DESCRIPTIVE REPORT
Air Photo
Topographic
Sheet No. T-5461

State: New York

Locality: Brooklyn, New York City

Bay Ridge and Vicinity

1936

Chief of Party
J.C. Partington Junior H.E. G.S.
DEPARTMENT OF COMMERCE
U.S. COAST AND GEODETIC SURVEY

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. 23
REGISTER NO. T-5461

State: New York
General locality: BROOKLYN
Locality: BROOKLYN BAY RIDGE and VICINITY

Scale: 1:5000
Date of survey: June 25, 1935
Photographs: May 15, 1935

Vessel: Photo Compilation Party # 25
Chief of party: J. C. Partington

Surveyed by: See STATISTICS SHEET
Inked by: J. A. Giles and J. C. Partington

Heights in feet above to ground to tops of trees
Contour, Approximate contour, Form line interval:

Instructions dated: March 14, 1934
Remarks:
2.

STATISTICS

on

AIR PHOTO COMPILATION SHEET, FIELD NO. 93; REGISTER NO. T-5441

<table>
<thead>
<tr>
<th>PHOTOGRAPH NO.</th>
<th>DATE</th>
<th>TIME</th>
<th>TIDE</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>High Time</td>
<td>Ht. Low Time</td>
</tr>
<tr>
<td>191-195 (870 N-8)</td>
<td>May 15, 1935 9:35 AM</td>
<td>5:40 AM 3.8</td>
<td>11:49 AM 0.3</td>
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<tr>
<td></td>
<td></td>
<td>5:59 PM 4.9</td>
<td></td>
</tr>
<tr>
<td>207-212 (870 N-8)</td>
<td>May 15, 1935 10:25 AM</td>
<td>as above</td>
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<tr>
<td></td>
<td></td>
<td>3:26 PM 5.1</td>
<td>10:03 PM 0.2</td>
</tr>
</tbody>
</table>

2 photographs - no number or time.

SCALE FACTOR (1.000)  By  From  To

R.C. Bolstad (Previously determined)

PROJECTION

Projection machine

6-25-36

PROJECTION CHECKED

J.C. Partington

6-27-36

CONTROL PLOTTED

J.C. Partington

7-1-36  7-2-36

CONTROL CHECKED

R.H. Young

7-21-36

SMOOTH RADIAL LINE PLOT

J.C. Partington

10-1-36  10-5-36

RADIAL LINE PLOT CHECKED

R.S. Poor

10-15-36

J.C. Partington

11-3-36  11-30-36

J.A. Giles

12-1-36  12-17-36

PRELIMINARY REVIEW OF SHEET

J.C. Partington

12-18-36  12-22-36

AREA OF DETAIL INKED (land area)  4.0  Square Statute Miles

AREA OF DETAIL UNKED (shoals)  0.0  Square Statute Miles

LENGTH OF SHORELINE (more than 200 M. from opposite shore)  20.4  Statute Mi.

LENGTH OF SHORELINE (rivers & sloughs less than 200 M. wide)  0.0  Statute Mi.

LENGTH OF STREETS, ROADS, RAILROADS, TRAILS  106.0  Statute Mi.

GENERAL LOCATION  New York City

LOCATION  Brooklyn

DATUM  North American 1927

STATION Public School 94

1930; r'31 (N.Y.)  Latitude  40° 38'  36.636"  = 1130.1 M.

(Adjusted Computations)
COMPILER'S REPORT

for

AIR PHOTO TOPOGRAPHIC SHEET, FIELD NO: 93; REGISTER NO. T-5461

GENERAL INFORMATION

The Air-photo Field Inspection Report for Metropolitan New York attached to the descriptive report of AIR PHOTO TOPOGRAPHIC SHEET, Field No. 90, Register No. T-5458, furnished the necessary information for the compilation of this sheet.

This sheet has been compiled from single lens photographs listed on pages of this report. Photographs numbers 191-195 (8/0 N-8) were taken on May 15, 1935 at approximately two hours and fifteen minutes before low water. Photographs numbers 207-212 (8/0 N-8) were taken on May 15, 1935 at approximately one hour and twenty five minutes before low water. Photographs numbers 224-230 (8/0 N-8) were taken on June 25, 1935 at low water.

