

5651

Form 504 Rev. Dec. 1933	
DEPARTMENT OF COMMERCE U.S. COAST AND GEODETIC SURVEY R. S. PATTON, DIRECTOR	
DESCRIPTIVE REPORT	
Air Photographic survey	
Topographic Hydrographic	Sheet No. 5651
State Maryland	
LOCALITY	
Northeast River	
Chesapeake Bay	
Photos taken 1937	
Drafting-Jan/Feb. 1938	
CHIEF OF PARTY	
J. C. Partington	

U. S. GOVERNMENT PRINTING OFFICE: 1934

5651

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. 5651

REGISTER NO. 5651

T5651

State Maryland

General locality Cheasapeake Bay

Locality Northeast River

Scale 1:10000 Date of Photographs April 30, 1937
and May 1, 1937

Vessel Air Photographic Survey Party # 25

Chief of party J.C. Partington

Surveyed by Field Inspection J.C. Partington, E.L. Jones
Compilation E.L. Jones

Inked by E.L. Jones (completed Feb 1938)

Heights in feet above *** to ground to tops of trees

Contour, Approximate contour, Form line interval *** feet

Instructions dated March 14, 1934

Remarks: Field inspection - Aug. and Oct. 1937

Scale factor of original drawing: 0.9650

STATISTICS

AIR PHOTOGRAPHIC SURVEY SHEET NO: 5651 ✓

Air Photographs

1223 ✓ 1313 ✓ 1381 ✓ 1278 ✓ Date of photographs May 1, 1937.
1224 ✓ 1314 ✓ 1382 ✓ 1279 ✓ Time unknown.
1225 ✓ 1315 ✓ 1383 ✓ 1281 ✓ see bottom of page

Scale Factor $\frac{1}{965}$ J.C. Partington ----- Jan. 11, 1938

Projection -- Ruling machine (scale 1:10000) ----- Dec. 8, 1937
Ruling machine (scale 1:9650) ----- Jan. 14, 1938

Projection Checked ----- Washington Office ----- no date

Control Plotted - E.L. Jones --- (scale 1:10000) ----- Dec. 8, 1937
E.L. Jones --- (scale 1:9650) ----- Jan. 17, 1938

Control Checked J.C. Partington ----- Dec. 9, 1937
Jan. 18, 1938

Radial Line Plot E.L. Jones ----- Dec. 13, 1937 to Jan. 11, 1938

Radial Line checked J.C. Partington ----- Jan. 12, 1938

Detail inked ---- E.L. Jones ----- Jan. 18, 1938 to Feb. 25, 1938

Preliminary Review J.C. Partington ----- Mar. 5, 1938

Area (land) ----- 22.3 square statute miles -----

Area (shoals) ----- 0.0 " " " -----

Shoreline (more than 200 m. from opposite shore) 15.2 statute miles

Shoreline (creeks) ----- 28.8 " "

Roads, streets, trails & rail roads ----- 116 " "

General Location ----- Maryland -----

Locality ----- Northeast River -----

Datum ----- North American 1927 -----

Station ----- Principio, 1845 -----
Latitude 39° 35' 36.312" 1119.9 meters (adjusted)
Longitude 76° 00' 16.563" 395.2 "

$K = 1,080,531 \text{ Ft}$
 $\mu = 692,545 \text{ Ft}$

Photo No.	Date	Time	Tide (from Tide Tables)	mean range of tide
1223-1225	April 30, 1937	11:56-11:58	high	2.5 ft.
1278-1281	" " "	2:35-2:37	0.7 ft below high	
1313-1315	" " "	3:03-3:05	0.9 ft below high	
1381-1383	May 1, 1937	10:06-10:07	1.0 ft below high	

REPORT

AIR PHOTOGRAPHIC SURVEY SHEET (Register) NO. 5651

GENERAL INFORMATION ✓

The field inspection for this area was made during August and October 1937 by Air Photographic Survey Party # 25 of Baltimore, Maryland.

The photographs were taken by the recently developed U.S. Coast and Geodetic Survey Nine Lens Aerial Camera by the U.S. Army Air Corp.

CONTROL.

The following triangulation stations fall within the limits of this sheet and were used in controlling the plot.

