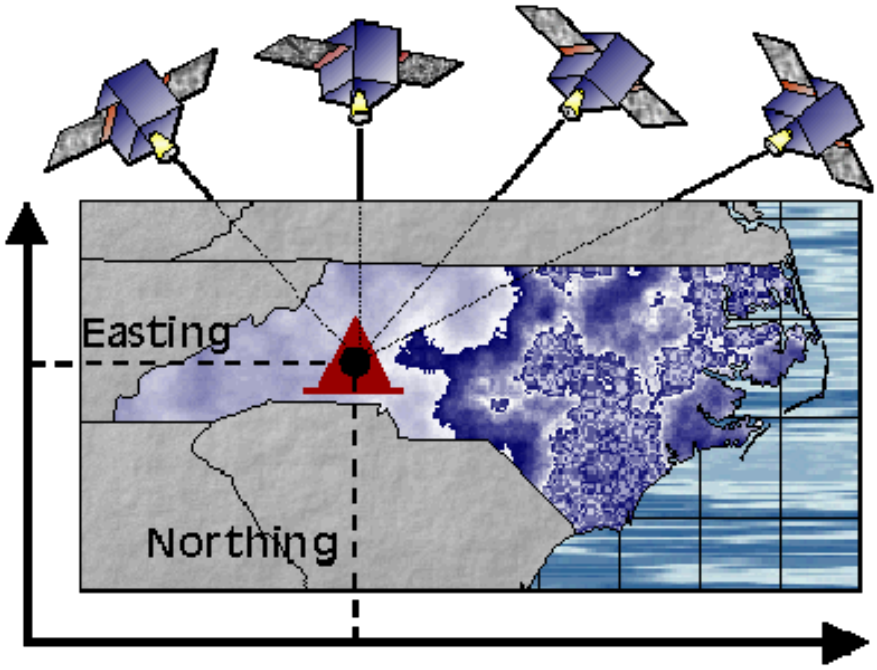
DEVELOPMENT & APPLICATION OF THE STATE COORDINATE SYSTEM



State of North Carolina
North Carolina Department of Public Safety
Division of Emergency Management

North Carolina Geodetic Survey
www.ncgs.state.nc.us/

STATE OF NORTH CAROLINA
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First in Geodetic Surveys

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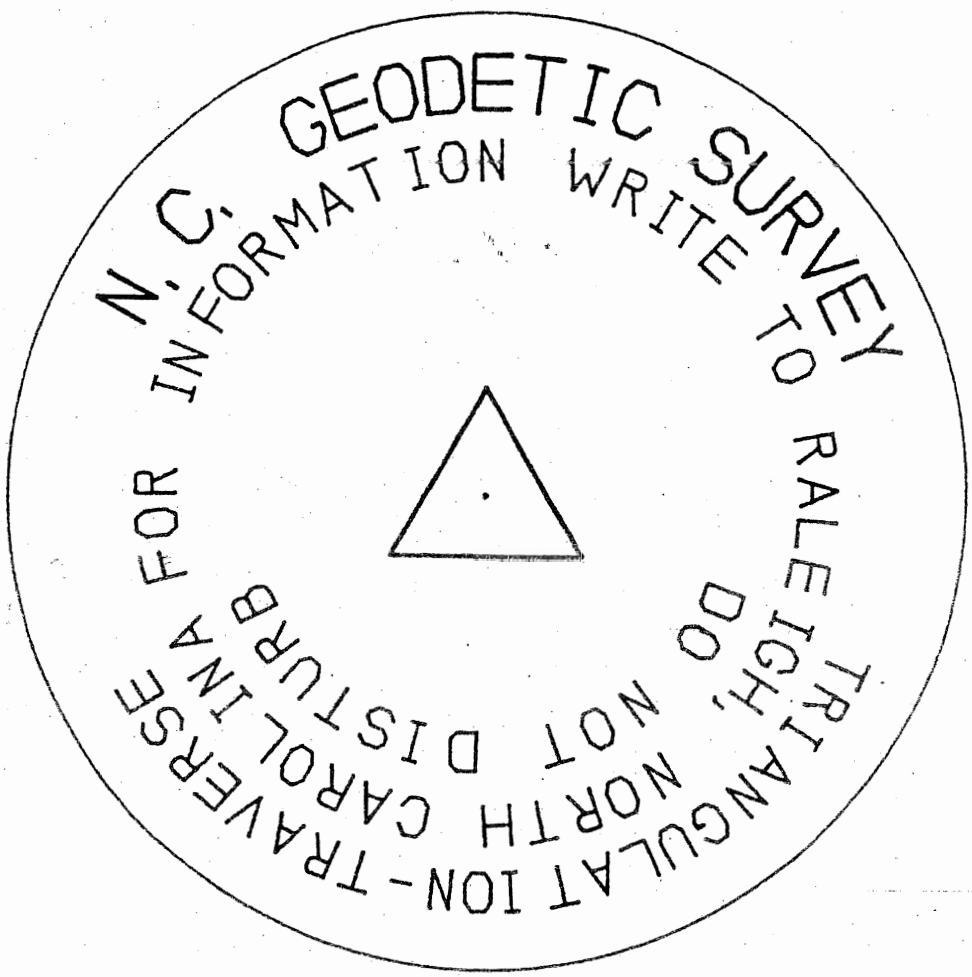
NORTH CAROLINA GEODETIC SURVEY



DEVELOPMENT AND APPLICATION

OF THE

STATE COORDINATE SYSTEM

DEVELOPMENT AND APPLICATION OF THE STATE COORDINATE SYSTEM

INTRODUCTION

The North Carolina Geodetic Survey (NCGS) is the official representative of the State of North Carolina in the field of Geodesy. The general purpose of the agency is to establish precisely located monuments on the North Carolina Grid System and bench marks referenced to a vertical datum (NGVD 1929 and NAVD 1988).

This manual has been prepared in the hope that all who are interested in the North Carolina Grid System - land surveyors, engineers, planners, instructors, students - will become familiar with the computations involved. State plane coordinates are really nothing more than an adaptation of the latitude and departure practices which have been in use for centuries. Most of the computation procedures are arithmetical, not mathematical.

The information in this booklet can be broken roughly into the following four sections: (1) In the first part a short history is presented and general development and application is discussed. Much of the information in this section is composed of excerpts from the papers listed in the bibliography. (2) The second part is an example of the computations necessary to coordinate a typical small property survey. (3) The new vertical datum (NAVD 88). (4) The final part consists of the Projection tables, Magnetic Declination tables, and inserts.

We hope the discussion and examples in this paper are presented in such a manner that you will have no difficulty in using the State Coordinate System in your profession and threrby enjoy the many advantages it offers. Should you have any questions, please feel free to contact the North Carolina Geodetic Survey by either of the following methods:

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DEVELOPMENT AND APPLICATION OF THE STATE COORDINATE SYSTEM

The chief purpose of this book is to explain the various degrees of development and practical application of the State Coordinate System.

A brief history of the development of the system could be of interest to you. Rectangular coordinate systems are probably as old as the surveying profession. The Romans employed such systems in the layouts of their cities and military encampments. In the United States, public land surveys were defined in rectangular coordinates. In 1932, O.B. Bestor and George F. Syme, two North Carolina Highway Engineers, initiated the idea of a State grid system which they hoped would eliminate the large amount of computations needed to make accurate surveys of large areas. They presented their idea to Dr. O.S. Adams of the U.S. Coast and Geodetic Survey, who undertook a feasibility study for a State plane coordinate system utilizing the geodetic data derived from the National Network. As a result of his studies, the Lambert conformal conic projection was developed for those States with greatest extent in the East - West direction.

After the system for North Carolina had been established, a study was made to select a projection suitable for states with greatest extent in a North - South direction. The transverse Mercator projection was chosen for these states. Projection tables have now been computed for all the states.

Projections adopted for the State Coordinate Systems are conformal. That is, the scale at any particular point is the same in any direction and small figures on the surface of a sphere retain their original forms on the map. On the Lambert projection, the basic line is a parallel of latitude and the scale changes in a North - South direction. The transverse Mercator projection is quite similar mathematically to the Lambert except the basic line is a meridian of longitude instead of a parallel of latitude and the scale changes in an East- West direction.

In setting up the State systems, it was necessary to decide on the minimum scale ratio to be tolerated. A curved surface cannot be projected on a plane without some distortion, but this distortion can be kept small by limiting the width of the zone. In the case of the Lambert projection, the zone can be any length in an East- West direction, and in the case of the transverse Mercator any length in a North - South direction. By keeping the width of the zones under 158 miles, and reducing the scale along the basic line, the scale ratio can be kept within one part in 10,000, an amount that can be neglected in most survey operations.

The scale ratio of one part in 10,000 was adopted as a maximum, and in most of the State coordinate zones the scale factor does not exceed this figure. Except in South Brunswick County, where it approaches one part in 5,000, the scale factor in North Carolina is never less than one part in 7,900.

State plane coordinates are available for all stations in the horizontal control network of the United States. The establishment of State plane coordinate systems not only simplifies the use of the control data, but it gives a permanent general grid useful for many purposes. County boundaries, property boundaries, intersection of roads and streets, and any prominent feature of a region can be accurately located with definite Northing (y) and Easting (x) coordinates. Any point which is referenced to the national control network could be relocated, if the marker should be destroyed. This is a very important characteristic and one which should be given due consideration by all surveyors and engineers. Until 1987, the N.C. State Plane Coordinate System was based on the North American Datum of 1927.

In 1978, the National Geodetic Survey (NGS) began the process of developing the data needed to perform a complete adjustment of the National Survey network. In 1987 NAD 83 was officially adopted as the official survey datum in N.C. (see GS 102).

The last total adjustment was done in 1927 (work was actually completed in 1930, but the adjustment was labeled NAD 27), since that adjustment, the technology has advanced rapidly (EDM's, GPS) and it became obvious to NGS that a new adjustment was needed.

Some of the weaknesses of the NAD 27 adjustment were:

1. The old adjustment (1901) did not include the Atlantic Seaboard control.

2. Length control was significantly deficient for the 1927 adjustment.

3. A number of Azimuths (Polaris observations) used in 1927 have been found to be of inferior accuracy.

4. The control in Alaska was connected to the datum during World War II by means of a single area of triangulation along the Alaska Highway.

5. In some areas of North America, relative horizontal tectonic (ground) movement as great as 5 cm per year has been observed.

The goals of the new adjustment were to:

1. Remove distortions in the network
2. Develop a new datum that is:
    a. suited for worldwide use, not just for North America
    b. Earth-centered

With the above criteria in mind, the GRS 80 (Geodetic Reference System) ellipsoid was developed. NAD 27 was based on Clark's ellipsoid of 1866, which had as its datum point a control station in Kansas named Meades Ranch. Clark's Ellipsoid worked best in North America. GRS 80 does not have a datum point, but instead is an earth-centered ellipsoid that can be used worldwide.

A comparison of the two ellipsoids shows us that: (Figure 1)

Clark Ellipsoid of 1866	GRS 80
a = 6,378,206.4 meters	a = 6,378,137 meters
b = 6,356,583.8 meters	b = 6,356,752.314140347 meters
f = 1/294.9786982	f = 1/298.2572221
Datum Point: Triangulation station Meades Ranch	Datum Point: None (Mass center of the Earth)

In addition to changing ellipsoids, other changes include all values being published in metric values and all azimuths oriented from North. Published Azimuths in the NAD 27 adjustment were oriented from South.

It should be noted if you convert the Metric values to English units (feet) in North Carolina, the official conversion (GS 102 1.1) is the U.S. Survey foot (1 meter = 39.37 inches or 1 meter = 3.2808333333..... feet). The use of the wrong (International foot) conversion factor will create an error up to approximately 4 feet in the coordinate value. Note that the states adjoining North Carolina have in some cases adapted a different feet/meters conversion.

South Carolina = International Foot
Virginia = US Survey Foot (Note: Some counties in the state use the International Foot Conversion)
Tennessee = US Survey Foot

GS 102-1.1

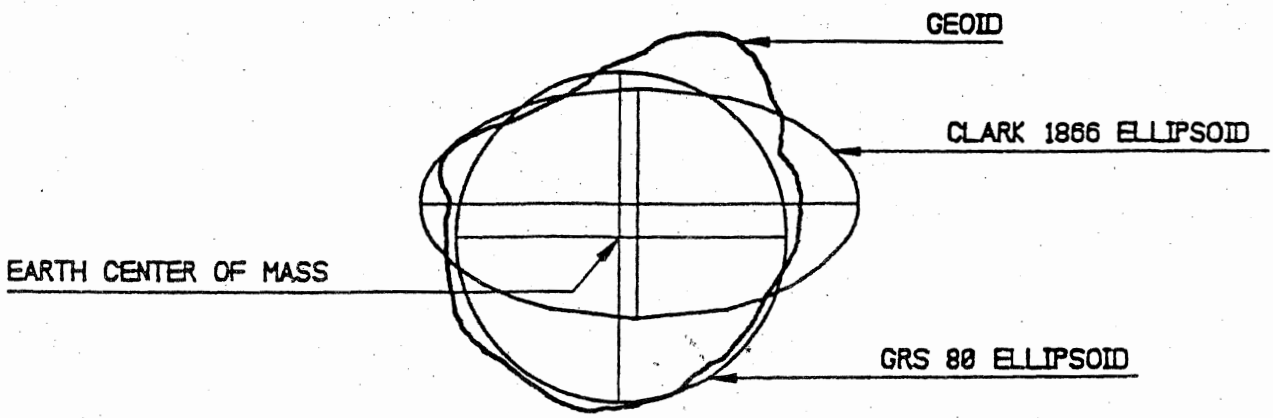
In North Carolina the official conversion for

feet/meter = US Survey Foot

1 meter = 3.2808333333.....ft
1 meter = 39.37 inches exactly
NOTE: DO NOT ROUND OFF this conversion, use at least 9 significant figures. LARGE errors can be introduced if you round off the conversion.

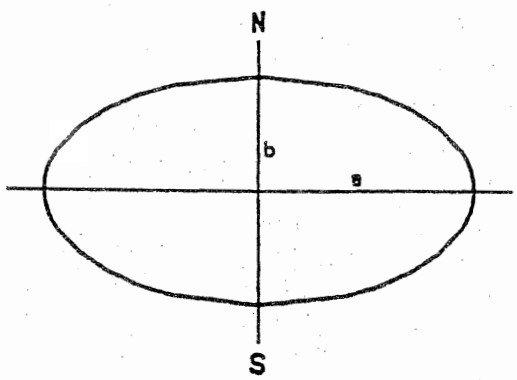
THE GEOID AND TWO ELLIPSOIDS

(FIG. 1)



NAD PROJECT

THE ELLIPSOID



a = SEMI MAJOR AXIS

b = SEMI MINOR AXIS

$f = \frac{a - b}{a}$ = FLATTENING

THE DATUM

NAME: NAD 83

ELLIPSOID: GRS 80 (GEOCENTRIC)

a = 6378137. METERS

$f = \frac{1}{298.257222}$

Comparison of North American Datum of 1927
and North American Datum of 1983

	NAD 27	NAD 83
Reference Ellipsoid	Clarke Ellipsoid of 1866	GRS 80
Datum Point	Triangulation Station Meades Ranch	None (Mass Center of Earth)
Longitude Origin	Greenwich Meridian (BIH Zero Meridian)	Greenwich Meridian (BIH Zero Meridian)
Azimuth Orientation	From South	From North
Adjustment	25,000 points Several Hundred Baselines Several Hundred Astro Azimuths	250,000 points App. 30,000 EDM Baselines 5,000 Astro Azimuths Doppler Point Positions Very Long Baseline Interferometry
Best Fitting	North America	World-Wide
Geodetic Elements	Latitude Longitude Azimuth Elevation (Only certain points)	Latitude Longitude Azimuth Elevation (All points, plus accuracy statement: scaled, trigometric bench mark)
Information Published on State Plane Coordinate Data Sheets	x coordinate y coordinate Grid Azimuth Mapping Angle (Theta)	Easting Northing Grid Azimuth Mapping Angle (Theta) Scale Factor
New Elements		Geoid Height (See page 21 and 22)
Units	Feet	Meters
Data Format	Paper Copy	Paper Copy Microfilm (from NGS) Microfiche (from NGS) Digital Data Base (In N.C. NCGS Database w/software)

As noted in the previous table, there are significant differences between NAD 27 and NAD 83. The Geodetic Zone constants (Central Meridian, Standard Parallels and Latitude Origin) for North Carolina did not change, and N.C. retained its single Lambert zone.

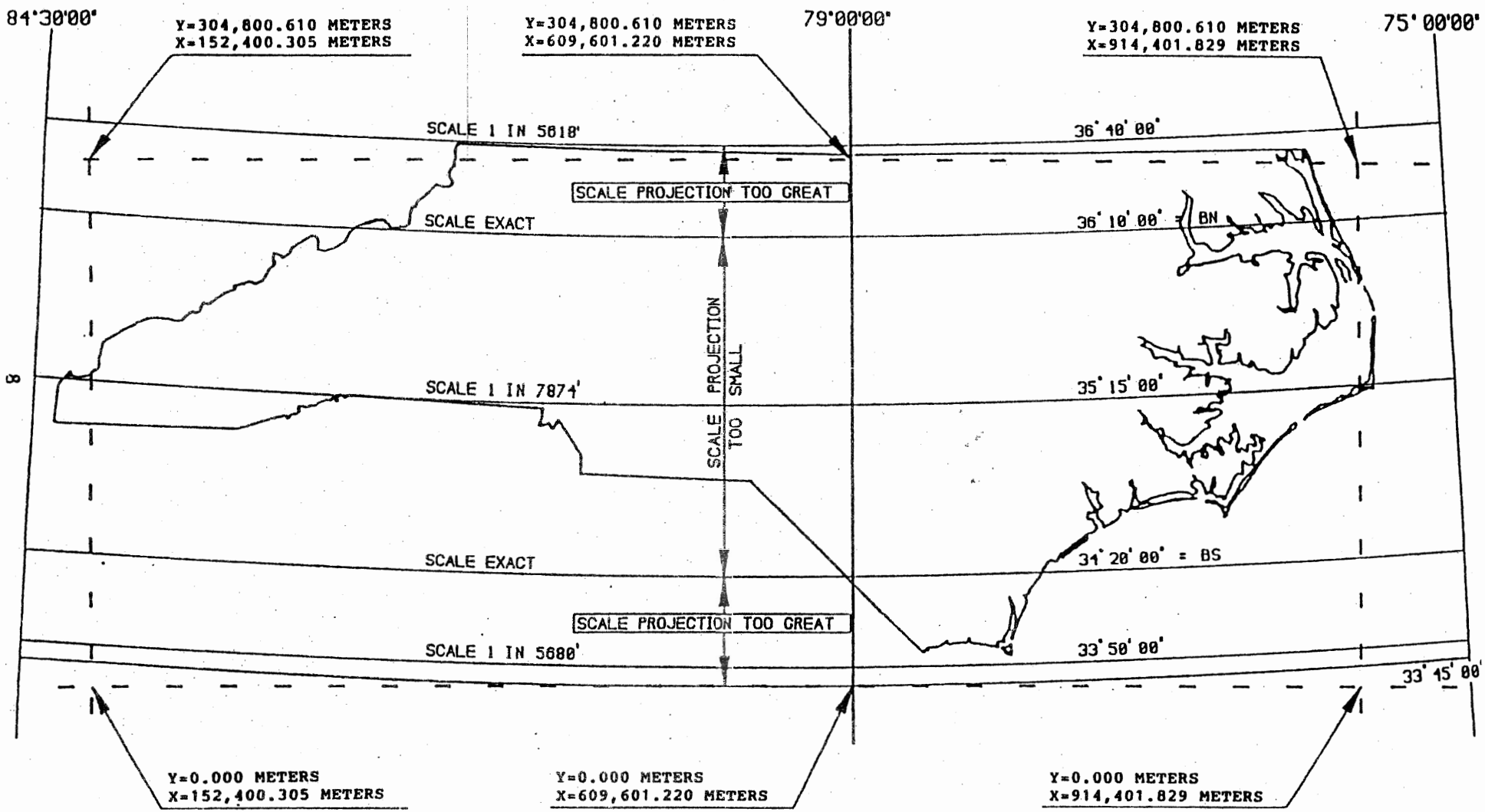
North Carolina Single Zone

	NAD 27	NAD 83
Projection	Lambert	Lambert
Latitude of Origin	33 degrees 45'	33 degrees 45'
Central Meridian	79 degrees 00'	79 degrees 00'
Standard Parallel 1	34 degrees 20'	34 degrees 20'
Standard Parallel 2	36 degrees 10'	36 degrees 10'
False Easting	2,000,000.00 Feet	609,601.22 Meters (2,000,000.00 Feet)
False Northing	0.00 Feet	0.00 Meters

As you can see on page 6, there have been some significant changes between NAD 27 and NAD 83, but the basic computations to connect to the N.C. coordinate system remain the same. See pages 31-40 for a step by step worksheet of a typical property survey that has been tied to grid monuments.

If you are interested in more indepth information concerning NAD 83, a list of NGS literature is listed on page 79 of this booklet.

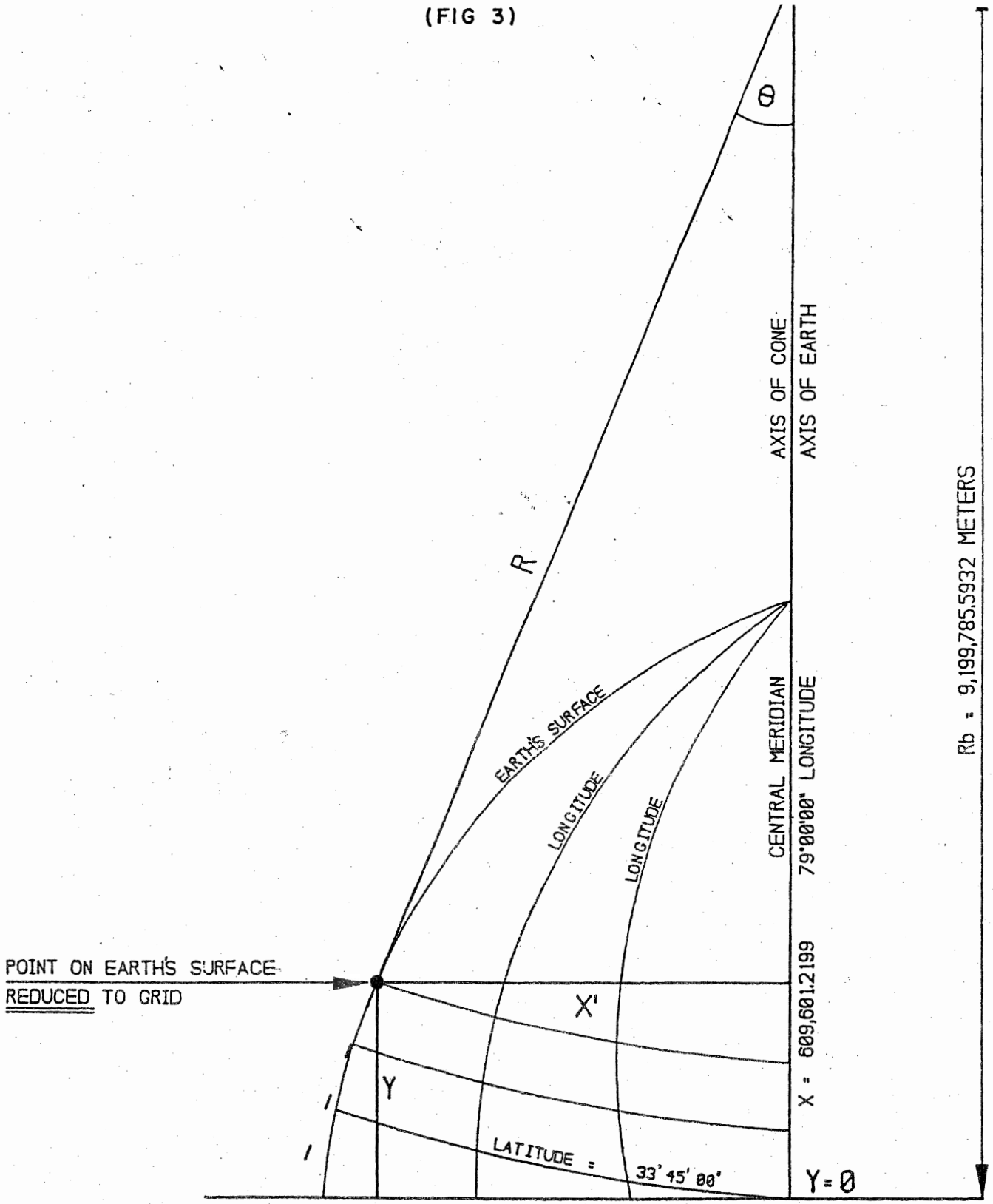
(FIG 2)



BS = SOUTHERN STANDARD PARALLEL
BN = NORTHERN STANDARD PARALLEL

FOR MORE INFORMATION SEE PAGE 47

(FIG 3)


θ
R
AXIS OF CONE
AXIS OF EARTH
Rb = 9,199,785.5932 METERS
EARTH'S SURFACE
LONGITUDE
LONGITUDE
CENTRAL MERIDIAN
79°00'00" LONGITUDE
POINT ON EARTH'S SURFACE
REDUCED TO GRID
X'
Y
X = 609,601.2199
LATITUDE = 33° 45' 00"
Y = 0

North Carolina is one of about 35 states which has adopted laws (GS 47-30 and GS 102), establishing the State Plane Coordinate System as a basis for property surveys. Since the laws do not contain mandatory clauses, the use of the State system has been limited to areas where control is readily available. In areas where horizontal control points are available, the State system should be used to supplement the description of land surveys. The State plane coordinates then provide means for accurate recovery of a boundary point should the monument become completely destroyed. Once a strong control network has been established in an area and the property corners are tied to this control, there is a no more precise or positive way of relocating the lost corners of the coordinate method.

