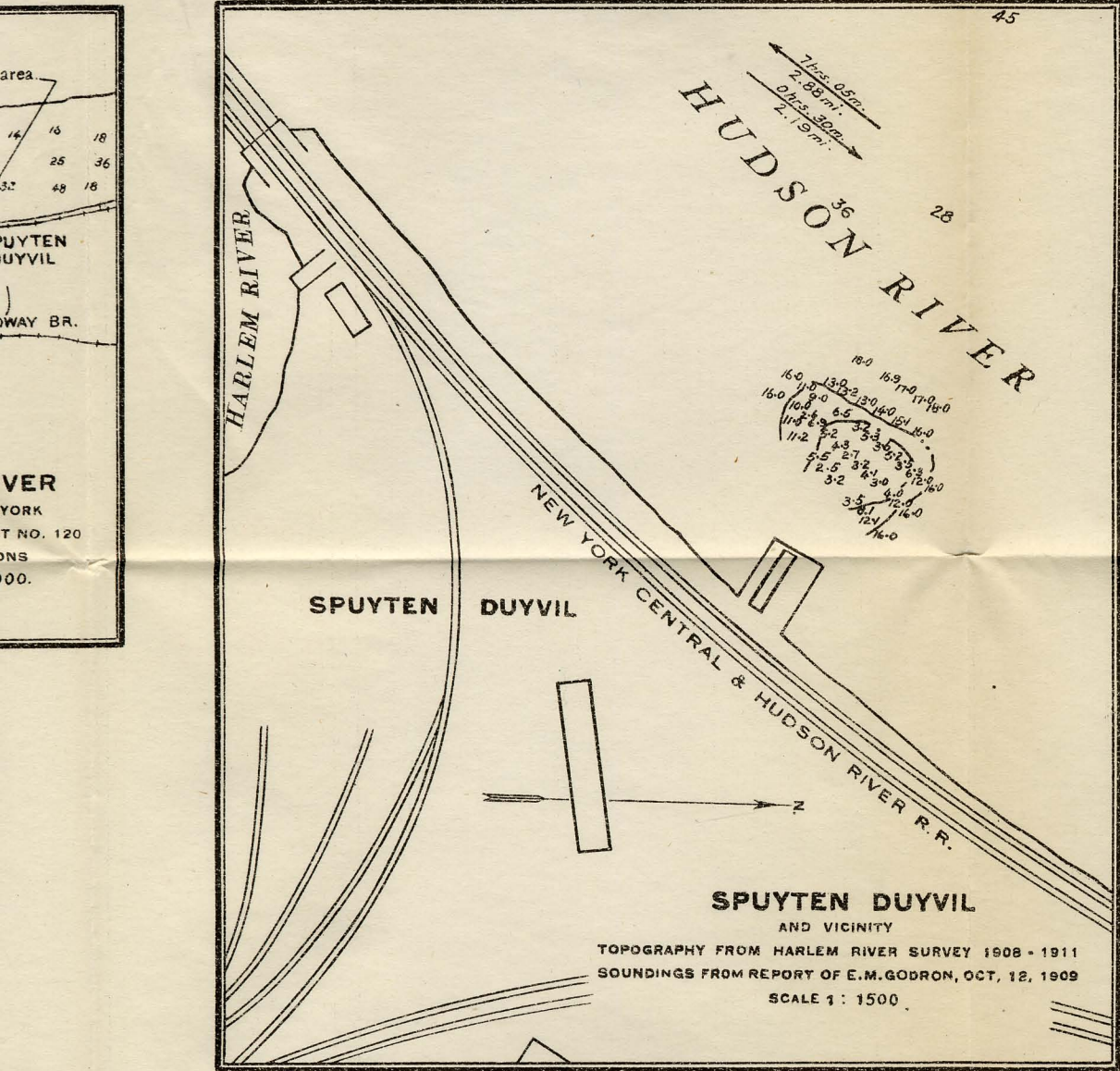
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Data regarding current directions at Corlears Hook and current directions and velocities in Hell Gate at Negro Point, in Little Hell Gate and in Harlem Kills are from observations made by the Engineer Department.