Principio, 1845

Millraft, 1937

Cooper, 1933

Chy, Charlestown, 1937

Clay, 1937

The following four triangulation stations although not falling within the limits of the sheet were used in controlling the plot:

Perry, 1933

Bluff, 1937

Airway Bn. 63B, 1933

D (U.S.E.), 1937

1937 by Partington
positions from field computations
(not office adjusted)

RADIAL PLOT. ✓

The radial plot was made directly on the sheet in pencil since several of the photographs were rigidly fixed with sufficient control. The plot was run twice on a 1:10000 scale sheet. The second running of the plot improved the intersections in the areas poorly controlled. The plot is well controlled along the waterfront but is weak along the northern limits, the northwest corner of the sheet, and along the meridian on the eastern limits of the sheet. The eastern flight (photographs #1223 to 1225) on this sheet was not intersected with the flight on the sheet to the east since the photographs were not available.

Poor intersections were obtained at five of the radial points at the waters edge on Roach Point in the Northeast River. However, by rejecting long radials from two of the photographs and by drawing radials from photographs on the sheet to the south, intersections of several radials were obtained.

Radial points on the 1:10000 scale sheet were transferred by graphical means to the 1:9650 scale sheet for detailing.

The following difficulties were encountered in the radial plot.

(a) Paper distortion.

The office prints for the photographs were printed on Haloid Pressed Bromide Paper. Extremely large distortions were taken on by the paper during the drying process. The photographs were, in general, large on one edge and small on the opposite edge. To correct for this a celluloid template was prepared from a standard template and revolved about the principal point until the best adjustment of the corners of the photographs was obtained. The corrections were then drawn on the photograph.

(b) Tilt.

The tilt on several of the photographs was determined by the Anderson Method of Scale Ratio Changes. The tilt was determined after the radial plot was completed since there was not sufficient control to determine it before radial plotting. The tilt found was between two and three degrees, which causes a relatively small displacement of the plumb point from the principal point. It does, however, cause large differences of scale near the border of the photograph.

There are on this sheet five different flights some of which are short flights, also, five of the photographs are either at the beginning or end of flights. From the compilers view point this is very bad since short flights and photographs at the beginning or end of flights are generally tilted.

(c) Scale.

The radial plot was run on a celluloid sheet (scale 1:10000) while the average scale of the five different flights on this sheet is 1:9550. The photographs vary greatly in scale factor.

(d) Relief.

There are large differences of relief on this sheet. The highest elevation as taken from the U.S. Geological Survey quadrangle maps is 420 feet, which is at Foys Hill.

The differences of scale and relief do not in themselves cause difficulty in running radial plots but do cause trouble when combined with paper distortion and tilt.

Aside from the above no unusual adjustment of the plot was necessary.

✓ RECOVERABLE TOPOGRAPHIC STATIONS (card form 524).

There is submitted with this report six card forms #524 for recoverable topographic stations appearing on this sheet.

✓ *card form #524 filed under T-5651*

DETAIL

Additional radial points not shown on the sheet were established during the detailing in areas where the photographs were off scale or where there were large differences in relief. Adjustments of several meters per 100 were not uncommon.

Double railroad tracks have been generalized on the sheet and are shown by a single track with a note "two tracks" on the overlay.

The double full line has been used to show streets and maintained roads (either gravel or concrete); the double dashed line to show roads not maintained and which are not passable in wet weather; and single dashed lines to show trails. It would have been desirable to have had more information from the field inspection party concerning the nature of the roads on this sheet.

Where information was available from the field inspection party the marsh areas are shown in accordance with The Director's letter of Feb. 4, 1938.

An attempt was made to show all buildings on the sheet except small sheds and out-buildings.

The stereoscope has been used freely in the interpretation of detail shown on this sheet.

Except for the control and the names on the overlay all other information shown on the sheet was taken from the field inspection notes and the photographs.

✓ COMPARISONS WITH PREVIOUS SURVEYS:

A comparison between the air photographic survey sheet and a bromide enlargement of a plane table survey (date 1900; register number ~~not known~~) was made.

ST-2383 and T-2465

In general there was a good agreement in the shoreline between the two surveys. Most of the larger discrepancies were in marshy areas where there was probably a difference in the interpretation of the high water line.