The photographs were taken by the U.S. Army Air Corps at Mitchell Field, L.I., N.Y. with a special camera recently developed by the Fairchild Camera Corporation, 62-10 Woodside Ave., Woodside, New York City. Due to the fact that these photographs were among the first to be taken by this camera, mechanical troubles were encountered which caused considerable difficulty at first. This probably accounts for the irregular time interval between exposures which in turn effects the overlap. This is also probably the cause of excessive tilt in some pictures. The camera is known as the "K-11" by the Army and as the "K-7A" by the Fairchild Corporation.

Army plane was piloted by Lieut. Cullen at an altitude very close to 600 feet; the photographer was Sergeant Gates. A 2½ inch cone (focal length 2½") was used with this camera, producing the negatives on a scale of 1:5,000. Contact prints were furnished the field party for use in field inspection. The original negatives were used by the Washington office of the Coast and Geodetic Survey for enlarging a set of office prints on a scale of 1:5,000. The 1:5,000 prints were furnished the field party and were used in compiling this sheet.

SOURCES

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

1. Triangulation, 1930-33 by H.W. Woodworth (Adjusted)
2. Triangulation, 1903-08, Greater New York.
3. U.S. Engineers stations as described on Form 524, submitted with this report.

The triangulation 1930-33 is given on N.A. 1927 datum. The triangulation 1903-08 is given on N.A. datum and a correction of -12.1 meters is applied to latitude and +3.5 meters to longitude in order to place positions on N.A. 1927 datum.

The geographic positions of all of the U.S. Engineers stations
(a) Sources. (continued)

were computed from their coordinates and plotted on the sheet with
a 2\text{\textdegree} mm. circle. It should be noted that the latitude and longitude
of these stations are given on N.A. datum and a correction of -12.1
metres was applied to latitude and +3.5 metres to longitude in order
to place the positions on N.A. 1927 datum.

(b) Lost and Unplotted Triangulation Stations.

WIL HEAD, 1908 - The field inspection party reports as follows:
"Station lost. The tower on which this station
was located has been razed since a field recovery
made in the spring of 1932."

BAY RIDGE, CRESCENT
ATHLETIC CLUB, CUP-
ER, 1930

BAY RIDGE, E.W.BLISS
CO., FLAGPOLE (N.Y.)
1930

This station is 1.7 meters southeast of
station "BLISS (N.Y.) 1931". To avoid con-
gestion the flagpole was not plotted.

(c) Errors.

No error was found in the position of any of the triangulation
stations.

No discrepancy of more than 1.0 meter was found in the position
of any of the recoverable H.S.E. stations and the position as given on
the plane table sheet was considered correct.

All of the U.S. Engineers stations agreed with the radial line
plot within 1.0 meter except the position of "Bush #2 (U.S.E.)". The
U.S. Engineers positions were considered correct except for this one
station.

The U.S. Engineers position of "Bush #2 (U.S.E.)" differs from
the radial line plot position by 2.5 meters in azimuth 137° (from
northeast), the U.S. Engineers position appearing to be too far toward the
southeast. This station can be clearly spotted on the photographs
and the field inspection measurements agree with the U.S. Engineers
sketch. The station is located by 4 "cuts" on the radial plot which
give a strong angle of intersection. The radial line plot in this
area is rigidly fixed by triangulation control and there is little
doubt that the U.S. Engineers coordinates of the spotted station are
in error. The position of this station as determined by the radial
line plot is shown on the sheet with a 2\text{\textdegree} mm. circle.

All of the U.S. Engineers stations shown on this sheet are de-
scribed on Form 524 accompanying this report. The descriptions of
recoverable H.S.E. Stations will be found with the descriptive report
of the plane table sheet.

Some of the U.S. Engineers stations found by the field inspection
party may not be shown on this sheet because they are not permanently
marked. An effort has been made to show the most permanently marked
stations at intervals of about one half mile along the waterfront.
COMPILATION.

(a) Method.

