5470

369-4

Form 504
Ed. June, 1928

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

R. S. Patton, Director

State: New Jersey

DESCRIPTIVE REPORT

Topographic / ~~*Hydrographic*~~ } *Sheet No.* T 5470

LOCALITY

Jersey City

Claremont and Vicinity

~~34~~
~~19 88~~ Photographs in 1934 and 1935

CHIEF OF PARTY

J.C. Partington Jr. H and G.E.

U. S. GOVERNMENT PRINTING OFFICE: 1930

5470

Applied to Chart 145 - Oct 15, 1937 - L.M.Z.

Applied to Chart 285 Dec 7, 1937 Chas. R Bosch Jr

" " " 287 June 1938 J.F.Lee

" " " 369 April 21, 1939 L.M.Z.

CONTENTS

Form 537a
Ed. Nov. 1929

DEPARTMENT OF COMMERCE
U.S. COAST AND GEODETIC SURVEY

REG. NO.

TOPOGRAPHIC TITLE SHEET

The Topographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

Field No.....

REGISTER NO. T-5470 **T5470**

State.....New Jersey.....

General locality.....Jersey City.....

Locality.....~~Ellis Island, Bedloe Island and Communipaw~~ Claremont and Vicinity.....

Scale.....1:5000..... Date of ~~survey~~ Photographs Mar. 27, 1935 Nov. 25, 1934

Vessel.....Photo Compilation Party #25.....

Chief of party.....J.C.Partington J.C.P.

Surveyed by.....Field Inspection - D.B.Bennett, D.B.Bogart & J.B.Moreland
Compilation - F.A.Riddell, E.L.Jones

Inked by.....F.A.Riddell, E.L.Jones.....

Heights in feet above.....--.....to ground to tops of trees

Contour, Approximate contour, Form line interval.....--.....feet

Instructions dated.....March 14....., 1934.

Remarks:.....

.....

STATISTICS
on

AIR PHOTO COMPILATION; REGISTER NO. T-5470

PHOTOGRAPH NO.	DATE	TIME	TIDE HIGH TIME	HT.	LOW TIME	HT.
V 148-151 (870N-8)	5/27/35	11:45A	1:11A	4.8	8:04A	0.5
			1:38P	3.8	7:31P	0.6
V 128-131 (870N-8)	5/27/35	11:30A	0:41A	4.5	7:34A	0.5
			1:08P	3.5	7:01P	0.6
V 75-77 (870N-8)	11/25/34	10:45A	10:44A	4.3	4:32A	0.3
			11:37P	3.5	5:19P	0.0
V 97-102 (870N-8)	11/25/34	1:04p	10:44A	4.3	4:32A	0.3
			11:37P	3.5	5:19P	0.0

SCALE FACTOR (1.000) R.C.Bolstad (Previously determined)

PROJECTION F.A.RIDDELL NO date

ProJECTION CHECKED F.R.Erskine No date

CONTROL PLOTTED F.A.Riddell No date

CONTROL CHECKED F.R.Erskine No date

SMOOTH RADIAL LINE PLOT F.A.Riddell No date

RADIAL LINE PLOT CHECKED E.L.Jones Feb. 18, 1937

DETAIL INKED F.A.Riddell No date
E.L.Jones 2/19/37 3/23/37

PRELIMINARY REVIEW OF SHEET J.C.Partington J.C.P. 3/30/37 4/1/37

AREA OF DETAIL INKED (land area) 4.5 square statue miles
AREA OF DETAIL INKED (shoals) 0.0 square statue miles

LENGTH OF SHORELINE (more than 200m from opposite shore) 18.3 statue miles
LENGTH OF SHORELINE (rivers & sloughs less than 200m) 2.3 statue miles

LENGTH OF STREETS, ROADS, RAILROADS & TRAILS 139.0 statue miles

GENERAL LOCATION New Jersey

Location Jersey City
Claremont and Vicinity

DATUM North American 1927

STATION Lehigh Grain Elevator, 1930: ~~1-131 (N.J.)~~ Latitude 40° 41' 47.445" 1463.5m
Longitude 74° 03' 50.394" 1183.2m
(adjusted computations)

N.J. Grid { X = 2,167,122.28 Ft
Y = 679,246.69 Ft.

J.L.P.

L.I. Grid { X = 1,982,253.09 Ft.
Y = 171,599.86 Ft.

COMPILER'S REPORT
for
AIR PHOTO TOPOGRAPHIC SHEET, Register No. T-5470

GENERAL INFORMATION

The Air Photo Field Inspection Report for the area covered on this Sheet is included with the Descriptive Report of Air Photo Sheet No. T-5448 (Field No. 80) submitted to the Office by Lt.(j.g.) Bolstad in 1935.

This sheet has been compiled from single lens photographs listed on page 2 of this report. Photographs V148-151 (870N-8) were taken at approximately ~~one-half hour after~~ 1½ hours before high tide. Photographs V128-131 (870N-8) were taken at approximately ~~two~~ one hours before high tide. Photographs V75-77 (870N-8) were taken at high water. Photographs V97-102 (870N-8) were taken at approximately two and one-half hours after high tide. corrections in red made to agree with Table given on preceding page. T.M.P.

The photographs were taken by the U.S.Army Air Corp at Mitchell Field, Long Island, N.Y. with a special camera developed by the Fairchild Camera Corporation, 62-10 Woodside Ave., Woodside, New York City and with the cooperation of the Air Corp. Inasmuch as these photographs were among the first to be taken with this camera, mechanical troubles were encountered which caused considerable difficulty. This probably accounts for the irregular time interval between exposures which in turn effects the overlap (see photos No. V148-151). This camera is known as the "K-7C" by the Army and as the "K-7A2" by the Fairchild Corporation.

The Army plane was piloted by Lieut. Cullen at an altitude very close to 15,000 feet; the photographer was Sergeant Cates. A 24 inch cone (focal length 24") was used which placed the original negatives on a scale of 1:7,500. Contacts prints were furnished the field party for inspection purposes and the original negatives were used to enlarge a set of office prints to a 1:5000 scale in the Washington Office. These office prints were furnished this party and were used for the compilation of this sheet.

CONTROL

(a) Sources.

Control for the compilation of this sheet was obtained from the following sources:

1. Triangulation, 1930-31 by R.W.Woodworth (adjusted)
   Twelve triangulation stations.

2. U.S.Engineers station as described on Form 524 (geographic position computed from coordinates).
   Three stations.

The triangulation by R.W.Woodworth is given on the N.A. 1927 datum (adjusted).

The geographic position of all U.S.Engineers station is shown by circles 2½ mm in diameter.

1 Δ of 1913, not relocated in 1930, computed on old N.A. Datum, + correction applied for plotting.

(b) Errors.

Triangulation station Slim Stack, 1930, located by R.W.Woodworth was not plotted on the sheet for the following reasons: on T6124 as A

(b) Errors.(Continued)

1. Its position does not appear on the adjusted list as published by the Washington Office. 3 cuts taken by triang. evidently did not agree therefore not published.
2. It's position as shown by R.W.Woodworth's field computation adjusted to the N.A. 1927 datum is in disagreement with the compilation position by 4 meters.

This station is now shown on the compilation by a 2½ mm circle. The compilation position was determined from two wide intersect-radials (see page 3 concerning overlap). This station has been resubmitted on Form 524. Div. of Geodesy advised. T.M.P.

COMPILATION

(a) Method.

The usual radial line method of plotting was used in the compilation of this sheet.

The principal point was used as the origin of radials on all photographs except No. V130, V149 and V150. On these photographs a point approximateing the isocenter was used.

The overlap on photographs No. V-148 to V-151 was insufficent for rigid compilation of the area covered by these photos.

The determination of detail in the vicinity of Lat. 40° 42.5, Long. 70° 04' is weak. The radial lines intersected at slim angles due to the detail being on the edge of the photographs on both flights.

This sheet is compiled from four different flights of photographs three of which are very close to scale. Photographs No. V-148 to V-151 are out of scale and caused considerable trouble in tracing detail.

(b) Recoverable Topographic Stations.

The 12 recoverable topographic stations,described on Form 524 and located by plane-table methods by the party of I.E.Rittenburg in 1934, were radial plotted and their compilation position compared with the plane-table position. Where the radial plot was strong and three or more radials gave a strong angle of intersection the compilation position of the recoverable topographic station was shown on the celluloid sheet.

The following compilation positions are shown on this sheet:

CAT
plane-table position, Lat. 40° 41' 1618m, Long. 74° 02' 872m
compilation position, Lat. 40° 41' 1623m, Long. 74° 02' 870 m

NEW
plane-table position, Lat. 40° 42' 69m, Long. 74° 02' 903m
compilation position, Lat. 40° 42' 69m, Long. 74° 02' 898 m

SIR
plane-table position, Lat. 40° 42' 256m, Long. 74° 02' 713m
compilation position, Lat. 40° 42' 256m, Long. 74° 02' 707m

For the above stations a note was placed on the plane table sheet and the new position noted on form 524 for the stations.

The following plane-table positions, from Form 524, are shown on this sheet:

POLE; compilation checks plane-table within 1½meter.

J.F. 8 (U.S.E.D.); compilation checks plane-table within 1 meter.

STA.PARK2J.F. 5.(U.S.E.D.)
Compilation checks plane-table position within 2 meters by four slim intersecting radials.

J.F.7 (U.S.E.D.)
This station was not field inspected and the description on Form 524 was insufficient to identify on the photographs. No comparison was made.

Gab
Compilation checks plane-table position within 2 meters.

LAG
Compilation checks plane-table position within 2 meters.

R.T.
Compilation checks plane-table position within 1½ meters.

TOW
Compilation checks plane-table position within 2 meters.

VEE
Insufficent overlap on photographs No. V-148 to 151.
This station appeared on only one photograph.
No comparison was made.

(T 6124)
Station FOX, shown on Form 524 and located by plane-table by the party of I.E.Rittenburg in 1934, is identical with triangulation station NEWARK BAY, Chamberlain Flying Service, Chimney, 1931. A note to this affect has been placed on Form 524 for Station Fox and the triangulation position shown on the sheet. (5470)
A position given on card and note made on plane table sheet.

Numerous sketches and some additional measurements (where they were available from the Air Photo field inspection party notes, were placed on description Forms No. 524 of the 1934 plane-table survey by the party of I.R.Rittenburg. computed USE stations.
See also top of page for 4X cards form 524 filed under T 5470 (this sheet). Remaining descriptions Form 524 filed under T 6124 & T 6127.

(c) Interpretation.

No attempt has been made to show any of the street car tracks on this sheet.

The outside railroad tracks of the freight yards are shown in their true position; the interior tracks have been generalized to show approximately every other track.

The double full line has been used to show all first class roads and streets (curb to curb); the double dashed line to show second class roads; and the single dashed line to show trails.

An attempt has been made to show all buildings of any importance along the waterfront, and some of the more important buildings inland. The stereoscope has been used freely in determining the shapes of buildings.

The usual graphic symbols were used throughout the sheet.*† No difficulty was experienced in interpreting the photographic detail, except at a few places where more explicit field inspection notes were desired. see last sentence on page 6.

The field inspection party spotted the wreckage on the photographs. but failed to note the number of feet they were bare at low water.

~~* In middle of sheet is shown a double track R.R. by a single line and x cross ties. This has been rewritten.~~ corrected T.M.P.

† Wrecks above H.W were outlined with a solid line. Those above L.W. with a dash line. The standard symbol was used for sunken wrecks. A dash line and label was used to limit large areas foul with wrecks of any height. T.M.P.