The air photographic survey sheet shows only the creeks as appear on the photographs and in some ~~instances~~ ^{cases} in the inland areas do not agree with the plane table sheet.

The roads and other detail on the inland areas of the sheet are in fair agreement considering the difficulties encountered in a planetable survey of the area on this sheet.

A few of the larger discrepancies are listed below:

- (a) The 20 meter difference in shoreline on the southwestern part of Carpenter Point is believed to be due to erosion.
- (b) Marsh grass is shown outside of the high water line on the old survey for the entire western side of Northeast River. This was not shown on the air photographic survey sheet since this grass does not have definite limits (it being of the floating type) and since the entire river is choked-up with it during the mid-summer months.
- (c) A 10 meter discrepancy was noted in the shoreline around Red Point and White Point. This difference is believed due to erosion.
- (d) The sand piles in latitude $39^{\circ} 35.5'$, longitude $75^{\circ} 57.4'$ are storage piles for a sand and gravel company operating in that vicinity and are not shown on the plane table survey. A dock used in connection with handling sand and gravel in the same locality is shown on the air photographic survey sheet and Chart 1226 but is not shown on the plane table survey.

↑ new features

- (e) The grass line on the marsh point in latitude $39^{\circ} 35.0$, longitude $75^{\circ} 51.0$ is changed by 150 meters from the old survey. It is shown on the air photographic survey sheet in accordance with the Director's letter of Feb. 4, 1938.
- (f) A discrepancy of 150 meters exists in the shoreline of the marsh in the back side of the cove east of Hance Point.
- (g) What is now a narrow creek bordered with marsh was formerly shown as 60 meter wide creek in latitude $39^{\circ} 33.8$, longitude $75^{\circ} 57.5$.

NAMES.

Geographic names shown on this sheet are listed on Form M234 in the appendix.

JUNCTIONS.

This sheet forms a junction with air photographic survey sheet #5052 along longitude $75^{\circ} 50' 00''$; with #5054 along latitude $39^{\circ} 31' 00''$; and with #5073 along longitude $70^{\circ} 01' 00''$. The northern limit of the sheet is along latitude $39^{\circ} 31' 00''$.

Junction with adjoining sheets is satisfactory.

LANDMARKS.

There are no out-standing landmarks in the area covered by this sheet. *No landmarks recommended.*

No non-floating aids to navigation.

RECOMMENDATION FOR FUTURE SURVEYS.

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

The probable error is not greater than 5 meters for radial points and well defined objects along the water front and in the areas well controlled. The error of other detail of importance on the sheet is not greater than 10 to 12 meters. (See office review)

Respectfully submitted,

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

Approved:

J.C. Partington
J.C. Partington
Chief-of-Party

Note: Recoverable topographic stations are shown by a $2\frac{1}{2}$ mm. black circle. Hydrographic signals are shown by a $1\frac{1}{2}$ mm. black circle.

note: the large circles are 3 mm. the small are 2 mm. some enlargement on reproduction @/50.

J.C.P.

Notes in red by T.M.R. upon review April 25, 1938

REVIEW OF AIR PHOTO COMPILATION NO. T 5651

Chief of Party: J.C. Partington

Compiled by: E.L. Jones

Project: HT- 175

Instructions dated: March 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) ✓
Par. 16 f ✓

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)

*no comparison to chart
 in report. Comparison
 made to previous surveys
 however.*

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)
No ground surveys used to supplement plot.

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.

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.
No contemporary surveys.

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."

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 low water indicated
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)
Natural objects described on form 524.
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 landmarks.
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 *T 5654 and T-5673* 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 Longi- ✓ tude 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, 49) ✓

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

17. Remarks:

18. Examined and approved;

J. C. Partridge
Chief of Party

REVIEW OF AIR PHOTOGRAPHIC SURVEY T-5651

DATA RECORD

Triangulation: 1845, 1933, 1937.
Photographs taken April 30 - May 1, 1937.
Field Inspection August and October, 1937.
Rec. Sta. of less than third order accuracy, located
by radial plot, 1937.
Hydrographic surveys in 1938.