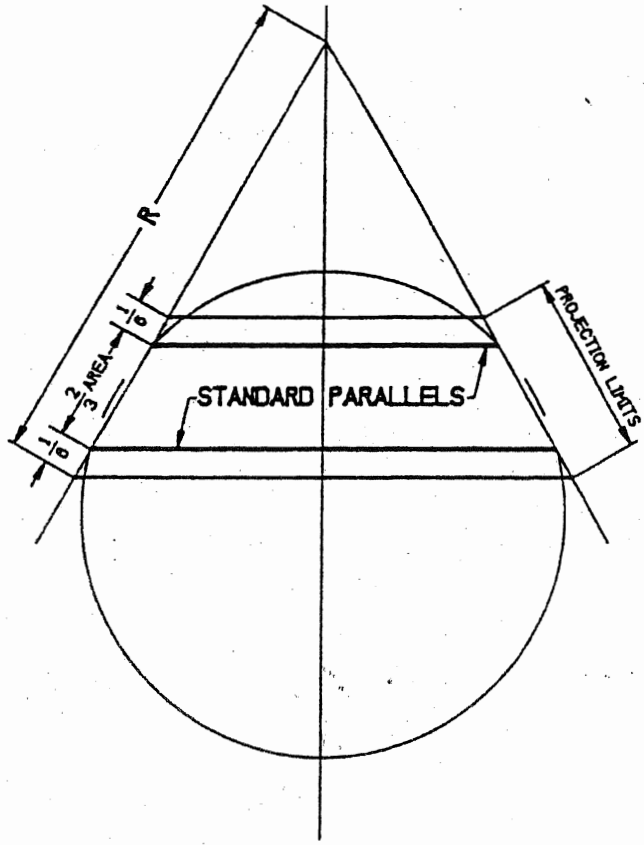
Many Federal and State agencies have made extensive use of the State systems. One of the most widespread applications of the State systems was that of the Tennessee Valley Authority. The TVA employed several State coordinate systems as the basis for computing and plotting practically every survey and map produced by that organization. Also, the N.C. Land Records Management program has based all of its 100 county maps on the N.C. Coordinate system.

In more recent years the State systems have been used extensively in connection with the interstate Highway Program. The National Geodetic Survey has cooperated with other states in the establishment of geodetic markers along many miles of interstate routes. Most of this was in the form of traverse surveys, combined with triangulation to connect to established control. All surveys have been reduced to the State Coordinate Systems.

A state-wide system of coordinates has many advantages over several local systems. When there are several local systems in use in a state, it often causes a great deal of confusion and difficulty in transforming coordinates from one system to another. Another advantage of the state system is the simplicity with which the scale in any part of the grid may be determined over a wide area and then applied to the survey values. One of the important characteristics is the small number of separate grids required to cover most states. North Carolina and several other states are fortunate to be covered by a single grid.

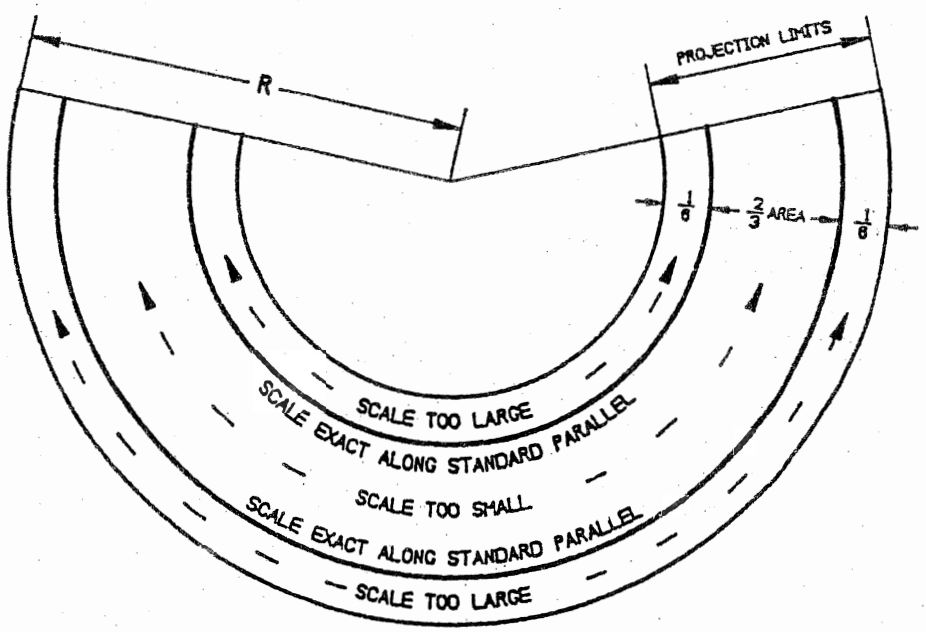
Since North Carolina is based on the Lambert Projection, discussion and explanation of example computations will be limited to that system.

The Lambert conformal conic projection with two standard parallels can be looked upon as a cone - the axis of which coincides with the axis of the earth and which intersects the earth. This cone intersecting the sphere is shown on page 12. The meridians on the earth are represented by the elements of the cone and they intersect in a point at the apex of the cone. When the conical surface is split along an element, it can be unrolled in a plane and the parallels become arcs of concentric circles. The developed cone in a plane is shown on page 12.



LAMBERT CONFORMAL CONIC PROJECTION SPHERE AND INTERSECTING CONE

(FIG 4)



LAMBERT CONFORMAL CONIC PROJECTION DEVELOPED CONE IN A PLANE

Page 8 shows the relation between the Latitudes and the Longitudes, State Coordinates and scale factors for the State of North Carolina. In the State Coordinate System the values of the Easting increases to the eastward and the Northing increases to the northward. An arbitrary Easting of 609601.22 meters was given to all points along the Central Meridian (79 degree Longitude) so that all Easting within the system are positive. The zero Northing was given to the point on the 79 Meridian at the 33 ° - 45'- 00" Latitude, a point further south than any position of the State. This enables all points within the State to have positive Northing coordinates.

Page 15 shows the relation between True North (Longitude lines solid) and Grid North (Grid Azimuth lines dotted). The sketch is not drawn to scale, but just illustrates the relation. You will note at the Central Meridian (79 ° - 00'-00") that the Geodetic Azimuth (or True North) and the Grid Azimuth are equal. The angle formed between the geodetic (Longitude solid lines) and the Grid meridians (dashed lines) is the Theta angle, often referred to as the mapping angle, or convergence angle. The Theta angle is positive to the east of the Central Meridian and negative to the west of the Central Meridian. This (+) or (-) angle sign is very important in your mathematical calculations when it is used. The rule is, Grid Azimuth equals Geodetic (True) Azimuth (-) Θ + 2nd Term.
On page 14 an example of computing a theta angle is shown. The ratio of theta (mapping angle) to the longitude difference from the Central Meridian equals 0.577170255241; or, in simple terms, one second of Longitude equals 0.577170255241" of Theta angle. Therefore to compute a Theta angle from the Central Meridian, simply subtract your longitude from the Central Meridian (79 ° 00' 00").

Multiply the difference by 0.577170255241 to obtain the theta angle. If you are east of the central meridian the theta angle will be positive, if you are west of the central meridian the theta angle will be negative.

Central Meridian = 79° 00' 00"

0.577170255241 = ratio of theta (mapping angle) to the longitude difference from the Central Meridian (in N.C.)

(Central Meridian - Longitude) (0.577170255241) = theta

Example

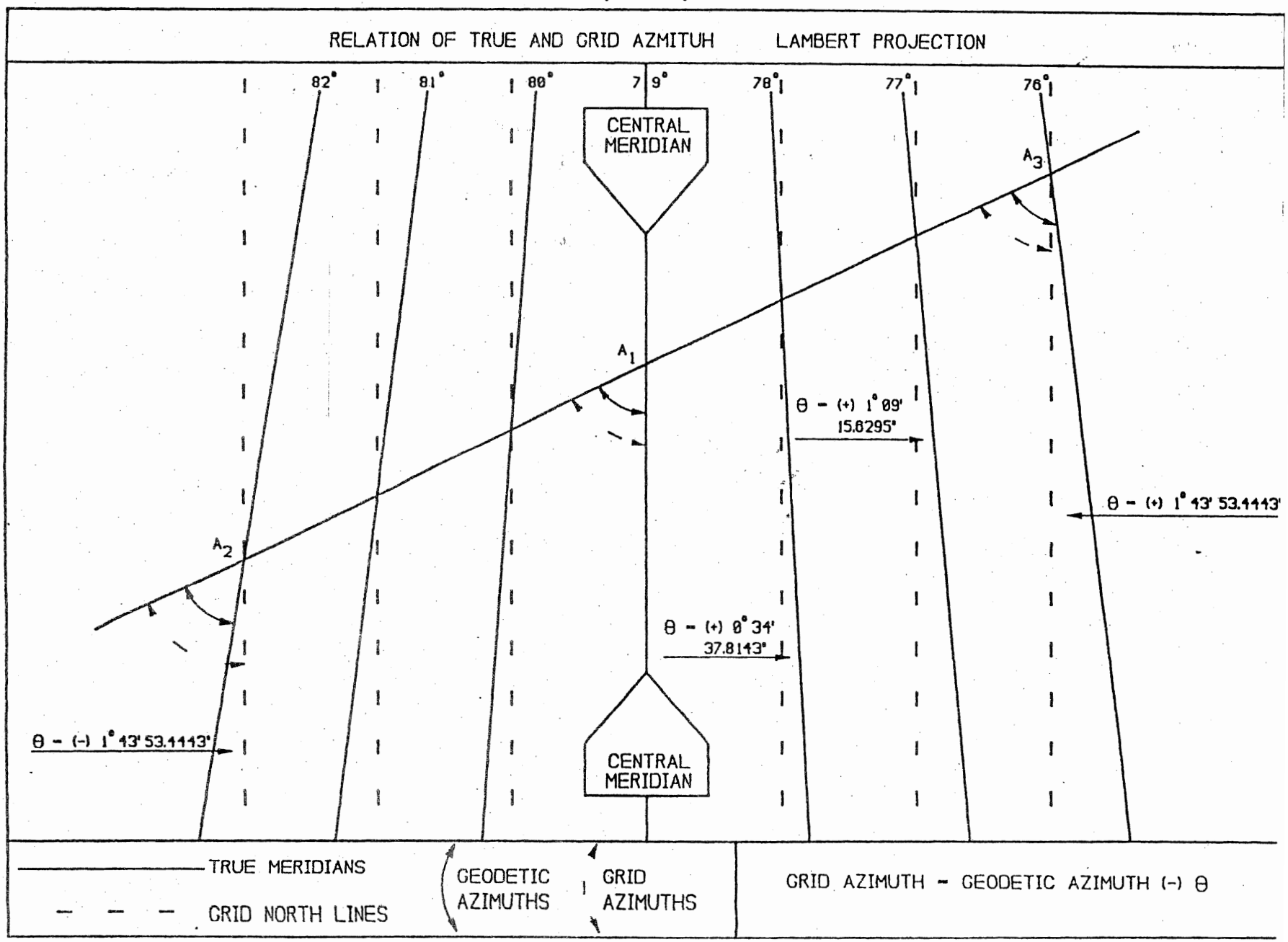
You are located at Latitude = 35° 19' 43.46521"
Longitude = 79° 56' 04.82641"

[(79° 00' 00") - (79° 56' 04.82641")] 0.577170255241 = theta

(- 0° 56' 04.82641") 0.577170255241 = theta

Theta = (- 0° 32' 22.08")

(FIG 5)


RELATION OF TRUE AND GRID AZMITUH LAMBERT PROJECTION
82°
81°
80°
79°
78°
77°
76°
CENTRAL MERIDIAN
A1
A2
A3
θ - (+) 1° 09' 15.8295"
θ - (+) 1° 43' 53.1113"
θ - (+) 0° 34' 37.8113"
θ - (-) 1° 43' 53.1113"
CENTRAL MERIDIAN
TRUE MERIDIANS
GRID NORTH LINES
GEODETIC AZIMUTHS
GRID AZIMUTHS
GRID AZIMUTH - GEODETIC AZIMUTH (-) θ

The "second term" in the formula is a very minor correction which may be neglected in most surveys spanning 10 miles or less (lines projecting east-west are most affected). The second term should be considered when true First and Second Order/Class 1 grid control is being established. Although the correction for individual traverse sections up to a mile long (on an east-west direction) may only yield tenths of a second, the values accumulate as the traverse expands. However, on the other hand, if the total traverse continues throughout in one direction, an adjustment for position closure will likely compensate for the neglecting of this correction.

The second term correction is a flattening value to apply to individual observed (geodetic) directions and/or azimuths to produce grid.

The formula:

1. NAD 27 coordinates are in feet;
   2nd term = $2.361\ (10^{-10})\ (X_2 - X_1) \left[Y_1 - Y_0\ (+)\ \frac{Y_2 - Y_1}{3} \right]$

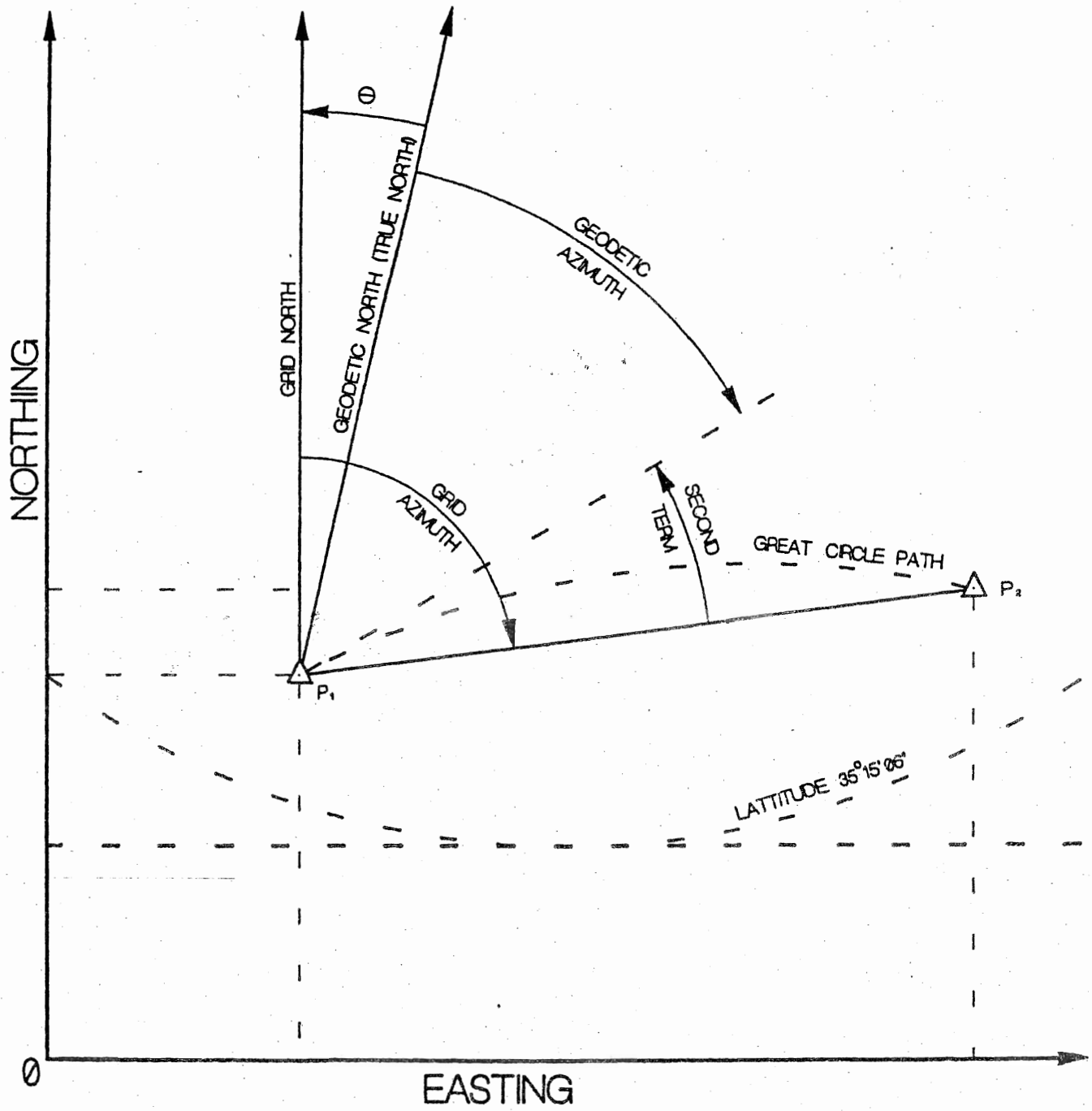
2. NAD 83 coordinates are in meters;
   2nd term = $25.4135\ (10^{-10})\ (X_2 - X_1) \left[Y_1 - Y_0\ (+)\ \frac{Y_2 - Y_1}{3} \right]$

will yield second terms to 95% or greater accuracy, where X = east coordinates, Y = north coordinates, and Y0 = 546552 feet for NAD 27 and 166580 meters for NAD 83.

Y0 is the northing coordinate of latitude 35° 15' 06" at the 79th degree Meridian.

The second term is best visualized by drawing a geodetic (curved) line over or under a straight (grid) line between two points, the curved line is always concave to the Y0 line, and the second term is the angle between the curved and straight line at point # 1. The second term as computed above would be the correction at point one, on the direction or azimuth to point two. Therefore to correct angles in this way, a second term would have to be computed and applied at every occupied point to every point observed.

GEODETIC AZIMUTH OF DISTANT POINTS



Θ = THETA

Slope Lengths Reduced to Horizontal

If ground lengths are not taped horizontally, but instead are measured with an EDM, as is the case with the North Carolina Geodetic Survey and most other agencies or firms, then they must be reduced from slope length to horizontal distances. In most cases this can be accomplished in one of two ways; either by using vertical angles or differences in elevation. When vertical angles are observed, the horizontal distance is equal to the slope distance times the cosine of the vertical angle, or HD = L Cos VA. In the cases where differences of elevation are available, the reduction is accomplished using the formula $HD = \sqrt{(L)^2 - (\Delta h)^2}$ where the Δ h is the difference in elevation between the measured stations. Of course, there are other formulae for reducing slope distances as well as computer software and total stations that internally reduce distance to horizontal.

The North Carolina Geodetic Survey reads reciprocal observations (vertical angles taken from both ends of each line) and carries elevation from station to station throughout the entire traverse. Results of experiments in this area indicate that if the heights of instruments and targets above ground are accurately measured along with the vertical angles, elevations can be computed for each station with a probable error of not more than one tenth of a meter (0.10) per mile or thirty-three hundredths of a foot (0.33) per mile of traverse. Since one minute in vertical angle per 1,000 feet of slope distance will cause 0.29 feet difference in vertical elevation, it is important that care be taken in all measurements and observations for vertical angle elevations. At the present time, elevations determined by GPS (Global Positioning System) are considered to have the same accuracy as trigometric elevations. At some time in the near future, elevations derived via GPS will increase in accuracy.

The computation for elevation from reciprocal observations are obtained from the formula $h_2 - h_1 = D \sin \frac{1}{2} (z_2 - z_1)$ (A.B.C.). In this formula h_1 is the elevation above NGVD 29/ NAVD 88 of station #1, whose elevation is known; h_2 is the elevation of station #2; D is the slope distance between the stations; Z_1 is the zenith angle from station #1 to station #2 and Z_2 is the zenith angle from station #2 to station #1. The A.B.C. in the formula are correction factors whose value is nearly unity and may be omitted from most computations and will not be covered herein.

Horizontal Distances Reduced to the Ellipsoid

The reduction of distances to the ellipsoid is one area that differs from the method used with NAD 27. When NAD 27 was developed, the geoid (NGVD 29/NAVD 88) and the ellipsoid (Clarke Ellipsoid of 1866) were about the same (within about 2 meters). With the advent of satellite positioning (GPS) and space coordinates, a new earth-centered ellipsoid was developed.

In order for this ellipsoid NAD 83 (GRS 80) to best fix the earth, GRS 80 and the geoid (NGVD 29/NAVD 88) could not be the same because it was developed for the whole earth. The difference between GRS 80 and the geoid is known as the geoid height (see figure 6 and 7). In N.C. the geoid height varies from -29 meters to -38 meters.

Since the geodetic data determined by the National Geodetic Survey (the Latitude and Longitude of points) are based on the ellipsoid, your survey must also be first reduced to the ellipsoid base before being reduced to grid.

The formula for reduction to the ellipsoid is:

$$\text{Ellipsoid Distance} = \text{Horizontal Distance} \times \left(\frac{R}{H + \text{Geoid Height} + R} \right)$$

or

$$\text{Ellipsoid Distance} = \text{Horizontal Distance} \times \left(1 - \left[\frac{H + \text{Geoid Height}}{R} \right] \right)$$

H = Elevation (NGVD 29/NAVD 88)

Geoid Height = In the above application, an average geoid height is best used throughout a project. The average geoid height for NC (-33 meters) would be adequate for most boundary surveys.

R = Mean Radius of the Earth (In N.C. use 6370944 meters as mean radius).

By use of the above formula, we can set up a table as follows:

Table of Ellipsoid Factors

Elevation = H (meters)	Ellipsoid Factor	Elevation = H (meters)	Ellipsoid Factor
25	1.00000126	1100	0.99983252
50	0.99999733	1200	0.99981682
100	0.99998948	1300	0.99980113
200	0.99997379	1400	0.99978543
300	0.99995809	1500	0.99976974
400	0.99994239	1600	0.99975404
500	0.99992670	1700	0.99973834
600	0.99991100	1800	0.99972265
700	0.99989531	1900	0.99970695
800	0.99987961	2000	0.99969125
900	0.99986391		
1000	0.99984822		

Note: The values computed for this table were obtained by using an average geoid height of - 33 meters.

In most land surveying projects, if the surface on which the traverse is measured is fairly regular so that variations in elevations are not large, a mean elevation and a mean geoid height for the entire traverse may be used.

For example, if the elevation of the beginning and ending control markers were 390 meters and 610 meters above NGVD 29/NAVD 88, and the traverse varied between those elevations, then the average elevation of the project would be 500 meters. From the table on page 19, the ellipsoid factor would be 0.99992670. Each horizontal line in the project should be multiplied by this factor for reduction to the ellipsoid.

Example
NAD 83 Sea Level Factor Computation
(Ellipsoid)

Your project is between:

NCGS Elwood:	NCGS Village:
MSL (NGVD 29) = 56.161 meters	MSL (NGVD 29) = 58.253 meters
Geoid Height = -32.43	Geoid Height = -32.44
Scale Factor = .9998793	Scale Factor = .9998793

$$\text{Ellipsoid Reduction Factor} = \frac{\text{Mean Radius}}{\text{Elevation (MSL)} + \text{Average Geoid Height} + \text{Mean Radius}}$$

Average elevation (MSL) of area you are working in = 57.207 m

$$\frac{56.161\text{ m} + 58.253\text{ m}}{2}$$

Average Geoid Height = ELWOOD Geoid Height = -32.43
Village " " = -32.44
Average = -32.44

$$\text{Ellipsoid Reduction Factor} = \frac{6370944}{57.207\text{m} + (-)32.44 + 6370944}$$

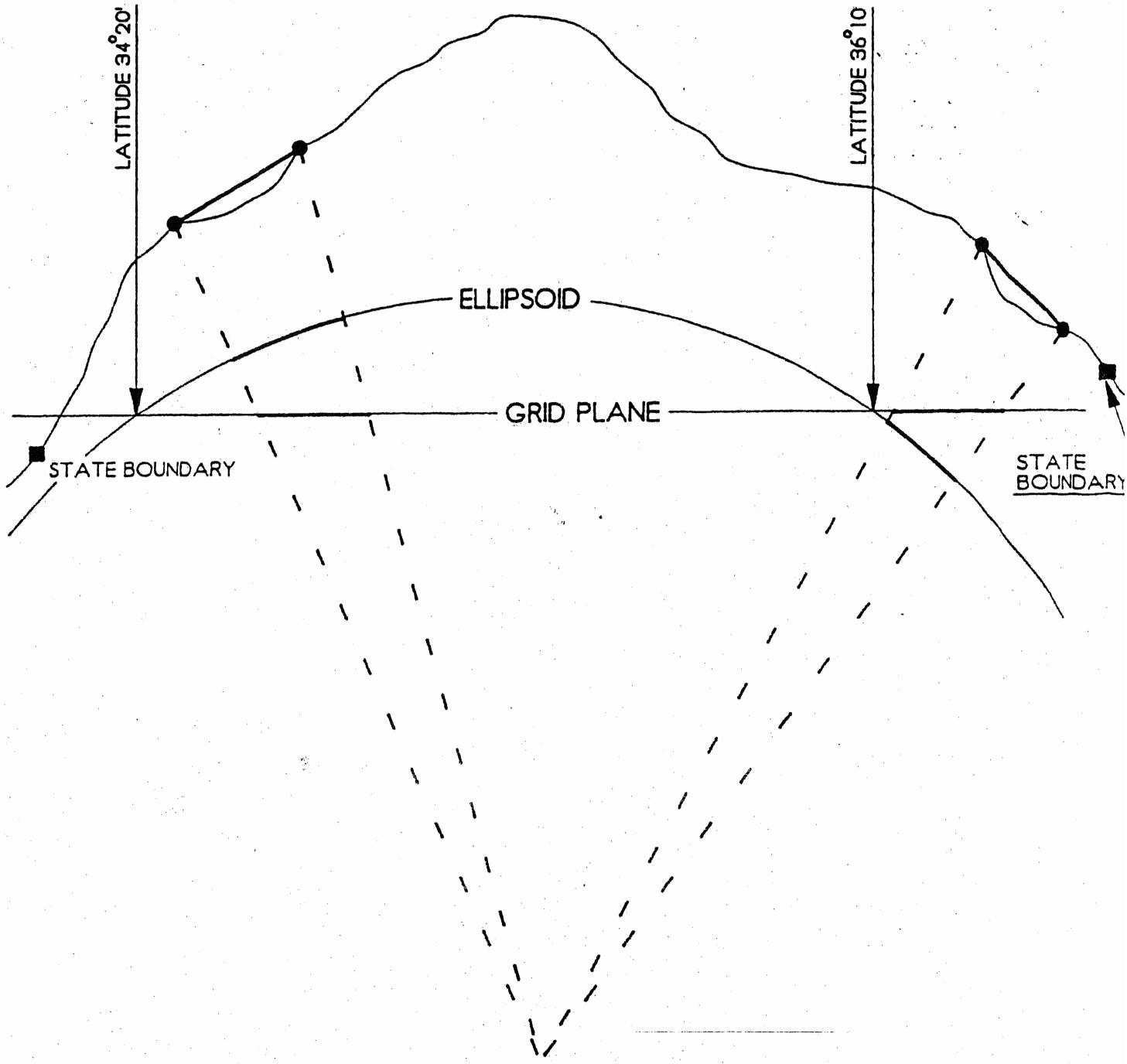
Ellipsoid Reduction Factor = .9999961

* Scale Factor = ELWOOD = .9998793 (Obtained from station
VILLAGE = .9998793 data sheet or NC
Mean = .9998793 Projection Tables)

Combined Factor = (Ellipsoid Factor) x Scale Factor

.9998754 = (.9999961) x (.9998793)

* See pages 23-24 for definition of Scale Factor.