(d) Information from other sources.

The geographic position of the following U.S.E. stations were computed from their U.S.E. coordinates and plotted on this sheet:

JF - 6 (U.S.E.)
N.B.- 11 (U.S.E.)
N.B.- 13)U.S.E.)

A copy of the above computation will be found in the back of this report.

Names were taken from charts and maps of the area.

Several dolphin, rocks awash and wrecks were transferred from topographic sheet No. 6127 (register number) as they could not be identified on the photographs. All objects so transferred are clearly shown on the over-lay sheet.

The positions of recoverable H. & T. stations, as noted under (b) on page 4, as were taken from topographic survey No. 6127. & 6124

Except as mentioned above all information shown on the sheet was taken from the photographs.

(e) Names.

A list of Geographic names shown on this sheet is given on Form M 234 included in this report.

The names of a few of the streets may be obtained from the Map of the City of New York, Board of Estimate and Apportionment. Additional names of streets are not available at this field office. A city map of Jersey City (blue print) is filed in Air Photo Section - this shows street names.

JUNCTIONS.

(1:5,000) The south-western portion of this sheet joins compilation sheet T-5469, to the south and west of meridian 74° 04½' and parallel 40° 41½'.

(1:5,000) East of Longitude 74° 03½' this sheet joins compilation sheet 5450, along the parallel of latitude 40° 42½'.

(1:10,000) West of longitude 74° 03½' this sheet joins compilation sheet T-5277, along the parallel of latitude 40° 42½'

The western limits of this sheet falls along the meridian of longitude 74° 06½' in Newark Bay. (Line of bridge joins T-5111 (1:10,000)] Junctions are satisfactory. In joining with 1:10,000 scale sheets it will be noted that some small features appear on this sheet that are not shown on the others because of the larger scale of this sheet. T.M.P.

COMPARISON WITH OTHER SURVEYS

This sheet has been compared with topographic survey No. 6127 & 6124 executed by the party of I.E.Rittenburg in 1934. The original survey was done on a scale of 1:10000. Bromide enlargements and film negative enlargements on a scale of 1:5000 of the topographic sheet No. 6127 & 6124 were used in making the comparisons.

A detail comparison is as follows:

(a) Three additional rocks awash at ½ tide from those shown by sheet No. 6127 are shown on the compilation about 150m N.W. of Caven Point.

(b) The shore line in the small bay immediately to the west of Caven Point does not agree closely with the topographic survey No. 6127. Large differences are to be noted in the two small creeks that make off from the head of the bay. In the north creek a short section of dashed line indicates probable H.W.L. in the absence of field inspection notes on this section of the high water line.

(c) The line of piling shown in the vicinity of Lat. 40° 41.6, Long. 74° 03.7' does not form a straight line as on the topo. sheet No. 6127 but is a broken line as shown on the compilation sheet.

(d) Differences of as much as 70 meters in the location of the high water line in the "bight" immediately to the north of the Lehigh Valley R.R. Terminals are to be noted. The field inspection notes for this area were inadequate; however the shoreline was compiled from photograph No. V*76 which was nearly to scale and taken at high water.

(e) There were numerous differences of opinion between the topographer of sheet No. 6127 and the air-photo field inspection party as to what constitutes wrecks. The topography was done in the Fall of 1934 while the air-photo inspection was done during the Spring of 1935. It is beleived that so far as wreckage is concerned that it was approximately the same at the two dates. An attempt has been made on this sheet to show all of the air-photo inspected wrecks and the wrecks indicated by the topographer on sheet No. 6127 where they could be identified on the photographs. Any wrecks transferred from sheet No. 6127 are so indicated on the over-lay sheet. Wrecks shown on the planetable sheets were transfered to the compilation upon review whether they showed on the photos or not, if there was a possibility that they existed when the photos were made.

(f) The dolphin shown on sheet No. 6127 at Lat. 40° 41.75, Long. 74° 03.0' is not shown on this sheet since the topographic location falls in the center of a ship on the photographs. This ship is not a wreck and it would be impossible for a dolphin to exist at position shown. Dolphin appears mislocated on T 6127. T.P. Ex. Ftk insp. shows a dolphin 18 m. E. This corrected to on compilation. T.M.P. '37

(g) The two wrecks in Newark Bay (Lat. 40° 42.2, Long. 74° 06.2') appearing on topographic sheet No. 6124 do not appear on the photographs and were not indicated by the air-photo field inspection party. They were not shown on the compilation. These sunken wrecks were transfered to the compilation from T 6124 upon review.

(h) The air-photo inspection party failed to note wreckage in the areas labeled "Area of Wrecks" in Newark Bay on topographic sheet No. 6124 (lat. 40° 41.8', long. 74° 06.2' and at lat. 40° 42.1', long. 74° 06.2'). However an examination of the photographs indicated several of the barges to be wrecks. These were placed on the sheet. An area of barges aground similar to that shown on T 6124 was outlined on the compilation upon review.

(i) Differences of as much as 20 meters are noted in the high water line of Newark Bay between Lat. 40° 41½' and Lat. 40° 42½'. It is recommended that the compilation shoreline be charted as this maximum difference occured near triangulation station Bay where the stereoscope was used freely with the field inspection notes to delinate the shoreline.

(j) A small rock jetty is shown on the compilation at Lat. 40° 42.2', Long. 74° 06.0' but was not located on topographic sheet No. 6124.

COMPARISON WITH CHARTS.

Chart 541 (scale 1:10000) issue date Nov. 18,1936.

Due to the difference of scale of this chart and the compilation no direct comparison was made. However, a visual comparison indicates that the discrepancies are simular to those noted under the comparison of this compilation and topographic sheet No. 6127.

Chart 745 (scale 1:10000) issue date Jan. 23, 1935.

A visual comparison idicates large changes of shoreline around Ellis Island and to the north of the Lehigh Valley R.R. Terminals in Lat. 40°41.5' and Long. 74°03.5'. However a more recent edition of this chart will probably make the comparison the same as noted under comparison of this compilation and topographic sheet No. 6127. Ed. 4/2/37 compares favorably.

Chart 369 (scale 1:40000)

A visual comparison indicates that the name "Caven Point" as appearing on chart 369 in Lat. 40°41', Long. 74°04' is applied to an island, while the compilation and chart 541 apply this name to the mainland one-half mile to the north. Same error on chart 285 (Ed. 11/21/37)

LANDMARKS.

The landmarks within the area of this compilation are shown on charts 541 and 369, except the landmark "Siren" on the east dock of Bedloe Island. This landmark is not shown on the compilation as it was not field inspected. All other landmarks are known to be in existence. Siren added upon review, from position given in Chart Letter 203, 1932.

No additional landmarks are recommended. T.M.P.

RECOMMENDATION FOR FURTHER SURVEYS.

This sheet is believed to be complete in all detail of importance for charting and no further surveys are required.

The probable error is not greater than 3 meters in position of well defined objects along the waterfront and not greater than 5 meters for other detail.

Respectfully submitted,

Edmund L. Jones

Edmund L. Jones
Aid, U.S.C.& G.S.

Approved:

J.C. Partington

J.C.Partington
Chief-of-Party

	Remarks	Decisions
1		USGB decision
2	For Auth. of Position see T-6127 (Name List)	USGB decision
3		USGB decision
4		see T-6124
5		USGB decision
6		
7		
8		
9		
10		
11	Upper New York Bay OK for Planimetric Maps.	
12	chtd in 1914 (ch. 369) Black Tom Id.	on B.P. 19161 (1924) USGS & local maps.
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		

M 234

GEOGRAPHIC NAMES

Survey No.

T-5470

Name on Survey	A On Chart No. 369	B On previous survey No. T-6124 T-6127	C * On U.S. quadrangle Chart Maps* 541	D From local information Field insp.	E Board of Estim & Apportionment On local Maps	F	G P. O. Guide or Map	H Rand McNally Atlas	K U.S. Light List GS. Pubn USCP	
Bedloe Island	appd *	*	*							1
Caven Point	appd *	*	*							2
Ellis Island	appd *	*	*		*					3
Newark Bay	appd *	*			*					4
Jersey City	appd *		*		*					5
Claremont	*	*			*		✓	✓		6
Communipaw	*	*			*		✓	✓		7
Bayside Park				*	*	✓				8
Greenville						✓	✓	✓		9
Morris Canal (abandoned)	approved on T5469 T.M.P.									10
upper New York Bay *	"	"	"	T.M.P.						11
Black Tom									✓	12
										13
										14
										15
										16
										17
										18
										19
										20
										21
										22
										23
										24
										25
										26
										27

Names underlined in red approved by ~~E.E.~~ on 5/27/37

M 234

Computation of Geographic Coordinates From Plane Coordinates

Chart No.

Origin of coordinates: Bogart, 1885

Lat. 40 ° 36′ (223.9 m.) Coordinate value of origin N. or S. 20350 feet 6202.7 m

Long. 74 ° 06′ (1367.4 m.) referred to the Zero E. or W. 20250 feet 6172.2 m

Name of station: N.B. 11 (U.S.E.)

Coordinates: N. or S. 12471.20 feet = 3801.23 m.
E. or W. 17315.10 feet = 5277.65 m.

Latitude N. – S. coordinates		Longitude E. – W. coordinates	
N. or S. 32821.20	feet = 10004.0 m.	E. or W. 2934.90	feet = 894.6 m.
+ or – seconds in meters	= 223.9 m.	+ or – seconds in meters	= 1365.6 m.
N. or S. of 40°36′	= 10227.9 m.	E. or W. of 74 °06′	= 471.0 m.
From table + or – 5′	= 9253.7 m.	From table + or – ′	= m.
Lat. (uncorrected) 40°41′	974.2 m.	Longitude 74° 06′	471.0 m.
Curvature	= .0 m.		
★Latitude 40°41′	974.2 m.		

Name of station: N.B. 13 (U.S.E.)

Coordinates: N. or S. 13495.00 feet = 4113.28 m.
E. or W. 16649.60 feet = 5074.81 m.

Latitude N. – S. coordinates		Longitude E. – W. coordinates	
N. or S. 33845.00	feet = 10316.0 m.	E. or W. 3600.40	feet = 1097.4 m.
+ or – seconds in meters	= 223.9 m.	+ or – seconds in meters	= 1365.5 m.
N. or S. of 40° 36′	= 10539.9 m.	E. or W. of 74 °06′	= 268.1 m.
From table + or – 5′	= 9253.7 m.	From table + or – ′	= m.
Lat. (uncorrected) 40° 41′	1286.2 m.	Longitude 74° 06′	268.1 m.
Curvature	= .1 m.		
★Latitude 40° 41′	1286.1 m.		

Name of station: J.F. 6 (U.S.E.)

Coordinates: N. or S. 12740.15 feet = 388321 m.
E. or W. 3933.43 feet = 1198.91 m.

Latitude N. – S. coordinates		Longitude E. – W. coordinates	
N. or S. 33090.15	feet = 10085.9 m.	E. or W. 16316.57	feet = 4973.3 m.
+ or – seconds in meters	= 223.9 m.	+ or – seconds in meters	= 1365.6 m.
N. or S. of 40 °36′	= 10309.8 m.	E. or W. of 74° 06′	= 3607.7 m.
From table + or – 5′	= 9253.7 m.	From table + or – 2′	= 2817.6 m.
Lat. (uncorrected) 40 ° 41′	1056.1 m.	Longitude 74° 03′	(790.1) m. 618.6
Curvature	= 1.7 m.		
★Latitude 40 ° 41′	1054.4 m.		