The field inspection was for the purpose of interpreting the photographs. The detail of T-5651 is of the date of the photographs except for two minor pier changes which were noted during field inspection *and the addition of shoreline details from the 1938 hydro surveys.*

COMPARISON TO CONTEMPORARY TOPOGRAPHY AND HYDROGRAPHY

No contemporary planetable or hydrographic surveys have been undertaken in this area at the time of this review.

See addition to this review placed at back of this report. Bgg.

COMPARISON WITH PREVIOUS TOPOGRAPHIC SURVEYS.

T-184	(1844-45)	1:10,000
T-185	(1844-45)	1:10,000
T-2383	(1899-1900)	1:20,000
T-2384	(1899-1900)	1:20,000
T-2465	(1900-1901)	1:20,000

T-5651 is adequate to supersede the above listed topographic surveys for the area covered, except for form lines.

A detail comparison to T-2383 and T-2465 is contained on page 5 of the descriptive report.

A general comparison of T-5651 to the previous surveys shows the following differences, in which it cannot be told with certainty whether the old or the new survey is more accurate. However, these items are of minor importance for charting, and it is recommended that the representation on T-5651 be accepted as correct.

(1) Bluffs.

The old surveys show more bluffs than T-5651. The bluffs which were omitted on the recent survey are probably low, and not considered of sufficient prominence to be indicated.

(2) Streams.

The streams on the old surveys were, in most cases, carried out much further than on T-5651. In several cases there is a variance ⁱⁿ the position of the streams on the old surveys and T-5651; the difference is most noticeable at the upper ends of the streams.

The compiler of T-5651 studied the photographs under the stereoscope, examined existing topographic maps of the area and drew in the streams on T-5651 with care. Therefore, it is recommended that they be accepted as correct as shown on T-5651, for although the streams are largely obscured by woods on the photographs, and there may be some misinterpretation, still, no improvement could be made without additional field inspection and this is not considered practicable for this survey at this time.

(3) Trails.

The old surveys show certain minor roads and trails which do not appear on T-5651, probably because they are obscured by woods on the photographs. However, nothing of any importance has been omitted.

COMPARISON WITH CHARTS.

Chart No. 1226; Scale 1:80,000 (plate corrected to 2/9/38)

(1) There are numerous changes in the roads and piers since the previous surveys were made, which is to be expected in an area of this character.

(2) The island charted at Lat. $39^{\circ} 35.5'$, Long. $75^{\circ} 57'$ is gone. It is shown on T-5651 as grass below M. H. W.

Certain islands which are not charted now exist 400 m. to the east. This change is apparent from the photographs.

(3) The pond at Lat. $39^{\circ} 34'$, Long. $75^{\circ} 52.5'$, is shown on T-5651 as marsh. T-5651 is correct.

(4) The minor streams are more extensive on the chart than on T-5651. For a discussion of streams see preceding paragraph "Comparison with Previous Topographic Surveys".

RECOVERABLE H. & T. STATIONS.

Six stations described on Form 524 appear on this sheet. They are filed under No. T-5651. These were all located by air photo radial plot.

Several other recoverable H. & T. stations located by the radial plot appear on this sheet but are not described on Form 524; these carry a descriptive name.

CHANGES AND REMARKS.

(1) Although the radial plot and detailing of this survey had been executed in the field ~~carefully~~, the work

was done under difficult conditions, as explained in detail on pages 3 and 4 of the descriptive report. These difficulties may be summarized as follows:

(a) The photographs were printed prior to completion of adjustment of transforming printer.

(b) The paper on which the photos were printed became distorted, and made radial adjustments necessary.

(c) Several photos were badly tilted.

(d) There are large difference of elevation in the terrain of this area.

Since several other surveys in this project were compiled under the same difficult conditions, it was considered desirable to carefully check T-5651 during the review in order to determine the probable accuracy of the plots and of tracing detail in this section of the project, particularly in regard to the location of the stations for hydrographic control. *Four new photographs were made for checking the plot. These were made after completion of adjustments to the transforming printer.*

(2) The result of the check is as follows:

(a) Seven of the H. & T. stations were moved approximately 10 m. *upon review.*

(b) Triangulation station CHY. Charlestown, 1937, was located on the photos 5 m. too far east.

(c) ^{50 ft.} A very close spacing of radial points is required in hilly country ~~such as this~~ to prevent small errors from creeping in during the adjustment in tracing detail. Errors of 8 - 20 m. in the position of houses and roads were found in a few cases, which illustrates this need.