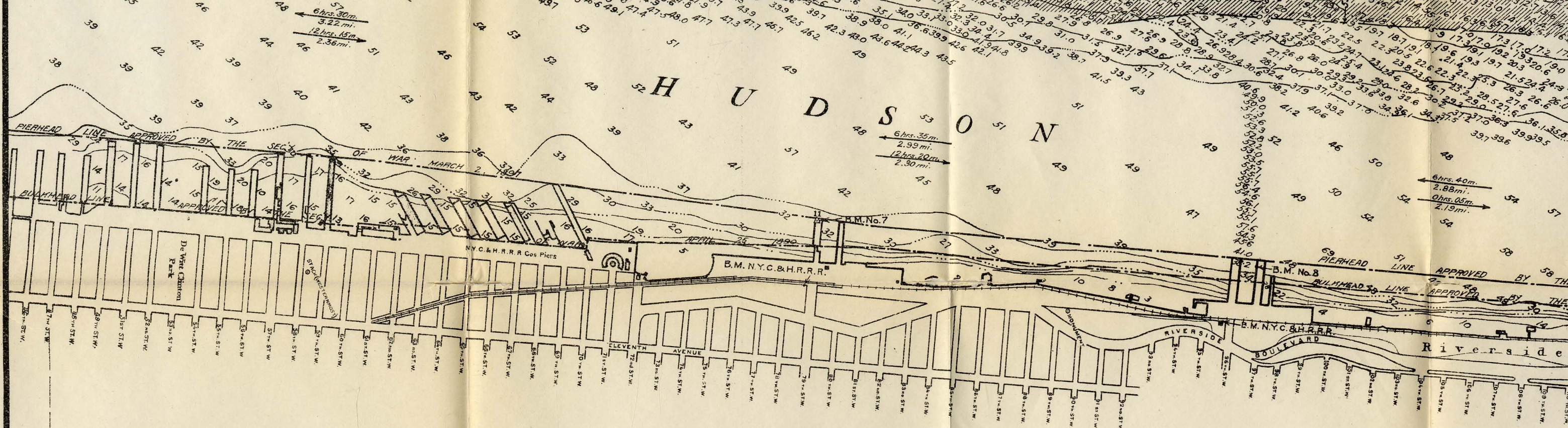
The currents shown by the long lines at Corlears Hook were observed by the Engineer Department for direction and are not maximum surface currents.







TIDES
 1907, by the
 the Battery.
 8.0 feet
 -4.0 feet
 4.24 feet
 at the Battery, is 2.09 ft.