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

The U.S. Engineers stations and the recoverable H. & T. stations were used as supplementary control and their positions accepted as correct only after it was found that they agreed with the radial line plot. There is ample triangulation control on this sheet to establish the plot independent of U.S. Engineers stations and the recoverable H. & T. stations.

(b) Adjustment of Plot.

Very little difficulty was encountered in running the radial line plot and no unusual adjustment of the plot was necessary. There is sufficient overlap between successive pictures to obtain strong angles of intersection on the radial points and almost without exception the points are located by three or more intersecting "cuts".

The photographs show very little tilt or scale fluctuation.

(c) Interpretation.

No attempt has been made to show street car tracks; only elevated tracks and railroad tracks have been shown. Railroad tracks have been generalized in accordance with recent instructions from the Washington office.

The double full line has been used to show first class roads and streets (curb to curb).

An attempt has been made to show all the buildings along the waterfront. The stereoscope has been used freely in determining the shapes of buildings.

The usual graphic symbols were used and no difficulty was experienced in interpreting the photographic detail.

(d) Information from other Sources.

All of the information shown on this sheet except names was taken from the photographs.

(e) Names.

A list of geographic names shown on this sheet is given on Form M-234 included with this report.

Street names may be obtained from the Map of the City of New York, Board of Estimate and Apportionment.

BRIDGES.

There are no bridges on this sheet.
JUNCTIONS.

The north end of this compilation joins the south end of compilation T-5460 along 23rd street and the junction is satisfactory.

The south end of this compilation joins the north end of compilation T-5462 along the parallel 40° 37' 30" and the junction is satisfactory.

LIST OF RECOVERABLE OBJECTS.

Four cards form 524 are included with this report which give the description and position of each U.S. Engineers station shown on this sheet.

Recoverable H. & T. stations have the cards form 524 filed with the descriptive report of the plane table sheet.

COMPARISON WITH OTHER SURVEYS.

This sheet has been compared with topographic surveys No. 6380 and 6381 accomplished by M.O. Witherbee, Chief of Party in 1934. T-6380 and T-6381 were done on a 1:10,000 scale. Bromide copies were made on 1:5,000 scale and the bromides were used for the comparison.

In general there is a very close agreement between this compilation and sheets T-6380 and T-6381.

Comparison with T-6380

In latitude 40° 39.1' longitude 74° 00.5' the 29th street dock and the docks to the northward seem to be too far north on the sheet T-6380 by an amount of about 7.5 meters. This same condition was noted in comparing the south end of compilation T-5460 with plane table sheet T-6380.

The photographs of this area are very close to scale and it is quite unlikely that the compilation is in error by this amount. The position of detail in this area has been checked by putting the photographs under the celluloid sheet and it appears to be shown correctly on the compilation.

Referring to the topographers report of sheet T-6380, it is noted that the docks were located by setting up at convenient points, establishing the position by 3 point fix, and rodding in the docks. It is probable that a strong 3 point fix could not be obtained in this area which would account for this discrepancy.

In latitude 40° 39.1' longitude 74° 01.6' the small docks extend farther to the westward than shown on plane table sheet T-6380 by a maximum amount of about 7.0 meters. The radial line plot is rigidly controlled in this area and it is believed that the positions of these docks as shown on this compilation are correct.

Comparison with T-6381

In latitude 40° 38.6' longitude 74° 02.0' the dilapidated dock and the next dock north appear to be too far north on T-6381 by an amount of about 5.0 meters. The high water line in this vicinity also appears to be too far east on T-6381 by about 9.0 meters.
COMPARISON WITH OTHER SURVEYS. (continued)

The photographs of this area are very close to scale and the plot is rigidly controlled. It is believed that the detail in this area is correctly shown on this compilation.

COMPARISON WITH CHARTS.

Due to the fact that chart 541 of this area is on a scale of 1:10,000 and the compilation is on a scale of 1:5,000 no direct comparison between the two has been made.

However, a visual comparison between the two shows the following discrepancies between chart 541, edition of Nov. 18, 1936 and this compilation.