Computed by E.L.Jones Feb. 1937

Checked by J.C.Partington J.C.P.

★Use in taking out longitude values.

File with history slip of largest scale chart covering this area.

(R - 325)

T5470

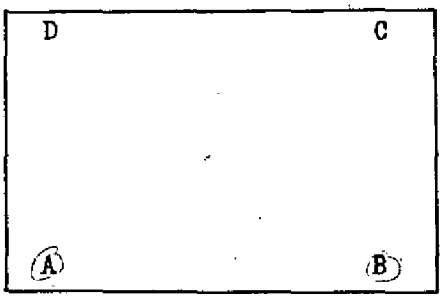
DISTORTION
of
AIR-PHOTO COMPILATION SHEETS
NO. T-5468, T-5469, T-5470

GENERAL.

A series of tests were run on the three above celluloid sheets to determine the relative distortion of the Eastman Acetate and Eastman Nitrate Celluloid Sheets. The sheets are 40x50 inches, with the acetate sheets a greater thickness than the nitrate sheet. The exact thickness not available at this field office.

SCALING *

The following sketch shows location of scaling points.



Sheet	true distance in meters AB	CD	AD & BC	type of sheet
T-5468	4935.2	4932.1	4626.5	Eastman Acetate
T-5469	4933.3	4930.2	4626.9	" "
T-5470	4931.6	4929.0	4626.9	" Nitrate

2782.1

RESULTS

Temperature (F)			Relative humidity	distance scaled in meters							
SHEET	DATE 1937		%	AB	diff	CD	diff	BC	diff	AD	diff
T-5468	Feb.17	71	24	4939.2	+ 4.0	4935.2	+ 3.1	4629.6	+3.1	4629.6	+3.1
	23	77	36	4941.6	+ 6.4	4938.6	+ 6.5	4636.1	+9.6	4636.1	+9.6
	Mar. 2	77	29	4941.5	+6.3	4938.4	+ 6.3	4634.6	+8.1	4633.9	+7.4
	8	79	27	4941.8	+ 6.6	4939.1	+ 7.0	4633.0	+6.5	4634.5	+8.0
	15	79	43	4942.8	+ 7.6	4940.9	+ 8.8	4636.8	+10.3	4636.8	+10.3
	22	83	18	4940.0	+ 4.8	4937.8	+5.7	4632.5	+6.0	4632.9	+6.4
	10-20-38	77	63	4942.5	+7.3	4940.0	+7.9	2785.0	+8.9	2785.0	+8.9
T-5469	Feb.17	71	26	4937.2	+ 3.9	4933.5	+3.3	4631.6	+4.7	4630.8	+3.9
	23	77	36	4943.8	+10.5	4940.8	+10.6	4637.6	+10.7	4636.8	+9.9
	Mar. 2	79	31	4938.0	+ 4.7	4936.8	+ 6.6	4636.3	+9.4	4635.8	+8.9
	8	79	27	4939.0	+ 5.7	4937.0	+ 6.8	4636.8	+9.9	4635.7	+8.8
	15	69	43	4940.9	+ 7.6	4937.1	+ 6.9	4635.2	+8.3	4635.2	+8.3
	22	83	17	4938.0	+ 4.7	4935.0	+4.8	4632.2	+5.3	4632.2	+5.3
	10-20-38	77	63	4939.5	+6.2	4937.5	+7.3	2785.0	+8.9	2784.5	+8.4
T-5470	Feb.17	71	25	4931.1	- 0.5	4923.8	- 5.2	4623.1	-3.8	4623.6	- 3.3
	23	77	36	4933.5	- 1.9	4926.8	- 2.2	4627.2	+0.3	4627.2	+ 0.3
	Mar. 2	77	29	4931.2	- 0.4	4923.7	- 5.3	4625.1	-1.8	4625.1	- 1.8
	8	79	27	4931.5	- 0.1	4924.8	- 4.2	4626.8	-0.1	4625.0	- 1.9
	15	79	43	4933.7	+ 2.1	4925.2	- 3.8	4626.9	0.0	4626.7	- 0.2
	22	83	17	4931.8	+ 0.2	4923.8	- 5.2	4624.3	-2.6	4624.2	- 2.7

scaled distance - true distance = + difference

* meter bar NO. 1083

T 5470

Distortion
of
AIR-PHOTO COMPILATION SHEETS.

Sheet	Maximum change				Kind of celluloid
	AB	CD	BC	AD	
5468	3.6 / 4935.2	5.7 / 4932.1	7.2 / 4626.5	7.2 / 4626.5	Eastman acetate
	0.0729 %	0.1156 %	0.1556 %	0.1556 %	
5469	6.6 / 4933.5	7.3 / 4930.2	6.0 / 4626.9	6.0 / 4626.9	Eastman acetate
	0.1338 %	0.1481 %	0.1297 %	0.1297 %	
5470	2.6 / 4931.6	3.4 / 4929.0	4.1 / 4626.9	3.6 / 4626.9	Eastman nitrate
	0.0527 %	0.0629 %	0.0886 %	0.0778 %	

The above results indicate that both types of celluloid sheets distort practically the same in a longitudinal and a transverse direction. The acetate sheets appear to distort approximately twice as much as the nitrate sheets for the same change in relative humidity.

The "non-shrink" quality of the nitrate sheets are practically offset by the following advantages of the acetate sheet:

1. The acetate sheet is less inflammable.
2. The acetate sheet is more durable and cracks less than the nitrate sheet.
3. Celluloid ink adheres better to an acetate sheet.

Respectfully submitted,

Edmund L. Jones

J.C. Partington

Reviewed
Prof River work
Phila work
Major

REVIEW OF AIR PHOTO COMPILATION T-5470

Data Record

Triangulation to 1931
Recoverable stations of less than 3rd order accuracy to 1934
Photographs to November 1934 and March 1935
Planetable topographic surveys to October 1934
Field inspection to spring 1935

The field inspection was for the interpretation of the photographs. Except for the rocks, piles, dolphins, wrecks, recoverable hydrographic and topographic stations taken from the 1934 planetable surveys, and recoverable hydrographic and topographic stations taken from U. S. Engineers' surveys of 1933, the detail of this compilation is of the date of the photographs.

Comparison with Recent Graphic Control Surveys

The following recent surveys are filed as topographic surveys but have been treated as graphic control surveys in this review:

T-6124 (1934), 1:10,000
T-6127 (1934), 1:10,000

(1) The descriptive report of this compilation (T-5470) on pages 3, 4 and 5 discusses the major differences between the above surveys and the compilation. Discrepancies in triangulation and recoverable hydrographic and topographic stations have been noted in green on the planetable sheets. These differences have been checked and the compilation is correct.

(2) Numerous minor differences not discussed in the descriptive report and not of sufficient importance to mention individually here have been checked and the compilation is correct.

(3) For differences in representation of wrecks and discussion of wrecks refer to page 4 of this review.

(4) These planetable sheets have been carefully compared with the compilation, the photographs and recent hydrographic sheets. In general the field inspection is adequate and the photographs show the detail clearly. The compilation has been corrected against the above sources of information and in case of any differences between the planetable sheets and the compilation, the latter should now be taken as correct.

This compilation is on a scale of 1:5,000 whereas the planetable surveys are on a scale of 1:10,000.

All detail on T-6124 and T-6127 within the area of the compilation is now shown on the compilation except:

(a) Detail proved in error or no longer existing as discussed above.

(b) Heights of wrecks, and rocks awash, changed from planetable designation (such as "awash 3/4 tide") to the equivalent in feet above M.L.W.

(c) The sand and the mud symbol between the high water line and the low water line and the dotted or dashed limit thereof. The approximate low water line as shown on the planetable surveys has already been transferred to the hydrographic sheets and it is usually better developed by the hydrographic surveys and changed considerably. Where mud exists it is so labelled, without limiting lines, on the compilation.

(d) Buoys.

(e) Magnetic declination.

(f) Temporary topographic stations.

Comparison with Previous Topographic Surveys

Except for those surveys treated above as graphic control surveys, the following list gives the previous topographic surveys in the area covered by the compilation:

T- 18 (1837),	1:10,000	T-1575 (1885),	1:5,000
T-482 (1855),	"	T-1579 (1885),	"
T-489 (1855),	"	T-2098 (1892),	1:25,000
T-543 (1855-6),	"	T-2323 (1889),	1:10,000
T-662 (1857-75),	"	T-3150 (1911),	"
T-677 (1857),	1:5,000	T-3226 (1911),	"
T-733 (1858),	1:10,000	T-3431 (1913),	"

Because of the many changes to be expected in an area of this character since the above surveys were made, only a general comparison was made between the above surveys and the compilation.

This compilation is adequate to supersede the portions of the former topographic surveys which it covers, with the following exceptions:

(1) Contours.

(2) A line of piles: T-3226 (1911), 1:10,000, page 17, lat. 40° 41.5', to lat. 40° 42.0' along long. 74° 03.2' approx., extends a line of piles. Most of this area has been filled in, but not all. Part of this line of piles may still exist in the remaining water areas. This area was not entered by the hydrography (1434), the piles cannot be seen on the photographs, and they are not indicated by the field inspection, T-6127, or the current charts. This line of piles was carried on chart 745 (to a varying extent) until T-6127 was applied, when it was entirely dropped.

Although not shown on this compilation, it is recommended that this line of piling should be continued to be charted until definitely disproved, unless information of their non-existence has been received in some form other than T-6127. Since no mention is made concerning these piles in the report or review of T-6127, it is possible that they were missed by that survey.

Comparison with Recent Hydrographic Surveys

H-5607 (1934), 1:10,000
H-5608 (1934), 1:10,000

The shoreline of the above hydrographic surveys was taken from the recent graphic control surveys and therefore differs with this compilation in the same particular as discussed under the graphic control survey comparison. These differences are of minor importance and have not been corrected on the hydrographic surveys which have been completed and applied to the charts.

H-5607 - Lat. 40° 41.1', long. 74° 03.8'. Wreck shown sunken on hydrographic sheet is shown above low water on compilation. Parts of the wreck can be seen on photographs taken 1 1/2 hours before high water and appear awash then. The wreck must therefore be above low water as shown on the compilation.

H-5608 - Lat. 40° 41.8', long. 74° 06.7'. Wreck above high water exists but is not shown on compilation because of tracing limit of compilation. Located by 2 fixed positions by hydrography so no check by photographs considered necessary.

Comparison with Charts

Because the current large scale charts of this area were prepared largely from the 1934 topographic and hydrographic surveys, the differences discussed in connection with those surveys apply also to the charts. Other differences are as follows:

Chart 745 (edition 4/2/37)

(1) Lat. 40° 42.1', long. 74° 02.4'. A sunken wreck near Ellis Island is not on the compilation or T-6127, and the area was skipped on ~~this compilation~~ H-5607. The existence of this wreck can not therefore be disproved, and it should continue to be carried.

(2) Lat. 40° 42.2', long. 74° 02.5'. A sunken wreck is shown alongside pier 9. It should be changed to above low water as indicated by the compilation and T-6127.

Chart 287 (edition 5/28/36)

(1) Lat. 40° 42.1', long. 74° 06.1'. Mud should be shown in this cove instead of marsh.

(2) Landmark, "Spire (Lutheran Church)" should not be in middle of street intersection. The correct relation to the streets is shown on compilation.

Chart 541 (edition 10/26/36)

Differences summarized on chart section which accompanies this review.