TABULATION
OF
TRIANGULATION & BENCH MARKS

STA	DESCRIPTION	ELEV	REFERENCES				NOTE BOOK		STA.	LATITUDE		DEPARTURE	
			FROM	TO	AZIMUTH	DISTANCE	NO.	PAGE		NORTH	SOUTH	EAST	WEST
B.M. 6	2" nails in coping on S.E. cor. of West Shore Pier #2 Manhattan, N.Y. 1/2' from iron mooring post #29.55' from S.E. cor. of shed	11.984					3	6					
B.M. West Shore R.R. Chisel cut in rock near watchman's shanty, 190'E. of E. portal Deepwater Tunnel, N.Y. R.R. 30.8' N. of N. rail		14.588					"	"	Δ 9	30 9 14.6		13423.0	
Δ 9	Nail within studs in raised platform on the N.W. cor. of Pier 95 foot of W. 55th St. N.Y.C. 1911 from N.W. cor. of wharf		Δ 9	Δ 8	36° 04' 48"	13.159.9'	1	9	" 10	31 6 23.9		10.532.2	
"	9.25' from N.W. cor. of building 106' from W. face of wharf		"	"	" 10	105 05 11			" 11	35 3 59.0		16132.0	
"	"		"	"	" 11	211 22 46			"				
"	"		"	"	" 12	172 26 46							
" 10	Nail in piece of cloth on ridge of roof of West Shore Pier #2, 89' from E. end of roof, 271' x 21.65' from N.E. S.E. corners of building		" 10	" 8	23 03 31	12406.2	"	12	" 12	36 2 11.2		12720.7	
"	"		"	"	" 9	285 03 11	2992.0						
"	"		"	"	" 11	236 40 28	6725.8						
" 11	Strike hitting N.E. S.W. corner of pier foot of W. 194th St. N.Y.C. 171/2' from corner		" 11	" 9	31 27 46	3241.0	"	8					
"	Base of string piece, 2.44' x 2.28' from N. N.E. faces of string piece		"	"	" 12	103 28 31	3528.5						
B.M. 7	5" nails in string piece below coping on N.W. cor. of pier foot of W. 79th St. 17.62' from N.W. cor. of pier #1193' S.W. of mooring post	8.397					3	8					
"	" N.Y.C. & H. R. R. 9' cut on stone ledge S. of 79th St. and E. of tracks, 2' below base of rail & 20.5' from N. end of wall	12.629					3	8					
Δ 12	Nail driven in piece of asbestos in ridge of roof of American Cotton Oil Co's 4 story brick bldg. Butterberg, N.Y. 5.05' from coping E. end of building, 34.4' x 34.55' from N.E. S.E. cor. of building		" 12	" 9	332 26 46	5343.0	1	13	" 10	25 30 54		5019.5	
"	"		"	"	" 11	283 28 31	3528.5						
B.M. 8	5" nails in string piece of S.W. corner of pier foot of W. 56th St. 24.47' from S.W. cor. of pier #19 27'E. from mooring post	7.622					3	8					
" 36	St. N.Y.C. & H. R. R. + cut on stone wall, S. of W. 96th St. E. of tracks, 2' above base of rail (COP) S. of station	14.239					"	"					
" 9	5" nails in S.W. cor. of platform of U.S. Vol Life Saving Sta. at foot of W. 113th St. 13.4' from S.W. cor. 20.26' W. from lattice enclosure 139.16' from S.W. cor. Life Saving Sta.	9.637					"	9					
"	N.Y.C. & H. R. R. cut on wall E. of tracks of foot of W. 113th St. N.Y. City. Opposite U.S. Vol. Life Saving Sta.	12.439					"	"					
" 10	5" Nails in coping on N. side of Pierfoot on Pier at foot of W. 129th St. N.Y. City 22.52' from N.W. corner of pier, 12.16'E. from iron cleat and 26.13' W. from iron mooring post	9.750					"	10					
"	N.Y.C. & H. R. R. S.W. corner, water table Hotel Antigonam 3' above sidewalk Manhattan Ave	15.229					"	"					

EXPLANATION

	Triangulation Station		18 ft. Contour
	Bench Mark		24 ft. Contour
	6 ft. Contour		30 ft. Contour
	12 ft. Contour		36 ft. Contour
	Work recommended to 26 feet		

Horizontal measurements and azimuths "as obtained from Steamer U.S.S. 'Manissee', New York Harbor Improvement Surveys. Jan. 22, 1905", are based on a line between triangulation stations 1 and 3 located on Castle William, Governors Island and on the Barge Office, New York City respectively.