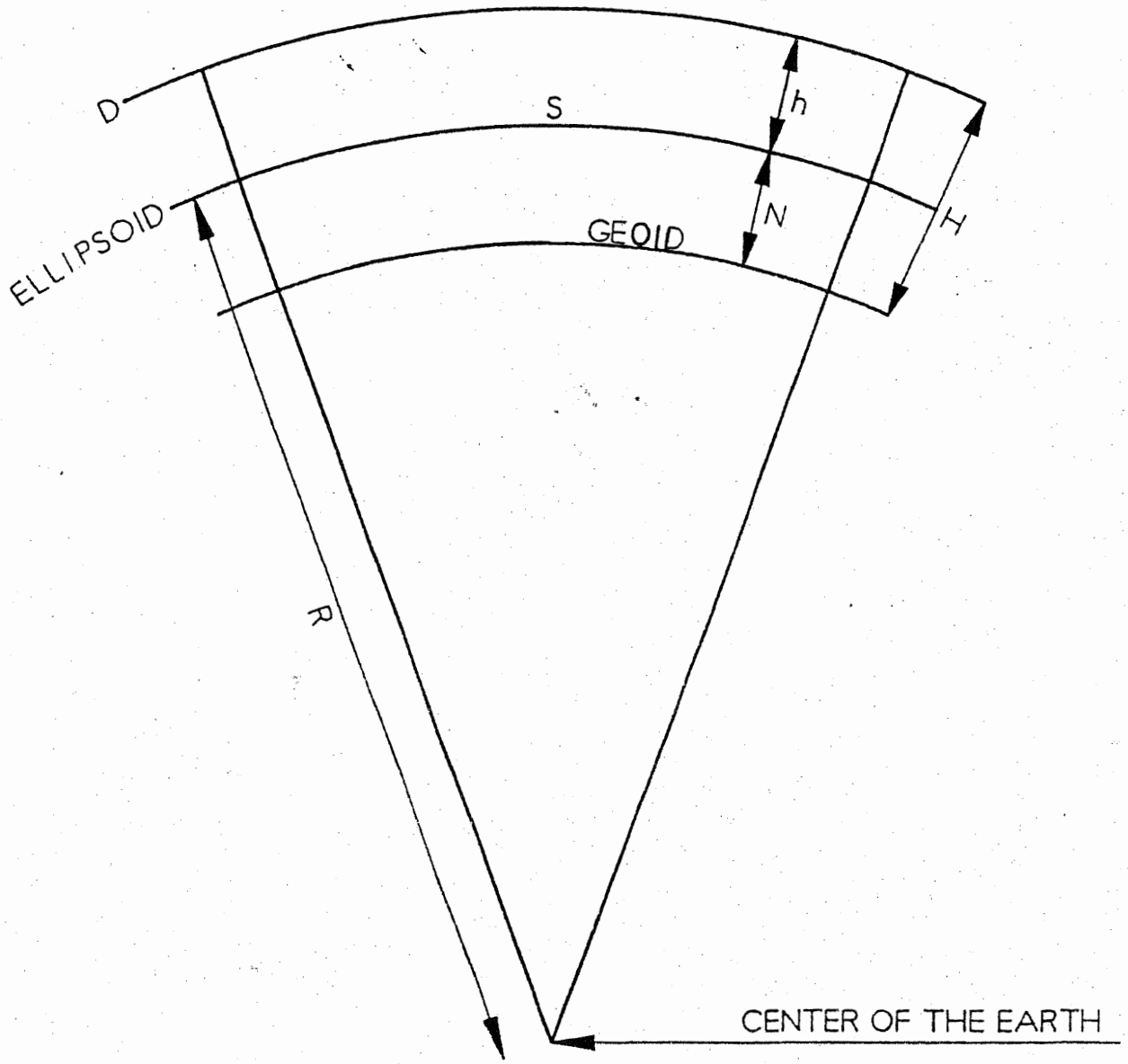
CENTER OF THE EARTH
MEAN RADIUS OF THE EARTH = 6,370,944 METERS

Distances measured on the curved surface of the earth can not be projected onto a flat plane surface without some distortion. Scale factors significantly reduce this distortion.

The Earth's curved surface approximates a spheroid. In order to convert the spherical coordinates (survey points on the ground) to plane rectangular coordinates, it 's necessary to mathematically project these points from the spheroid to an imaginary developable surface - one that can be unrolled and laid flat into a plane surface (a grid plane) without much distortion of shape or size.

REDUCTION TO THE ELLIPSOID

(FIG. 7)



$$S = D \left(\frac{R}{R + N + H} \right)$$

WHERE

S = GEODETIC DISTANCE
D = HORIZONTAL DISTANCE
H = MEAN ELEVATION
N = MEAN GEOID HEIGHT (h - H)
R = MEAN RADIUS OF THE EARTH
IN N.C. 6370944 METERS
h = ELLIPSOID HEIGHT

Geodetic Lengths Reduced to Grid Lengths

The geodetic (Ellipsoid) lengths are further corrected for scale differential between the actual length and the same length as represented on the State Plane or grid. This is accomplished by application of a scale factor taken from the NAD 83 NC Projection Tables on pages 51-55.

From observation of the figures on pages 8 & 12 and the Projection Tables, it is seen that for lines along or near the Standard parallels of 36 ° 10' and 34 ° 20' Latitude the scale factor is unity and therefore no correction is applied to the Ellipsoid distances; Ellipsoid distances falling between the Standard parallels must be further reduced to the grid; and that those Ellipsoid distances falling outside of the Standard parallels must be increased up to the grid.

If the latitude extent of a survey is not great, a mean scale factor may be used. The approximate mean latitude of a project can be determined from the published latitudes of the beginning and tying geodetic control markers or scaled from a map. For example, if the latitude of the beginning control marker is 35° 51' 01.1715" and the latitude of the ending control marker is 35 ° 52' 19.7654", the approximate mean latitude of the project would be about 35 ° 51' 40". From the Projection Tables (pages 51-55), interpolation between 35 ° 51' = .99992699 and 35 ° 52' = .99993007 gives a scale factor of 0.9999290. Each Ellipsoid distance of the project should be multiplied by this factor to obtain grid lengths.

The ellipsoid factor of 0.99992670 as derived previously and the scale factor of 0.9999290 from above may be combined by multiplying them together to obtain a combined factor of 0.9998557. This combined factor may then be multiplied by each horizontal distance to obtain grid lengths for your entire traverse.

Using this combined factor of 0.9998557, the horizontal distance will be shortened by about 0.15 of a foot per thousand feet of traverse. If the traverse is 10,400.00 feet long, the length after both the Ellipsoid and scale factors are applied would be 10,398.50 feet, or a reduction of 1.50 foot.

For more detailed information about data reductions and grid or geodetic computations refer to one or more of the U.S. Department of Commerce (NOAA) Special Publications, such as NOAA Manual NOS NGS 5 "State Plane Coordinate System of 1983".

Geodetic Control Information

In addition to our own geodetic control, we strive to maintain and update data files for the following agencies:

National Geodetic Survey - NGS (formerly U.S. Coast & Geodetic)

U.S. Geological Survey - USGS

N.C. Department of Transportation - NCDOT

Army Map Service - AMS

Tennessee Valley Authority - TVA

Army Corps of Engineers - USCE

We will be glad to furnish you with data when available in digital (floppy disk) form. The free Searcher program that is included will enable you to maintain a data base of all the geodetic control in your area on your PC. On page 59 is an example of Searcher, along with a current price list of control data which has been inserted into this booklet. If you obtain Searcher we recommend that you update your data base yearly. To do this, return your data files on floppy disk to our office and request an update. You will only be charged for any new marks that have been added.

When data is not available in digital form, or the request is for printed material, hard copies will be provided. In either case cost estimates can be provided when an order is placed.

The discussion of geodetic data above referred to all published and preliminary adjusted data available. Most of you are aware that our PRELIMINARY positions are available while NGS is making final adjustment and publishing our horizontal and vertical control projects. We are now using a Least Square Adjustment set up by NGS (Program ADJUST) which computes positions only on the new NAD 83 (North American Datum of 1983). These preliminary values will be available in LATITUDE, LONGITUDE, and METRIC COORDINATES, and very likely will be close to, if not the same as, final adjusted values. However, when either NAD 27 or NAD 83 preliminary positions are used for any surveying, mapping, or survey-related projects, it should be so noted (along with the date of the preliminary data) on the resulting instrument of the survey.

We are receiving so many calls for data that our office staff is often backlogged with individual requests. To avoid lengthy phone conversations, it is preferred that data requests be mailed or faxed in, or either called in to be mailed out the next working day. If descriptions and/or position data must be read over the phone (only a maximum of 3 stations will be permitted).

Please be aware that the basic policy of this section is that we stand ready to consult with any surveyor, engineer, community or individual about surveying matters and to furnish, or assist in obtaining the basic data which exists throughout North Carolina.

Feel free to write or call us any time at:

North Carolina Geodetic Survey
512 N. Salisbury Street
Raleigh, N.C. 27604
Telephone (919) 733-3836
FAX (919) 733-4407

North Carolina no longer has a National Geodetic Survey Mark Maintenance representative as this federal program has been phased out. However, our agency has initiated a cooperative agreement with NGS to continue a Mark Maintenance Program in North Carolina. We are extremely interested in preserving all survey marks in our state and encourage you to contact us whenever any survey marker is destroyed or disturbed, or in danger of becoming unusable for whatever reason. As we maintain and share recovery information for all survey marks, please feel free to use the inserted " Survey Mark Recovery Index" form to report on any such mark you may visit.

Classification Definitions

The Standards and Specifications as set forth on pages 28-30 are primarily for use in geodetic control surveys such as those performed by NCGS. It is highly desirable that all geodetic, or other precise engineering surveys referenced to the National Geodetic Control Networks, adhere to these standards whenever possible.

These standards and specifications are suggested by the National Geodetic Survey for geodetic control traverse and are not to be confused with or used in place of those defined by the North Carolina Society of Surveyors and/or the North Carolina Board of Registration for use in land surveying. We assume that all Registered Land Surveyors in the State are familiar with and adhere to the general specifications and classifications of their profession.

CAUTION: The North Carolina Geodetic Survey (NCGS) does provide both horizontal and vertical positions supplied by other governmental and private agencies; however, NCGS and the National Geodetic Survey only verify, compute, adjust and maintain original field records for control published in the National Network's National Geodetic Reference System (NGRS). One of the main benefits of having surveys included within the NGRS network is the ability to continually upgrade and correct the network as new surveys are interconnected within the system. Non-NGRS control surveys may or may not agree with NGRS control within the same area at the time they are established, and may become outdated if the national network is upgraded. A few local networks (including some recent GPS surveys) do exist where adequate connections or adequate constraints to the local NGRS control were not made. Therefore, if and when you use Non-NGRS control and/or data (even if it is classified as higher order) you are advised to close your survey into any NGRS control that may exist within 2000 feet. This should both assure you that the marks have not been moved and that their coordinates agree with each other.

STANDARDS FOR THE CLASSIFICATION OF GEODETIC CONTROL
AND PRINCIPAL RECOMMENDED USES

HORIZONTAL CONTROL
(Traditional Surveying Methods)

Classification	Relative Accuracy Between Directly Connected Adjacent Points (At Least)	Recommended Uses
First-Order	1 Part in 100,000	Primary National Network. Metropolitan Area Surveys. Scientific Studies.
Second-Class I	1 Part in 50,000	Area Control which strengthens the National Network. Subsidiary Metropolitan Control.
Second-Class II	1 Part in 20,000	Area Control which contributes to, but is supplemental to, the National Network.
Third-Class I	1 Part in 10,000	General Control Surveys Referenced to the National Network. Local Control Surveys.
Third-Class II	1 Part in 5,000	

(Standards and Specifications for Geodetic Control Networks
FGCC September 1984.)

(Global Positioning System)

Survey categories	Order	Base error e (cm)	(95 percent confidence level) Minimum geometric Accuracy standard Line-length Dependent error p (ppm)	a (1:a)
Global-regional geodynamics; deformation measurements....	AA	0.3	0.01	1:100,000,000
National Geodetic Reference System, "primary" networks; regional-local geodynamics; deformation measurements...	A	0.5	0.1	1: 10,000,000
National Geodetic Reference System, "secondary" networks; connections to the "primary" NGRS network; local geodynamics; deformation measurements; high-precision engineering surveys...	B	0.8	1	1: 1,000,000
National Geodetic Reference System, (Terrestrial based); dependent control surveys to meet mapping, land information, property, and engineering requirements.....	(C)			
	1	1.0	10	1: 100,000
	2-I	2.0	20	1: 50,000
	2-II	3.0	50	1: 20,000
	3	5.0		1: 10,000

Geometric Geodetic Accuracy Standards
and
Specifications for using GPS Relative
Positioning Techniques
Version 5.0 (Aug. 1, 1989)

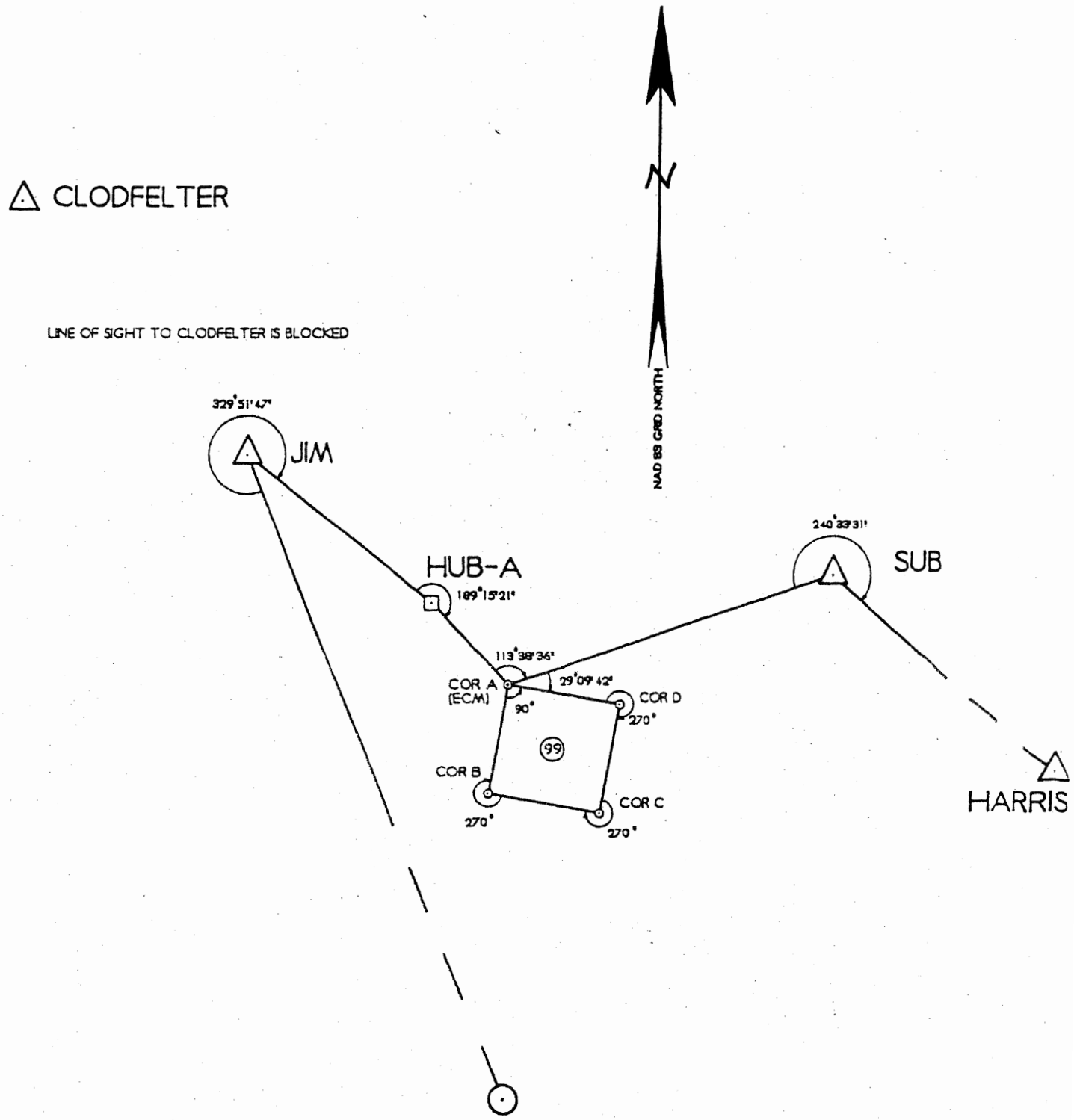
Vertical Control

Classification	Relative Accuracy Between Directly Connected Points or Benchmarks	Recommended Uses
First-Class I	3 MM $\sqrt{K}$	Basic Framework of the National Network and Metropolitan Area Control. Regional Crustal Movement Studies.
First-Class II	4 MM $\sqrt{K}$	Extensive Engineering Projects. Support for Subsidiary Surveys.
Second-Class I	6 MM$\sqrt{K}$	Secondary Framework of the National Network and Metropolitan Area Control. Local Crustal Movement Studies. Large Engineering Projects. Tidal Boundary Reference. Support for Lower Order Surveys.
Second-Class II	8 MM $\sqrt{K}$	Densification within the National Network. Rapid Subsidence Studies. Local Engineering Projects. Topographic Mapping.
Third-Order	12 MM $\sqrt{K}$	Small-scale topographic mapping. Establishing gradients in mountainous areas. Small Engineering Projects. May or may not be adjusted to the National Network.

(K is the distance in Kilometers between points.)

(Standards and Specifications for Geodetic Control Networks
FGCC, September, 1984)

COMPUTATIONS FOR A TYPICAL LOT SURVEY



1. Since the line of sight between NCGS "Jim" and "Clodfelter" is blocked, the grid azimuth is obtained by computing an inverse between "Jim" and the coordinated position of Buck Mountain Lookout Tower, which is about 0.75 miles away and visible from the ground at "Jim".

NAD 83 Coordinates (Meters)

Jim	Northing = 184809.724 m	Easting = 518664.028 m
Buck Mountain Lookout Tower	Northing = 184232.329 m	Easting = 518892.835 m

To inverse between any two points Grid Bearing = $\text{Tan}^{-1} \dfrac{X_2 - X_1}{Y_2 - Y_1}$

$$\text{Grid Bearing} = \text{Tan}^{-1} \frac{518892.835 - 518664.028}{184232.329 - 184809.724}$$

$$\text{Grid Bearing} = \tan^{-1} \frac{228.807}{-577.395}$$

$$\text{Grid Bearing} = \tan^{-1} - 0.396274647$$

Grid Bearing = -21° 37' 02"

Az (from North) = 180° - 21° 37' 02" = 158° 22' 58" (S 21° 37' 02" E)

2. Using the adjusted field angles as turned, grid azimuths and grid bearings are computed for the project.

Grid Azimuth Jim to Buck Mt. L/T	158° 22' 58" (S 21° 37' 02" E) 329° 51' 47" 488° 14' 45" - 360 = 128° 14' 45"
Grid Azimuth Jim to Hub A	128° 14' 45" (S 51° 45' 15" E) 180° 308° 14' 45" 189° 15' 21"
Grid Azimuth Hub A to ECM (Cor A)	137° 30' 06" (S 42° 29' 54" E) 180° 317° 30' 06" 113° 38' 36"
Grid Azimuth ECM (Cor A) to Sub	71° 08' 42" (N 71° 08' 42" E) 180° 251° 08' 42" 240° 33' 31"
Grid Azimuth Sub to Harris	131° 42' 13" (S 48° 17' 47" E)

To check our Azimuth tie, we must inverse between Sub and Harris.

Sub	N = 184704.115	E = 519186.888
Harris	N = 184527.934	E = 519384.605

Grid Bearing = (tan) $\frac{519384.605 - 519186.888}{184527.934 - 184704.115}$

Grid Bearing = (tan) - 1.122237926

Grid Bearing = - 48° 17' 47" (S 48° 17' 47" E)

Az (from North) = 180° - 48° 17' 47" = 13° 42' 13"

Published Az = 131°42' 13"
Survey Az = 131°42' 13"
Error = 0° 0' 0.0'

(Note: In most practical situations some Azimuth error will occur. practical method of adjusting for angular error would be to distribute error equally among all angles.)

3. In this problem it is assumed that all measured distances are slope and can be reduced to horizontal by one of two ways; either by using vertical angles or difference of elevation. When vertical angles are observed, the horizontal distance (HD) = L (Cos VA), where L is the slope distance and VA is the vertical angle.

When differences in elevation are available, the reduction is accomplished using $HD = \sqrt{(L)^2 - (\Delta h)^2}$ where Δh is the difference in elevation between the two measured stations.

4. To reduce horizontal distances to the ellipsoid, we use the formula:

$$\text{Ellipsoid Dist.} = \left(\frac{\text{Mean Radius}}{\text{Elevation} + \text{GeoidHeight} + \text{MeanRadius}}\right) * \text{HD}$$

or

$$\text{Ellipsoid Dist.} = \frac{\text{HD} * (1 - \text{Elevation} + \text{GeoidHeight})}{\text{Mean Radius}}$$

(Note: See page 19-22 for more details)

Since the average elevation for this small project is about 156 meters (Mean elevation of two control points: Jim 147.5 m and Sub 164.1 m), the average geoid height of this project is -30.3 m (Mean geoid height of two control points: Jim -30.3 m and Sub - 30.3 m). Using this average elevation of 156 meters and average geoid height of -30.3 m , the ellipsoid reduction factor can be obtained by using the above formulas.

$$\text{Ellipsoid Factor} = \frac{6370944}{156 + (-30.3) + 6370944}$$

Ellipsoid Factor = .9999803

This factor multiplied by each horizontal distance of the survey will reduce the distance to the ellipsoid base.

5. To reduce the ellipsoid distances to grid lengths we must use a scale factor from the published control data sheets or from the projection tables on pages 51-55.
The scale factor to be used can be obtained if the mean latitude of the project is known. The mean latitude of the project can be obtained by averaging the published latitudes of the beginning and ending control points or by scaling the mean latitude from a USGS topographic map. For this project the mean latitude is:

Jim: 35° 24' 42.71580"
Sub: 35° 24' 39.45944"

Mean Latitude = 35° 24' 41"

From the projection tables using a latitude of 35° 24' 41" = .9998764

or

If the NCGS control data sheets are available, you can obtain the scale factor from these sheets, and average the factors from the beginning and ending NCGS control.

From the control sheets:

Jim NAD 83 Scale Factor = 0.9998765

Sub NAD 83 Scale Factor = 0.9998764
Average NAD 83 Scale Factor = 0.9998764

This factor multiplied by each ellipsoid distance will reduce the distance to the grid base.

It might be noted that if you multiply the:

Ellipsoid Factor X Scale Factor = Combined Factor

This combined factor can be multiplied by each horizontal distance to obtain a grid distance.

For this project: Ellipsoid Factor = .9999803
Scale Factor = .9998764

Combined Factor = .9998567

Line	Horizontal Dist. (Meters)	X Combined Factor	= Grid Distance (Meters)
Jim to Hub A	212.295	.9998567	212.264
Hub A to Cor A (ECM)	99.010	.9998567	98.996
Cor A (ECM) to Sub	305.702	.9998567	305.658

LATITUDE = COS (AZ) X (DIST)

	AZIMUTH	DISTANCE (GRID)	LATITUDE (NORTHING)	DEPARTURE (EASTING)
JIM			(NAD 83) 184809.724m	518664.028m
	128°14'45"	212.264m	-131.399	166.704
HUB-A			184678.325	518830.732
	137°30'06"	98.996m	-72.989	66.879
COR A (ECM)	71°08'42"	305.658m	98.781	289.256
SUB			184704.117	519186.867
	TOTAL DISTANCE	616.918m	(NAD 83) 184704.115m	519186.888m
			ERROR -0.002	-0.021

TOTAL ERROR = $\sqrt{-0.002^2 + -0.021^2}$

TOTAL ERROR = $\sqrt{0.0004450}$

TOTAL ERROR = 0.021m

ERROR OF CLOSURE = $\frac{\text{TOTAL DISTANCE}}{\text{ERROR}}$

ERROR OF CLOSURE = $\frac{616.918}{0.021}$

ERROR OF CLOSURE = $\frac{1}{29,377}$

BUCK MOUNTAIN LOOKOUT TOWER,

MONTGOMERY COUNTY

NAD 83 =>	LATITUDE = 35 24 24.05413	LONGITUDE = 079 59 55.51900	
SPC 83 =>	NORTHING = 184232.329 Meters	EASTING = 518892.835 Meters	
NAD 27 =>	LATITUDE = 35 24 23.55000	LONGITUDE = 79 59 56.34400	
SPC 27 =>	NORTH(Y) = 604368.460 Feet	EAST(X) = 1702325.156 Feet	

GRID SHIFT (NAD27 - NAD83) NORTH = -67.106 feet EAST = -75.753 feet

NAD83 CONVERGENCE (Θ) = -0 34 35.23 NAD83 SCALE FACTOR = 0.9998762

ELEVATION (NGVD 29) GEOID90 GEOID HEIGHT IS

meters -30.32 meters

PID = EZ3772

THIS IS A TRAVERSE STATION.