The small dock shown on the chart in latitude 40° 38.1' longitude 74° 02.3' does not appear on the photographs and is not shown on the compilation. This dock does not appear on plane table sheet T-6361. It has evidently been built since June 25, 1935, the date of the latest photographs of this area.

The landmark CUP (C.A.C. BOATHOUSE) shown on the chart does not appear on the photographs. It is reported to have burned down about 1932. The field inspection notes and sheet T-6361 show that this dock is in ruins.

The siren shown on Pier 2 latitude 40° 38.8' longitude 74° 01.9' has evidently been changed. The field inspection party spot this siren on the seaward face of the building as shown on the compilation.

LANDMARKS.

All of the landmarks within the area of this sheet are shown on the chart 541. They are all in existence and should be shown except the following:

CUP (C.A.C. BOATHOUSE) - no longer in existence.
SIREN - pier 2, new position

The position of the SIREN and deletion of CUP (C.A.C. BOATHOUSE) and the old SIREN are given on form 567 included with this report.

RECOMMENDATIONS 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 believed to be not greater than 2 meters in position of well defined objects along the waterfront and not greater than 4 meters for other detail.

It is understood that railroads and similar detail is shown as generalized and the compilation does not show all of the tracks.

Respectfully submitted,

J.C. Partington
Chief of Party
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<th>Decisions</th>
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<td>4</td>
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<td>5</td>
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<tr>
<td>6 * Called &quot;Owl's Head Park&quot;</td>
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<tr>
<td>Bay Ridge</td>
<td></td>
</tr>
<tr>
<td>Dear Franklin Square</td>
<td></td>
</tr>
<tr>
<td>Long Island Railroad</td>
<td>X</td>
</tr>
</tbody>
</table>

Names underlined in red approved by ESC on 5/6/37
I recommend that the following objects which have (have not) been inspected from seaward to determine their value as landmarks, be (deleted from) the charts indicated.

The positions given have been checked after listing.

| General Locality | Position | Method of Location | Date of Location | Datum | Latitude | Longitude | Charts Affected |
|------------------|----------|--------------------|------------------|-------|----------|-----------|----------------|----------------|
| New York, Brooklyn | SIREN, pier 2 | N.A. | 1927 | 74.01 | 1297 | 40.38 | 14.69 | 5, 369 |
|                  |          |                    |                  |       |          |           |                |                |
|                  |          | The air photo field inspection party spots this siren on the seaward face of this pier. For new position see "Landmarks for Charts" submitted by me on Dec. 22, 1936. | | | | | | |
|                  | CUP (C.A.C. BOATHOUSKS) | N.A. | 1930 | 74.02 | 668.0 | 40.37 | 1243.9 | 5, 369 |
|                  |          | The photographs show no building in this area. The boathouse is reported to have burned down about 1932. | | | | | | |

This form shall be prepared in accordance with 1934 Field Memorandum, "LANDMARKS FOR CHARTS." The data should be considered for the charts of the area and not by individual field survey sheets. Information under each column heading should be given.
I recommend that the following objects which have (have not) been inspected from seaward to determine their value as landmarks, be charted on (deleted from) the charts indicated.

The positions given have been checked after listing.

<table>
<thead>
<tr>
<th>Name and Description</th>
<th>Position</th>
<th>Date of Location</th>
<th>Method of Location</th>
<th>Datum</th>
<th>Charts Affected</th>
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<td>Siren, pier 2</td>
<td>40 38 1.98</td>
<td>74 01 1261</td>
<td>1937</td>
<td>Photos</td>
<td>N.A. Radial June 25, 1937 Phib 1955 xx 369</td>
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</tbody>
</table>

This form shall be prepared in accordance with 1934 Field Memorandum, "LANDMARKS FOR CHARTS." The data should be considered for the charts of the area and not by individual field survey sheets. Information under each column heading should be given.
REVIEW OF AIR PHOTO COMPILATION T-5461
Scale 1:5,000

Data Record

Triangulation to 1933
Photographs to 1935
Planetary surveys to 1934
Hydrography to 1934
Field inspection to 1935

The detail on this compilation is that of the date of the photographs except for a few changes along the shoreline as determined by field inspection and the 1934 planetary surveys.