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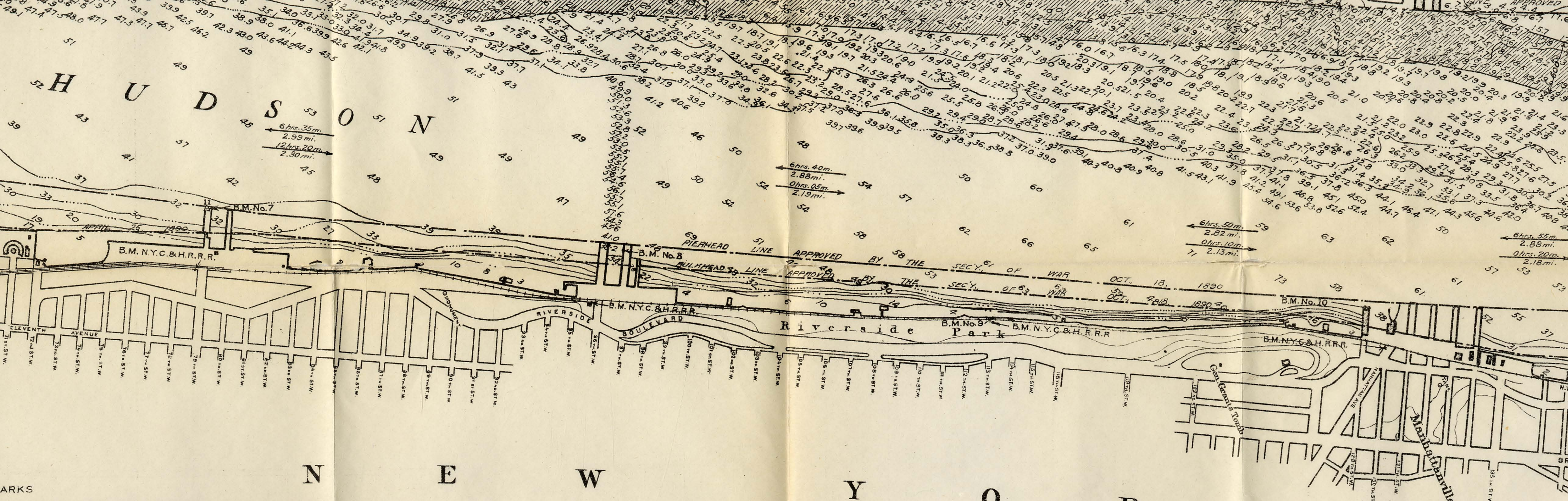
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For a more complete description of triangulation stations, stadia stations, bench marks, etc. see office records.

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CE	NOTE BOOK		STA.	LATITUDE		DEPARTURE	
	NO.	PAGE		NORTH	SOUTH	EAST	WEST
	3	6	9	30 9 14.6		13 423.0	
	"	"	10	31 6 23.9		10 532.2	
	1	5	11	35 3 59.0		16 132.0	
	"	12	12	36 2 11.2		12 720.7	
	3	8					
	3	8					
	1	13					
	3	8					
	"	"					
	"	9					
	"	"					
	"	10					
	"	"					
	"	"					

EXPLANATION

Horizontal measurements and azimuths "as obtained from Steamer U.S.S. 'Manisees', New York Harbor Improvement Surveys, Jan. 22, 1905", are based on a line between triangulation stations 1 and 3 located on Castle William, Governors Island and on the Barge Office, New York City respectively.

Soundings expressed in FEET and TENTHS are from Survey 1911 - 12 made by this office; they are referred to the plane of mean low water see note below. They were taken with a lead line and located by intersection with two transits.

Soundings expressed in even feet were taken from U. S. C. S. Chart No. 369^a (advance print) and are referred to the plane of mean low water as established by the United States Coast and Geodetic Survey.

Bench marks were established by "Y" level and are referred to the plane of mean low water of the Dock Dept. New York City at Pier A North River.

Shore line, wharfs, buildings, etc. were taken from U. S. C. S. Chart No. 369^a (advance print)

Pierhead and Bulkhead Lines from Guttenberg to Fort Lee, N.J. were taken from map entitled "Supplemental Sheet to the map of 'Pierhead and Bulkhead Lines for the waterfront of the City of New York and *** New Jersey shore *** to show changes and modifications since original approval". Remaining Pierhead and Bulkhead Lines were taken from map entitled "Pierhead and Bulkhead Lines for the waterfronts of the City of New York and *** New Jersey Shore *** as recommended by the New York Harbor Line Board *** scale 1:10,000", approved by Secretary of War Feb. 15, 1902.

For a more complete description of triangulation stations, stadia stations, bench marks, etc. see office records.

NOTE:- To reduce depths to the plane of mean low water as determined by the Dock Dept. New York City at Pier A North River from 21 years observation 1887 - 1907 deduct 0.6 from all soundings expressed in feet and tenths.

MEAN RANGE OF TIDES

21 years observations 1887 - 1907, by the Dock Department at the Battery.

Highest observed 8.0 feet

Lowest observed -4.0 feet

Mean range 4.24 feet

Mean low water of the Dock Dept. at the Battery, is 2.09 ft. below mean sea level of the U.S.C.S. at Sandy Hook, N. J.

MEAN RANGE OF TIDES

Observations made during one lunation in 1907, and are referred to mean low water at Spuyten Duyvil R.R. Bridge.