THE STATION IS LOCATED 6-1/2 MILES NORTHWEST OF TROY AND 3 MILES SOUTH OF ELDORADO, ON LAND OWNED BY THE UNITED STATES FOREST SERVICE AND ON THE HIGHEST POINT OF BUCK MOUNTAIN.

IT IS A FOUR LEGGED STEEL STRUCTURE ABOUT 100 FEET IN HEIGHT. THE POINT OBSERVED ON WAS THE CENTER OF THE AIR VENT ON THE TOP OF THE CAB.

A TRAVERSE CONNECTION WAS MADE FROM TRIANGULATION STATION BUCK TO THE CENTER OF THE BASE OF THE LOOKOUT TOWER AND THE DISTANCE WAS FOUND TO BE 13.910 METERS.

TO REACH THE STATION FROM THE JUNCTION OF STATE HIGHWAYS 109 AND 27 AT THE NORTHWEST CORNER OF THE COURTHOUSE SQUARE IN TROY, GO NORTHWEST ON HIGHWAY 109 FOR 7.1 MILES TO A SIDE ROAD LEFT AND A SIGN BUCK MTN. TOWER, TURN LEFT AND GO 0.65 MILE TO THE STATION AS DESCRIBED.

********** RECOVERY TEXT **********

RECOVERED BY CGS in 1967. SOME OF THE OLD STEEL MEMBERS AT THE BASE OF THE TOWER HAVE BEEN RECENTLY REPLACED, WHICH MAY POSSIBLY HAVE AFFECTED THE COLLIMATION, OTHERWISE THE TOWER IS IN GOOD CONDITION AND AS DESCRIBED.

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN 0.8 MILE SOUTHEAST OF UWHARRIE. 6.5 MILES NORTHWEST OF TROY.

********** RECOVERY TEXT **********

RECOVERED AS DESCRIBED.

********** RECOVERY TEXT **********

Last Recovery: 92 GOOD

HARRIS, MONTGOMERY COUNTY

NAD 83 =>	LATITUDE = 35 24 33.80665	LONGITUDE = 079 59 36.14466	
SPC 83 =>	NORTHING = 184527.934 Meters	EASTING = 519384.605 Meters	
NAD 27 =>	LATITUDE = 35 24 33.30179	LONGITUDE = 79 59 36.97103	
SPC 27 =>	NORTH(Y) = 605338.189 Feet	EAST(X) = 1703938.500 Feet	

GRID SHIFT (NAD27 - NAD83) NORTH = -67.208 feet EAST = -75.825 feet

NAD83 CONVERGENCE (Θ) = -0 34 24.04 NAD83 SCALE FACTOR = 0.9998764

ELEVATION (NGVD 29) GEOID90 GEOID HEIGHT IS

167.7 meters (±0.3 m) -30.32 meters

PID = EZ3787

HARRIS IS LOCATED APPROXIMATELY 6.7 MILES WNW OF TROY, AND 0.6 MILE ESE OF UWHARRIE COMMUNITY. TO REACH STATION FROM INTERSECTION OF SR 1150 WITH NC 109 AT UWHARRIE, PROCEED EASTERLY ALONG NC 109 FOR 0.7 MILE TO STATION ON THE LEFT, APPROXIMATELY 250 FEET SE OF INTERSECTION WITH DIRT ROAD LEADING TO BUCK MOUNTAIN.

STATION MARK IS A STANDARD N. C. BRASS TRAVERSE DISK, STAMPED HARRIS 1974, SET IN THE TOP OF A CONCRETE CYLINDER, THE TOP OF WHICH IS FLUSH WITH THE SURFACE OF THE GROUND.

MARK IS 23.0 FT NE OF C/L OF NC 109
23.1 FT NW OF NE END OF CONCRETE CULVERT UNDER NC 109
113.0 FT N OF CENTER OF TOP OF TELEPHONE JUNCTION BOX WITH POLE WITH ALUMINUM REF. TAG
68.5 FT ESE OF SE END OF CONCRETE CULVERT UNDER ABANDONED DRIVEWAY

10.0 FT W OF 12 IN GUM WITH ALUMINUM REF. TAG
27.0 FT SSE OF 8 IN OAK WITH ALUMINUM REF. TAG

JIM, MONTGOMERY COUNTY

NAD 83 =>	LATITUDE = 35 24 42.71580	LONGITUDE = 080 00 4.81876	
SPC 83 =>	NORTHING = 184809.724 Meters	EASTING = 518664.028 Meters	
NAD 27 =>	LATITUDE = 35 24 42.21129	LONGITUDE = 80 0 5.64495	
SPC 27 =>	NORTH(Y) = 606262.713 Feet	EAST(X) = 1701574.362 Feet	

GRID SHIFT (NAD27 - NAD83) NORTH = -67.190 feet EAST = -75.870 feet

NAD83 CONVERGENCE (Θ) = -0 34 40.59 NAD83 SCALE FACTOR = 0.9998765

ELEVATION (NGVD 29) GEOID90 GEOID HEIGHT IS

147.5 meters (±0.3 m) -30.32 meters

PID = FA1873

JIM IS LOCATED APPROXIMATELY 7.0 MILES WNW OF TROY, AND AT SE EDGE OF UWHARRIE COMMUNITY. TO REACH STATION FROM INTERSECTION OF SR 1150 WITH NC 109 AT UWHARRIE, PROCEED EASTERLY ALONG NC 109 FOR 0.2 MILE TO STATION ON THE RIGHT, APPROXIMATELY 150 FEET EAST OF A ONE STORY YELLOW FRAMED HOUSE.

STATION MARK IS A STANDARD N. C. BRASS TRAVERSE DISK, STAMPED JIM 1974, SET IN THE TOP OF A CONCRETE CYLINDER, THE TOP OF WHICH IS FLUSH WITH THE SURFACE OF THE GROUND.

MARK IS 23.4 FT SSW OF C/L OF NC 109
138.4 FT E OF NE CORNER OF YELLOW HOUSE
199.2 FT SE OF CENTER OF TOP OF TELEPHONE JUNCTION BOX (LARGER)
22.1 FT NE OF 8 IN PINE WITH ALUMINUM REF. TAG
20.5 FT N OF 6 IN PINE WITH ALUMINUM REF. TAG
57.4 FT NNW OF 15 IN TWIN TRUNK OAK WITH ALUMINUM REF. TAG

********** RECOVERY TEXT **********

Last Recovery: 83 GOOD

SUB, MONTGOMERY COUNTY

NAD 83 =>	LATITUDE = 35 24 39.45944	LONGITUDE = 079 59 44.05158	
SPC 83 =>	NORTHING = 184704.115 Meters	EASTING = 519186.888 Meters	
NAD 27 =>	LATITUDE = 35 24 38.95481	LONGITUDE = 79 59 44.87789	
SPC 27 =>	NORTH(Y) = 605916.219 Feet	EAST(X) = 1703289.813 Feet	

GRID SHIFT (NAD27 - NAD83) NORTH = -67.198 feet EAST = -75.835 feet

NAD83 CONVERGENCE (Θ) = -0 34 28.61 NAD83 SCALE FACTOR = 0.9998764

ELEVATION (NGVD 29) GEOID90 GEOID HEIGHT IS

164.1 meters (±0.3 m) -30.32 meters

PID = EZ3788

SUB IS LOCATED APPROXIMATELY 6.8 MILES WNW OF TROY, AND 0.5 MILE ESE OF UWHARRIE COMMUNITY. TO REACH STATION FROM INTERSECTION OF SR 1150 WITH NC 109 AT UWHARRIE, PROCEED EASTERLY ALONG NC 109 FOR 0.55 MILE TO STATION ON THE LEFT, NEAR THE SOUTH CORNER OF A METAL FENCE AROUND AN ELECTRIC SUB-STATION. 0.15 MILE NW OF INTERSECTION WITH BUCK MOUNTAIN ROAD.

STATION MARK IS A STANDARD N. C. BRASS TRAVERSE DISK, STAMPED SUB 1974, SET IN THE TOP OF A CONCRETE CYLINDER, THE TOP OF WHICH IS FLUSH WITH THE SURFACE OF THE GROUND.

MARK IS 51.5 FT NE OF C/L OF NC 109
26.6 FT WNW OF C/L OF WESTERNMOST DRIVEWAY TO A ONE STORY BRICK HOUSE

7.6 FT SE OF SOUTH CORNER OF SUB-STATION FENCE
6.2 FT N OF PP WITH ALUMINUM REF. TAG
96.1 FT ESE OF PP WITH ALUMINUM REF. TAG

NGVD 29

National Geodetic Vertical Datum of 1929

NAVD 88

North American Vertical Datum of 1988

At the present time, most surveys that dealt with vertical components were referenced to NGVD 29. Since the last adjustment in 1929, the national vertical network has been enlarged with additional leveling and much of the original level lines have been releveled. Many areas of the United States have experienced crustal movement in the vertical component due to earthquakes, past glacial uplift and subsidence from withdrawal of fluids. As additional leveling was performed since 1929, these level networks were made to fit to the NGVD 29 datum. As more and more networks were added to NGVD 29 it became obvious that a new general least square adjustment was needed.

In 1977 the National Geodetic Survey began the huge task of readjusting the vertical network and redefining the vertical datum. The target date for completion was set for 1991. Before the adjustment could be accomplished, many kilometers of leveling were required along with putting observations in a digital format and verifying this data. In addition, other agencies that would be impacted by NAVD 88 were contacted to determine what problems would be encountered by a readjustment of the vertical datum.

After much hard work, the National Geodetic Survey released the vertical values based on NAVD 88 in 1991. On the succeeding pages (42-46) are some important facts about NGVD 29/NAVD 88 and how NAVD 88 will affect the land surveyors in North Carolina. We have also included a sample data sheet from NGS which contains both NGVD 29 and NAVD 88 elevations.

NAVD 88
North American Vertical Datum of 1988

The goals of NAVD 88 were:

Readjust the vertical network for the first time in 60 years;

Redefine and create a single datum for North America that will meet modern needs;

Create a truly international vertical datum;

Perform releveling of 80,000 Km of first order level lines to strengthen the network and replace destroyed bench marks;

Convert bench mark data to a computer-readable format (descriptions and field observation);

Approximate Geographic positions for all bench marks;

Improve geoid modeling using Global Positioning System and NAVD 88; and

Develop software to support NAVD 88.

History of Vertical Datums and Adjustments

1856 First vertical survey began in New York Bay, Hudson River

1877 Transcontinental Leveling Started, Hagerstown, Maryland

Network Adjustments:

Year	Kilometers of level lines	Number of Tide Stations
1900	21,000 Kms	5
1903	32,000 Kms	8
1907	38,000 Kms	8
1912	46,000 Kms	9
1929	75,159 Kms U.S (NGVD 29)	21 U.S.
	31,565 Kms Canada	5 Canada
1988	1,300,000 Kms	1

The NGVD 29 adjustment used the heights of 26 tidal bench marks referenced to local mean sea level and they were constrained to define a reference surface (datum) based on a value of 0.0 M for each local mean sea level. The NAVD 88 adjustment will be a minimally constrained adjustment holding one point fixed at Father Point/Rimouski (Point-au-Perc). With this adjustment, NAVD 88 will be a vertical datum based on an equipotential surface.

Impact of NAVD 88

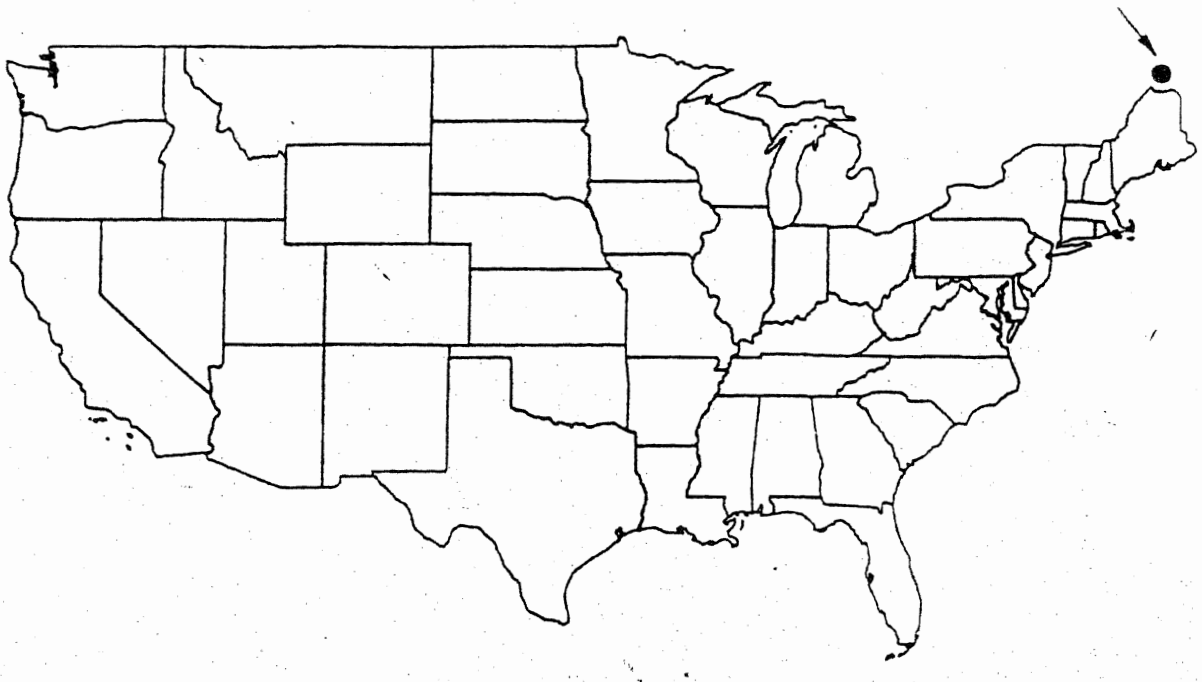
In stable areas, relative height changes between adjacent bench marks should only be a few millimeters. The absolute height value could change by as much as a few decimeters.

In many areas, there will be a single bias factor describing the difference between NGVD 29 and NAVD 88.

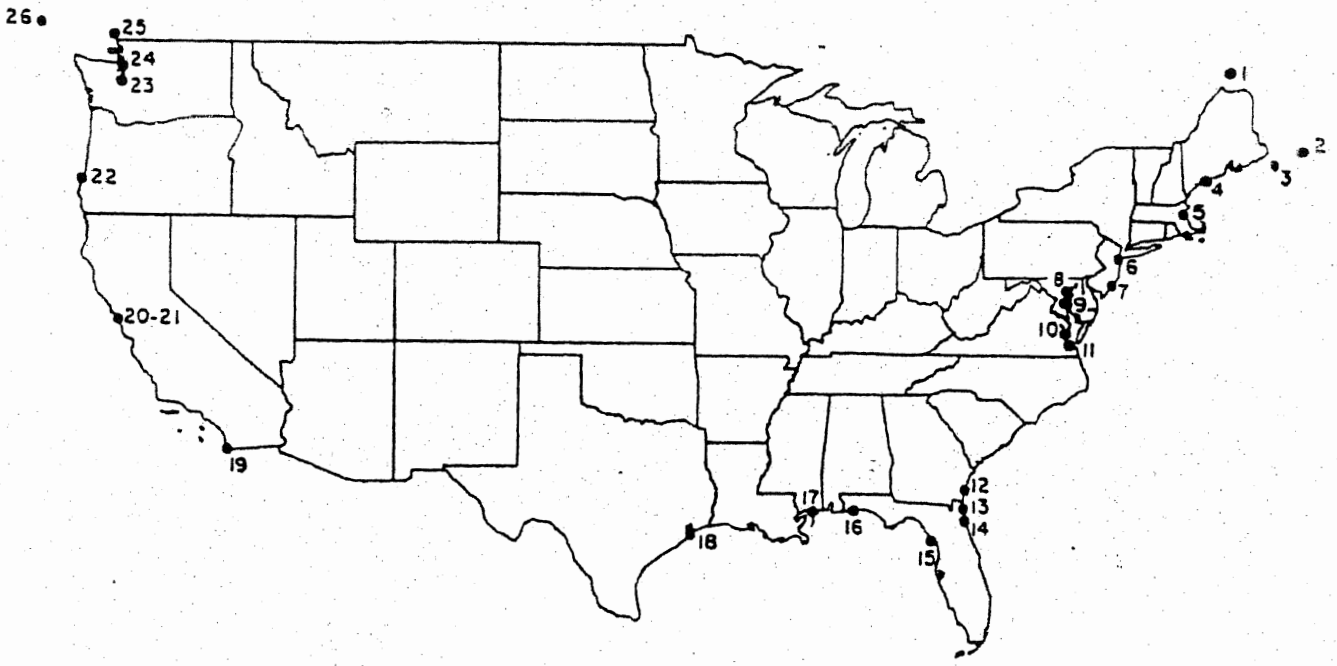
NAVD 88 will have a major impact on mapping agencies such as USGS and FEMA.

Impact of NAVD 88 in North Carolina

In North Carolina, the shift will vary from -0.3' in Western North Carolina to -1.0' in Eastern North Carolina. As of January, 1992, only NGS and NCGS vertical control will be included in the NAVD 88 adjustment. None of the third order bench marks other than those already in the NGRS database will have NAVD 88 values. NCGS is in the process of preparing the third order USGS and other agencies' data in a computer-readable format so that NGS can provide NAVD 88 values of these bench marks in North Carolina.

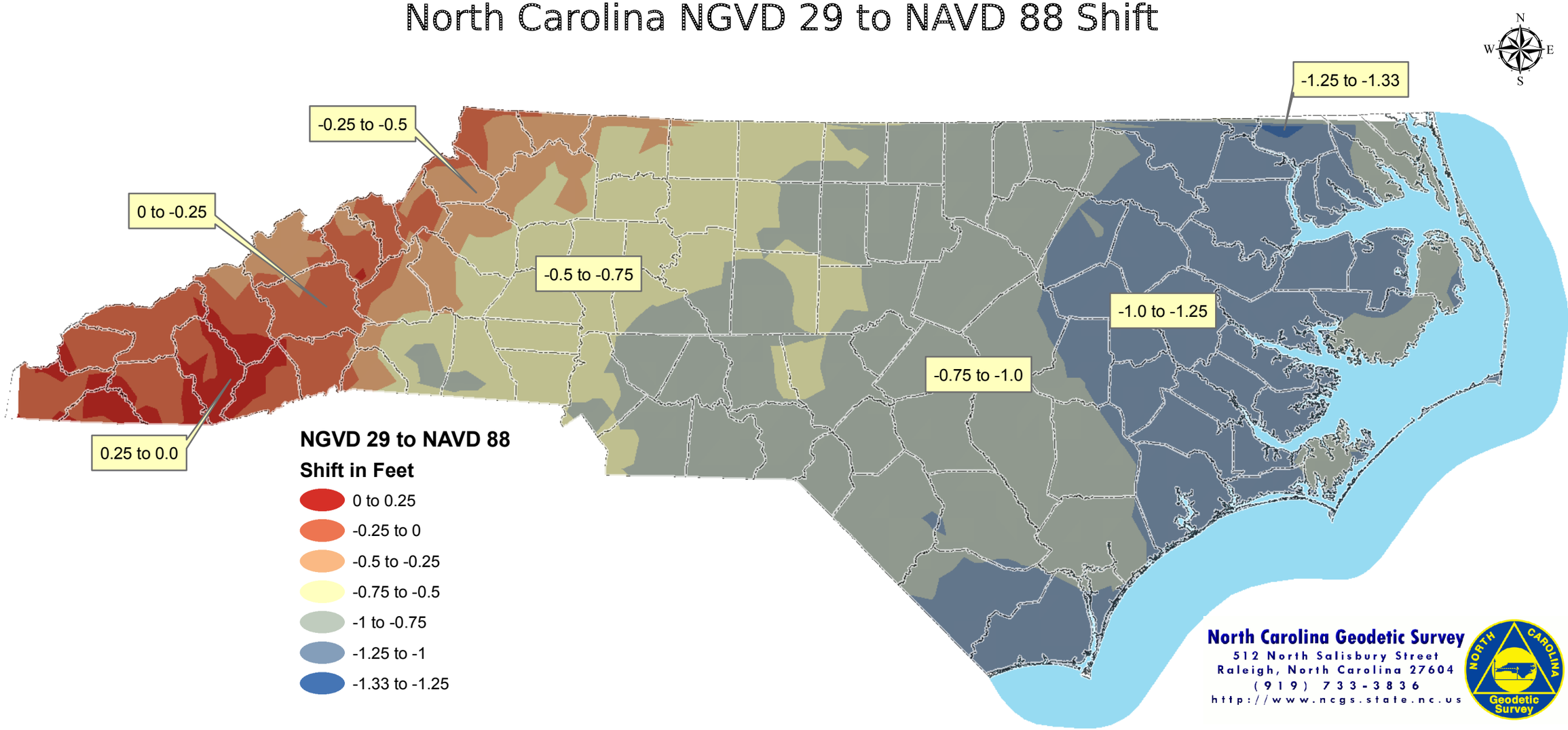


GAUGE SITES HELD FIXED IN 1929



1. FATHER POINT, QUE
2. HALIFAX, N.S.
3. YARMOUTH, N.S.
4. PORTLAND, ME.
5. BOSTON, MASS.
6. PERTH AMBOY, N.J.
7. ATLANTIC CITY, N.J.
8. BALTIMORE, MD.
9. ANNAPOLIS, MD.
10. OLD POINT COMFORT, VA.
11. NORFOLK, VA.
12. BRUNSWICK, GA.
13. FERNANDINA, FLA.
14. ST. AUGUSTINE, FLA.
15. CEDAR KEYS, FLA.
16. PENSACOLA, FLA.
17. BILOXI, MISS.
18. GALVESTON, TEX.
19. SAN DIEGO, CALIF.
20. SAN PEDRO, CALIF.
21. SAN FRANCISCO, CALIF.
22. FORT STEVENS, ORE.
23. SEATTLE, WASH.
24. ANACORTES, WASH.
25. VANCOUVER, B.C.
26. PRINCE RUPERT, B.C.

North Carolina NGVD 29 to NAVD 88 Shift



North Carolina Geodetic Survey
512 North Salisbury Street
Raleigh, North Carolina 27604
(919) 733-3836
http://www.ncgs.state.nc.us

NORTH CAROLINA

Lambert conformal conic projection with two standard parallels

Plane coordinate projection tables

Zone Code: 3200

DATUM: NAD 83

Ellipsoidal constants

a = 6378137 m

f = 1/298.25722210 --(See Figure 1)

Defining constants

B_b = 33 45′ (latitude of grid origin)

L_o = 79 00′ (longitude of origin and Central Meridian, CM)

B_s = 34 20′ (southern standard parallel)

B_n = 36 10′ (northern standard parallel) --(See Figure 2)

E_o = 609601.2199 m (easting coordinate of origin)

N_b = 0.0000 m (northing coordinate of origin)

Derived constants

ℓ = 0.577170255241 = ratio of the mapping angle to the longitude difference from the Central Meridian

K = 13178320.6222 m (mapping radius at the equator)

R_b = 9199785.5932 m (mapping radius at grid origin) --(See Figure 3)

R = radius of the cone for the latitude of the station

(Longitude is greater than 79 degrees when Easting is less than 609601.2199 and less than 79 degrees when Easting is greater than 609601.2199)

(B_s, B_n, B_b, and L_o in degrees: minutes. Linear units in meters.)

(For a more detailed explanation of the North Carolina constants, the NOAA manual NOS NGS 5--State Plane Coordinate Syst 1983 by James E. Stem is an excellent source. See page 79 for information on how to obtain this manual.)

LAMBERT COORDINATES (Northing/Easting) FROM GEODETIC POSITIONS (Latitude/Longitude)

$$\Theta(\text{theta}) = (L_o - L)\,\ell$$

$$E = R\,(\sin\Theta) + E_o$$

$$N = R_b - R\,(\cos\Theta) + N_b$$

Example: NCGS "SUB"

Latitude = 35° 24′ 39.45944" Longitude = 79° 59′ 44.05158"

(theta) $\Theta = (L_o - L)\,\ell$

$\Theta = (79^\circ\ 00'\ 00" - 79^\circ\ 59'\ 44.05158)\ .577170255241$

$\Theta = \bar{0}^\circ\ 34'\ 28.60796$

$E = R\,(\sin\Theta) + E_o$ (Note: R is interpolated from tables)

$E = 9015534.859\ (\sin \bar{0}^\circ\ 34'\ 28.60796") + 609601.2199$

E = 519186.888 meters

$N = R_b - R\,(\cos\Theta) + N_b$

$N = 9199785.5932 - 9015534.859\ (\cos \bar{0}^\circ\ 34'\ 28.60796") + 0.000$

N = 184704.115 meters

Lo = Longitude of Central Meridian (79° 00′)

Eo = False Easting of Central Meridian (609601.2199 meters)

E = Easting of Point (meters)

Rb = Mapping radius of Central Meridian (9199785.5932 meters)

N = Northing of Point (meters)

Nb = Northing value of grid origin (0.000)

Θ = theta (mapping angle)

ℓ = 0.577170255241

R = radius of the cone for the longitude of the station

WARNING: Use sufficient significant digits for trig. functions.