Other Comparisons

Coast Pilot of this area checked and no differences noted except in names, which were reported to Coast Pilot Section.

Remarks

Landmarks and Aids to Navigation

(1) Spire (Lutheran Church) added to compilation upon review because it was shown on charts and no information discredited it. Position is triangulation station Spire German Lutheran Church, 1913, old datum geographic position adjusted to N. A. 1927.

(2) Siren, on Bedloe Island, added to compilation upon review in position indicated on chart letter 303 (1932).

Recoverable topographic stations - Descriptions on Form 524 are filed under the numbers of the following surveys: T-5470, T-6124, T-6127.

Wrecks

On this sheet the term "wreck" includes a number of grounded abandoned vessels, hulks and barges which are subject to considerable change either by removal, movement or addition. The representation on the compilation is of the date of the latest photographs (March 27, 1935) and the field inspection (to spring of 1935) except the sunken wrecks, wrecks slightly above low water or in the shadow of piers, which were transferred from October 1934 planetable sheets. Wrecks above high water are outlined with solid lines; those above low water with a dashed line.

(1) Lat. 40° 42.2', long. 74° 06.2'. Two wrecks are shown with a sunken wreck symbol inside the low water line. This probably indicates debris sunk in the mud flats. Although not visible on the photos or mentioned in the field inspection notes, these wrecks have been transferred exactly as shown on T-6124.

(2) Lat. 40° 41.5', long. 74° 03.1'. On T-6127 a sunken wreck symbol is shown and labeled, "Awash at 1/2 tide, surrounded by piling". This representation was transferred directly from T-6127 to the compilation because the wreck could not be seen on the photos and there were no field inspection notes.

(3) Lat. 40° 41.8', long. 74° 06.2',
" 40 42.1 " 74 06.2. Area of barges aground not adequately covered by field notes. The whole area of barges as seen on the photographs was outlined and labeled because those afloat could not be distinguished from those aground. This approximates the representation on T-6124.

(4) Lat. 40° 41.6', long. 74° 04.5',
" 40 41.7 " 74 03.5 . Wrecks shown sunken on T-6127 are correctly shown as above high water on the compilation.

Accuracy

The statement of accuracy given in the report appears correct. Most detail appears to have been located within the stated 2 m. probably error. The 5 m. probably error would apply more to the southwest side of the sheet and to a small area inshore on the northeast side, than elsewhere.

General

There have been a number of minor changes made on this sheet upon review to apply data called for in the field inspection notes and/or the graphic control sheets. The most important are:

(1) The wrecks discussed on pages 4 and 5, under Wrecks, paragraphs 1, 2, 3.

(2) Lat. 40° 41.5', long. 74° 04.5'. Dock ruins north of island added as on T-6127. Not visible on photographs.

(3) A number of wrecks and piles, some visible and some not visible on photographs, were transferred from T-6127 if their existence seemed possible.

(4) Triangulation station Spire, German Lutheran Church and the aid "Siren", Bedloe Island, as discussed on page 4.

Additional work

This survey is complete and adequate for chart compilation except for the location of submerged pipe lines and cable crossings.

It is suggested that when the next survey is made in this vicinity, the following items, not definitely established by this survey, receive attention:

(1) Lat. 40° 42.1', long. 74° 02.4', sunken wreck near Ellis Island. Existence or non-existence.

(2) Line of piles shown on T-~~6326~~ 3226; Lat. 40° 41.5', to 40° 42.0' in approx. long. 74° 03.2'. Extent remaining.

(3) Siren, Bedloe Island. Location with regard to building and dock.

July 6, 1937.

T. M. Price, Jr.

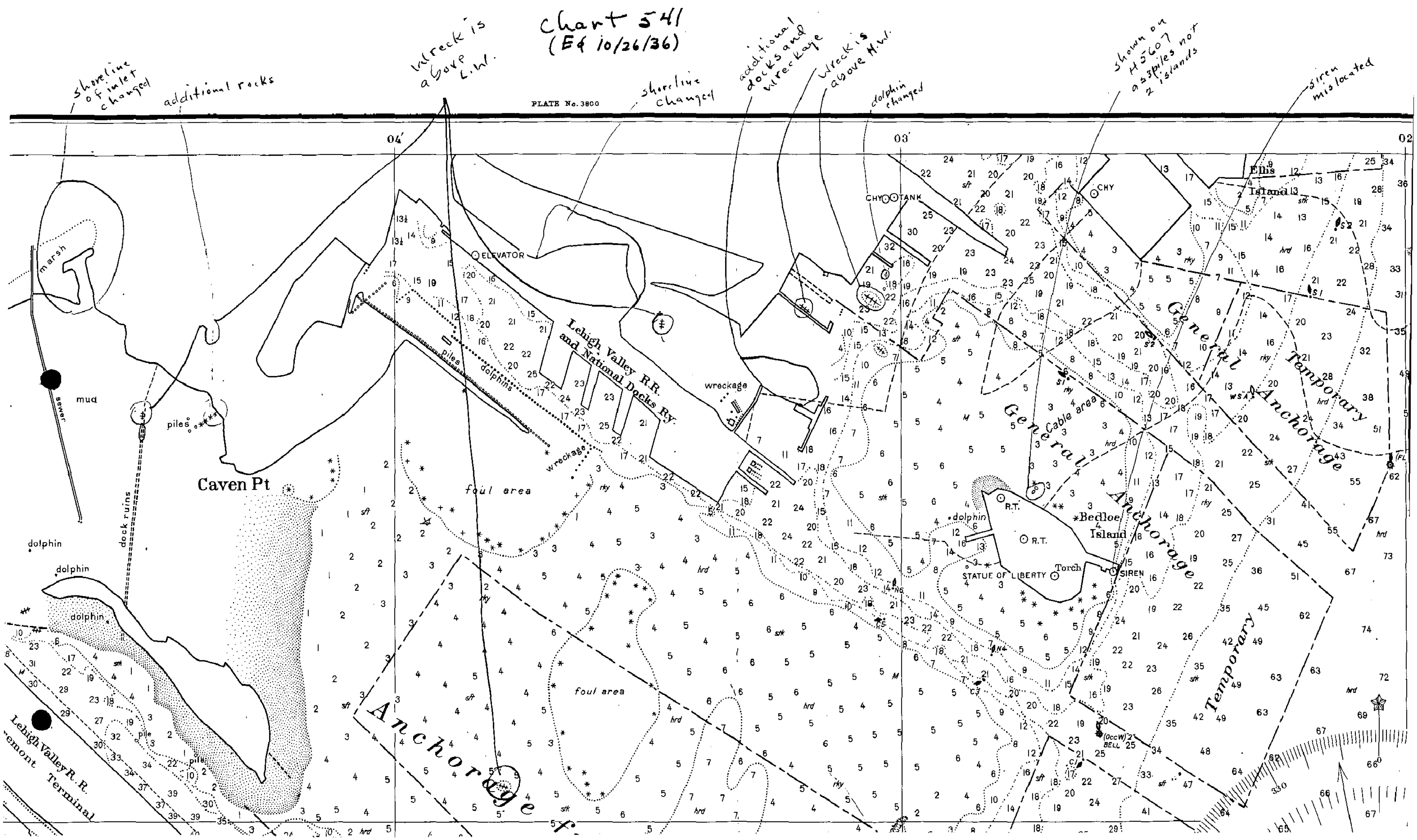


Chart 541
(E4 10/26/36)
PLATE No. 3800
shoreline of inlet changed
additional rocks
wreck is above L.W.
shoreline changed
additional docks and wreckage
wreck is above H.W.
dolphin changed
shown on H5607 as 3 piles not 2 islands
siren mislocated
Caven Pt
Lehigh Valley R.R. and National Docks Ry.
Lehigh Valley R.R.
Terminal
ELEVATOR
CHY
TANK
Ellis Island
Bedloe Island
STATUE OF LIBERTY
Torch
SIREN
General Anchorage
Temporary Anchorage
Anchorage
Temporary
Cable area
foul area
wreckage
dock ruins
dolphin
dolphins
piles
marsh
mud
sewer

REVIEW OF AIR PHOTO COMPILATION NO. T-5470 F.A. Riddel

Chief of Party: J.C. Partington Compiled by: E.L. Jones

Project: HT-175 Instructions dated: Mar. 14, 1934

1. The charts of this area have been examined and topographic information necessary to bring the charts up to date is shown on this compilation. (Par. 16a, b,c,d,e,g and i; 26; and 64)

2. Change in position, or non-existence of wharfs, lights, and other topographic detail of particular importance to navigation which affect the chart, is discussed in the descriptive report. (Par. 26; and 66 g,n)

3. Ground surveys by plane table, ~~sextant~~, or theodolite have been used to supplement the photographic plot where necessary to obtain complete information, and all such surveys are discussed in the descriptive report. (Par. 65; and 66 d,e)

Certain rocks, dolphins, etc. taken from topographic sheet 6127. Noted on overlay sheet. Certain rec. stations located by plane table. U.S.E. location of rec. stations probably was by theodolite.

4. Blue-prints and maps from other sources which were transmitted by the field party contain sufficient control for their application to the charts. (Par. 28)

No blue-prints or maps transmitted.
A blue print showing street names is filed in air photo section.

5. Differences between this compilation and contemporary plane table and hydrographic surveys have been examined ~~and rectified~~ in the field before forwarding the compilations to the office and are discussed in the descriptive report.

Discussed in descriptive report, and reviewed

6. The control and adjustment of the photo plot are discussed in the descriptive report. Unusual or large adjustments are discussed in detail and limits of the area affected are stated. (Par. 12b; 44; and 66 c,h,i)

7. High water line on marshy ~~and mangrove~~ coast is clear and adequate for chart compilation. (Par. 16a, 43, and 44)

NOTE: Strike out paragraphs, words or phrases not applicable and modify those requiring it. Paragraph numbers refer to those in the Topographic Manual. Refer also to the pamphlet "Notes on the Compilation of Planimetric Line Maps from Five Lens Air Photographs." M-67

8. The representation of low water lines, reefs, ~~coral reefs~~ and rocks, and legends pertaining to them is satisfactory. (Par. 36, 37, 38, 39, 40, 41)

No notes by field inspection party concerning amount rocks and wrecks bare at low water. No limit shown on this sheet. T.M.P.

9. Recoverable objects have been located and described on Form 524 in accordance with circular 30, 1933, circular letter of March 3, 1933, and circular 31, 1934. (Par. 29, 30, and 57)

10. A list of landmarks was furnished on Form 567 and instructions in the Director's letter of July 16, 1934, Landmarks for Charts, complied with. (Par. 16d, e; and 60)

No additional landmarks recommended.

Change in location of Siren, Bedloe I., as shown on chart 746(Ed. 4/2/37) to the location shown on compilation, is recommended.

11. All bridges shown on the compilation are accompanied by a note stating whether fixed or draw, clearance, and width of draw if a draw bridge. Additional information of importance to navigation is given in the descriptive report. (Par. 16c)

No bridges.