(d) The buildings had been examined and marked under the stereoscope, prior to tracing by the compiler which resulted in an accurate and complete representation of the buildings on this sheet.

(e) The drafting was neatly done and the completeness of the detail showed that the photographs had been thoroughly studied by the compiler.

ACCURACY.

(a) The H. & T. stations are located with a probable error of 5 m.

(b) The shoreline and the shoreline detail is drafted with a probable error of 8 m.

(c) The probable error of other detail is 10 - 15 m.
(except for small streams through woods, for which no check
could be made.)

ADDITIONAL WORK.

This survey is complete and adequate for detail of
importance for charting.

Reviewed in office by ^{T. M. Price} - T. M. Price, April 26, 1938.

Inspected by ^{B. G. Jones} - B. G. Jones, April 30, 1938.

Examined and approved:

Thos B Reed
Chief, Section of Field Records
Fred. L. Peacock

Chief, Division of Charts.

K. T. Adams
Chief, Section of Field Work.
G. H. de

Chief, Division of Hydrography
and Topography.

See also next page.

addition to the Review of T5651
7/20/39

Comparison with H6362, 1:10 000 (1938)

The field inspection of photographs on T5651 was incomplete for the marsh limits and shoreline details, these items having been left for completion of the Hydrographic Party.

After comparison with H6362, T5651 has been corrected to agree with H6362 as regards marsh limits and the addition of a number of small piers, ruins, piling and wecks. These corrections and additions have been made directly on the celluloid prior to reproduction and also on the temporary ozalid file copy.

B.G. Jones 7/20/39

Remarks

Decisions

1		
2		
3		<i>USGB decision</i>
4		
5	Called "Carpenters Pt." on Survey T-2383	
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17	<i>See D.R. - H6362</i>	<i>File No 395 759</i>
18	<i>"</i>	<i>" "</i>
19	<i>"</i>	<i>" "</i>
20		<i>USGB</i>
21		
22		
23		
24		
25		
26		
27		

GEOGRAPHIC NAMES

Survey No. T-5651

GEOGRAPHIC NAMES											
Survey No. T-5651											
Name on Survey	<div>On Chart No. 1226</div> <div>On previous survey No. T2465 & T2383</div> <div>On U. S. quadrangle Maps</div> <div>From local information</div> <div>On local Maps</div> <div>P. O. Guide or Map</div> <div>Rand McNally Atlas</div> <div>U. S. Light List</div> <div>Doc. 248 75 Congress 1st</div>										
	A,	B,	C,	D	E	F	G	H	K		
<u>Northeast River</u>	✓	✓	✓				✓		✓	1	
<u>Charlestown</u>	✓	✓	✓			✓	✓			2	
North East <u>Northeast</u>	✓	✓	✓			North East	North East		North East	3	
<u>Seneca Pt.</u>	✓	✓	✓							4	
<u>Carpenter Pt.</u>	✓		✓							5	
<u>Hance Pt.</u>	✓	✓	✓							6	
<u>Roach Pt.</u>	✓	✓	✓							7	
<u>Carrot Cove</u>	✓	✓	✓							8	
<u>White Pt.</u>	✓	✓	✓							9	
<u>Red Pt.</u>	✓	✓	✓							10	
<u>Black Hill</u>	✓	✓	✓							11	
<u>Elk Neck</u>	✓		✓							12	
<u>Northeast Creek</u>			✓							13	
<u>Stony Run</u>			✓						✓	14	
<u>Foys Hill</u>			✓							15	
<u>Piney Creek</u>	✓	✓	✓							16	
<u>Ford Run</u>										17	
<u>Northeast Heights</u>										18	
<u>Hance Point Creek</u>										19	
<u>Chesapeake Bay</u>										20	
										21	
										22	
										23	
										24	
Names underlined in red approved										25	
by <u>GHE</u> on <u>4/2/38</u>										26	
										27	

M 234

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 H. D. REED, JR.