Highest observed 4.88 feet

Lowest observed -1.28 feet

Mean range 3.71 feet

Extreme range 6.16 feet

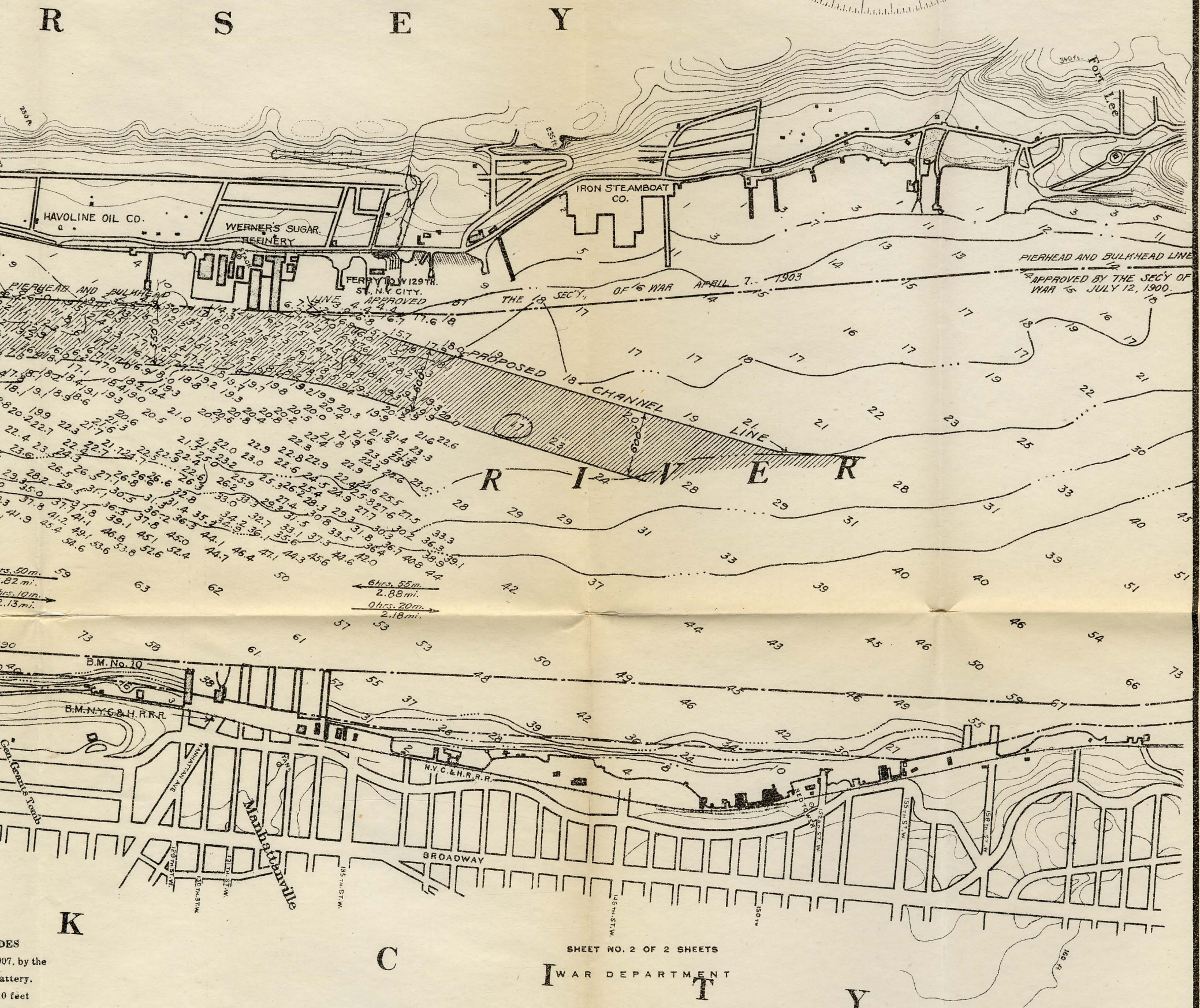
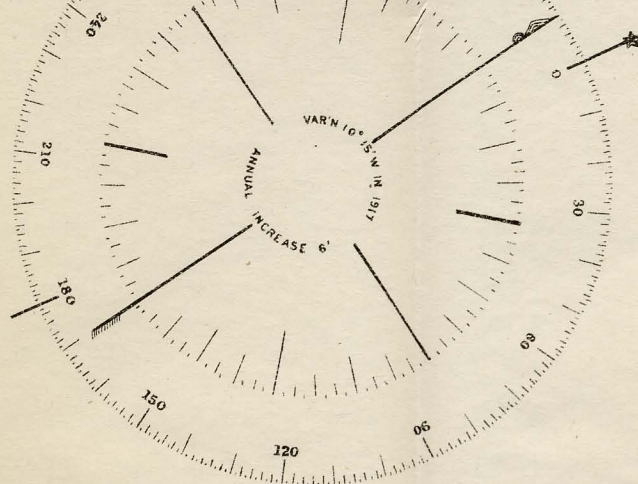
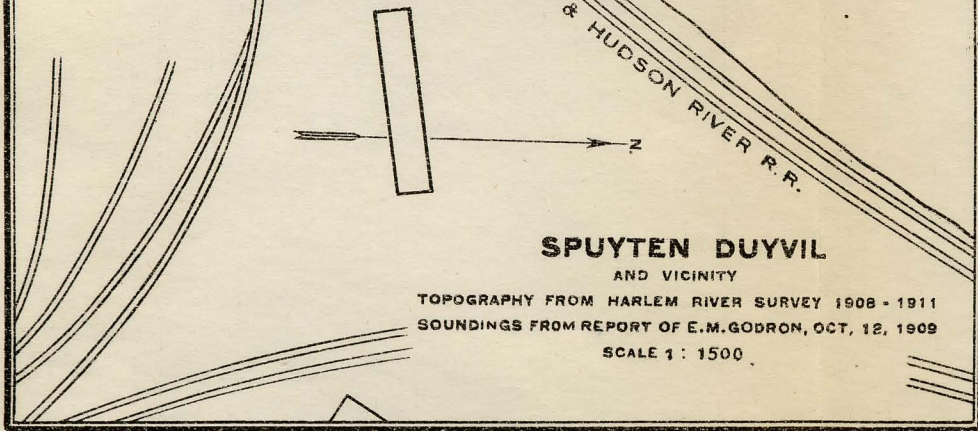
Elev. of local M.L.W. referred to M.L.W. 1874 at 3rd Ave. Bridge +1.445 feet