12. Geographic names are shown on the overlay tracing. The accepted local usage of new names has been determined and they are listed in the report, together with a general statement as to source of information and a specific statement when advisable. Complete discussion of place names differing from the charts and from the U. S. G. S. Quadrangles is given in the descriptive report, together with reasons for recommendations made. (Par. 64, and 66k) ✓

13. The geographic datum of the compilation is N.A. 1927 and the reference station is correctly noted. ✓

14. Junctions with adjoining compilations have been examined and are in agreement. (Par. 66j) ✓

15. The drafting is satisfactory and particular attention has been given the following:

    1. Standard symbols authorized by the Board of Surveys and Maps have been used throughout except as noted in the report. ✓

    2. The degrees and minutes of Latitude and Longitude are correctly marked. ✓

3. All station points are exactly marked by fine black dots. ✓

4. Closely spaced lines are drawn sharp and clear for printing. ✓

5. Topographic symbols for similar features are of uniform weight. ✓

6. All drawing has been retouched where partially rubbed off. ✓

7. Buildings are drawn with clear straight lines and square corners where such is the case on the ground. ✓

(Par. 34 ✓, 35 ✓, 36 ✓, 37 ✓, 38 ✓, 39 ✓, 40 ✓, ~~41~~, 42 ✓, 43 ✓, 44 ✓, 45 ✓, 46 ✓, 48 ✓)

16. No additional surveying is recommended at this time. ✓

17. Remarks:

18. Examined and approved;

J.C. Partington
Chief of Party

19. Remarks after review in office:
Some detail was not drawn heavy enough; i.e. certain R.R. tracks, roads, bldg. crosshatching too fine and light for good printing.

Reviewed in office by: B.J. Jones ✓
T.M. Price
July 6, 1937

Examined and approved:

acting Chief, Section of Field Records — Fred L. Peacock, Chief, Section of Field Work

L.O. Colbert
Chief, Division of Charts

G Rude
Chief, Division of Hydrography and Topography.

M-350

T-5170

NEW JERSEY GRID
PLANE COORDINATE GRID SYSTEM

Positions of grid intersections used for fitting the grid to this compilation were computed by Division of Geodesy and the computation forms are included in this report.

Positions plotted by R. E. Ask, H. D. Reed, Jr.

Positions checked by _____

Grid inked ~~on machine~~ by hand by H. D. Reed, Jr.

Intersections inked by H. D. Reed, Jr.

Points used for plotting grid:

x 2,174,000 FT. y 686,000 FT	x 2,166,000 y 686,000
x 2,174,000 y 674,000	x 2,166,000 y 674,000
x 2,156,000 y 674,000	x 2,166,000 y 686,000
x 2,156,000 y 686,000	x y

Triangulation stations used for checking grid:
X = 2,167,122.28 FT, Y = 679,246.69 FT.

1. Lehigh Grain Elevator, 1930
2. Statue of Liberty, 1887
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Form No. 748
DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Ed. May 1935

T-5470-∞

GEODETIC POSITIONS FROM TRANSVERSE MERCATOR COORDINATES

STATE N. J. STATION

x	2,174,000.00	$\log S_g$	5.24054423
K	2,	$\log (1200/3937)$	9.48401583
x' $(=x-K)$	+ 174,000.00	$\log (1/R)$	1086
$x'^3/(6\rho_o^2)_g$	− 2.01	$\log S_m$	4.72457092
S_g	173,997.99	cor. arc to sine	− 499
		$\log S_1$	4.72456593
$3 \log x'$	15.72164775	$\log A$	8.50910028
$\log 1/(6\rho_o^2)_g$	4.58102138	$\log \sec \phi$	0.12035111
$\log x'^3/(6\rho_o^2)_g$	0.30266690	$\log \Delta\lambda_1$	3.35401732
		cor. sine to arc	+ 869
$\log S_m^2$	9.44914184	$\log \Delta\lambda$	3.35402601
$\log C$	1.339261	$\Delta\lambda$	2259.5711
$\log \Delta\phi$	0.7884403		
y	686 000.00		
ϕ' (by interpolation)	40 42 59.4417	λ (central mer.)	74 40
$\Delta\phi$	− 6.1433	$\Delta\lambda$	− 37 39.5711
ϕ	40 42 53.6984	λ	74 02 20.4289

146.20 mm 95.90 mm

Explanation of form:

$x'=x-K$

$S_g=x'-\dfrac{x'^3}{(6\rho_o^2)_g}$

$S_m=\dfrac{1}{R}\left(\dfrac{1200}{3937}\right)S_g$

R=scale reduction factor

ϕ' is interpolated from table of y

$\Delta\phi=C\,S_m^2$

$\phi=\phi'-\Delta\phi$

$\Delta\lambda_1=S_1 A \sec\phi$

$\log S_1=\log S_m-$cor. arc to sine

$\log \Delta\lambda=\log \Delta\lambda_1+$cor. arc to sine

$\lambda=\lambda$ (central mer.)$-\Delta\lambda$

U. S. GOVERNMENT PRINTING OFFICE 11—11621

T-5470-b

Form No. 743
DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Ed. May 1935

GEODETIC POSITIONS FROM TRANSVERSE MERCATOR COORDINATES

STATE N-J. STATION

x	2,174,000.00	$\log S_g$	5.24054423
K	2	$\log (1200/3937)$	9.48401583
x' $(=x-K)$	174,000.00	$\log (1/R)$	1686
$x'^3/(6\rho_o^2)_g$	− 2.01	$\log S_m$	4.72457092
S_g	173,997.99	cor. arc to sine	− 499
		$\log S_1$	4.72456593
3 $\log x'$	15.72164775	$\log A$	8.50910118
$\log 1/(6\rho_o^2)_g$	4.5810213	$\log \sec \phi$	0.1201363 8
$\log x'^3/(6\rho_o^2)_g$	0.3026690	$\log \Delta\lambda_1$	3.3538034 3
		cor. sine to arc	+ 868
$\log S_m^2$	4.4491418 4	$\log \Delta\lambda$	3.3538121 1
$\log C$	1.3348760	$\Delta\lambda$	2256.4585
$\log \Delta\phi$	0.7871902		
y	674 000.00		
ϕ' (by interpolation)	40° 41′ 01.2632	λ (central mer.)	74° 40′
$\Delta\phi$	− 6.1362	$\Delta\lambda$	− 37 38.4585
ϕ	40 40 55.1270	λ	74 02 21.5415

155.02 mm

101.17 mm

Explanation of form:

$x'=x-K$

$S_g=x'-\frac{x'^3}{(6\rho_o^2)_g}$

$S_m=\frac{1}{R}\left(\frac{1200}{3937}\right)S_g$

R=scale reduction factor

ϕ' is interpolated from table of y

$\Delta\phi=C\,S_m^2$

$\phi=\phi'-\Delta\phi$

$\Delta\lambda_1=S_1 A \sec\phi$

$\log S_1=\log S_m-$cor. arc to sine

$\log \Delta\lambda=\log \Delta\lambda_1+$cor. arc to sine

$\lambda=\lambda$ (central mer.)$-\Delta\lambda$

U. S. GOVERNMENT PRINTING OFFICE 11—11521

Form No. 743
DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Ed. May 1935

C-1

T-5470-C

3

GEODETIC POSITIONS FROM TRANSVERSE MERCATOR COORDINATES

STATE N. J. STATION

x	2,156,000.00	$\log S_g$	5.19312056
K	2,	$\log (1200/3937)$	9.48401583
x' $(=x-K)$	156,000.00	$\log (1/R)$	1086
$x'^3/(6\rho_o^2)_g$	− 1.45	$\log S_m$	4.67714725
S_g	155,998.55	cor. arc to sine	− 401
		$\log S_1$	4.67714324
$3 \log x'$	15.57937380	$\log A$	8.50910111
$\log 1/(6\rho_o^2)_g$	4.58102133	$\log \sec \phi$	0.12013456
$\log x'^3/(6\rho_o^2)_g$	0.16039513	$\log \Delta\lambda_1$	3.30634291
		cor. sine to arc	+ 697
$\log S_m^2$	9.35426450	$\log \Delta\lambda$	3.30638988
$\log C$	1.33876060	$\Delta\lambda$	~~2034.1423~~ 2024.8361
$\log \Delta\phi$	0.69305 4		
y	674 000.00		
ϕ' (by interpolation)	40 41 01.2432	λ (central mer.)	74 40
$\Delta\phi$	− 4.9324	$\Delta\lambda$	− 33 44.8361 15.1639
ϕ	40 40 56.3308	λ	74 06 05.4172

162.44 mm

71.22 mm

Explanation of form:

$x'=x-K$

$S_g=x'-\frac{x'^3}{(6\rho_o^2)_g}$

$S_m=\frac{1}{R}\left(\frac{1200}{3937}\right)S_g$

R=scale reduction factor

ϕ' is interpolated from table of y

$\Delta\phi=C\,S_m^2$

$\phi=\phi'-\Delta\phi$

$\Delta\lambda_1=S_1 A \sec\phi$

$\log S_1=\log S_m-$cor. arc to sine

$\log \Delta\lambda=\log \Delta\lambda_1+$cor. arc to sine

$\lambda=\lambda$ (central mer.)$-\Delta\lambda$

U. S. GOVERNMENT PRINTING OFFICE 11—11021

Form No. 743
DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Ed. May 1935

T-5470-d

GEODETIC POSITIONS FROM TRANSVERSE MERCATOR COORDINATES

STATE N. J. STATION

x	2,156,000.00	$\log S_g$	5.19312056
K	2	$\log (1200/3937)$	9.48401583
x' $(=x-K)$	2,156,000.00	$\log (1/R)$	.1086
$x'^3/(6\rho_o^2)_g$	− 1.45	$\log S_m$	4.67714725
S_g	155,998.55	cor. arc to sine	− 401
		$\log S_1$	4.67714324
3 log x'	15,579373380	$\log A$	4.50910027
$\log 1/(6\rho_o^2)_g$	4.58102133	$\log \sec \phi$	0.12035330
$\log x'^3/(6\rho_o^2)_g$	0.16039511	$\log \Delta\lambda_1$	3.30655681
		cor. sine to arc	+ 698
$\log S_m^2$	9.35425450	$\log \Delta\lambda$	3.30660379
$\log C$	1.33926 1	$\Delta\lambda$	2025.8337
$\log \Delta\phi$	0.69355 6		
y	686		
ϕ' (by interpolation)	40° 42′ 59.84417″	λ (central mer.)	74° 40′ 0″
$\Delta\phi$	− 4.9381	$\Delta\lambda$	33′ 45.8337″
ϕ	40° 42′ 54.9036″	λ	74° 06′ 14.1663″

153.64 mm

66.50 mm

Explanation of form:

$x'=x-K$

$S_g=x'-\frac{x'^3}{(6\rho_o^2)_g}$

$S_m=\frac{1}{R}\left(\frac{1200}{3937}\right)S_g$

R=scale reduction factor

ϕ' is interpolated from table of y

$\Delta\phi=C\,S_m^2$

$\phi=\phi'-\Delta\phi$

$\Delta\lambda_1=S_1 A \sec\phi$

$\log S_1=\log S_m-$cor. arc to sine

$\log \Delta\lambda=\log \Delta\lambda_1+$cor. arc to sine

$\lambda=\lambda$ (central mer.)$-\Delta\lambda$

U. S. GOVERNMENT PRINTING OFFICE 11—11521

Form No. 743
DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Ed. May 1965

T-5470-e

5

GEODETIC POSITIONS FROM TRANSVERSE MERCATOR COORDINATES

STATE N. J. STATION

x	2,166,000.00	$\log S_g$	5.2201 0354
K	2	$\log (1200/3937)$	9.4840 1583
x' $(=x-K)$	166,000.00	$\log (1/R)$	1086
$x'^3/(6\rho_o^2)_g$	− 1.74	$\log S_m$	4.7041 3023
S_g	165,998.26	cor. arc to sine	− 454
		$\log S_1$	4.7041 2569
3 log x'	15.6603 2427	$\log A$	8.5091 0069
$\log 1/(6\rho_o^2)_g$	4.5810 2133	$\log \sec \phi$	0.1202 4472
$\log x'^3/(6\rho_o^2)_g$	0.2413 4560	$\log \Delta\lambda_1$	3.3334 7110
		cor. sine to arc	+ 760
$\log S_m^2$	9.4082 6045	$\log \Delta\lambda$	3.3334 7870 d
$\log C$	1.3390 11	$\Delta\lambda$	2155.1574
$\log \Delta\phi$	0.7472 71		
	−		
y	680 000.00		
ϕ' (by interpolation)	40 42 00.5525	λ (central mer.)	74 40
$\Delta\phi$	− 5.5842	$\Delta\lambda$	35 55.1574
ϕ	40 41 54.9683	λ	74 04 04.8426