GEODETIC POSITIONS (Latitude/Longitude) FROM LAMBERT COORDINATES (Northing/Easting)

$\tan(\Theta) = (E - E_o)/((R_b - (N - N_b))$

$R = (R_b - (N - N_b))/\cos(\Theta)$

Longitude = L_o - theta/ℓ

ϕ from table using R

EXAMPLE: NCGS "JIM"

N = 184,809.724 meters E = 518,664.028 meters

$$\tan \Theta \text{ (theta)} = \frac{E - Eo}{Rb - (N - Nb)}$$

$$\tan \Theta = \frac{518664.028 - 609601.2199}{9199785.5932 - (184809.724 - 0.000)}$$

$$= -0^\circ\ 34'\ 40.59415"$$

$$R = \frac{(Rb - (N - Nb)}{\cos \Theta}$$

$$R = \frac{9199785.5932 - (184809.724 - 0)}{\cos - 0^\circ\ 34'\ 40.59415"} = 9015434.515$$

From tables, interpolate radius to obtain Latitude.

Radius at "JIM" = 9015434.515 meters

From tables: 35° 24′ R = 9016750.806
35° 25′ R = 9014901.900

From tables, the radius decreases 30.81510 meters per second of latitude.

We can see that the radius at "JIM" is between 35° 24′ and 35° 25′. By interpolation, we determine the latitude.

9016750.806 - 9015434.515 = 1316.291

1316.291 = 42.7158" of latitude
30.81510
Latitude of "JIM" = 35° 24′ 42.7158"

(Longitude) $\lambda = L_o - \frac{\Theta \text{ (theta)}}{\ell}$

$\lambda = 79^\circ\ 00'\ 00" - \frac{2080.59415'}{.577170255241}$ (Note: convert theta to seconds)

$\lambda = 79^\circ\ 00'\ 00" - 1^\circ\ 00'\ 04.818736$

(Longitude) $\lambda = 80^\circ\ 00'\ 04.818736"$

Lo = Longitude of Central Meridian (79° 00')

Eo = False Easting of Central Meridian (609601.2199 meters)

E = Easting of Point (meters)

Rb = Mapping radius of Central Meridian (9199785.5932 meters)

N = Northing of Point (meters)

Nb = Northing value of grid origin (0.000)

Θ = theta (mapping angle)

ℓ = 0.577170255241

R = radius of the cone for the longitude of the station

WARNING: Use sufficient significant digits for trig. functions.

NORTH CAROLINA
Lambert conformal conic projection tables

Lat	R (meters)	tab diff.	k=scale factor
33 45′	9199785.593	30.81699	1.00021249
33 46	9197936.574	30.81685	1.00020500
33 47	9196087.563	30.81671	1.00019761
33 48	9194238.560	30.81656	1.00019029
33 49	9192389.566	30.81643	1.00018306
33 50	9190540.581	30.81629	1.00017591
33 51	9188691.603	30.81616	1.00016884
33 52	9186842.634	30.81603	1.00016185
33 53	9184993.672	30.81590	1.00015495
33 54	9183144.718	30.81577	1.00014813
33 55	9181295.772	30.81565	1.00014140
33 56	9179446.833	30.81553	1.00013474
33 57	9177597.901	30.81541	1.00012817
33 58	9175748.976	30.81530	1.00012169
33 59	9173900.058	30.81519	1.00011528
34 0	9172051.147	30.81508	1.00010896
34 1	9170202.242	30.81497	1.00010272
34 2	9168353.344	30.81486	1.00009657
34 3	9166504.452	30.81476	1.00009050
34 4	9164655.566	30.81466	1.00008451
34 5	9162806.687	30.81457	1.00007860
34 6	9160957.813	30.81447	1.00007278
34 7	9159108.944	30.81438	1.00006704
34 8	9157260.081	30.81429	1.00006139
34 9	9155411.224	30.81420	1.00005581
34 10	9153562.372	30.81412	1.00005032
34 11	9151713.525	30.81404	1.00004492
34 12	9149864.682	30.81396	1.00003959
34 13	9148015.845	30.81388	1.00003435
34 14	9146167.012	30.81381	1.00002919
34 15	9144318.183	30.81374	1.00002412
34 16	9142469.359	30.81367	1.00001913
34 17	9140620.539	30.81360	1.00001422
34 18	9138771.722	30.81354	1.00000940
34 19	9136922.910	30.81348	1.00000466

NORTH CAROLINA
Lambert conformal conic projection tables

Lat	R (meters)	tab diff.	k=scale factor
34 20′	9135074.101	30.81342	1.00000000
34 21	9133225.296	30.81337	0.99999543
34 22	9131376.494	30.81331	0.99999093
34 23	9129527.695	30.81326	0.99998653
34 24	9127678.899	30.81321	0.99998220
34 25	9125830.106	30.81317	0.99997796
34 26	9123981.316	30.81313	0.99997381
34 27	9122132.529	30.81309	0.99996973
34 28	9120283.743	30.81305	0.99996574
34 29	9118434.961	30.81301	0.99996183
34 30	9116586.180	30.81298	0.99995801
34 31	9114737.401	30.81295	0.99995427
34 32	9112888.624	30.81292	0.99995061
34 33	9111039.848	30.81290	0.99994704
34 34	9109191.074	30.81288	0.99994355
34 35	9107342.301	30.81286	0.99994014
34 36	9105493.530	30.81284	0.99993682
34 37	9103644.759	30.81283	0.99993358
34 38	9101795.990	30.81282	0.99993043
34 39	9099947.221	30.81281	0.99992736
34 40	9098098.452	30.81280	0.99992437
34 41	9096249.684	30.81280	0.99992146
34 42	9094400.916	30.81280	0.99991864
34 43	9092552.149	30.81280	0.99991591
34 44	9090703.381	30.81280	0.99991325
34 45	9088854.613	30.81281	0.99991068
34 46	9087005.844	30.81282	0.99990820
34 47	9085157.075	30.81283	0.99990579
34 48	9083308.305	30.81284	0.99990348
34 49	9081459.535	30.81286	0.99990124
34 50	9079610.763	30.81288	0.99989909
34 51	9077761.990	30.81290	0.99989702
34 52	9075913.216	30.81293	0.99989504
34 53	9074064.441	30.81295	0.99989314
34 54	9072215.663	30.81298	0.99989132
34 55	9070366.884	30.81302	0.99988959
34 56	9068518.103	30.81305	0.99988794
34 57	9066669.320	30.81309	0.99988638
34 58	9064820.535	30.81313	0.99988490
34 59	9062971.747	30.81317	0.99988350

NORTH CAROLINA
Lambert conformal conic projection tables

Lat	R (meters)	tab diff.	k=scale factor
35 0'	9061122.956	30.81322	0.99988219
35 1	9059274.163	30.81327	0.99988096
35 2	9057425.367	30.81332	0.99987982
35 3	9055576.568	30.81337	0.99987876
35 4	9053727.766	30.81343	0.99987778
35 5	9051878.960	30.81349	0.99987689
35 6	9050030.151	30.81355	0.99987608
35 7	9048181.338	30.81361	0.99987536
35 8	9046332.522	30.81368	0.99987472
35 9	9044483.701	30.81375	0.99987416
35 10	9042634.876	30.81382	0.99987369
35 11	9040786.047	30.81389	0.99987330
35 12	9038937.213	30.81397	0.99987300
35 13	9037088.375	30.81405	0.99987278
35 14	9035239.532	30.81413	0.99987264
35 15	9033390.684	30.81422	0.99987259
35 16	9031541.831	30.81430	0.99987263
35 17	9029692.973	30.81439	0.99987274
35 18	9027844.110	30.81449	0.99987294
35 19	9025995.240	30.81458	0.99987323
35 20	9024146.365	30.81468	0.99987360
35 21	9022297.485	30.81478	0.99987406
35 22	9020448.598	30.81488	0.99987459
35 23	9018599.705	30.81499	0.99987522
35 24	9016750.806	30.81510	0.99987593
35 25	9014901.900	30.81521	0.99987672
35 26	9013052.987	30.81532	0.99987759
35 27	9011204.068	30.81544	0.99987856
35 28	9009355.142	30.81556	0.99987960
35 29	9007506.209	30.81568	0.99988073
35 30	9005657.268	30.81580	0.99988194
35 31	9003808.320	30.81593	0.99988324
35 32	9001959.364	30.81606	0.99988463
35 33	9000110.401	30.81619	0.99988609
35 34	8998261.429	30.81632	0.99988765
35 35	8996412.450	30.81646	0.99988928
35 36	8994563.462	30.81660	0.99989100
35 37	8992714.466	30.81674	0.99989281
35 38	8990865.461	30.81689	0.99989470
35 39	8989016.448	30.81704	0.99989668

NORTH CAROLINA
Lambert conformal conic projection tables

Lat	R (meters)	tab diff.	k=scale factor
35 40′	8987167.426	30.81719	0.99989874
35 41	8985318.395	30.81734	0.99990088
35 42	8983469.355	30.81749	0.99990311
35 43	8981620.305	30.81765	0.99990543
35 44	8979771.246	30.81781	0.99990782
35 45	8977922.177	30.81798	0.99991031
35 46	8976073.098	30.81814	0.99991288
35 47	8974224.010	30.81831	0.99991553
35 48	8972374.911	30.81848	0.99991827
35 49	8970525.802	30.81866	0.99992109
35 50	8968676.683	30.81883	0.99992400
35 51	8966827.553	30.81901	0.99992699
35 52	8964978.412	30.81919	0.99993007
35 53	8963129.260	30.81938	0.99993323
35 54	8961280.097	30.81957	0.99993648
35 55	8959430.923	30.81976	0.99993981
35 56	8957581.738	30.81995	0.99994323
35 57	8955732.541	30.82014	0.99994673
35 58	8953883.333	30.82034	0.99995032
35 59	8952034.112	30.82054	0.99995399
36 0	8950184.880	30.82074	0.99995775
36 1	8948335.635	30.82095	0.99996159
36 2	8946486.378	30.82116	0.99996552
36 3	8944637.109	30.82137	0.99996953
36 4	8942787.826	30.82158	0.99997363
36 5	8940938.531	30.82180	0.99997781
36 6	8939089.224	30.82202	0.99998208
36 7	8937239.903	30.82224	0.99998643
36 8	8935390.568	30.82246	0.99999087
36 9	8933541.220	30.82269	0.99999539
36 10	8931691.859	30.82292	1.00000000
36 11	8929842.484	30.82315	1.00000469
36 12	8927993.095	30.82339	1.00000947
36 13	8926143.692	30.82362	1.00001434
36 14	8924294.274	30.82386	1.00001929
36 15	8922444.843	30.82411	1.00002432
36 16	8920595.396	30.82435	1.00002944
36 17	8918745.935	30.82460	1.00003465
36 18	8916896.459	30.82485	1.00003994
36 19	8915046.968	30.82510	1.00004532

NORTH CAROLINA
Lambert conformal conic projection tables

Lat	R (meters)	tab diff.	k=scale factor
36 20′	8913197.462	30.82536	1.00005078
36 21	8911347.941	30.82562	1.00005633
36 22	8909498.404	30.82588	1.00006196
36 23	8907648.851	30.82614	1.00006768
36 24	8905799.283	30.82641	1.00007349
36 25	8903949.698	30.82668	1.00007938
36 26	8902100.098	30.82695	1.00008535
36 27	8900250.481	30.82722	1.00009141
36 28	8898400.847	30.82750	1.00009756
36 29	8896551.197	30.82778	1.00010379
36 30	8894701.531	30.82806	1.00011011
36 31	8892851.847	30.82835	1.00011651
36 32	8891002.146	30.82864	1.00012300
36 33	8889152.428	30.82893	1.00012958
36 34	8887302.692	30.82922	1.00013624
36 35	8885452.939	30.82951	1.00014298
36 36	8883603.168	30.82981	1.00014982
36 37	8881753.380	30.83011	1.00015674
36 38	8879903.573	30.83042	1.00016374
36 39	8878053.748	30.83072	1.00017083
36 40	8876203.904	30.83103	1.00017800

North Carolina Geodetic Survey
EDM Baselines

N.C. Geodetic Survey maintains 14 EDM baselines in North Carolina. We have received requests for baseline information and instructions on how to properly use the baselines. Looking at the published baseline information sheet, you see that two distances (slope mk/mk and horizontal) are given for each section of the baseline. To isolate the error in your EDM and prism, the slope mk/mk distance should be used. This can be accomplished by setting your EDM and prism at the same height above the baseline marks. Be sure you have the proper atmospheric and prism constant set into your EDM, the displayed distance should match the published slope mk/mk distance. By using this method, you isolate the EDM and prism from any other factors that might create error. If the slope mk/mk distance matches within tolerance, you can then reduce the slope distance to horizontal and make that comparison.

Some guidelines we use at NCGS when testing our EDM equipment:

1. Use the same prism at the baseline as you do in the field with your EDM.

2. Set the EDM and prism on tripods to insure stable conditions during the measurements. Don't use a range pole to mount a prism until you have confirmed that your EDM is working properly.

3. Document all results of your EDM test for future reference.

4. Don't panic if your EDM doesn't operate within tolerance. Check your prism constant and atmospheric correction to make sure they have been entered properly. Check with NCGS to insure that the monuments haven't been disturbed.

The baseline at Raeford was monumented by NCGS, calibrated by NGS and paid for by local firms and individuals from the Fayetteville/Raeford area.

There is another baseline in Hamlet that was established by Rice International in 1974 and remeasured by NGS in 1980. Information and data for this line is on file at the NCSS (N.C. Society of Surveyors) and NCGS offices.

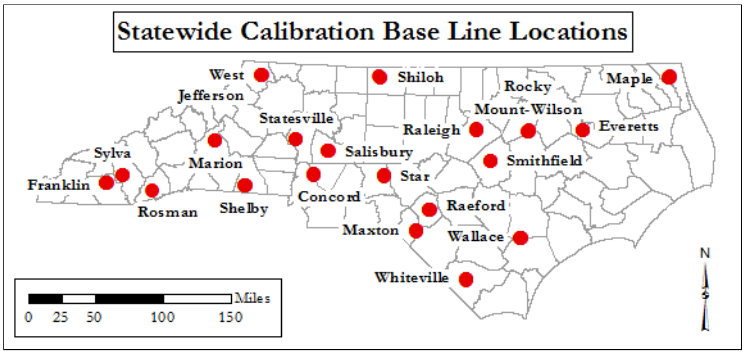
Please maintain strict safety precautions at all times when driving or walking along taxiways and runways. Most authorities would prefer that, after determining there are no take-off or landing approaches in progress, you drive along the edge of runway pavement rather than the grassy areas, especially when ground is soft. Park vehicles completely out of flight paths when measuring distances. If any incident occurs which you feel airport authorities should be aware of, please do not hesitate to notify local authorities and our NCGS office.

The National Geodetic Survey no longer has the funds nor field personnel to reimburse and calibrate baselines every five years as required. We would very much appreciate your sending a copy of any measurements you make to NCGS so that a permanent file on each baseline may be maintained for determining stability of marks and rate of usage of each line.

Additional site information:

Asheville	- Along state right-of-way near Dreamland Drive-In
Hendersonville	- Destroyed by Construction.
Hamlet	- must check in with airport manager's office before measuring.
Maple	- same as above.
Statesville	- same as above.
Franklin	- same as above.
Raeford	- there is no gate; usually there is someone there.
Wallace	- seldom anyone on premises, but gate is open during the day.
Everetts	- gate is locked when no one there, but usually there is an attendant in the hangar; also, only a short walk to runway.
Marion	- check with airport manager or personnel in hangar before measuring.
Shelby	- check with airport manager before measuring; gate locked after 5 pm.
Whiteville	- check with airport manager before measuring; gate locked after 5 pm.
Jefferson	- check with airport manager before measuring.
Manteo	- check with airport manager before measuring.
Maple (Currituck Co.)	- check with airport manager before measuring.

The data results are given in meters for slope distance mark to mark and horizontal distance between each mark. Distances in feet may be obtained by multiplying by 3.2808333333...



Concord EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910 - OCTOBER 15,1998

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: CONCORD CBL
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: CONCORD

QUAD: N350803
NORTH CAROLINA
CABARRUS COUNTY

LIST OF ADJUSTED DISTANCES (OCTOBER 9, 1998)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
3N8 0	206.238	3N8 150	204.897	150.0016	150.0076	0.1
3N8 0	206.238	3N8 420	202.221	419.9897	420.0089	0.1
3N8 0	206.238	3N8 1250	194.552	1250.0512	1250.1058	0.1
3N8 150	204.897	3N8 420	202.221	269.9881	270.0014	0.1
3N8 150	204.897	3N8 1250	194.552	1100.0496	1100.0982	0.1
3N8 420	202.221	3N8 1250	194.552	830.0615	830.0969	0.1

YEAR MEASURED: 1997
DATE RECOVERED: 10/07/2009 (DISTURBED)
DATE RECOVERED: 01/22/2014 (DISTURBED)
AZIMUTH: 190 DEGREES TRUE NORTH
CHIEF OF PARTY: TRW

DISTURBED (2009): THE 1250-METER MARK WAS NOT FOUND AND BELIEVED DESTROYED. THE RUNWAY HAS BEEN EXTENDED AND A NEW TAXIWAY HAS BEEN BUILT WHERE THE MARK WAS LOCATED.

THE BASE LINE IS LOCATED ABOUT 11.3 KM (7.0 MI) SOUTHWEST OF CONCORD AT THE CONCORD REGIONAL AIRPORT.

THE BASE LINE IS A NORTH-SOUTH LINE WITH THE 0-METER MARK ON THE NORTH END. IT CONSISTS OF THE 0, 150, 420 AND 1250 METER MARKS. THERE IS NO 100 FT. TAPE CALIBRATION MARK.

TO REACH THE 0-METER MARK FROM THE INTERSECTION OF INTERSTATE 85 (I-85 AT EXIT 52) AND POPLAR BRANCH ROAD, GO WEST ON POPLAR TENT ROAD FOR 0.9 MI, THENCE SOUTH FOR 1.5 MI (2.4 KM) ALONG DERITA ROAD, THENCE EAST FOR 0.45 MI (0.72 KM) ALONG THE ENTRANCE ROAD TO CONCORD REGIONAL AIRPORT, THENCE NORTH FROM THE TERMINAL BUILDING FOR 0.3 MI (0.5 KM) ALONG THE TAXIWAY, BETWEEN THE TAXIWAY AND THE RUNWAY, AND ON THE PROLONGATION OF THE NORTH SIDE OF THE NORTHMOST HANGAR.

THE 0-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY (NCGS) HORIZONTAL CONTROL DISK STAMPED ---3N8 000 1996---, SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE POST, LEVEL WITH THE TAXIWAY AND RECESSED 2 CM (1 IN) BELOW THE SURFACE OF THE GROUND. IT IS LOCATED 67.0 FT (20.4 M) EAST OF THE CENTERLINE OF THE TAXIWAY, 174.5 FT (53.2 M) NORTH OF THE CENTERLINE OF A RAMP, 283.0 FT (86.3 M) WEST OF THE WEST EDGE OF THE RUNWAY, 216.0 FT (65.8 M) SOUTHWEST OF THE NORTHMOST OF 3 WINDSOCKS, 119.8 FT (36.5 M) NORTH-NORTHWEST OF THE CENTER OF A DROP INLET AND 139.6 FT (42.6 M) NORTH-NORTHWEST OF THE NORTHWEST CORNER OF THE PAD FOR SIGN D 20-2.

THE 150-METER MARK IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---3N8 150 1996--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE POST, 2 FT LOWER THAN THE TAXIWAY AND RECESSED 2 CM (1 IN) BELOW THE SURFACE OF THE GROUND. IT IS LOCATED 67.0 FT (20.4 M) EAST OF THE CENTERLINE OF THE TAXIWAY, 282.0 FT (86.0 M) WEST OF THE WEST EDGE OF THE RUNWAY, 338.0 FT (103.0 M) NORTH-NORTHEAST OF THE NORTHEAST CORNER OF THE PAD FOR THE TERM SIGN, 267.0 FT (81.4 M) SOUTHWEST OF THE SOUTHWEST CORNER OF THE PAD FOR THE D-A SIGN AND 112.3 FT (34.2 M) NORTH-NORTHWEST OF THE CENTER OF A DROP INLET.

THE 430-METER MARK IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---3N8 420 1996--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE POST, 2 FT LOWER THAN THE TAXIWAY AND FLUSH WITH THE SURFACE OF THE GROUND. IT IS LOCATED 66.5 FT (20.3 M) EAST OF THE CENTERLINE OF THE TAXIWAY, 171.5 FT (52.3 M) NORTH OF THE CENTERLINE OF A RAMP, 114.7 FT (35.0 M) SOUTHWEST OF THE CENTER WIND SOCK, 137.8 FT (42.0 M) NORTH-NORTHWEST OF THE NORTHWEST CORNER OF A PAD FOR THE SIGN C 20-2, 108.0 FT (32.9 M) NORTH-NORTHWEST OF THE CENTER OF A DROP INLET AND 283.0 FT (86.3 M) WEST OF THE WEST EDGE OF THE RUNWAY.

THE 1250-METER MARK IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---3N8 1250 1996--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE POST, 2 FEET LOWR THAN THE TAXIWAY AND RECESSED 2 CM (1 IN) BELOW THE SURFACE OF THE GROUND. IT IS LOCATED 66.5 FT (20.3 M) EAST OF THE CENTERLINE OF THE TAXIWAY, 282.5 FT (86.1 M) WEST OF THE WEST EDGE OF THE RUNWAY, 144.8 FT (44.1 M) NORTH-NORTHWEST OF THE NORTHWEST CORNER OF THE PAD FOR THE A 2 SIGN, 105.2 FT (32.1 M) NORTH-NORTHWEST OF THE CENTER OF A DROP INLET, 215.0 FT (65.5 M) NORTHEAST OF THE CENTER OF A DROP INLET AND 180.0 FT (54.9 M) NORTH OF THE CENTERLINE OF THE TAXIWAY AT THE SOUTH END OF THE RUNWAY. THE MARK WAS NOT FOUND IN 2009 AND BELIEVED DESTROYED. THE RUNWAY HAS BEEN EXTENDED AND A NEW TAXI WAY HAS BEEN BUILT WHERE THE MARK WAS LOCATED.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. THE FOLLOWING

COORDINATES WERE ESTABLISHED USING GPS.

PID	DESIGNATION	LATITUDE	LONGITUDE
AI0930	CONCORD CBL 3N8 000	35 23 22.40	80 42 35.52
AI0924	CONCORD CBL 3N8 150	35 23 17.61	80 42 36.60
AI0925	CONCORD CBL 3N8 420	35 23 09.00	80 42 38.54
AI0931	CONCORD CBL 3N8 1250	35 22 42.51	80 42 44.51

THE BASE LINE WAS ESTABLISHED BY THE NORTH CAROLINA GEODETIC SURVEY. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, AT THE NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607, PHONE: (919) 733-3836, FAX: (919) 733-4407.

Return to top of page

Everetts EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
ROCKVILLE MD 20852 - MARCH 29, 1993

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: EVERETTS CBL
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: EVERETTS

QUAD: N350771
NORTH CAROLINA
MARTIN COUNTY

LIST OF ADJUSTED DISTANCES (MARCH 22, 1993)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
EVERETTS 0	22.537	EVERETTS 150	22.604	150.0013	150.0013	0.1
EVERETTS 0	22.537	EVERETTS 430	21.723	430.0002	430.0009	0.1
EVERETTS 0	22.537	EVERETTS 1130	19.698	1129.9911	1129.9947	0.2
EVERETTS 150	22.604	EVERETTS 430	21.723	279.9989	280.0002	0.1
EVERETTS 150	22.604	EVERETTS 1130	19.698	979.9898	979.9941	0.1
EVERETTS 430	21.723	EVERETTS 1130	19.698	699.9909	699.9939	0.1

YEAR MEASURED: 1982
YEAR RE-MEASURED: 1993
YEAR VERIFIED: 2011

THE BASE LINE IS LOCATED ABOUT 8.0 KM (5.0 MI) NORTHWEST OF WILLIAMSTON, 8.0 KM (5.0 MI) NORTHEAST OF ROBERSONVILLE, AND 3.2 KM (2.0 MI) NORTH OF EVERETTS AT THE MARTIN COUNTY AIRPORT. THE BASE LINE RUNS ALONG AND IS APPROXIMATELY PARALLEL WITH THE EASTERN EDGE OF RUNWAY (3-21).

THE BASE LINE IS A NORTH-NORTHEAST, SOUTH-SOUTHWEST LINE WITH THE 0-METER MARK ON THE NORTH-NORTHEAST END. IT CONSISTS OF THE 0-, 150-, 430-, AND 1130-METER MARKS. THE BASE LINE DISKS ARE NORTH CAROLINA GEODETIC SURVEY DISKS.

TO REACH THE 0-METER MARK FROM THE JUNCTION OF U.S. HIGHWAYS 13, 64 AND 17, LOCATED IN SOUTHERN WILLIAMSTON, GO WESTERLY ON U.S. HIGHWAY 13 AND 64 FOR 9.8 KM (6.1 MI) TO THE INTERSECTION OF STATE ROAD 1138 (EVERETTS ROAD) ON THE RIGHT. TURN RIGHT AND GO NORTHERLY ON STATE ROAD 1138 FOR 2.6 KM (1.6 MI) TO THE T-INTERSECTION OF STATE ROAD 1404 (AIRPORT ROAD). TURN LEFT AND GO SOUTHWEST ON STATE ROAD 1404 FOR 0.6 KM (0.4 MI) TO THE ENTRANCE DRIVE FOR THE MARTIN COUNTY AIRPORT ON THE RIGHT. TURN RIGHT AND GO NORTHERLY ON THE ENTRANCE DRIVE FOR 0.5 KM (0.3 MI) TO A LOCKED GATE. PASS THROUGH GATE AND GO NORTHERLY ACROSS THE AIRCRAFT PARKING AREA ONTO TAXIWAY FOR 0.10 KM (0.06 MI) TO THE EASTERN EDGE OF RUNWAY (3-21). TURN RIGHT AND GO NORTHERLY PARALLELING THE EASTERN EDGE OF RUNWAY (3-21) FOR 0.67 KM (0.42 MI) TO THE 0-METER MARK NEAR THE NORTHEAST CORNER OF RUNWAY (3-21).