Comparison with Contemporary Graphic Control Surveys

T-6380 (1934), 1:10,000
T-6381 (1934), 1:10,000

The compilation is in agreement with the graphic control surveys except as noted on page 6 of descriptive report. As a whole the compilation and the graphic control surveys are in good agreement.

All information and detail shown on the above graphic control surveys has been shown on the compilation.

Comparison with Contemporary Hydrographic Surveys

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

There are no discrepancies between H-5607 and this compilation.

Comparison with Former Topographic Surveys

T-12 (1837), 1:10,000
T-487 (1856), "
T-1413a (1875), "
T-1414 (1875), "
T-1576 (1885), "

Since the time of these surveys practically the entire waterfront has been rebuilt with docks and piers. The compilation is complete and adequate to supersede those portions of the above surveys which it covers except for contours.
Comparison with Charts 541 and 369

The above charts show a small dock at lat. 40°38.1' long.
74°02.3' which is non-existent and should be deleted from the charts.

See page 7 of Descriptive Report for landmarks.

April 28, 1937.

L. C. Hardy

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

Yes.

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, h)

Yes.

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. 23)

No blue-prints or other 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.

Yes. Compared with plane table sheets T-6380, T-6381

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 d, h, i)

Yes.

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

Yes.

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)

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)

Yes.

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)

Yes.

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 68k)

Listed on Form M 234 attached to descriptive report.

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

Yes.

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

Yes.

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.

(Far. 34, 35, 38, 39, 40, 42, 43, 44, 45, 46, 48)

16. No additional surveying is recommended at this time.

17. Remarks:

18. Examined and approved:

[Signature]
Chief of Party

19. Remarks after review in office:

Reviewed in office by: [Signature]

Examined and approved:

[Signature]
Chief, Section of Field Records

[Signature]
Chief, Division of Charts

[Signature]
Chief, Section of Field Work

[Signature]
Chief, Division of Hydrography and Topography.
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**

Positions checked by **R. E. Ask**

Grid inked on machine by **R. E. Ask**

Intersections inked by **P. Sushka**

Points used for plotting grid:

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<td>1,998</td>
<td>148</td>
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Triangulation stations used for checking grid:

1. Public School 94 (1930) ref 7. Also check on 74° Meridian
2. School House 4th St (1908) 6.
4. Public School 201 (1931-2) 8.
Geodetic positions from Lambert coordinates

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<th>Station</th>
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<table>
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<th>$x$</th>
<th>$1,994,000$</th>
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<th>$24,462,545.30$</th>
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<tr>
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<td></td>
<td>$y$</td>
<td>$142,000$</td>
</tr>
<tr>
<td>$x' = x - C$</td>
<td>$-6,000$</td>
<td>$R_b + A - y$</td>
<td>$24,320,545.30$</td>
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<th>$\theta/\xi (= \Delta \lambda)$</th>
<th>$50.8866$</th>
<th>$y''$</th>
<th>$-$</th>
<th>$74$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\lambda (\text{central mer.})$</td>
<td>$74^\circ 00'$</td>
<td>$y'$</td>
<td>$143,999.26$</td>
<td></td>
</tr>
<tr>
<td>$- \Delta \lambda$</td>
<td>$17.7985$</td>
<td>$\phi$ (by interpolation)</td>
<td>$40^\circ 37' 14.7773$</td>
<td></td>
</tr>
<tr>
<td>$\lambda$</td>
<td>$74^\circ 58' 42.2015$</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$x$</th>
<th>$1,988,000$</th>
<th>$R_b + A$</th>
<th>$24,462,545.30$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C$</td>
<td></td>
<td>$y$</td>
<td>$148,000$</td>
</tr>
<tr>
<td>$x' = x - C$</td>
<td>$-12,000$</td>
<td>$R_b + A - y$</td>
<td>$24,314,545.30$</td>
</tr>
<tr>
<td>$\tan \theta$</td>
<td>$4,07918125$</td>
<td>$R$</td>
<td>$-$</td>
</tr>
<tr>
<td>$\theta$</td>
<td>$101.7982$</td>
<td>$y''$</td>
<td>$-$</td>
</tr>
<tr>
<td>$\theta/\xi (= \Delta \lambda)$</td>
<td>$35.6352$</td>
<td>$y'$</td>
<td>$147,997.04$</td>
</tr>
<tr>
<td>$\lambda (\text{central mer.})$</td>
<td>$74^\circ 00'$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$- \Delta \lambda$</td>
<td>$2$</td>
<td>$\phi$ (by interpolation)</td>
<td>$40^\circ 37' 54.2810$</td>
</tr>
<tr>
<td>$\lambda$</td>
<td>$74^\circ 02' 35.6352$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