Positions checked by "

Grid inked on machine by "

Intersections inked by "

Points used for plotting grid:

x 1,075,000 ET
y 615,000

x 1,085,000
y 630,000

x 1,075,000
y 650,000

x
y

x 1,095,000
y 615,000

x
y

x 1,095,000
y 650,000

x
y

Triangulation stations used for checking grid:

$x=1,080,531 - y=642,545$

- | | |
|--|----------|
| 1. <u>Principio, 1845, (Ref. Sta.)</u> | 5. _____ |
| $x=1,087,504 - y=619,139$ | |
| 2. <u>Clay, 1937</u> | 6. _____ |
| 3. _____ | 7. _____ |
| 4. _____ | 8. _____ |

Plane coordinates on Lambert projection

1,095,000
~~2,295,000~~
 650,000

State

md

Station

 $\phi = 39^{\circ} 36' 48.38''$
 $\lambda = 75^{\circ} 57' 10.65''$
Tabular difference of R for 1" of $\phi =$

R (for min. of ϕ)		y' (for min. of ϕ)	
Cor. for sec. of ϕ	-	Cor. for sec. of ϕ	+
R	25,720,804.93	y'	648,307.83
		$y'' (= 2R \sin^2 \frac{\theta}{2})$	+ 1,691.73
θ (for min. of λ)	+ $0^{\circ} 39' 32.4570''$	y	649,999.56
Cor. for sec. of λ	- 6.6843		
θ	39 25.7727	$\frac{\theta}{2}$	0 ' "
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	log sin $\frac{\theta}{2}$	sin $\frac{\theta}{2}$
log R		R sin $\frac{\theta}{2}$	
log x'		log sin ² $\frac{\theta}{2}$	R sin ² $\frac{\theta}{2}$
x'	R sin θ	log R	
	295,000.6	log 2	0.30103000
	2,000,000.00	log y''	
x	2,295,000.6		
	1,095,000.6		

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

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

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

5651

Plane coordinates on Lambert projection ~~2,000,000~~~~2,285,000~~

State

Md

Station

630,000

 $\phi = 39^{\circ} 33' 31''.85$ $\lambda = 75^{\circ} 59' 21''.26$ Tabular difference of R for 1" of $\phi =$

R (for min. of ϕ)		y' (for min. of ϕ)	
Cor. for sec. of ϕ	-	Cor. for sec. of ϕ	+
R	25,740,690.65	y'	628,422.11
		y'' (= $2R \sin^2 \frac{\theta}{2}$)	+ 1,577.75
θ (for min. of λ)	+ $0^{\circ} 38' 17''.1409$	y	629,999.86
Cor. for sec. of λ	- 13.3435		
θ	38 03.7974	$\frac{\theta}{2}$	0 ' "
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 .0110719360	log sin $\frac{\theta}{2}$	sin $\frac{\theta}{2}$
log R		R sin $\frac{\theta}{2}$	
log x'		log sin ² $\frac{\theta}{2}$	R sin ² $\frac{\theta}{2}$
x'	R sin θ 284999.3	log R	
	2,000,000.00	log 2	0.30103000
x	2,284,999.3	log y''	
	1,084,999.3		

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

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

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

56.51

Plane coordinates on Lambert projection

1,095,000

~~2,295,000~~

615,000

State

Ind.

Station

 $\phi = 39^\circ 31' 02.50''$ $\lambda = 75^\circ 57' 15.78''$ Tabular difference of R for 1" of $\phi =$

R (for min. of ϕ)		y' (for min. of ϕ)	
Cor. for sec. of ϕ	-	Cor. for sec. of ϕ	+
R	25,755,802.24	y'	613,310.52
		$y'' (= 2R \sin^2 \frac{\theta}{2})$	+ 1,689.42
θ (for min. of λ)	+ $0^\circ 39' 32.4570''$	y	614,999.94
Cor. for sec. of λ	- 9.9041		
θ	39 22.5529	$\frac{\theta}{2}$	0 ' "
θ''	For machine computation	θ''	For machine computation
log θ''		colog 2	9.69897000
S for θ		S for $\frac{\theta}{2}$	
log sin θ	sin θ .0114537292	log sin $\frac{\theta}{2}$	sin $\frac{\theta}{2}$
log R		R sin $\frac{\theta}{2}$	
log x'		log sin ² $\frac{\theta}{2}$	R sin ² $\frac{\theta}{2}$
x'	R sin θ 295,000.0	log R	
	800,000 2,000,000.00	log 2	0.30103000
x	1,095,000.00	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