THE 0-METER MARK IS A NCGS DISK STAMPED ---EVERETTS 000--- SET IN THE TOP OF A 33 CM (13 IN) DIAMETER CONCRETE POST PROJECTING 2.5 CM (1 IN) ABOVE THE SURFACE OF THE GROUND. IT IS 37.4 M (122.7 FT) NORTH-NORTHEAST OF THE NORTHWEST CORNER OF A CONCRETE APPROACH LIGHT FOUNDATION, 8.7 M (28.5 FT) SOUTHEAST OF THE EASTERN MOST RUNWAY END LIGHT, 7.4 M (24.3 FT) EAST-SOUTHEAST OF THE NORTHEAST CORNER OF RUNWAY (3-21), 61.0 FEET EAST OF THE CENTERLINE OF THE RUNWAY, 139 FEET S-SW OF A RUNWAY LIGHT, AND 54.0 FEET NE OF A RUNWAY LIGHT.

THE 150-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---EVERETTS 150--- SET IN THE TOP OF A 25 CM (10 IN) DIAMETER CONCRETE POST RECESSED 5 CM (2 IN) BELOW THE SURFACE OF THE GROUND. IT IS 39.8 M (130.6 FT) NORTH-NORTHEAST OF THE NORTHWEST CORNER OF A CONCRETE APPROACH LIGHT FOUNDATION, 7.1 M (23.3 FT) EAST-SOUTHEAST OF THE EASTERN EDGE OF RUNWAY (3-21), AND 6.1 M (20.0 FT) EAST-NORTHEAST OF A RUNWAY LIGHT.

THE 430-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---EVERETTS 430--- SET IN THE TOP OF A 25 CM (10 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 28.4 M (93.2 FT) SOUTH-SOUTHEAST OF A RUNWAY LIGHT, 21.4 M (70.2 FT) NORTHEAST OF A RUNWAY LIGHT, AND 6.9 M (22.6 FT) EAST-SOUTHEAST OF THE EASTERN EDGE RUNWAY (3-21).

THE 1130-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---EVERETTS 1130--- SET IN THE TOP OF A 28 CM (11 IN) DIAMETER CONCRETE POST PROJECTING 2.5 CM (1 IN) ABOVE THE SURFACE OF THE GROUND. IT IS 7.6 M (24.9 FT) SOUTHEAST OF THE SOUTHEAST CORNER OF RUNWAY (3-21), 4.2 M (13.8 FT) EAST OF THE EASTERN MOST RUNWAY END LIGHT, AND 4.1 M (13.5 FT) WEST-NORTHWEST OF THE WESTERN EDGE OF A CUT-BANK.

USER NOTES: CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. DRIVING ON THE RUNWAYS IS STRICTLY PROHIBITED AND ALL AIRCRAFT HAVE THE RIGHT-OF-WAY. THE FOLLOWING COORDINATES WERE ESTABLISHED USING GPS.

PID	DESIGNATION	LATITUDE	LONGITUDE
EY1988	EVERETTS CBL 000	35 51 54.45	77 10 35.00
EY1987	EVERETTS CBL 150	35 51 50.00	77 10 37.41
EY1986	EVERETTS CBL 430	35 51 41.68	77 10 41.91
EY1985	EVERETTS CBL 1130	35 51 20.90	77 10 53.16

THIS CALIBRATION BASE LINE WAS ESTABLISHED AND REMEASURED WITH ASSISTANCE FROM THE NORTH CAROLINA GEODETIC SURVEY. CONTACT MR. LEO HOLLIS, AIRPORT MANAGER, P.O. BOX 436, WILLIAMSTON, NC 27892. TELEPHONE (919) 792-4464. MUST BE NOTIFIED 24-HOURS PRIOR TO WORK ON THE BASE LINE AND CAN PROVIDE THE KEY TO THE GATE**. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607, PHONE: (919) 733-3836, FAX: (919) 733-4407.

Return to top of page

Franklin EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
CALIBRATION BASE LINE DATA
QUAD: N350832

NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910 - May 15, 2000

BASE LINE DESIGNATION: FRANKLIN CBL
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: FRANKLIN

NORTH CAROLINA
MACON COUNTY

LIST OF ADJUSTED DISTANCES (May 10, 2000)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
0 MACON	614.561	150 MACON	614.941	150.0268	150.0273	0.1
0 MACON	614.561	410 FRANKLIN	613.557	419.7585	419.7597	0.1
0 MACON	614.561	1400 FRANKLIN	628.283	1409.9860	1410.0528	0.2
150 MACON	614.941	410 FRANKLIN	613.557	269.7317	269.7353	0.1
150 MACON	614.941	1400 FRANKLIN	628.283	1259.9591	1260.0298	0.1
410 FRANKLIN	613.557	1400 FRANKLIN	628.283	990.2270	990.3365	0.1

DESCRIPTION OF FRANKLIN BASE LINE
YEAR MEASURED: 1999
LATITUDE: 35 13 19
LONGITUDE: 083 25 14
AZIMUTH: 69 DEGREES TRUE NORTH
CHIEF OF PARTY: JGG

THE BASE LINE IS LOCATED ABOUT 5.6 KM (3.5 MI) NORTHWEST OF FRANKLIN AT THE MACON COUNTY AIRFIELD WHICH IS 21.8 KM (13.1 MI) NORTH OF THE NORTH CAROLINA/GEORGIA STATE LINE AND 8.8 KM (5.3 MI) NORTHEAST OF CARTOOGECHAYE.

THE BASE LINE IS A SOUTHWEST-NORTHEAST LINE WITH THE 0 METER MARK ON THE SOUTHWEST END. THE BASE LINE CONSISTS OF THE 000, 150, 410, AND 1400 METER MARKS. THERE IS NO 100-FOOT TAPE CALIBRATION STATION LOCATED AT THIS BASE LINE.

TO REACH THE 0-METER MARK OF THE BASE LINE FROM THE JUNCTION OF NORTH CAROLINA STATE HIGHWAY 28 (NC 28) AND U.S. BUSINESS 441 IN FRANKLIN, GO NORTH ON NC 28 FOR 4.5 KM (2.7 MI) TO THE JUNCTION OF STATE ROUTE 1434 (AIRPORT ROAD). TURN LEFT AND GO WEST ON STATE ROUTE 1434 FOR 2.0 KM (1.2 MI) TO A SIDE ROAD RIGHT. TURN RIGHT AND GO NORTH ON THE SIDE ROAD FOR 0.25 KM (0.15 MI) TO GATE AT AIRPORT TERMINAL. TURN RIGHT AND GO NORTHWEST ON TAXI RAMP ---D--- FOR 0.13 KM (0.08 MI) TO THE JUNCTION OF RUNWAY AND THE 0-METER MARK ON THE LEFT ALONG THE SOUTH EDGE OF THE RUNWAY.

THE 0 METER MARK IS A STANDARD NORTH CAROLINA GEODETIC SURVEY DISK, STAMPED ---MACON 000 1998---, SET IN THE TOP OF A 26 CM (10 IN) ROUND CONCRETE POST RECESSED 2.5 CM (1.0 IN) BELOW THE SURFACE OF THE GROUND. IT IS 41.9 M (137.5 FT) WEST SOUTHWEST OF THE CENTERLINE OF THE TAXI RAMP ---D---, 29.1 M (95.5 FT) NORTHWEST OF WINDSOCK IN FRONT OF TERMINAL, 20.4 M (67.0 FT) SOUTH OF THE CENTERLINE OF THE RUNWAY, AND 19.7 M WEST OF THE SOUTHWEST CORNER OF CONCRETE PAD FOR THE TAXI RAMP SIGN ---D---.

THE 150 METER MARK IS A STANDARD NORTH CAROLINA GEODETIC SURVEY DISK, STAMPED ---MACON 150 1998---, SET IN THE TOP OF 26 CM (10 IN) ROUND CONCRETE POST RECESSED 2.5 CM (1.0 IN) BELOW THE SURFACE OF THE GROUND. IT IS 85.4 M (280.3 FT) EAST-NORTHEAST OF THE NORTHEAST CORNER OF A CONCRETE PAD FOR THE TAXI RAMP SIGN ---D---, 33.8 M (111.0 FT) NORTH-NORTHWEST OF THE WEST END OF A 24-INCH CONCRETE CULVERT PIPE, 33.0 M (108.4 FT) SOUTHWEST OF RUNWAY LIGHT NUMBER 49, 27.9 M (91.6 FT) EAST OF RUNWAY LIGHT NUMBER 50 AND 20.5 M (67.2 FT) SOUTH- SOUTHEAST OF THE CENTERLINE OF THE RUNWAY.

THE 410 METER MARK IS A STANDARD NORTH CAROLINA GEODETIC SURVEY DISK, STAMPED ---410 1988---, SET IN THE TOP OF 26 CM (10 IN) ROUND CONCRETE POST RECESSED 2.5 CM (1.0 IN) BELOW THE SURFACE OF THE GROUND. IT IS 45.6 M (149.5 FT) NORTHWEST OF A DROP INLET, 28.3 M (93.0 FT) EAST-NORTHEAST OF THE CENTERLINE OF TAXI RAMP ---E---, 26.2 M (85.8 FT) WEST-SOUTHWEST OF A MANHOLE ACCESS COVER, 20.7 M (67.9 FT) SOUTH-SOUTHEAST OF THE CENTERLINE OF THE RUNWAY, AND 4.5 M (14.6 FT) NORTHEAST OF THE NORTHEAST CORNER OF THE CONCRETE SLAB FOR TAXI RAMP SIGN ---E---.

THE 1400 METER MARK IS A STANDARD NORTH CAROLINA GEODETIC SURVEY DISK, STAMPED ---1400 1988---, SET IN THE TOP OF 26 CM (10 IN) ROUND CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 46.25 M (151.74 FT) NORTHWEST OF THE NORTHWEST CORNER OF A PORCH, 28.65 M (94.0 FT) WEST OF THE CENTERLINE OF A GRAVEL DRIVE, 1.95 M (6.4 FT) NORTHEAST OF A FENCE POST WITH REFERENCE TAG, AND 1.5 M (4.92 FT) SOUTH-SOUTHEAST OF A FENCE POST WITH A REFERENCE TAG.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. AIRPORT MANAGER: NEIL HOPPE, PHONE 828-524-5529, FAX 828-369-1769

THE BASE LINE WAS ESTABLISHED IN CONJUNCTION WITH THE NORTH CAROLINA GEODETIC SURVEY.

FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, AT: NORTH CAROLINA GEODETIC SURVEY, 512 NORTH SALISBURY STREET, RALEIGH, NC 27604. PHONE: (919) 733-3836 FAX: (919) 733-4407.

Return to top of page

Maple EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910 - MARCH 4, 1998

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: MAPLE CBL
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: BARCO

QUAD: N360762
NORTH CAROLINA
CURRITUCK COUNTY

LIST OF ADJUSTED DISTANCES (FEBRUARY 12, 1998)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
0 MAPLE	5.180	150 MAPLE	5.260	149.9906	149.9906	0.2
0 MAPLE	5.180	400 MAPLE	5.046	400.0014	400.0014	0.3
0 MAPLE	5.180	1000 MAPLE	3.531	1000.0084	1000.0097	0.4
150 MAPLE	5.260	400 MAPLE	5.046	250.0108	250.0109	0.2
150 MAPLE	5.260	1000 MAPLE	3.531	850.0178	850.0195	0.3
400 MAPLE	5.046	1000 MAPLE	3.531	600.0070	600.0089	0.2

YEAR MEASURED: 1997
DATE VERIFIED: 02/14/2017
AZIMUTH: 34 DEGREES TRUE NORTH
CHIEF OF PARTY: W.M. KING

THE BASE LINE IS LOCATED ABOUT 3.2 (2.0 MI) WEST OF BARCO, N. C. AND 8.0 KM (5.0 MI) NORTHWEST OF COINJOCK, N.C. IN THE COMMUNITY OF MAPLE AT THE CURRITUCK COUNTY AIRPORT (PERMISSION NEEDED FOR ACCESS SEE BELOW) ALONG THE NORTHWESTERN SIDE OF THE NORTHEASTERN END OF THE RUNWAY APPROXIMATELY PARALLEL WITH AND IN BETWEEN THE RUNWAY AND A LINE OF COUNTY WATER WELLS.

THE BASE LINE IS A NORTHEAST-SOUTHEAST LINE WITH THE 0-METER MARK ON THE SOUTHEAST END. IT CONSISTS OF THE 0, 150, 400 AND 1000 METER MARK. THERE IS NO 100 FOOT TAPE CALIBRATION MARK.

TO REACH THE 0-METER MARK FROM THE JUNCTION OF US HIGHWAY 158 AND STATE ROUTE 168 LOCATED IN BARCO, N.C., GO WEST ON U.S. HIGHWAY 158 FOR 4.0 KM (2.8 MI) TO STATE ROUTE SR1246 (MAPLE ROAD). TURN RIGHT AND GO NORTHEAST ON SR1246 FOR 1.1 KM (0.7 MI) TO A DIRT PATH LEADING EAST. TURN RIGHT ON DIRT PATH AND GO EAST FOR 0.2 KM (0.1 MI) THEN NORTHEAST ON DIRT PATH 0.2 KM (0.1 MI) TO THE STATION ON THE SOUTHEAST SIDE OF A DIRT PATH THAT LEADS TO A LINE OF COUNTY WATER WELLS.

THE 0-METER MARK IS A STANDARD NCGS HORIZONTAL CONTROL DISK STAMPED ---MAPLE 000 1992--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE CYLINDER FLUSH WITH THE SURFACE OF THE GROUND. IT IS: 73.2 M (240.0 FT) SOUTH SOUTHEAST OF A CONCRETE MONUMENT NEAR THE SOUTHEAST CORNER OF NCDOT MAINTENANCE YARD, 27.2 MT (89.1 FT) NORTHWEST OF THE NORTHWEST EDGE OF THE RUNWAY, 24.0 MT (78.7 FT) NORTHWEST OF A RUNWAY LIGHT ON THE NORTHWEST SIDE OF THE RUNWAY, 5.9 MT (19.4 FT) SOUTHEAST OF THE CENTERLINE OF THE DIRT PATH TO THE WELLS AND 0.5 MT (1.5 FT) SOUTHEAST OF A FIBERGLASS WITNESS POST.

THE 150-METER MARK IS A STANDARD NCGS HORIZONTAL CONTROL DISK STAMPED ---MAPLE 150 1992--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE CYLINDER FLUSH WITH THE SURFACE OF THE GROUND. IT IS: 81.4 MT (267.0 FT) SOUTHWEST OF THE SOUTHEAST END OF A 12 INCH CORRUGATED METAL PIPE UNDER THE DIRT PATH, 28.6 MT (93.9 FT) NORTHWEST OF THE NORTHWEST EDGE OF THE RUNWAY, 6.6 MT (21.8 FT) EAST OF THE CENTERLINE OF THE DIRT PATH LEADING TO THE COUNTY WATER WELLS, AND 0.5 MT (1.5 FT) SOUTHEAST OF A FIBERGLASS WITNESS POST.

THE 400-METER MARK IS A STANDARD NCGS HORIZONTAL CONTROL DISK STAMPED ---MAPLE 400 1992--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE CYLINDER FLUSH WITH THE SURFACE OF THE GROUND. IT IS: 37.8 MT (124.0 FT) EAST OF THE EAST CORNER OF COUNTY WATER WELL NO.1, 31.2 MT (102.3 FT) NORTHWEST OF THE NORTHWEST EDGE OF THE RUNWAY, 10.2 MT (33.6 FT) SOUTHEAST OF THE CENTERLINE OF THE DIRT PATH LEADING TO THE COUNTY WATER WELLS AND 0.5 MT (1.5 FT) SOUTHEAST OF A FIBERGLASS WITNESS POST.

THE 1100-METER MARK IS A STANDARD NCGS HORIZONTAL CONTROL DISK STAMPED ---MAPLE 1000 1992--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE CYLINDER RECESSED 5 CM (2.0 IN) BELOW THE SURFACE OF THE GROUND. IT IS: 60.7 MT (199.0 FT) SOUTHEAST OF A WOVEN WIRE FENCE WITH A WITNESS SIGN, 44.3 MT (145.4 FT) EAST NORTHEAST OF THE EAST CORNER OF COUNTY WATER WELL NO.6, 18.3 MT (60.0 FT) SOUTHEAST OF THE APPROXIMATE CENTERLINE OF THE LINE OF WATER WELLS AND 0.5 MT (1.5 FT) SOUTHEAST OF A FIBERGLASS WITNESS POST.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY.

FOR INTERVISIBILITY BETWEEN ALL MARKS, SET TRIPODS AT APPROXIMATELY:
1.51 M (5.0 FT) ABOVE THE 0-METER MARK
1.14 M (3.7 FT) ABOVE THE 150-METER MARK
0.92 M (3.0 FT) ABOVE THE 400-METER MARK
1.54 M (5.1 FT) ABOVE THE 1000-METER MARK

THE FOLLOWING COORDINATES WERE ESTABLISHED USING GPS:

PID	DESIG.	LATITUDE	LONGITUDE
AB6791	MAPLE CBL 000	36 23 57.85	76 00 59.66
AJ1741	MAPLE CBL 150	36 24 01.88	76 00 56.27
AJ1742	MAPLE CBL 400	36 24 08.57	76 00 50.60
AJ1743	MAPLE CBL 1000	36 24 24.62	76 00 36.97

CONTACT AIRPORT MANAGER, MR. LELAND GIBBS, (919) 232-2769, FOR ACCESS TO MAPLE BASE LINE AREA. THE BASE LINE WAS ESTABLISHED BY THE NORTH CAROLINA GEODETIC SURVEY. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607, PHONE: (919) 733-3836, FAX: (919) 733-4407.

Return to top of page

Marion EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910 - OCTOBER 15, 1998

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: MARION CBL
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: MARION

QUAD: N350821
NORTH CAROLINA
MCDOWELL COUNTY

LIST OF ADJUSTED DISTANCES (OCTOBER 9, 1998)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
0 SHIFLET	368.095	150 SHIFLET	368.331	150.0250	150.0251	0.1
0 SHIFLET	368.095	430 SHIFLET	367.606	430.0034	430.0036	0.1
0 SHIFLET	368.095	1010 SHIFLET	365.948	1010.0434	1010.0457	0.2
150 SHIFLET	368.331	430 SHIFLET	367.606	279.9784	279.9793	0.1
150 SHIFLET	368.331	1010 SHIFLET	365.948	860.0185	860.0218	0.1
430 SHIFLET	367.606	1010 SHIFLET	365.948	580.0401	580.0425	0.1

YEAR MEASURED: 1997
DATE VERIFIED: 03/02/2017
AZIMUTH: 104 DEGREES TRUE NORTH
CHIEF OF PARTY: MDB

THE BASE LINE IS LOCATED ABOUT 4.0 (2.5 MI) NORTH OF MARION AT THE SHIFLET FIELD AIRPORT AT THE END OF THE STATE ROUTE 1500 (AIRPORT ROAD).

THE BASE LINE IS A EAST-WEST LINE WITH THE 0-METER MARK ON THE WEST END. IT CONSISTS OF THE 0, 150, 430 AND 1010-METER MARKS. THERE IS NO 100-FT TAPE CALIBRATION MARK.

TO REACH THE 0-METER MARK FROM THE AIRPORT OFFICE PROCEED TO THE WEST END OF THE RUNWAY ALONG THE NORTH EDGE OF THE GRASS RUNWAY.

THE 0-METER MARK (AB6814) IS A NORTH CAROLINA GEODETIC SURVEY (NCGS) HORIZONTAL CONTROL DISK STAMPED ---SHIFLET 000 1989--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE NONUMENT FLUSH WITH THE SURFACE OF THE GROUND. IT IS: 5.0 M (16.4 FT) SOUTH OF A WITNESS POST, 1.58 M (5.18 FT) NORTH OF THE NORTH MOST OF TWO RUNWAY LIGHTS, AND 0.79 M (2.59 FT) NORTH OF A WOODEN SIGN POST (MONITOR T229) WITH REFERENCE TAG.

THE 150-METER MARK (AE7938) IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---SHIFLET 150 1989--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE CYLINDER FLUSH WITH THE SURFACE OF THE GROUND. IT IS: ABOUT 500 FEET EAST OF THE WEST END OF THE GRASS RUNWAY ALONG THE NORTH EDGE, 24.35 M (79.89 FT) EAST OF A RUNWAY LIGHT, 4.94 (16.21 FT) SOUTH OF A WITNESS POST IN A WIRE FENCE.

THE 430-METER MARK (AE7939) IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---SHIFLET 430 1989--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE CYLINDER FLUSH WITH THE SURFACE OF THE GROUND. IT IS: ALONG THE NORTH EDGE OF A GRASS RUNWAY ABOUT 1400 FT EAST OF THE WEST END OF THE RUNWAY, 10.15 M (33.30 FT) WEST OF A RUNWAY LIGHT, 4.79 M (15.72 FT) SOUTH OF A WITNESS POST IN A WIRE FENCE, AND 1.58 M (5.18 FT) NORTH OF THE EDGE OF THE RUNWAY.

THE 1010-METER MARK (AE7940) IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---SHIFLET 1010 1989--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE CYLINDER FLUSH WITH THE SURFACE OF THE GROUND. IT IS: ALONG THE NORTH EDGE OF A GRASS RUNWAY AT

THE EAST END, 5.91 M (19.39 FT) SOUTH OF A WITNESS POST IN A WIRE FENCE LINE, 4.69 M (15.39 FT) SOUTHEAST OF RUNWAY END LIGHT, AND 4.66 M (15.29 FT) EAST OF THE NORTH MOST OF TWO NORTH MOST OF TWO RUNWAY LIGHTS.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. THE FOLLOWING COORDINATES WERE ESTABLISHED USING GPS.

PID	DESIGNATION	LATITUDE	LONGITUDE
AB6814	SHIFLET CBL 000	N35 43 18.00	W082 00 56.08
AE7938	SHIFLET CBL 150	N35 43 16.86	W082 00 50.28
AE7939	SHIFLET CBL 430	N35 43 14.72	W082 00 39.46
AE7940	SHIFLET CBL 1010	N35 43 10.29	W082 00 17.03

THIS BASE LINE WAS ESTABLISHED IN CONJUNCTION WITH NORTH CAROLINA GEODETIC SURVEY. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON AT THE NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607, PHONE: (919) 733-3836, FAX: (919) 733-4407.

Return to top of page

Maxton EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: MAXTON MEB CBL
PROJECT ACCESSION NUMBER:
NEAREST TOWN: MAXTON

QUAD:
STATE: NC
COUNTY: SCOTLAND

LIST OF ADJUSTED DISTANCES (2/7/2017)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
MAX 000	64.890	MAX 150	64.906	150.0013	150.0013	0.1
MAX 000	64.890	MAX 420	65.116	420.0024	420.0025	0.1
MAX 000	64.890	MAX 1020	64.318	1020.0045	1020.0046	0.1
MAX 150	64.906	MAX 420	65.116	270.0011	270.0011	0.1
MAX 150	64.906	MAX 1020	64.318	870.0032	870.0033	0.1
MAX 420	65.116	MAX 1020	64.318	600.0021	600.0026	0.1

DATE MEASURED 02/07/2017
CHIEF OF PARTY: W.M. KING

MAXTON MEB CBL WAS ESTABLISHED TO REPLACE MAXTON CBL (EST. 1997).

THE BASE LINE IS LOCATED ABOUT 5.3 MI (8.5 KM) EAST-NORTHEAST OF LAURINBURG AND 4.1 MI(6.6 KM) NORTH-NORTHWEST OF MAXTON. AT THE LAURINBURG-MAXTON AIRPORT. CONTACT AIRPORT MANAGER FOR ACCESS.

THE BASE LINE IS A NORTHEAST-SOUTHWEST LINE WITH THE 0-METER MARK ON THE SOUTHWEST END. IT CONSISTS OF 000, 150 , 420, AND 1020 METER MARKS.

TO REACH THE 0-METER MARK FROM THE JUNCTION OF US-74 BUSINESS(W. DR ML KING JR DRIVE) AND NC HIGHWAY 71(N. PATTERSON ST) IN MAXTON PROCEED WESTERLY ALONG US-74 BUSINESS FOR 1.3 MI (2.1 KM) TO AIRPORT ROAD(SR-1436), THENCE NORTHERLY ALONG AIRPORT ROAD FOR 3.9 MI (6.3 KM) TO AIRPORT TERMINAL ENTRANCE ROAD ON THE RIGHT. PROCEED SOUTHEAST ALONG ENTRANCE ROAD FOR APPROXIMATELY 375 FT (99.1 M) TO AIRPORT ACCESS GATE, CONTINUE SOUTHEAST THROUGH GATE FOR APPROXIMATELY 325 FT (99.1 M) TO TAXIWAY ALPHA, THENCE SOUTHWEST ALONG TAXIWAY ALPHA FOR 0.45 MI (0.72 KM) TO STATION ON THE EAST SIDE OF TAXIWAY ALPHA.

THE 0-METER MARK IS A STANDARD NCGS HORIZONTAL CONTROL DISK STAMPED ---MAX 000 2016--- SET IN THE TOP OF A 12 IN (30.5 CM) DIAMETER CONCRETE CYLINDER WHICH IS ABOUT LEVEL WITH TAXIWAY ALPHA AND IS FLUSH WITH THE GROUND. LOCATED 298.7 FT (91.0 M) NORTHWEST OF THE CENTERLINE OF RUNWAY 5-23, 100.2 FT (30.5 M) EAST OF THE CENTERLINE OF TAXIWAY ALPHA, 62.4 FT (19.0 M) EAST-NORTHEAST OF A TAXIWAY LIGHT, 78.8 FT (24.0 M) SOUTHEAST OF A TAXIWAY LIGHT AND 119.7 FT (36.5 M) NORTH-NORTHEAST OF THE NORTHEAST CORNER OF CONCRETE PAD FOR SIGN A 5 13-31.