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

$\lambda = \lambda (\text{central mer.}) - \Delta \lambda$

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

$C$ 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

$\phi$ is interpolated from table of $y'$
### Geodetic positions from Lambert coordinates

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>L. Island</td>
<td>Station</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>2,002,000</td>
<td>Rₚ + A</td>
</tr>
<tr>
<td>C</td>
<td>y</td>
<td>24,462,545.30</td>
</tr>
<tr>
<td>x' ( = x - C )</td>
<td>2,000</td>
<td>Rₚ + A - y</td>
</tr>
<tr>
<td></td>
<td>3,30105,900</td>
<td>24,304,545.30</td>
</tr>
<tr>
<td>tan θ</td>
<td>y</td>
<td></td>
</tr>
<tr>
<td>θ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[
\theta = \tan^{-1} \left( \frac{x - C}{Rₚ + A - y} \right) \\
\theta = \tan^{-1} \left( \frac{14,9734}{158,000} \right) = 16.9734^\circ \\
\theta' = \Delta \lambda \\
\theta' = 25,9500 \ (by \ interpolation) \\
\lambda \ (central \ mer.) = 74° 00' \\
\lambda = 73° 59' 34.0500' |

\[\text{19.03 mm}\]

---

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>1,998,000</td>
<td>Rₚ + A</td>
</tr>
<tr>
<td>C</td>
<td>y</td>
<td>24,462,545.30</td>
</tr>
<tr>
<td>x' ( = x - C )</td>
<td>-2,000</td>
<td>Rₚ + A - y</td>
</tr>
<tr>
<td></td>
<td>3,30103,900</td>
<td>24,314,545.30</td>
</tr>
<tr>
<td>tan θ</td>
<td>y</td>
<td></td>
</tr>
<tr>
<td>θ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[
\theta = \tan^{-1} \left( \frac{x - C}{Rₚ + A - y} \right) \\
\theta = \tan^{-1} \left( \frac{-14,964}{158,000} \right) = 148.000^\circ \\
\theta' = \Delta \lambda \\
\theta' = 25,9393 \ (by \ interpolation) \\
\lambda \ (central \ mer.) = 74° 00' \\
\lambda = 74° 00' 25,9393 |

\[\text{121.92 mm}\]

### Calculation notes:
- \(\tan \theta = \frac{x - C}{Rₚ + A - y}\)
- \(y'' = 2R \sin^2 \frac{\theta}{2}\)
- \(y' = y - y''\)
- \(\Delta \lambda = \frac{\theta'}{\ell}\)
- C is a constant added to x' in computation of coordinates
- Rₚ is the map radius of the lowest parallel
- A is the value of y' for Rₚ; in most cases it is zero
- \(\phi\) is interpolated from the table of y'
### Geodetic positions from Lambert coordinates