1,075,000

~~2,275,000~~

650,000

State

Md

Station

 $\phi = 39^{\circ} 36' 50.57''$ $\lambda = 76^{\circ} 01' 26.19''$ Tabular difference of R for 1" of $\phi =$

R (for min. of ϕ)		y' (for min. of ϕ)	
Cor. for sec. of ϕ	-	Cor. for sec. of ϕ	+
R	25,720,583.33	y'	648,529.43
θ (for min. of λ)	+ $0^{\circ} 37' 01.8248''$	$y'' (= 2R \sin^2 \frac{\theta}{2})$	+ 1,470.12
Cor. for sec. of λ	- 16.4377	y	649,999.55
θ	36 45.3871	$\frac{\theta}{2}$	0 ' "
θ''	For machine computation	θ''	For machine computation
log θ''		log θ''	
S for θ		colog 2	9.69897000
log sin θ	sin θ	S for $\frac{\theta}{2}$	
log R		log sin $\frac{\theta}{2}$	sin $\frac{\theta}{2}$
log x'		log sin ² $\frac{\theta}{2}$	R sin ² $\frac{\theta}{2}$
x'	R sin θ	log R	
	274,999.7	log 2	0.30103000
	800,000.00	log y''	
	2,000,000.00		
x	2,274,999.7		
	1,074,999.7		

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

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

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

5651

Plane coordinates on Lambert projection

1,075,000

~~2,275,000~~

615,000

State Ind.

Station

 $\phi = 39^{\circ} 31' 04.69$ $\lambda = 76^{\circ} 01' 30.97$ Tabular difference of R for 1" of $\phi =$

R (for min. of ϕ)		y' (for min. of ϕ)	
Cor. for sec. of ϕ	-	Cor. for sec. of ϕ	+
R	25,755,580.65	y'	613,532.11
		$y'' (= 2R \sin^2 \frac{\theta}{2})$	+ 1,468.12
θ (for min. of λ)	+ $0^{\circ} 37' 01.8248$	y	615,000.23
Cor. for sec. of λ	- 19.4378		
θ	36 42.3870	$\frac{\theta}{2}$	$18' 21.1935$
θ''	For machine computation	$\frac{\theta}{2}$	For machine computation
		$\log \theta''$	
$\log \theta''$		$\log 2$	9.69897000
S for θ		S for $\frac{\theta}{2}$	
$\log \sin \theta$	$\sin \theta$.0106772706	$\log \sin \frac{\theta}{2}$	$\sin \frac{\theta}{2}$
$\log R$		$R \sin \frac{\theta}{2}$	
$\log x'$		$\log \sin^2 \frac{\theta}{2}$	$R \sin^2 \frac{\theta}{2}$
x'	$R \sin \theta$ 274,999.3	$\log R$	
	800,000.00	$\log 2$	0.30103000
	2,000,000.00	$\log y''$	
x	1,074,999.3		

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

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

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 md. Station Clay, 1937
 $\phi = 39^{\circ} 31' 44.237''$ $\lambda = 75^{\circ} 58' 58.834''$

Tabular difference of R for 1" of $\phi =$

R (for min. of ϕ)		y' (for min. of ϕ)	
Cor. for sec. of ϕ	-	Cor. for sec. of ϕ	+
R	25,751,579	y'	617,534
		$y'' (= 2R \sin^2 \frac{\theta}{2})$	+ 1605
θ (for min. of λ)		y	619,139
Cor. for sec. of λ	-		
θ	+ 0 38 228937	$\frac{\theta}{2}$	
θ''	For machine computation	$\frac{\theta}{2}$	For machine computation
		log θ''	.000062325
log θ''		colog 2	9.69897000
S for θ		S for $\frac{\theta}{2}$	
log sin θ	sin θ	log sin $\frac{\theta}{2}$	sin $\frac{\theta}{2}$
log R			R sin $\frac{\theta}{2}$
log x'		log sin ² $\frac{\theta}{2}$	R sin ² $\frac{\theta}{2}$
x'	R sin θ	log R	
	800,000	log 2	0.30103000
	2,000,000.00	log y''	
x	2,287,504		
	1,087,504		

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

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

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