154.01 mm

22.74 mm

Explanation of form:

$x'=x-K$

$S_g=x'-\frac{x'^3}{(6\rho_o^2)_g}$

$S_m=\frac{1}{R}\left(\frac{1200}{3937}\right)S_g$

R=scale reduction factor

ϕ' is interpolated from table of y

$\Delta\phi=C\,S_m^2$

$\phi=\phi'-\Delta\phi$

$\Delta\lambda_1=S_1 A \sec\phi$

$\log S_1=\log S_m-$cor. arc to sine

$\log \Delta\lambda=\log \Delta\lambda_1+$cor. arc to sine

$\lambda=\lambda$ (central mer.)$-\Delta\lambda$

U. S. GOVERNMENT PRINTING OFFICE 11—11501

5470

Geodetic positions from transverse Mercator coordinates

State New Jersey Station Grid intersection

x	2,166,000	log S_g	5.22010354
C	2 — —	log (1200/3937)	9.48401583
x' (=x−C)	+ 166,000	log (1/R)	1086
$x'^3/(6\rho_o^2)_g$	− 1.74	log S_m	4.70413023
S_g	165,998.26	cor. arc to sine	− 454
		log S_1	4.70412569
log S_m^2	9.408260	log A	8.509101 11
log C	1.338760	log sec ϕ	0.120137 38
log $\Delta\phi$	0.747020	log $\Delta\lambda_1$	3.33336 348
		cor. sine to arc	+ 790
y	674,000	log $\Delta\lambda$	3.33337 138
ϕ'(by interpolation)	40° 41′ 01″.2632	$\Delta\lambda$	2154″.6259
$\Delta\phi$	− 5.5850	λ (central mer.)	74° 40′ ″
ϕ	40 40 55.6782	$\Delta\lambda$	35 54.6259
		λ	74 04 05.3731

Station Grid intersection

x	2,166,000	log S_g	5.
C		log (1200/3937)	9.48401583
x' (=x−C)	+ 166,000	log (1/R)	
$x'^3/(6\rho_o^2)_g$	−	log S_m	
S_g	165,998.26	cor. arc to sine	−
		log S_1	4.70412569
log S_m^2	9.408260	log A	8.509100 27
log C	1.339261	log sec ϕ	0.120352 43
log $\Delta\phi$	0.747521	log $\Delta\lambda_1$	3.333578 397
		cor. sine to arc	+ 791
y	686,000	log $\Delta\lambda$	3.33358598
ϕ'(by interpolation)	40° 42′ 59.8417	$\Delta\lambda$	2155″.6884
$\Delta\phi$	− 5.5914	λ (central mer.)	74° 40′ ″
ϕ	40 42 54.2503	$\Delta\lambda$	35 55.6884
		λ	74 04 04.3116

(M-29)

(over)

Explanation of form:

$$x' = x - C$$

$$S_g = x' - \frac{x'^3}{(6\rho_o^2)_g}$$

$$S_m = \frac{1}{R}\left(\frac{1200}{3937}\right)S_g$$

R = scale reduction factor

ϕ' is interpolated from table of y

$\Delta\phi = C\, S_m^2$

$\phi = \phi' - \Delta\phi$

$\Delta\lambda_1 = S_1 A \sec\phi$

$\log S_1 = \log S_m$ − cor. arc to sine

$\log \Delta\lambda = \log \Delta\lambda_1 +$ cor. arc to sine

$\lambda = \lambda$(central mer.) $- \Delta\lambda$

5470

PLANE COORDINATES ON TRANSVERSE MERCATOR PROJECTION

State N.J. Station Grid intersection 71

λ (Central meridian) 74° 40' "

φ 40° 40' 55.6782 λ 74 04 05.3731

Δλ (Central meridian−λ) +35 54.6269

Δλ (in sec.) + 2154.6269

log Δλ	3.33337208	log S_m^2	9.408260
Cor. arc to sine	− 790	log C*	1.338760
log $\Delta\lambda_1$	3.33336418	log Δφ	0.747020
log cos φ	9.87986262		
colog A	1.49089889	φ	40° 40' 55.6782
log S_1	4.70412569	Δφ	+ 5.5850
Cor. sine to arc	+ 454	φ'	41 01.2632
log S_m	4.70413023		
log 3937/1200	0.51598417	Tabular difference of y for 1" of φ'	101.19867
log R	− 1086		
log S_g	5.22010354	y (for min. of φ')	673,872.17
log S_g^3	15.6603106	y (for seconds of φ')	+ 127.83
log $1/6\rho_o^2R^2$	4.5810213	y	674,000.00
log $(S_g^3/6\rho_o^2)_g$	0.2413319		
		log sin $\frac{\phi+\phi'}{2}$	
S_g	165,998.261	log Δλ	
$(S_g^3/6\rho_o^2)_g$	1.743	log $\Delta\alpha_1$	
x'	+ 166,000.00		
	2,000,000.00	log $(\Delta\lambda)^3$	
x	2,166,000.00	log F	
		log b	
		$\Delta\alpha_1$	"
		b	
		$\Delta\alpha$	"
		$\Delta\alpha$	° ' "

* Take out C first for φ and correct for approximate φ'.

(R 349)

$$x = 2{,}000{,}000.00 + x'$$

$$x' = S_g + \left(\frac{S_g^3}{6\rho_0^2}\right)_g$$

$$S_g = \frac{3937}{1200} S_m R$$

$$\log S_m = \log S_1 + \text{cor. sine to arc}$$

$$S_1 = \frac{\Delta\lambda_1 \cos\phi}{A}$$

$$\log \Delta\lambda_1 = \log \Delta\lambda - \text{cor. arc to sine}$$

$$\left(\frac{S_g^3}{6\rho_0^2}\right)_g = \frac{S_g^3}{6\rho_0^2 R^2}$$

$$\phi' = \phi + \Delta\phi$$

$$\Delta\phi = C S_m^2$$

$$\Delta\alpha = \Delta\lambda \sin\frac{\phi + \phi'}{2} + F(\Delta\lambda)^3$$

S_m = distance in meters from point to central meridian

S_1 = distance in meters from point to central meridian reduced to sine

S_g = grid distance in feet from point to central meridian

R = scale reduction factor

Values of y in minutes and tabular difference for one second, scale reduction factors, colog A, and log C are given in auxiliary tables.

5470

PLANE COORDINATES ON TRANSVERSE MERCATOR PROJECTION

State N. J. Station Grid intersection

ϕ 40° 42' 54.2503 — λ (Central meridian) 74° 40' "

λ 74 04 04.3116

$\Delta\lambda$ (Central meridian–λ) +35 55.6884

$\Delta\lambda$ (in sec.) " + 2155.6884

log $\Delta\lambda$	3.33358598	log S_m^2	9.408260
Cor. arc to sine	− 791	log C*	1.339261
log $\Delta\lambda_1$	3.33357807	log $\Delta\phi$	0.747521
log cos ϕ	9.87964789		
colog A	1.49089973	ϕ	40° 42' 54.2503
log S_1	4.70412569	$\Delta\phi$	+ 5.5914
Cor. sine to arc	+ 454	ϕ'	59.8417
log S_m	4.70413023		
log 3937/1200	0.51598417	Tabular difference of y for 1" of ϕ'	101.19883
log R	− 1086		
log S_g	5.22010354	y (for min. of ϕ')	679,944.09
log S_g^3	15.6603106	y (for seconds of ϕ')	+ 6,055.91
log $1/6\rho_o^2R^2$	4.5810213	y	686,000.00
log $(S_g^3/6\rho_o^2)_g$	0.2413319		
		log sin $\frac{\phi+\phi'}{2}$	
S_g	165,998.261	log $\Delta\lambda$	
$(S_g^3/6\rho_o^2)_g$	1.743	log Δa_1	
x'	+ 166,000.00		
	2,000,000.00	log $(\Delta\lambda)^3$	
x	2,166,000.00	log F	
		log b	
		Δa_1	"
		b	
		Δa	"
		Δa	° ' "

* Take out C first for ϕ and correct for approximate ϕ'.

(R 349)

$$x = 2{,}000{,}000.00 + x'$$

$$x' = S_g + \left(\frac{S_g^3}{6\rho_0^2}\right)_g$$

$$S_g = \frac{3937}{1200} S_m R$$

$$\log S_m = \log S_1 + \text{cor. sine to arc}$$

$$S_1 = \frac{\Delta\lambda_1 \cos\phi}{A}$$

$$\log \Delta\lambda_1 = \log \Delta\lambda - \text{cor. arc to sine}$$

$$\left(\frac{S_g^3}{6\rho_0^2}\right)_g = \frac{S_g^3}{6\rho_0^2 R^2}$$

$$\phi' = \phi + \Delta\phi$$

$$\Delta\phi = C S_m^2$$

$$\Delta\alpha = \Delta\lambda \sin\frac{\phi + \phi'}{2} + F(\Delta\lambda)^3$$

S_m = distance in meters from point to central meridian

S_1 = distance in meters from point to central meridian reduced to sine

S_g = grid distance in feet from point to central meridian

R = scale reduction factor

Values of y in minutes and tabular difference for one second, scale reduction factors, colog A, and log C are given in auxiliary tables.

5410

PLANE COORDINATES ON TRANSVERSE MERCATOR PROJECTION

State N.J. Station Statue of Liberty (1887)

ϕ 40° 41' 20.648 λ (Central meridian) 74° 40'

λ 74 02 41.892

$\Delta\lambda$ (Central meridian−λ) +37 18.108

$\Delta\lambda$ (in sec.) +2238.108

log $\Delta\lambda$	3.34988104	log S_m^2	9.4411188
Cor. arc to sine	− 852	log C*	1.3388678
log $\Delta\lambda_1$	3.34987252	log $\Delta\phi$	0.7800556
log cos ϕ	9.87981742		
colog A	1.49089906	ϕ	40° 41' 20.648
log S_1	4.72058900	$\Delta\phi$	+ 6.0264
Cor. sine to arc	+ 490	ϕ'	26.6744
log S_m	4.72059390		
log 3937/1200	0.51598417	Tabular difference of y for 1" of ϕ'	101.1987
log R	− 1086		
log S_g	5.23656721	y (for min. of ϕ')	673,872.17
log S_g^3	15.7097016	y (for seconds of ϕ')	+ 2,699.41
log $1/6\rho_o^2R^2$	4.5810213	y	676,571.58
log $(S_g^3/6\rho_o^2)_g$	0.2907229		
		log sin $\frac{\phi+\phi'}{2}$	
S_g	172,411.889	log $\Delta\lambda$	
$(S_g^3/6\rho_o^2)_g$	1.953	log $\Delta\alpha_1$	
x'	+ 172,413.84		
	2,000,000.00	log $(\Delta\lambda)^3$	
x	2,172,413.84	log F	
		log b	
		$\Delta\alpha_1$	"
		b	
		$\Delta\alpha$	"
		$\Delta\alpha$	° ' "

* Take out C first for ϕ and correct for approximate ϕ'.