Mean low water at Spuyten Duyvil R.R. Bridge is 1.525 ft. below mean sea level of U. S. C. S. at Sandy Hook, N. J.

UNITED STATES ENGINEER OFFICE, DISTRICT NO. 1, NEW YORK
ROOM 702 ARMY BUILDING
NEW YORK, N. Y., MARCH 4th 1912.

RESPECTFULLY FORWARDED TO THE CHIEF OF ENGINEERS
WITH REPORT OF THIS DATE.

H. M. Black
COLONEL CORPS OF ENGINEERS U. S. ARMY



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Sandy Hook, N. J.

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4.88 feet
-1.28 feet
3.71 feet
6.16 feet

+1.445 feet
Bridge is 1.525 ft.
Sandy Hook, N. J.

DISTRICT NO. 1, NEW YORK
LDING
Y, MARCH 4th 1912.
CHIEF OF ENGINEERS
M. Black
RPS OF ENGINEERS U. S. ARMY

SHEET NO. 2 OF 2 SHEETS
I WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE, DISTRICT NO. 1, NEW YORK.

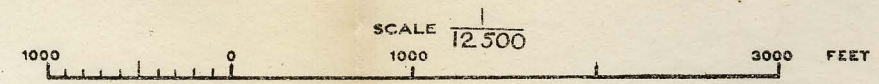
HUDSON RIVER NEW YORK HARBOR

BEDLOES ISLAND TO FORT LEE

SHEET NO. 2

48TH STREET TO FORT LEE

SURVEYED IN COMPLIANCE WITH RIVER AND HARBOR ACT OF JUNE 25, 1910.
FROM SURVEYS OF 1911-12



PREPARED UNDER THE DIRECTION OF
COLONEL W. M. BLACK, CORPS OF ENGINEERS U. S. ARMY.

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