THE 150-METER MARK IS A STANDARD NCGS HORIZONTAL CONTROL DISK STAMPED ---MAX 150 2016--- SET IN THE TOP OF A 12 IN (30.5 CM) DIAMETER CONCRETE CYLINDER WHICH IS ABOUT 1 FT (0.3 M) HIGHER THAN TAXIWAY ALPHA AND IS FLUSH WITH THE GROUND. LOCATED 298.7 FT (91.0 M) NORTHWEST OF THE CENTERLINE OF RUNWAY 5-23, 200.9 FT (61.2 M) SOUTHEAST OF THE CENTERLINE OF TAXIWAY ALPHA, 57.4 FT (17.5 M) WEST-NORTHWEST OF THE CENTER OF A DROP INLET, 228.5 FT (69.6 M) WEST-SOUTHWEST OF THE TOP CENTER OF PAPI-VASI LIGHT CONTROL BOX, 130.9 FT (39.9 M) SOUTH-SOUTHEAST OF THE CENTER OF A DROP INLET, 175.0 FT (53.3 M) SOUTH-SOUTHEAST OF A TAXIWAY LIGHT AND 198.2 FT (60.4 M) EAST-SOUTHEAST OF A TAXIWAY LIGHT.

THE 420-METER MARK IS A STANDARD NCGS HORIZONTAL CONTROL DISK STAMPED ---MAX 420 2016--- SET IN THE TOP OF A 12 IN (30.5 CM) DIAMETER CONCRETE CYLINDER WHICH IS ABOUT 1 FT (0.3 M) HIGHER THAN TAXIWAY ALPHA AND IS FLUSH WITH THE GROUND. LOCATED 298.9 FT (91.1 M) NORTHWEST OF THE CENTERLINE OF RUNWAY 5-23, 84.3 FT (25.7 M) SOUTHWEST OF THE CENTERLINE OF TAXIWAY DELTA, 200.6 FT (61.1 M) SOUTHEAST OF THE CENTERLINE OF TAXIWAY ALPHA, 75.5 FT (23.0 M) NORTH-NORTHEAST OF THE CENTER OF A DROP INLET AND 93.3 FT (28.4 M) SOUTHEAST OF THE SOUTH CORNER OF CONCRETE PAD FOR D-A SIGN.

THE 1020-METER MARK IS A STANDARD NCGS HORIZONTAL CONTROL DISK STAMPED ---MAX 1020 2016--- SET IN THE TOP OF A 12 IN (30.5 CM) DIAMETER CONCRETE CYLINDER WHICH IS ABOUT 0.5 FT (15 CM) HIGHER THAN TAXIWAY ALPHA AND IS FLUSH WITH THE GROUND. LOCATED 299.2 FT (91.2 M) NORTHWEST OF THE CENTERLINE OF RUNWAY 5-23, 200.5 FT (61.1 M) SOUTHEAST OF THE CENTERLINE OF TAXIWAY ALPHA, 363.0 FT (110.6 M) NORTHEAST OF TAXIWAY CHARLIE, 200.5 FT (61.1 M) SOUTH OF A TAXIWAY LIGHT AND 219.0 FT (66.8 M) EAST-SOUTHEAST OF A TAXIWAY LIGHT.

USER NOTES - CBL USERS MUST OBTAIN PERMISSION FROM AIRPORT MANAGER TO ACCCES BASE LINE. CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. THE FOLLOWING COORDINATES WERE ESTABLISHED USING A HANDHELD GPS RECEIVER.

MAX 000	N34 47 29.34	W079 22 19.20
MAX 150	N34 47 32.73	W079 22 14.97
MAX 420	N34 47 38.84	W079 22 07.36
M 1020	N34 47 52.41	W079 21 50.44

THE BASE LINE WAS ESTABLISHED BY THE NORTH CAROLINA GEODETIC SURVEY. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, AT THE NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607, PHONE: (919) 733-3836, FAX: (919) 733-4407.

Return to top of page

Raeford EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
CALIBRATION BASE LINE DATA
QUAD: N350792

NOS - NATIONAL GEODETIC SURVEY
ROCKVILLE MD 20852 - MARCH 22, 1993

BASE LINE DESIGNATION: RAEFORD CBL
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: RAEFORD

NORTH CAROLINA
HOKE COUNTY

LIST OF ADJUSTED DISTANCES (MARCH 2, 1993)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
RAEFORD 0	88.657	RAEFORD 150	88.915	149.9930	149.9932	0.1
RAEFORD 0	88.657	RAEFORD 430	89.481	429.9876	429.9883	0.1
RAEFORD 0	88.657	RAEFORD 1030	92.364	1030.0169	1030.0235	0.2
RAEFORD 150	88.915	RAEFORD 430	89.481	279.9945	279.9951	0.1
RAEFORD 150	88.915	RAEFORD 1030	92.364	880.0238	880.0306	0.1
RAEFORD 430	89.481	RAEFORD 1030	92.364	600.0292	600.0362	0.1

DESCRIPTION OF RAEFORD BASE LINE
YEAR MEASURED: 1982
YEAR REMEASURED: 1993
CHIEF OF PARTY: KM

THE BASE LINE IS LOCATED ABOUT 29.0 KM (18.0 MI) WEST OF FAYETTEVILLE AND 4.8 KM (3.0 MI) NORTHEAST OF RAEFORD AT THE RAEFORD AIRPORT. THE BASE LINE RUNS ALONG AND IS APPROXIMATELY PARALLEL WITH THE NORTHWEST EDGE OF RUNWAY (4-22).

THE BASE LINE IS A NORTHEAST-SOUTHWEST LINE WITH THE 0-METER MARK ON THE SOUTHWEST END. IT CONSISTS OF THE 0, 150, 430 AND 1030 METER MARKS. THE BASE LINE DISKS ARE NORTH CAROLINA GEODETIC SURVEY TRIANGULATION DISKS.

TO REACH THE 0-METER MARK FROM THE OVERPASS JUNCTION OF U.S. HIGHWAY 401 AND STATE HIGHWAY 211 (PROSPECT AVENUE), LOCATED ON THE WEST SIDE OF RAEFORD, GO NORTHERLY ON U.S. HIGHWAY 401 FOR 2.8 KM (1.7 MI) TO THE NORTH END OF THE CONCRETE BRIDGE OVER ROCKFISH CREEK. CONTINUE NORTHERLY ON U.S. HIGHWAY 401 FOR 0.4 KM (0.2 MI) TO THE INTERSECTION OF STATE ROAD 1302 (DOC BROWN ROAD) ON THE LEFT. TURN LEFT AND GO NORTHWEST CURVING TO WEST ON STATE ROAD 1302 FOR 1.2 KM (0.7 MI) TO A FORK. TAKE THE RIGHT FORK AND GO NORTHERLY ON STATE ROAD 1302 FOR 1.2 KM (0.7 MI) TO THE INTERSECTION OF A TRACK ROAD (LOCKHEED LANE) ON THE LEFT. *** NOTE: TO REACH THE MAIN AIRPORT COMPLEX CONTINUE NORTHERLY ON STATE ROAD 1302 FOR 0.5 KM (0.3 MI) TO THE ENTRANCE DRIVE ON THE LEFT ***. TURN LEFT AND GO SOUTHWEST ON THE TRACK ROAD FOR 0.2 KM (0.12 MI) TO A DIM TRACK ON THE LEFT. TURN RIGHT AND GO NORTH-NORTHEAST CROSS-COUNTRY FOR 90 M (295 FT) TO THE 0-METER MARK NEAR THE SOUTHWESTERN CORNER OF RUNWAY (4-22).

THE 0-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---RAEFORD 000--- SET IN THE TOP OF A 28 CM (11 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 90.9 M (298.2 FT) NORTH-NORTHEAST OF THE CENTERLINE OF A TRACK ROAD, 15.0 M (49.2 FT) SOUTHEAST OF THE CENTERLINE OF A DITCH, AND 4.6 M (15.1 FT) NORTHWEST OF THE SOUTHWEST CORNER OF RUNWAY (4-22).

THE 150-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---RAEFORD 150--- SET IN THE TOP OF A 28 CM (11 IN) DIAMETER CONCRETE POST RECESSED 2.5 CM (1 IN) BELOW THE SURFACE OF THE GROUND. IT IS 76.8 M (252.0 FT) SOUTHWEST OF THE SOUTHEASTERN CORNER OF A CONCRETE APPROACH LIGHT FOUNDATION, 73.5 M (241.1 FT) NORTHEAST OF THE NORTHEASTERN CORNER OF A CONCRETE APPROACH LIGHT FOUNDATION, AND 4.5 M (14.8 FT) NORTHWEST OF THE NORTHWEST EDGE OF RUNWAY (4-22).

THE 430-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---RAEFORD 430--- SET IN THE TOP OF A 28 CM (11 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 66.1 M (216.9 FT) SOUTH-SOUTHEAST OF THE CENTER OF A WINDSOCK STAND, 12.6 M (41.3 FT) SOUTHWEST OF THE EXTENDED CENTERLINE OF A TAXIWAY, AND 4.4 M (14.4 FT) NORTHWEST OF THE NORTHWEST EDGE OF RUNWAY (4-22).

THE 1030-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---RAEFORD 1030--- SET IN THE TOP OF A 28 CM (11 IN) DIAMETER CONCRETE POST RECESSED 2.5 CM (1 IN) BELOW THE SURFACE OF THE GROUND. IT IS 8.8 M (28.9 FT) WEST-SOUTHWEST OF THE NORTHWEST CORNER OF A RUNWAY (4-22), AND 4.2 M (13.8 FT) NORTHWEST OF THE NORTHWEST EDGE OF RUNWAY (4-22).

USER NOTES: CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. DRIVING ON THE RUNWAYS IS STRICTLY PROHIBITED AND ALL AIRCRAFT HAVE THE RIGHT-OF-WAY. FOR SITE ACCESS PLEASE CONTACT MR. GENE THACKER, POST OFFICE DRAWER 1510, RAEFORD, NC 28376. TELEPHONE (919) 875-3261.

THIS CALIBRATION BASE LINE WAS ESTABLISHED AND REMEASURED WITH ASSISTANCE FROM THE NORTH CAROLINA GEODETIC SURVEY.

FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, AT: NORTH CAROLINA GEODETIC SURVEY, 512 NORTH SALISBURY STREET, RALEIGH, NC 27604. PHONE: (919) 733-3836 FAX: (919) 733-4407.

Return to top of page

Raleigh EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
ROCKVILLE MD 20852 - MARCH 29, 1993

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: RALEIGH CBL
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: RALEIGH

QUAD: N350784
NORTH CAROLINA
WAKE COUNTY

LIST OF ADJUSTED DISTANCES (MARCH 22, 1993)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
RALEIGH 0	95.440	RALEIGH 150	92.778	149.9473	149.9710	0.1
RALEIGH 0	95.440	RALEIGH 400	87.377	399.8802	399.9615	0.2
RALEIGH 0	95.440	RALEIGH 1400	85.134	1399.9235	1399.9615	0.3
RALEIGH 150	92.778	RALEIGH 400	87.377	249.9329	249.9913	0.1
RALEIGH 150	92.778	RALEIGH 1400	85.134	1249.9760	1249.9994	0.2
RALEIGH 400	87.377	RALEIGH 1400	85.134	1000.0427	1000.0452	0.2

DESCRIPTION OF RALEIGH BASE LINE
YEAR MEASURED: 1982
YEAR REMEASURED: 1993
CHIEF OF PARTY: KM

THE BASE LINE IS LOCATED ABOUT 13.4 KM (8.3 MI) SOUTHWEST OF WAKE FOREST, 11.3 KM (7.0 MI) NORTHEAST OF RALEIGH, AND 3.7 KM (2.3 MI) NORTHEAST OF THE JUNCTION OF U.S. HIGHWAYS 1 AND 401. THE BASE LINE RUNS ALONG AND IS APPROXIMATELY PARALLEL WITH A METAL RIGHT-OF-WAY FENCE THAT BORDERS THE WESTERN EDGE OF U.S. HIGHWAY 1 AND THE EASTERN EDGE OF U.S. HIGHWAY 1 SERVICE ROAD.

THE BASE LINE IS A NORTHEAST-SOUTHWEST LINE WITH THE 0-METER MARK ON THE SOUTHWEST END. IT CONSISTS OF THE 0, 150, 400, AND 1400 METER MARKS. THE BASE LINE DISKS ARE NORTH CAROLINA GEODETIC SURVEY TRIANGULATION STATION DISKS.

TO REACH THE 0-METER MARK FROM THE U.S. HIGHWAY 1 BRIDGE OVER U.S. HIGHWAY 401, LOCATED ON THE NORTH SIDE OF RALEIGH, GO NORTH ON U.S. HIGHWAY 1 (CAPITAL BOULEVARD) FOR 3.4 KM (2.1 MI) TO THE INTERSECTION OF OLD WAKE FOREST ROAD ON THE LEFT. TURN LEFT AND GO WESTERLY ON OLD WAKE FOREST ROAD FOR 0.10 KM (0.06 MI) TO THE INTERSECTION OF U.S. HIGHWAY 1 SERVICE ROAD ON THE RIGHT. TURN RIGHT THEN BEAR RIGHT AND GO EAST FOLLOWING A METAL-RIGHT-OF-WAY FENCE FOR 0.10 KM (0.06 MI) TO THE 0-METER MARK NEAR THE RIGHT-OF-WAY

FENCE CORNER.

THE 0-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---RALEIGH 000--- SET IN THE TOP OF A 28 CM (11 IN) DIAMETER CONCRETE POST RECESSED 2.5 CM (1 IN) BELOW THE SURFACE OF THE GROUND. IT IS 43.2 M (141.7 FT) SOUTHWEST OF A WOODEN UTILITY POLE WITH AN ALUMINUM REFERENCE TAG, 35.0 M (114.8 FT) SOUTHEAST OF THE CENTERLINE OF THE FRONTAGE ROAD, 21.5 M (70.5 FT) NORTH OF A WOODEN UTILITY POLE WITH AN ALUMINUM REFERENCE TAG, AND 8.2 M (26.9 FT) WEST OF A METAL WITNESS POST AT THE METAL RIGHT-OF-WAY FENCE CORNER.

THE 150-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---RALEIGH 150--- SET IN THE TOP OF A 25 CM (10 IN) DIAMETER CONCRETE POST RECESSED 2.5 CM (1 IN) BELOW THE SURFACE OF THE GROUND. IT IS 51.5 M (169.0 FT) NORTHEAST OF A WOODEN UTILITY POLE WITH AN ALUMINUM REFERENCE TAG, 17.3 M (56.8 FT) SOUTHEAST OF THE CENTERLINE OF THE FRONTAGE ROAD, 10.0 M (32.8 FT) SOUTHWEST OF A WOODEN UTILITY POLE WITH AN ALUMINUM REFERENCE TAG, AND 8.2 M (26.9 FT) NORTHWEST OF A FIBERGLASS WITNESS POST IN THE METAL RIGHT-OF-WAY FENCE.

THE 400-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---RALEIGH 400--- SET IN THE TOP OF A 33 CM (13 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 9.4 M (30.8 FT) WEST OF A WOODEN UTILITY POLE WITH AN ALUMINUM REFERENCE TAG, 7.8 M (25.6 FT) NORTHWEST OF A FIBERGLASS WITNESS POST IN THE METAL RIGHT-OF-WAY FENCE, AND 6.7 M (22.0 FT) SOUTHEAST OF THE CENTER LINE OF THE FRONTAGE ROAD.

THE 1400-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---RALEIGH 1400--- SET IN THE TOP OF A 33 CM (13 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 59.0 M (193.6 FT) SOUTHWEST OF THE EXTENDED SOUTHERN ENTRANCE DRIVE CENTERLINE FOR THE MILL OUTLET VILLAGE, 9.7 M (31.8 FT) SOUTHEAST OF THE CENTERLINE OF THE FRONTAGE ROAD, AND 4.7 M (15.4 FT) NORTHWEST OF A FIBERGLASS WITNESS POST IN THE METAL RIGHT-OF-WAY FENCE.

USER NOTES: CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. TRAFFIC ON BOTH HIGHWAYS IS HEAVY; SAFETY PRECAUTIONS ARE RECOMMENDED.

THIS CALIBRATION BASE LINE WAS ESTABLISHED AND REMEASURED WITH ASSISTANCE FROM THE NORTH CAROLINA GEODETIC SURVEY.

FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, AT: NORTH CAROLINA GEODETIC SURVEY, 512 NORTH SALISBURY STREET, RALEIGH, NC 27604. PHONE: (919) 733-3836 FAX: (919) 733-4407.

Return to top of page

Rocky Mount-Wilson EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: ROCKY MOUNT WILSON A
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: ROCKY MOUNT-WILSON

QUAD: N350774
NORTH CAROLINA
NASH COUNTY

LIST OF ADJUSTED DISTANCES (11/ 3/2011)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
RWI 0	45.563	RWI 150	45.114	149.9932	149.9939	0.1
RWI 0	45.563	RWI 430	44.017	429.9894	429.9922	0.2
RWI 0	45.563	RWI 1135	47.593	1135.4376	1135.4394	0.3
RWI 150	45.114	RWI 430	44.017	279.9962	279.9983	0.1
RWI 150	45.114	RWI 1135	47.593	985.4443	985.4475	0.2
RWI 430	44.017	RWI 1135	47.593	705.4480	705.4571	0.1

DESCRIPTION OF ROCKY MOUNT-WILSON BASELINE
YEAR MEASURED: 2011
LATITUDE: 35 51 25
LONGITUDE: 077 53 35

THE ROCKY MOUNT CBL IS LOCATED ABOUT 8.0 MI (12.9 KM) SOUTHWEST OF ROCKY MOUNT, 3.9 MI (6.3 KM) NORTH-NORTHWEST OF ELM CITY AND 2.4 MI (3.9 KM) EAST-NORTHEAST OF WINSTEAD CROSSROADS AT THE ROCKY MOUNT WILSON COUNTY AIRPORT.

TO REACH THE 0-METER MARK FROM THE INTERSECTION OF NC HIGHWAY 97 AND INTERSTATE 95(EXIT 127), GO EAST THEN NORTHEAST ON HIGHWAY 97 FOR 4.9 MI (7.9 KM) TO AIRPORT ENTRANCE ON THE RIGHT. TURN RIGHT ON AIRPORT ROAD AND GO 0.05 MI (0.1 KM) TO FIRST LEFT (CORPORATE DRIVE). TURN LEFT AND GO 0.2 MI (0.3 KM) NORTHEAST THEN SOUTHEAST TO SECURITY GATE. PROCEED THROUGH GATE AND CONTINUE SOUTHEAST ACROSS RAMP TO THE FIRST OF TWO PARALLEL TAXIWAYS. TURN LEFT AND GO NORTHEAST FOR 0.3 MI (0.5 KM) TO CONNECTOR TAXI D1. FOLLOW CURVE TO THE RIGHT AND JUST SHORT OF THE PARALLEL TAXI D AND THE MARK ON THE LEFT.

THE 0-METER STATION IS A NATIONAL GEODETIC SURVEY CBL DISK SET IN THE TOP OF A 0.3 M (1.0 FT) CEMENT POST SET FLUSH WITH THE GROUND. IT IS 38.44 M (126.1 FT) EAST OF THE CENTER OF A TAXIWAY SIGN, 27.55 M (90.4 FT) NORTHEAST OF CONNECTOR TAXIWAY, 17.13 M (56.2 FT) NORTHWEST OF OF THE NORTHWEST EDGE OF TAXIWAY, 16.06 M (52.7 FT) NORTH OF THE NORTH CORNER OF A CONCRETE PAD AND SET IN THE TOP OF A 30-CM (12 INCH) ROUND CONCRETE POST AND ABOUT 0.3 M (1.0 FT) LOWER THAN THE TAXIWAY.

THE 150-METER STATION IS A NATIONAL GEODETIC SURVEY CBL DISK. IT IS 176.0 FT (53.6 M) SOUTH-SOUTHEAST OF THE CENTERLINE OF THE NORTHWEST END OF A CONCRETE CULVERT UNDER THE TAXIWAY, 165.0 FT (50.3 M) NORTH-NORTHEAST OF TAXIWAY LIGHT, 55.8 FT (17.0 M) WEST OF TAXIWAY LIGHT, 55.2 FT (16.8 M) NORTHWEST EAST NORTHWEST OF NORTHWEST EDGE OF THE TAXIWAY, 27.2 FT (8.3 M) SOUTHWEST OF PROJECTION OF A JOG IN THE AIRPORT PERIMETER FENCE AND SET IN THE TOP OF A 12-IN (30 CM) ROUND CONCRETE POST AND ABOUT 2 FT (0.6 M) LOWER THAN THE TAXIWAY.

THE 430-METER STATION IS A NATIONAL GEODETIC SURVEY CBL DISK. IT IS 127.8 FT (39.0 M) NORTHEAST OF A BLUE TAXIWAY LIGHT 1-97, 82.6 FT (25.2 M) WEST-SOUTHWEST OF A BLUE TAXIWAY LIGHT-1-96-, 77.9 FT (23.7 M) NORTHWEST OF THE CENTERLINE OF THE TAXIWAY, 46.5 FT (14.2 M) SOUTHEAST OF THE CENTER OF A CONCRETE SWALE AND SET IN THE TOP OF A 12-IN (30 CM) ROUND CONCRETE POST AND ABOUT 1 FT (0.3 M) LOWER THAN THE TAXIWAY CENTERLINE.

THE 1135-METER STATION IS A NATIONAL GEODETIC SURVEY CBL DISK. IT IS 274.5 FT (83.7 M) EAST OF SOUTH-EAST CORNER OF A CHAIN LINK FENCE, 217.0 FT (66.1 M) SOUTH OF NORTH EAST CORNER OF A CHAIN LINK FENCE, 178.5 FT (54.4 M) NORTHEAST OF CENTER OF THE DIRT ROAD, 74.1 FT (22.6 M) NORTHWEST OF EXTENDED CENTERLINE OF THE TAXIWAY AND SET IN THE TOP OF A 12-IN (30 CM) ROUND CONCRETE POST AND ABOUT 15 FT (4.6 M) HIGHER THAN THE TAXIWAY.

THIS BASE LINE WAS ESTABLISHED IN CONJUNCTION WITH NORTH CAROLINA GEODETIC SURVEY.

FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, AT: NORTH CAROLINA GEODETIC SURVEY, 512 NORTH SALISBURY STREET, RALEIGH, NC 27604. PHONE: (919) 733-3836 FAX: (919) 733-4407.

Return to top of page

Rosman EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: ROSMAN CBL
PROJECT ACCESSION NUMBER:
NEAREST TOWN: ROSMAN

QUAD: ROSMAN
STATE: NC
COUNTY: TRANSYLVANIA

LIST OF ADJUSTED DISTANCES (1/25/2017)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
ROSMAN 000	673.967	ROSMAN 150	672.362	149.9986	150.0071	0.1
ROSMAN 000	673.967	ROSMAN 420	669.536	419.9864	420.0096	0.1
ROSMAN 000	673.967	ROSMAN 990	678.585	990.0377	990.0489	0.1
ROSMAN 150	672.362	ROSMAN 420	669.536	269.9878	270.0024	0.1
ROSMAN 150	672.362	ROSMAN 990	678.585	840.0391	840.0624	0.1
ROSMAN 420	669.536	ROSMAN 990	678.585	570.0514	570.1232	0.1

DATE MEASURED: 01/25/2017
CHIEF OF PARTY: M.D. BOOTHE

THE BASE LINE IS LOCATED WITHIN THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RIGHT-OF WAY ABOUT 2.7 KM (1.7 MI) NORTHEAST OF ROSMAN, NC, 10.2 KM (6.3 MI) SOUTHWEST OF BREVARD, NC and 10.2 KM (6.3 MI) NORTHEAST OF REID, NC.

THE BASE LINE IS A NORTHEAST-SOUTHWEST LINE WITH THE 0-METER MARK ON THE SOUTHWEST END. IT CONSISTS OF THE 000, 150, 420, AND 990 METERS MARKS.

TO REACH THE 0-METER MARK FROM THE JUCTION OF US 64 AND US 178, LOCATED ABOUT 0.7 MI NORTHWEST OF ROSMAN, NC. GO NORTHEAST ON US 64 FOR 2.7 KM (1.64 MI) TO THE HELICOPTER PAD AND THE GRADED ROAD BED SOUTHEAST OF US 34.

THE 0-METER MARK IS A NCGS HORIZONTAL DISK STAMPED ---ROSMAN 000 2016--- SET IN THE TOP OF A 30.5 CM (12 IN) DIAMETER, ROUND CONCRETE POST, RECESSED 1 INCH BELOW THE SURFACE OF THE GROUND. IT IS 83.0 M (272.2 FT) NORTHEAST OF THE CENTER OF THE HELICOPTER PAD, 32.1 M (105.3 FT) NORTH-NORTHEAST OF A 10-INCH BIRCH TREE WITH A REFERENCE TAG, 24.9 M (81.7 FT) WEST OF A 14-INCH BIRCH TREE WITH REFERENCE TAG, AND 23.3 M (76.5 FT) SOUTHEAST OF THE CENTERLINE OF US 64.

THE 150-METER MARK IS A NCGS HORIZONTAL DISK STAMPED ---ROSMAN 150 2016--- SET IN THE TOP OF A 30.5 CM (12 IN) DIAMETER, ROUND CONCRETE POST, RECESSED 1 INCH BELOW THE SURFACE OF THE GROUND. IT IS 69.3 M (227.5 FT) SOUTHWEST OF A DROP INLET, 35.2 M (115.4 FT) WEST-SOUTHWEST OF A 14-INCH BIRCH TREE WITH A REFERENCE TAG, 23.6 M (77.5 FT) SOUTHEAST OF THE CENTERLINE OF US 64, AND 16.9 M (55.3 FT) WEST-NORTHWEST OF A 12-INCH BIRCH TREE WITH A REFERENCE TAG.