(R 349)

$$x = 2{,}000{,}000.00 + x'$$

$$x' = S_g + \left(\frac{S_g^3}{6\rho_0^2}\right)_g$$

$$S_g = \frac{3937}{1200} S_m R$$

$$\log S_m = \log S_1 + \text{cor. sine to arc}$$

$$S_1 = \frac{\Delta\lambda_1 \cos\phi}{A}$$

$$\log \Delta\lambda_1 = \log \Delta\lambda - \text{cor. arc to sine}$$

$$\left(\frac{S_g^3}{6\rho_0^2}\right)_g = \frac{S_g^3}{6\rho_0^2 R^2}$$

$$\phi' = \phi + \Delta\phi$$

$$\Delta\phi = C S_m^2$$

$$\Delta\alpha = \Delta\lambda \sin\frac{\phi + \phi'}{2} + F(\Delta\lambda)^3$$

S_m = distance in meters from point to central meridian

S_1 = distance in meters from point to central meridian reduced to sine

S_g = grid distance in feet from point to central meridian

R = scale reduction factor

Values of y in minutes and tabular difference for one second, scale reduction factors, colog A, and log C are given in auxiliary tables.

M-350

T-5470

LONG ISLAND GRID

PLANE COORDINATE GRID SYSTEM

Positions of grid intersections used for fitting the grid to this compilation were computed by Division of Geodesy and the computation forms are included in this report.

Positions plotted by R. E. Ask / H. D. Reed, Jr.

Positions checked by _____

Grid inked on machine by R. E. Ask

Intersections inked by H. D. REED, JR.

Points used for plotting grid:

x 1,988,000 FT. y 178,000 FT.	x 1,980,000 y 172,000
x 1,988,000 y 168,000	x 1,980,000 y 168,000
x 1,972,000 y 168,000	x 1,980,000 y 178,000
x 1,972,000 y 178,000	x y

Triangulation stations used for checking grid:

x=1,982,253.09 Ft., y=171,599.86 Ft.

Ref. Sta. 1. Lehigh Grain Elevator, 1930 5. _____

2. Statue of Liberty, 1887 6. _____

3. _____ 7. _____

4. _____ 8. _____

5470

Form No. 742
DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Ed. May 1935

GEODETIC POSITIONS FROM LAMBERT COORDINATES

STATE La. St. STATION

x	1,988,000.00	R_b+A	24,462,545.30
C	2,	y	178,000.00
x' $(=x-C)$	12,000.00	R_b+A-y	24,284,545.330
log $(x-C)$	4.079181255	$\frac{\theta}{2}$ (in secs.)	
log (R_b+A-y)	7,385329948	log $\frac{\theta}{2}$	
log tan θ	6.693851277	log S	
θ	- ° 0′ 41.″9240	log sin $\frac{\theta}{2}$	0′ 50.″4620
	101.″92398		6.342481823
log θ (θ in secs.)	2.008277637	log sin^2 $\frac{\theta}{2}$	2.745263646
log l	9.815632266	log 2	0.301030000
log $\frac{\theta}{l}$	2.192644411	log R*	7.385329948
$\Delta\lambda$ $(=\frac{\theta}{l})$	155.82724 50	log y''	0.471996444
		y''	2.965
λ (central mer.)	74° ′ ″		
$-\Delta\lambda$	+ 02 35.8272 5	R_b+A-y	24,462,545.30
λ	74 02 35.8272 5	y''	+ 2.96 2.965
	27.35 mm	R	24,462,574.965
		y	178,000.00
		y''	− 2.96 2.965
		y'	177,970.35 97 04
		ϕ (by interpolation)	40 42 50.4578 7215

127.84 mm

$\tan\theta=\frac{x-C}{R_b+A-y}$

$\Delta\lambda=\frac{\theta}{l}$

$\lambda=\lambda$ (central mer.)$-\Delta\lambda$

$y''=2R\sin^2\frac{\theta}{2}$

$y'=y-y''$

C is constant added to x' in computation of coordinates

R_b is map radius of lowest parallel

A is value of y' for R_b; in most cases it is zero

ϕ is interpolated from table of y'

* Use (R_b+A-y) as an approximate value of R and later correct this value when R is obtained below.

U. S. GOVERNMENT PRINTING OFFICE 11—11524

Form No. 742
DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Ed. May 1935

5470

GEODETIC POSITIONS FROM LAMBERT COORDINATES

STATE L. I. STATION

x	1,988,000.00	R_b+A	24,462,545.30
C	2	y	168,000.00
x' $(=x-C)$	12,000.00	R_b+A-y	24,294,545.30
log $(x-C)$	4.079181255	$\frac{\theta}{2}$ (in secs.)	50.9410
log (R_b+A-y)	7.385508772	log $\frac{\theta}{2}$	
log tan θ	6.693672488	log S	
θ	° ′ ″ 0 1 41.8420	log sin $\frac{\theta}{2}$	6.292637263
	101.8″4203		
log θ (θ in secs.)	2.008097558	log sin$^2\frac{\theta}{2}$	2.585275526
log l	9.815632266	log 2	0.3010300
log $\frac{\theta}{l}$	2.192465332	log R*	7.385508772
$\Delta\lambda$ $(=\frac{\theta}{l})$	155.76336	log y''	0.4718140 3
		y''	2.96
λ (central mer.)	74° ′ ″		
$-\Delta\lambda$	02 32 35.7634	R_b+A-y	24,462,545.30
λ	74 02 35.7634	y''	+ 2.96
		R	24,462,548.26
	27.07 mm		
		y	168,000.00
		y''	− 2.96
		y'	167,997.04
		ϕ (by interpolation)	
			40 41 11.9084
			73.47 mm

$\tan\theta=\frac{x-C}{R_b+A-y}$

$\Delta\lambda=\frac{\theta}{l}$

$\lambda=\lambda$ (central mer.)$-\Delta\lambda$

$y''=2R\sin^2\frac{\theta}{2}$

$y'=y-y''$

C is constant added to x' in computation of coordinates

R_b is map radius of lowest parallel

A is value of y' for R_b; in most cases it is zero

ϕ is interpolated from table of y'

* Use (R_b+A-y) as an approximate value of R and later correct this value when R is obtained below.

U.S. GOVERNMENT PRINTING OFFICE 11—11524

Form No. 742
DEPARTMENT OF COMMERCE
U. S. Coast and Geodetic Survey
Ed. May 1935

5470 3
69

GEODETIC POSITIONS FROM LAMBERT COORDINATES

State Lt. Station

x	1 972 000.00	R_b+A	24,462,545.30
C	2,	y	168 000
x' $(=x-C)$	28,000.00	R_b+A-y	24,294,545.30
log $(x-C)$	4.4471 5803	$\frac{\theta}{2}$ (in secs.)	
log (R_b+A-y)	7.3855 0477	log $\frac{\theta}{2}$	
log tan θ	7.0616 4926	log S	
θ	° 0' 57.72246	log sin $\frac{\theta}{2}$	01' 58.8623
	− 237.72464		6.7606 1214
log θ (θ in secs.)	2.3760 7420	log sin$^2\frac{\theta}{2}$	3.5212 3428
log l	9.8156 3226	log 2	0.3010 3000
log $\frac{\theta}{l}$	2.5604 4194	log R*	7.3855 0477
$\Delta\lambda$ $(=\frac{\theta}{l})$	363.44772	log y''	9.2027 7305
		y''	16.14
λ (central mer.)	74 ' "		
$-\Delta\lambda$	06 03.44772	R_b+A-y	24,462,545.30
λ	74 06 03.44772	y''	+ 16.14
	16.19 mm	R	24,462,561.44
		y	168,000.00
		y''	− 16.14
		y'	167,983.86
		ϕ (by interpolation)	40 41 11.77281
			72.66 mm

$\tan\theta=\frac{x-C}{R_b+A-y}$

$\Delta\lambda=\frac{\theta}{l}$

$\lambda=\lambda$ (central mer.)$-\Delta\lambda$

$y''=2R\sin^2\frac{\theta}{2}$

$y'=y-y''$

C is constant added to x' in computation of coordinates

R_b is map radius of lowest parallel

A is value of y' for R_b; in most cases it is zero

ϕ is interpolated from table of y'

* Use (R_b+A-y) as an approximate value of R and later correct this value when R is obtained below.

U. S. GOVERNMENT PRINTING OFFICE 11—11524

5470 4

Form No. 742
DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Ed. May 1935

GEODETIC POSITIONS FROM LAMBERT COORDINATES

STATE N. J. STATION

x	1,972,000.00	R_b+A	24,462,545.30
C	2	y	178,000.00
x' $(=x-C)$	1,794,000.00	R_b+A-y	24,284,545.30
log $(x-C)$	4.44715803	$\frac{\theta}{2}$ (in secs.)	
log (R_b+A-y)	7.38532998	log $\frac{\theta}{2}$	
log tan θ	7.06182805	log S	
θ	° 03′ 57.″8225	log sin $\frac{\theta}{2}$	01′ 58.″9112
	237.″82253		6.76079635
log θ (θ in secs.)	2.37762599	log sin^2 $\frac{\theta}{2}$	3.52159270
log l	5.81663226	log 2	0.30103000
log $\frac{\theta}{l}$	2.56062073	log R*	7.38532998
$\Delta\lambda$ $(=\frac{\theta}{l})$	363.59737	log y''	1.20795268
		y''	16.14
λ (central mer.)	74° ′ ″		
$-\Delta\lambda$	06 03.5974	R_b+A-y	24,284,545.30
λ	74 06 03.5974	y''	+ 16.14
	16.89 mm.	R	24,284,561.44
		y	178,000.00
		y''	− 16.14
		y'	177,983.86
		ϕ (by interpolation)	
			40 42 50.5913

127.03 mm

$\tan\theta=\frac{x-C}{R_b+A-y}$

$\Delta\lambda=\frac{\theta}{l}$

$\lambda=\lambda$ (central mer.)$-\Delta\lambda$

$y''=2R\sin^2\frac{\theta}{2}$

$y'=y-y''$

C is constant added to x' in computation of coordinates

R_b is map radius of lowest parallel

A is value of y' for R_b; in most cases it is zero

ϕ is interpolated from table of y'

* Use (R_b+A-y) as an approximate value of R and later correct this value when R is obtained below.