<table>
<thead>
<tr>
<th>State ( x )</th>
<th>( 1,994,000 )</th>
<th>( R_b + A )</th>
<th>( 24462,545.30 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( C )</td>
<td></td>
<td>( y )</td>
<td>( 152,000 )</td>
</tr>
<tr>
<td>( x' = x - C )</td>
<td>(-6,000)</td>
<td>( R_b + A - y )</td>
<td>( 24,310,545.30 )</td>
</tr>
<tr>
<td>( \tan \theta )</td>
<td>( 3.77815125 )</td>
<td>( 7,385,994.70 )</td>
<td>( 6,392,369.55 )</td>
</tr>
<tr>
<td>( \theta )</td>
<td>( 4.885,798.8 )</td>
<td>( 1.740,478.16 )</td>
<td>( 50,9075 )</td>
</tr>
<tr>
<td>( \theta' ( = \Delta \lambda ) )</td>
<td>( y )</td>
<td>( 152,000 )</td>
<td>( 151,999.26 )</td>
</tr>
<tr>
<td>( \lambda ( \text{central mer.} ) )</td>
<td>( 74^\circ 00' )</td>
<td>( -17,8304 )</td>
<td>( (\text{by interpolation}) )</td>
</tr>
<tr>
<td>( -\Delta \lambda )</td>
<td>( 74^\circ 01'17,8304 )</td>
<td>( \phi )</td>
<td>( 40^\circ 38'33.8285 )</td>
</tr>
</tbody>
</table>

### Station

<table>
<thead>
<tr>
<th>( x )</th>
<th>( R_b + A )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( C )</td>
<td>( \tan \theta )</td>
<td>( \theta' ( = \Delta \lambda ) )</td>
</tr>
<tr>
<td>( \lambda ( \text{central mer.} ) )</td>
<td>( \lambda )</td>
<td>( \phi (\text{by interpolation}) )</td>
</tr>
</tbody>
</table>

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

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

\[ y' = y - y'' \]

\[ \Delta \lambda = \frac{\theta}{\ell} \]

\[ \lambda = \lambda (\text{central mer.}) - \Delta \lambda \]

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

\[ A \text{ is value of } y' \text{ for } R_b; \text{ in most cases it is zero} \]

\[ \phi \text{ is interpolated from table of } y' \]

\[ C \text{ is constant added to } x' \text{ in computation of coordinates} \]

\[ R_b \text{ is map radius of lowest parallel} \]
Plane coordinates on Lambert projection

<table>
<thead>
<tr>
<th>State</th>
<th>U.T.</th>
<th>Station</th>
<th>Public School 94</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[
\phi = 40^\circ 38' 36.636'' \quad \lambda = 74^\circ 06' 32.519''
\]

Tabular difference of \( R \) for 1" of \( \phi = 101.20033 \)

<table>
<thead>
<tr>
<th>( R ) (for min. of ( \phi ))</th>
<th>24,313,969.56</th>
<th>( y' ) (for min. of ( \phi ))</th>
<th>145,517,580</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cor. for sec. of ( \phi )</td>
<td>-3,717,569</td>
<td>Cor. for sec. of ( \phi )</td>
<td>+3,707,569</td>
</tr>
<tr>
<td>( \theta ) (for min. of ( \lambda ))</td>
<td>00 00 00 00 00 00</td>
<td>( y'' ) (=2R sin^2 \frac{\theta}{2})</td>
<td>+152,297,51</td>
</tr>
<tr>
<td>Cor. for sec. of ( \lambda )</td>
<td>-21,263.61</td>
<td>( \theta '' )</td>
<td>10.6318</td>
</tr>
</tbody>
</table>

\[
\begin{align*}
\theta'' &= 21.26361 \times \frac{\theta}{2} \\
\theta'' &= \log \theta'' = 1.32762679 \\
\log \theta'' &= 1.32762679 \\
\log \theta'' &= 1.32762679 \\
\sin \theta &= 0.13226166 \\
\log \sin \theta &= 0.13226166 \\
\sin \theta &= 0.13226166 \\
\log R &= 1.94578964 \\
\log R &= 1.94578964 \\
\log x' &= 3.399901326 \\
\log x' &= 3.399901326 \\
R \sin \theta &= 2000.00000 \\
R \sin \theta &= 2000.00000 \\
log y'' &= 9.1118296 \\
log y'' &= 9.1118296
\end{align*}
\]

\[
x = 2000,000.00 + R \sin \theta \\
y = y' + 2R \sin^2 \frac{\theta}{2}
\]

\( y' \) = 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

\[\text{(see log tables)}\]

\( R, y', \) and \( \theta \) are given in special tables