U.S. GOVERNMENT PRINTING OFFICE 11—11524

Form No. 742
DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Ed. May 1935

5470
69

GEODETIC POSITIONS FROM LAMBERT COORDINATES

STATE Ut. STATION

x	1,980,000.00	R_b+A	24,462,545.30
C	2	y	172,000.00
x' $(=x-C)$	20,000.08	R_b+A-y	24,290,545.30
log $(x-C)$	4.3010 3000	$\frac{\theta}{2}$ (in secs.)	
log (R_b+A-y)	7.3854 3726	log $\frac{\theta}{2}$	
log tan θ	6.9155 9274	log S	
θ	° 02′ 49″.8913	log sin $\frac{\theta}{2}$	′ ″ 01′ 24.9157
	169.8313 1		6.6145 6051
log θ (θ in secs.)	2.2300 1777	log $\sin^2\frac{\theta}{2}$	3.2291 2102
log l	9.8156 3226	log 2	0.3010 3000
log $\frac{\theta}{l}$	2.4143 8551	log R*	7.3854 3726
$\Delta\lambda$ $(=\frac{\theta}{l})$	259.6431	log y''	0.9155 9828
		y''	8.23
λ (central mer.)	74° ′ ″		
$-\Delta\lambda$	04 19.6483	R_b+A-y	24,290,545.30
λ	74 04 19.6483	y''	+ 8.23
	92.26 mm	R	24,290,553.53
		y	172,000.00
		y''	− 8.23
		y'	171,991.77
		ϕ (by interpolation)	40 41 57.3816
			131.91 mm

$\tan\theta=\dfrac{x-C}{R_b+A-y}$

$\Delta\lambda=\dfrac{\theta}{l}$

$\lambda=\lambda$ (central mer.)$-\Delta\lambda$

$y''=2R\sin^2\dfrac{\theta}{2}$

$y'=y-y''$

C is constant added to x' in computation of coordinates

R_b is map radius of lowest parallel

A is value of y' for R_b; in most cases it is zero

ϕ is interpolated from table of y'

* Use (R_b+A-y) as an approximate value of R and later correct this value when R is obtained below.

U.S. GOVERNMENT PRINTING OFFICE 11—11524

Geodetic positions from Lambert coordinates

State Long Island Station Grid intersection

x	1,980,000	$R_b + A$	24,462,545.30
C	2	y	168,000
$x' (= x - C)$	-20,000	$R_b + A - y$	24,294,545.30
tan θ		R	
θ	° ′ ″		
	″	y	168,000
$\frac{\theta}{\ell} (= \Delta\lambda)$		y″	− 8.23
		y′	167,991.77
λ (central mer.)	74° 00′ ″		
$-\Delta\lambda$	− 4 19.6056	ϕ (by interpolation)	40° 41′ 11.8563 ✓
λ	74 04 19.6056		

Station Grid intersection

x	1,980,000	$R_b + A$	24,462,545.30
C	2	y	178,000
$x' (= x - C)$	-20,000	$R_b + A - y$	24,284,545.30
tan θ		R	
θ	° ′ ″		
	″	y	178,000
$\frac{\theta}{\ell} (= \Delta\lambda)$		y″	− 8.24
		y′	177,991.76
λ (central mer.)	74° 00′ ″		
$-\Delta\lambda$	− 4 19.7125	ϕ (by interpolation)	40° 42′ 50.6694 ✓
λ	74 04 19.7125		

$$\tan\theta = \frac{x - C}{R_b + A - y}$$

$$\Delta\lambda = \frac{\theta}{\ell}$$

$\lambda = \lambda$ (central mer.) $- \Delta\lambda$

$R = (R_b + A - y) \sec\theta$

$$y'' = 2R \sin^2\frac{\theta}{2}$$

$y' = y - y''$

C is constant added to x′ in computation of coordinates

R_b is map radius of lowest parallel

A is value of y′ for R_b; in most cases it is zero

ϕ is interpolated from table of y′

Plane coordinates on Lambert projection

State L.I. Station Grid intersection

ϕ = 40° 41′ 11.8563 λ = 74° 04′ 19.6056

Tabular difference of R for 1″ of ϕ = 101.20100

R (for min. of ϕ)		24,295,753.40	y′ (for min. of ϕ)		166,791.90
Cor. for sec. of ϕ		− 1 199.87	Cor. for sec. of ϕ		+ 1 199.87
R		24,294,553.53	y′		167,991.77
			y″ (=2R sin² $\frac{\theta}{2}$)		+ 8.23
θ (for min. of λ)		− 0° 02′ 36.97970	y		168,000.00
Cor. for sec. of λ		− 12.82367			
θ		− 2 49.80337	$\frac{\theta}{2}$		° 1 ′ 24.901685
θ''	For machine computation	″		For machine computation	
			log θ''		
log θ''			colog 2		9.69897000
S for θ			S for $\frac{\theta}{2}$		
log sin θ	sin θ	.00082 32299	log sin $\frac{\theta}{2}$	sin $\frac{\theta}{2}$	.00041 16150
log R				R sin $\frac{\theta}{2}$	10,000.002
log x′			log sin² $\frac{\theta}{2}$	R sin² $\frac{\theta}{2}$	4.116
x′	R sin θ	− 20,000.00	log R		
		2,000,000.00	log 2		0.30103000
x		1,980,000.00	log y″		

x = 2,000,000.00 + R sin θ

y = y′ + 2R sin² $\frac{\theta}{2}$

y′ = the value of y on the central meridian for the latitude of the station

S = log of ratio for reducing arc expressed in seconds to sine (see log tables)

R, y′, and θ are given in special tables

Plane coordinates on Lambert projection

State L. I. Station Grid intersection

ϕ = 40° 42′ 50.6694 λ = 74° 04′ 19.7125

Tabular difference of R for 1″ of ϕ = 101.20117

R (for min. of ϕ)		24,289,681.34	y′ (for min. of ϕ)		172,863.96
Cor. for sec. of ϕ		− 5 127.80	Cor. for sec. of ϕ		+ 5 127.80
R		24,284,553.54	y′		177,991.76
			y″ (=2R sin² $\frac{\theta}{2}$)		+ 8.24
θ (for min. of λ)		− 0° 02′ 36.9797	y		178,000.00
Cor. for sec. of λ		− 12.89359			
θ		− 2 49.87329	$\frac{\theta}{2}$		° 1′ 24.936645
θ''	For machine computation	″		For machine computation	
			log θ''		
log θ''			colog 2		9.69897000
S for θ			S for $\frac{\theta}{2}$		
log sin θ	sin θ	.00082 35689	log sin $\frac{\theta}{2}$	sin $\frac{\theta}{2}$	.00041.17845
log R				R sin $\frac{\theta}{2}$	10,000.023
log x′			log sin² $\frac{\theta}{2}$	R sin² $\frac{\theta}{2}$	4.118
x′	R sin θ	− 20,000.00	log R		
		2,000,000.00	log 2		0.30103000
x		1,980,000	log y″		

$x = 2{,}000{,}000.00 + R \sin \theta$

$y = y' + 2R \sin^2 \frac{\theta}{2}$

y′ = the value of y on the central meridian for the latitude of the station

S = log of ratio for reducing arc expressed in seconds to sine (see log tables)

R, y′, and θ are given in special tables

Plane coordinates on Lambert projection

State L.I. Station Statue of Liberty 1887

ϕ = 40° 41′ 20.648″ λ = 74° 02′ 41.892″ W

Tabular difference of R for 1″ of ϕ = 101.20100

R (for min. of ϕ)		24,295,753.40	y′ (for min. of ϕ)		166,791.90
Cor. for sec. of ϕ		− 2089.60	Cor. for sec. of ϕ		+ 2089.60
R		24,293,663.80	y′		168,881.50
			y″ (=2R $\sin^2 \frac{\theta}{2}$)		+ 3.20
θ (for min. of λ)		− 0° 01′ 18.48985″	y		168,884.70
Cor. for sec. of λ		− 27.40081			
θ		− 1 45.89066	$\frac{\theta}{2}$		° ′ 52.94533″
θ''	For machine computation	″		For machine computation	
			log θ''		
log θ''			colog 2		9.69897000
S for θ			S for $\frac{\theta}{2}$		
log sin θ	sin θ	.000 5133724	log sin $\frac{\theta}{2}$	sin $\frac{\theta}{2}$	.000 25 66862
log R				R sin $\frac{\theta}{2}$	6,235.848
log x′			log $\sin^2 \frac{\theta}{2}$	R $\sin^2 \frac{\theta}{2}$	1.601
x′	R sin θ	− 12,471.70	log R		
		2,000,000.00	log 2		0.30103000
x		1,987,528.30	log y″		

$x = 2{,}000{,}000.00 + R \sin \theta$

$y = y' + 2R \sin^2 \frac{\theta}{2}$

y′ = the value of y on the central meridian for the latitude of the station

S = log of ratio for reducing arc expressed in seconds to sine (see log tables)

R, y′, and θ are given in special tables

Plane coordinates on Lambert projection

State L. Island (N.J.) Station Lehigh Grain Elevator

ϕ = 40° 41' 47".445 λ = 74° 03' 50".394

Tabular difference of R for 1" of ϕ = 101.20100

R (for min. of ϕ)		24,295,753.40		y' (for min. of ϕ)			166,791.90
Cor. for sec. of ϕ		− 4801.48		Cor. for sec. of ϕ			+ 4801.48
R		24,290,951.92		y'			171,593.38
				y'' (=2R $\sin^2 \frac{\theta}{2}$)			+ 6.48
θ (for min. of λ)		− ° 1' 57".73478		y			171,599.86
Cor. for sec. of λ		− . 32.96181					
θ		− 2 30.69659		$\frac{\theta}{2}$			° 1' 15".348295
θ''	For machine computation	"			For machine computation		
				log θ''			
log θ''				colog 2			9.69897000
S for θ				S for $\frac{\theta}{2}$			
log sin θ	sin θ	.00073 05976		log sin $\frac{\theta}{2}$	sin $\frac{\theta}{2}$		.00036 52988
log R					R sin $\frac{\theta}{2}$		8,873.46
log x'				log $\sin^2 \frac{\theta}{2}$	R $\sin^2 \frac{\theta}{2}$		3.241
x'	R sin θ	− 17,746.91		log R			
		2,000,000.00		log 2			0.30103000
x		1,982,253.09		log y''			

$x = 2{,}000{,}000.00 + R \sin \theta$

$y = y' + 2R \sin^2 \frac{\theta}{2}$

y' = the value of y on the central meridian for the latitude of the station

S = log of ratio for reducing arc expressed in seconds to sine (see log tables)

R, y', and θ are given in special tables

(R 340)

used for checks.

Geodetic positions from Lambert coordinates

State L Island Station Lehigh Grain Elevator (N.J.)

x	1,982,253.09	$R_b + A$	24,462,545.30
C		y	171,599.86
x' (= x − C)	−17,746.91	$R_b + A - y$	24,290,945.44
tan θ		R	
θ	° ′ ″		
	″	y	171,599.86
$\frac{\theta}{\ell}$ (= Δλ)		y″	− 6.48
		y′	171,593.38
λ (central mer.)	74° 00′ ″		
− Δλ	3 50.394	φ (by interpolation)	40° 41′ 47.445
λ	74 03 50.394		

Station Public School 22 (N.Y.)

x	1,957,889.67	$R_b + A$	24,462,545.30
C		y	145,606.62
x' (= x − C)	− 42,110.33	$R_b + A - y$	24,316,938.68
tan θ		R	
θ	° ′ ″		
	″	y	145,606.62
$\frac{\theta}{\ell}$ (= Δλ)		y″	− 36.46
		y′	145,570.16
λ (central mer.)	74° 00′ ″		
− Δλ	9 06.100	φ (by interpolation)	40° 37′ 30.300
λ	74 09 06.100		

$\tan\theta = \frac{x - C}{R_b + A - y}$

$\Delta\lambda = \frac{\theta}{\ell}$

$\lambda = \lambda$ (central mer.) $- \Delta\lambda$

$R = (R_b + A - y) \sec\theta$

$y'' = 2R \sin^2 \frac{\theta}{2}$

$y' = y - y''$

C is constant added to x′ in computation of coordinates

R_b is map radius of lowest parallel

A is value of y′ for R_b; in most cases it is zero

φ is interpolated from table of y′

(M-28)