THE 420-METER MARK IS A NCGS HORIZONTAL DISK STAMPED ---ROSMAN 420 2016--- SET IN THE TOP OF A 30.5 CM (12 IN) DIAMETER, ROUND CONCRETE POST RECESSED 1 INCH BELOW THE SURFACE OF THE GROUND. IT IS 62.0 M (203.5 FT) SOUTHWEST OF A DROP INLET, 60.6 M (198.8 FT) NORTH OF A RIGHT-OF-WAY FENCE CORNER POST WITH REFERENCE TAG, 42.2 M (138.3 FT) NORTHWEST OF THE NORTHWEST CORNER OF A METAL BUILDING, AND 23.6 M (77.5 FT) SOUTHEAST OF THE CENTERLINE OF US 64.

THE 990-METER MARK IS A NCGS HORIZONTAL DISK STAMPED ---ROSMAN 990 2016--- SET IN THE TOP OF A 30.5 CM (12 IN) DIAMETER, ROUND CONCRETE POST RECESSED 1 INCH BELOW THE SURFACE OF THE GROUND. IT IS 49.7 M (163.0 FT) SOUTH OF THE CENTERLINE INTERSECTION OF US 64 AND SR 1392-CHERRYFIELD ROAD, 23.3 M (76.5 FT) SOUTHEAST OF THE CENTERLINE OF US 64, 22.4 M (73.5 FT) NORTH OF AN 8-INCH CHERRY TREE WITH A REFERENCE TAG, AND 21.0 M (69.0 FT) NORTHWEST OF A 14-INCH PINE TREE WITH REFERENCE TAG.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. THE FOLLOWING COORDINATES WERE ESTABLISHED USING GPS.

ROSMAN 000 N35 10 00.13 W082 48 40.82
ROSMAN 150 N35 10 03.82 W082 48 36.98
ROSMAN 420 N35 10 10.46 W082 48 30.01
ROSMAN 990 N35 10 24.33 W082 48 15.07

THE BASE LINE WAS ESTABLISHED BY THE NORTH CAROLINA GEODETIC SURVEY. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, AT THE NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607, PHONE: (919) 733-3836, FAX: (919) 733-4407.

Return to top of page

Salisbury EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910 - MARCH 7, 1995

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: SALISBURY CBL
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: SALISBURY

QUAD: N350804
NORTH CAROLINA
ROWAN COUNTY

LIST OF ADJUSTED DISTANCES (JANUARY 29, 1995)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
SALISPORT	234.063	150	234.483	149.9910	149.9916	0.1
SALISPORT	234.063	430	234.793	429.9987	429.9993	0.1
SALISPORT	234.063	1050	234.884	1049.9998	1050.0001	0.1
150	234.483	430	234.793	280.0077	280.0079	0.1
150	234.483	1050	234.884	900.0088	900.0089	0.1
430	234.793	1050	234.884	620.0011	620.0011	0.1

DESCRIPTION OF SALISBURY BASE LINE
YEAR MEASURED: 1994
CHIEF OF PARTY: DJN

THE BASE LINE IS LOCATED ABOUT 3.2 KM (2.0 MI) SOUTH OF SALISBURY AT THE ROWAN COUNTY AIRPORT.

FOR PERMISSION TO ENTER AIRPORT PROPERTY PLEASE CONTACT MR. LINDSAY HESS, AIRPORT MANAGER, ROWAN COUNTY AIRPORT. TELEPHONE 704-633-5021 OR 704-636-6649.

THE BASE LINE IS A NORTH-NORTHEAST, SOUTH-SOUTHWEST LINE WITH THE 0-METER MARK ON THE SOUTH-SOUTHWEST END. IT CONSISTS OF THE 0, 150, 430, AND 1050 METER MARKS.

TO REACH THE 0-METER MARK FROM THE US HIGHWAY 29-601 BRIDGE OVER JAKE ALEXANDER BOULEVARD, LOCATED IN THE SOUTHWEST

SECTION OF SALISBURY, GO SOUTHWEST ON US 29-US 601 FOR 2.49 KM (1.55 MI) TO SR 1516 (AIRPORT ROAD). THENCE NORTH FOR 0.2 KM (0.1 MI) ON SR 1516, THENCE NORTHEAST FOR 0.3 KM (0.2 MI) ON SR 1517 (AIRPORT LOOP) TO THE AIRPORT ENTRANCE, THENCE WEST FOR 0.2 KM (0.1 MI) ALONG A TAXI RAMP, CROSS THE MAIN TAXIWAY TO THE GRASSY AREA AND THE 0-METER MARK BETWEEN THE RUNWAY AND TAXIWAY.

THE 0-METER MARK IS A STANDARD NGS DISK STAMPED ---SALISPORT 1986--- SET IN THE TOP OF A 25 CM (10 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 60.7 M (199.0 FT) EAST-SOUTHEAST FROM THE APPROXIMATE CENTER OF THE RUNWAY, 43.9 M (144.0 FT) SOUTHEAST FROM A SMALL LIGHT NEAR THE EDGE OF THE RUNWAY, 35.8 M (117.5 FT) NORTHEAST FROM THE CENTER OF A VASI LIGHT, AND 15.5 M (51.0 FT) WEST-NORTHWEST FROM THE APPROXIMATE CENTER OF THE TAXIWAY AND DIRECTLY ACROSS FROM A DRIVEWAY LEADING TO THE AIRPORT HANGARS.

THE 150-METER MARK IS A NC GEODETIC SURVEY DISK STAMPED ---SALISBURY 150 1993--- SET IN THE TOP OF A CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 74.7 M (245.0 FT) SOUTH-SOUTHWEST OF A DROP INLET, 21.0 M (69.0 FT) NORTH-NORTHWEST OF THE INTERSECTION OF THE TAXIWAY AND RAMP TO THE AIRPORT TERMINAL, 15.5 M (51.0 FT) NORTHWEST OF THE CENTERLINE OF THE TAXIWAY, AND 14.0 M (46.0 FT) NORTH-NORTHEAST OF THE NORTHWEST CORNER OF A CONCRETE PAD WITH A--RAMP--SIGN.

THE 430-METER MARK IS A NC GEODETIC SURVEY DISK STAMPED ---SALISBURY 430 1993--- SET IN THE TOP OF A CONCRETE POST RECESSED 3 CM (1 IN) BELOW THE SURFACE OF THE GROUND. IT IS 30.7 M (100.7 FT) SOUTHWEST OF THE SOUTH EDGE OF THE TAXI RAMP, 30.7 M (100.7 FT) SOUTHEAST OF A 0.6 M (2 FT) BY 0.6 M (2 FT) CONCRETE ELECTRICAL ACCESS PAD, 15.5 M (50.7 FT) NORTHWEST OF THE CENTERLINE OF THE TAXIWAY, AND 10.6 M (34.7 FT) NORTHEAST OF A DROP INLET.

THE 1050-METER MARK IS A NC GEODETIC SURVEY DISK STAMPED ---SALISBURY 1050 1993--- SET IN THE TOP OF A CONCRETE POST RECESSED 3 CM (1 IN) BELOW THE SURFACE OF THE GROUND. IT IS 104.5 M (343.0 FT) SOUTHWEST OF THE SOUTH EDGE OF THE NORTHERN MOST TAXI RAMP, 42.9 M (140.6 FT) SOUTHEAST OF A SMALL LIGHT NEAR THE EDGE OF THE RUNWAY, 34.4 M (112.8 FT) SOUTH-SOUTHEAST OF A 0.6 M (2 FT) BY 0.6 M (2 FT) CONCRETE ELECTRICAL ACCESS PAD, AND 15.3 M (50.1 FT) NORTHWEST OF THE CENTERLINE OF THE TAXIWAY.

USER NOTES: CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. THE BASE LINE ELEVATIONS ARE UNADJUSTED SECOND ORDER CLASS II ELEVATIONS TIED TO THE NATIONAL NETWORK.

THIS BASE LINE WAS ESTABLISHED IN CONJUNCTION WITH THE NORTH CAROLINA GEODETIC SURVEY.

FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, AT: NORTH CAROLINA GEODETIC SURVEY, 512 NORTH SALISBURY STREET, RALEIGH, NC 27604. PHONE: (919) 733-3836 FAX: (919) 733-4407.

Return to top of page

Shelby EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: SHELBY CBL
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: SHELBY

QUAD: N350813
NORTH CAROLINA
CLEVELAND COUNTY

LIST OF ADJUSTED DISTANCES (7/20/2004)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
CLEV 000 1998	256.730	CLEV 150 1998	257.659	149.9983	150.0012	.1
CLEV 000 1998	256.730	CLEV 400 1998	255.935	400.0068	400.0076	.1
CLEV 000 1998	256.730	CLEV 1000 1998	253.389	999.9981	1000.0037	.2
CLEV 150 1998	257.659	CLEV 400 1998	255.935	250.0085	250.0145	.1
CLEV 150 1998	257.659	CLEV 1000 1998	253.389	849.9999	850.0106	.1
CLEV 400 1998	255.935	CLEV 1000 1998	253.389	599.9914	599.9968	.1

YEAR MEASURED: 2003
DATE VERIFIED: 03/01/2017
AZIMUTH: 224 DEGREES
CHIEF OF PARTY: MDB

THE BASE LINE IS LOCATED ABOUT 6.8 KM (4.1 MI) WEST-SOUTHWEST OF SHELBY AT THE SHELBY MUNICIPAL AIRPORT. 6.5 KM (3.9 MI) EAST OF BOILING SPRINGS; 9.5 KM (5.7 MI) NORTH OF THE NORTH CAROLINA/SOUTH CAROLINA STATE LINE.

THE BASE LINE IS A NORTHEAST-SOUTHWEST LINE WITH THE 0-METER MARK ON THE NORTHEAST END. IT CONSISTS OF THE 000, 150, 400, AND 1000 METER MARKS.

TO REACH THE 0-METER MARK FROM THE JUNCTION OF NC 150 AND NC 18, LOCATED IN SOUTH SHELBY, GO WEST ON NC 150 FOR 3.25 KM (1.95 MI) TO THE JUNCTION OF THE AIRPORT ENTRANCE, TURN RIGHT AND GO NORTHWEST FOR 0.3 KM (0.2 MI) TO THE AIRPORT TERMINAL. CONTINUE NORTHWEST FOR 0.16 KM (0.1 MI) ACROSS THE PARKING APRON AND ALONG THE NORTHEAST TAXI RAMP TO THE TAXIWAY. TURN RIGHT AND GO NORTHEAST FOR 0.2 KM (0.12 MI) ALONG THE TAIWAY TO THE STATION ON THE LEFT IN THE GRASS MEDIAN BETWEEN THE TAXIWAY AND RUNWAY.

THE 0-METER MARK (DG6083) IS A STANDARD NCGS DISK STAMPED ---CLEV 000 1998--- SET IN THE TOP OF A 26 CM (10 IN) DIAMETER, ROUND CONCRETE POST RECESSED 2.5 CM (1 IN) BELOW THE SURFACE OF THE GROUND. IT IS 47.9 M (157.0 FT) NORTHEAST OF THE CENTER OF A DROP INLET, 45.7 M (150.0 FT) SOUTHEAST OF THE CENTERLINE OF THE RUNWAY, 44.8 M (147.0 FT) WEST-SOUTHWEST OF THE CENTER OF A DROP INLET AND 30.1 M (99.0 FT) NORTHWEST OF THE CENTERLINE OF THE TAXIWAY.

THE 150-METER MARK (DG6084) IS A STANDARD NCGS DISK STAMPED ---CLEV 150 1998--- SET IN THE TOP OF A 26 CM (10 IN) DIAMETER, ROUND CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 143.9 M (472 FT) NORTHEAST OF A DROP INLET, 96.6 M (317.0 FT) NORTHWEST OF THE WINDSOCK, 46.6 M (153.0 FT) SOUTHEAST OF THE CENTERLINE OF THE RUNWAY, 29.7 M (97.5 FT) NORTHWEST OF THE CENTERLINE OF THE TAXIWAY AND 7.8 M (25.5 FT) WEST OF THE CENTERLINE OF THE NORTHEAST MOST TAI RAMP.

THE 400-METER MARK (DG6085) IS A STANDARD NCGS DISK STAMPED ---CLEV 400 1998--- SET IN THE TOP OF A 26 CM (10 IN) DIAMETER, ROUND CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 56.7 M (186.0 FT) SOUTH-SOUTHWEST OF THE CENTERLINE OF MOST SOUTHWESTERLY TAXI RAMP, 47.7 M (156.5 FT) SOUTHEAST OF THE CENTERLINE OF THE RUNWAY, 13.4 M (43.8 FT) NORTHEAST OF THE CENTER OF A DROP INLET AND 28.8 M (94.5 FT) NORTHWEST OF THE CENTERLINE OF THE TAXIWAY.

THE 1000-METER MARK (DG6086) IS A STANDARD NCGS DISK STAMPED ---CLEV 1000 2002--- SET IN THE TOP OF A 26 CM (10 IN) DIAMETER, ROUND CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 49.7 M (163.0 FT) SOUTHEAST OF THE CENTER OF THE SOUTHWEST END OF THE RUNWAY, 45.6 M (149.5 FT) WEST OF A DROP INLET, 14.5 M (47.5 FT) SOUTHWEST OF THE CENTERLINE OF THE TAXI RAMP, 9.3 M (30.6 FT) SOUTHEAST OF A 2X2-FT. CONCRETE PAD ---RUNWAY CABLE--- AND 7.9 M (25.9 FT) NORTHEAST OF A FIBERGLASS WITNESS POST.

USER NOTES: CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. THE FOLLOWING COORDINATES WERE ESTABLISHED USING GPS.

PID	DESIGNATION	LATITUDE	LONGITUDE
DG6083	CLEV 000	N35 15 25.04	W081 35 55.12
DG6084	CLEV 150	N35 15 21.52	W081 35 59.23
DG6085	CLEV 400	N35 15 15.66	W081 36 06.06
DG6086	CLEV 1000	N35 15 01.59	W081 36 22.47

THIS CALIBRATION BASE LINE WAS ESTABLISHED IN CONJUNCTION WITH THE NORTH CAROLINA GEODETIC SURVEY. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON AT THE NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607, PHONE: (919) 733-3836, FAX: (919) 733-4407.

Return to top of page

Shiloh EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: SHILOH CBL
PROJECT ACCESSION NUMBER:
NEAREST TOWN: REIDSVILLE

QUAD:
STATE: NC
COUNTY: ROCKINGHAM

LIST OF ADJUSTED DISTANCES (2/2/2017)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
SHILOH 000	202.443	SHILOH 150	202.173	149.9978	149.9981	0.0
SHILOH 000	202.443	SHILOH 420	200.616	419.9942	419.9981	0.0
SHILOH 000	202.443	SHILOH 1110	204.691	1109.9897	1109.9922	0.0
SHILOH 150	202.173	SHILOH 420	200.616	269.9964	270.0008	0.0
SHILOH 150	202.173	SHILOH 1110	204.691	959.9919	959.9954	0.0
SHILOH 420	200.616	SHILOH 1110	204.691	689.9955	690.0076	0.0

DATE MEASURED: 02/02/2017
AZIMUTH: 304.5 DEGREES TRUE NORTH
CHIEF OF PARTY: W.M. KING

THE CBL IS LOCATED ABOUT 8.3 MI (13.4 KM) SOUTH-SOUTHEAST OF PRICE, 7.0 MI (11.3 KM) EAST-NORTHEAST OF MAYODAN AND 5.7 MI (9.2 KM) SOUTHWEST OF EDEN AT THE ROCKINGHAM COUNTY AIRPORT (SHILOH FIELD) ON THE NORTHEAST SIDE OF THE RUNWAY.

THE BASE LINE IS A NORTHWEST-SOUTHEAST LINE WITH THE 0 METER MARK ON THE SOUTHEAST END. IT CONSISTS OF THE 000-, 150-, 420-, AND 1110-METER MARKS.

TO REACH THE 0-METER MARK OF THE BASE LINE FROM THE INTERSECTION OF US HIGHWAY 311 AND NC HIGHWAY 770, PROCEED SOUTHWEST ON US 311 FOR 4.4 MI TO THE JUCTION WITH SETTLE BRIDGE ROAD. TURN LEFT AND GO SOUTHEAST ON SETTLE BRIDGE ROAD FOR 1.05 MI TO THE ROCKINGHAM COUNTY AIRPORT ENTRANCE ROAD ON THE LEFT. TURN LEFT AND PROCEED 0.1 MI NORTHWEST PASSING THE AIRPORT TERMINAL AND PASSING THROUGH A GATE TO THE TAXI STRIP. TURN RIGHT ON TO THE TAXI STRIP AND GO SOUTHEAST FOR 0.55 MI TO THE SOUTHEAST END OF THE RUNWAY AND THE 0 METER MARK ON THE NORTHEAST SIDE OF THE RUNWAY.

THE 0-METER MARK IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---SHILOH 000 2016---, SET IN THE TOP OF A 14-INCH ROUND CONCRETE MONUMENT, FLUSH WITH THE GROUND AND ABOUT 2.5 FT (0.8 M) LOWER THAN THE CENTERLINE OF THE RUNWAY. LOCATED 95.3 FT (29.0 M) NORTHEAST OF THE CENTERLINE OF THE RUNWAY, 44.8 FT (13.7 M) NORTHEAST OF THE NORTHEAST ASPHALT CORNER OF THE RUNWAY, 36.0 FT (11.0 M) NORTH-NORTHEAST OF THE NORTHEAST MOST RUNWAY END LIGHT AND 36.7 FT (11.2 M) WEST-NORTHWEST OF THE RUNWAY END INDICATOR LIGHT (REIL).

THE 150-METER MARK IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---SHILOH 150 2016---, SET IN THE TOP OF A 14-INCH ROUND CONCRETE MONUMENT, FLUSH WITH THE GROUND AND ABOUT 2 FT (0.6 M) LOWER THAN THE CENTERLINE OF THE RUNWAY. IT IS LOCATED 95.3 FT (29.0 M) NORTHEAST OF THE CENTERLINE OF THE RUNWAY, 45.0 FT (13.7 M) NORTHEAST OF THE NORTHEAST EDGE OF THE RUNWAY PAVEMENT, 83.0 FT (25.3 M) EAST-SOUTHEAST OF A RUNWAY LIGHT AND 124.0 FT (37.8 M) NORTH-NORTHWEST OF A RUNWAY LIGHT.

THE 420-METER MARK IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---SHILOH 420 2016---, SET IN THE TOP OF A 14-INCH ROUND CONCRETE MONUMENT, FLUSH WITH THE GROUND AND ABOUT 3 FT (0.9 M) LOWER THAN THE CENTERLINE OF THE RUNWAY. IT IS LOCATED 95.2 FT (29.0 M) NORTHEAST OF THE CENTERLINE OF THE RUNWAY, 45.0 FT (13.7 M) NORTHEAST OF THE NORTHEAST EDGE OF THE RUNWAY PAVEMENT, 54.0 FT (16.5 M) NORTH-NORTHWEST OF A RUNWAY LIGHT AND 155.0 FT (47.2 M) SOUTHEAST OF A RUNWAY LIGHT.

THE 1110-METER MARK IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---SHILOH 1110 2016---, SET IN THE TOP OF A 14-INCH ROUND CONCRETE MONUMENT, RECESSED 2 INCHES (5 CM) BELOW THE GROUND AND ABOUT 1.5 FT (0.5 M) LOWER THAN THE CEDNTERLINE OF THE RUNWAY. IT IS LOCATED 94.8 FT (28.9 M) NORTHEAST OF THE CENTERLINE OF THE RUNWAY, 44.8 FT (13.7 M) NORTHEAST OF THE NORTHEAST EDGE OF THE RUNWAY PAVEMENT, 34.7 FT (10.6 M) NORTHEAST OF A RUNWAY LIGHT, 191.5 FT (58.4 M) NORTH-NORTHWEST OF A RUNWAY LIGHT, 199.0 FT (60.7 M) SOUTHEAST OF A RUNWAY LIGHT AND 86.3 FT (26.3 M) WEST-NORTHWEST OF PRIMARY AIRPORT CONTROL STATION SIF A.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. THE FOLLOWING COORDINATES WERE ESTABLISHED USING GPS.

DESIGNATION	LATITUDE	LONGITUDE
SHILOH 000	N36 26 00.16	W079 50 36.77
SHILOH 150	N36 26 02.92	W079 50 41.73
SHILOH 420	N36 26 07.89	W079 50 50.66
SHILOH 1110	N36 26 20.59	W079 51 13.47

THE BASE LINE WAS ESTABLISHED BY THE NORTH CAROLINA GEODETIC SURVEY. FOR ACCESS, CONTACT THE AIRPORT MANAGER AT 2691 SETTLE BRIDGE ROAD, STONEVILLE, NORTH CAROLINA 27048, (336) 573-3115.FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607. PHONE: (919) 733-3836 FAX: (919) 733-4407.

Return to top of page

Smithfield EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: SMITHFIELD CBL
PROJECT ACCESSION NUMBER:
NEAREST TOWN: SMITHFIELD

QUAD: N350781
STATE: NC
COUNTY: JOHNSTON

LIST OF ADJUSTED DISTANCES (2/20/2017)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
SMITHFIELD CBL 000	47.205	SMITHFIELD CBL 150	44.342	149.9992	150.0265	0.1
SMITHFIELD CBL 000	47.205	SMITHFIELD CBL 400	41.208	399.9759	400.0207	0.1
SMITHFIELD CBL 000	47.205	JNX B	41.143	1099.9975	1100.0137	0.1

SMITHFIELD CBL 150	44.342	SMITHFIELD CBL 400	41.208	249.9767	249.9962	0.1
SMITHFIELD CBL 150	44.342	JNX B	41.143	949.9983	950.0030	0.1
SMITHFIELD CBL 400	41.208	JNX B	41.143	700.0216	700.0209	0.1

YEAR MEASURED: 2008
DATE RE-MEASURED: 02/20/2017
AZIMUTH: 203 DEGREES TRUE NORTH
CHIEF OF PARTY: W.M. KING

THE BASE LINE IS LOCATED ABOUT 5.4 (3.4 MI) NORTHWEST OF SMITHFIELD, N. C. AND 13.1 KM (8.2 MI) SOUTH SOUTHEAST OF CLAYTON, N.C. AT THE JOHNSTON COUNTY AIRPORT (PERMISSION NEEDED FOR ACCESS SEE BELOW).

THE BASE LINE IS A NORTH-SOUTH LINE WITH THE 0-METER MARK ON THE NORTH END. IT CONSISTS OF THE 0-, 150-, 400- AND 1100-METER MARKS. THERE IS NO 100 FT. TAPE CALIBRATION MARK.

TO REACH THE 0-METER MARK FROM THE JUNCTION OF US HIGHWAY 70 BUSINESS AND STATE ROUTE 1501 (BUCKET JONES ROAD) LOCATED ABOUT 6.4 KM (4.0 MI) NORTHWEST OF SMITHFIELD, N.C., GO SOUTHWEST ON STATE ROUTE SR1501 FOR 1.0 KM (0.6 MI) TO THE ENTRANCE TO JOHNSTON COUNTY AIRPORT ON THE LEFT, TURN LEFT AND GO EAST ALONG ENTRANCE ROAD FOR 0.03 KM (0.05 MI) TO BRICK AIRPORT FACILITY BUILDING. PASS THROUGH GATE ON THE NORTH SIDE OF THE BUILDING AND GO SOUTHWEST FOR 0.3 KM (0.2 MI) ALONG THE TAXIWAY TO THE 0-METER MARK NEAR THE SOUTHWEST CORNER OF THE APRON.

THE 0-METER MARK IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---SMITH 000 1997--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE CYLINDER FLUSH WITH THE SURFACE OF THE GROUND. IT IS 112.8 M (370.0 FT) NORTHWEST OF THE CENTERLINE OF THE RUNWAY, 10.7 M (35.0 FT) NORTH NORTHEAST OF THE NORTHWEST CORNER OF CONCRETE FOOTING OF TAXIWAY HOLDING POSITION SIGN A21-3, 9.5 M (31.0 FT) SOUTHEAST OF THE CENTERLINE OF THE TAXIWAY, 7.5 M (24.5 FT) WEST SOUTHWEST OF THE CENTER OF THE NORTH END OF A CONCRETE DRAINAGE SPILLWAY, 5.3 M (17.5 FT) WEST NORTHWEST OF TAXIWAY LIGHT #37, AND 3.0 M (9.8 FT) NORTHEAST OF TAXIWAY LIGHT #38.

THE 150-METER MARK IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---SMITH 150 1997--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE CYLINDER FLUSH WITH THE SURFACE OF THE GROUND. IT IS: 48.7 M (159.8 FT) SOUTH OF THE SOUTHEAST CORNER OF END OF A RAMP FOOTING, 48.6 M (159.5 FT) SOUTHWEST OF THE SOUTHWEST END OF RAMP E CULVERT, 44.8 M (147.0 FT) SOUTHWEST OF THE CENTERLINE OF RAMP E, 36.5 M (119.6 FT) NORTHEAST OF A TAXIWAY LIGHT, 31.6 M (103.6 FT) WEST OF THE SOUTHWEST CORNER OF FOOTING FOR RAMP E EXIT SIGN, AND 9.5 M (31.0 FT) SOUTHEAST OF THE CENTERLINE OF THE TAXIWAY.

THE 400-METER MARK IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---SMITH 400 1997--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE CYLINDER FLUSH WITH THE SURFACE OF THE GROUND. IT IS: 100.3 M (329.0 FT) NORTH NORTHEAST OF THE CENTERLINE OF RAMP F, 95.0 M (311.8 FT) NORTH OF THE RAMP F SIGN, 93.9 M (308.0 FT) SOUTHWEST OF THE SOUTHWEST END OF A CULVERT HEADWALL, 39.0 M (128.1 FT) SOUTHWEST OF TAXIWAY LIGHT #57, AND 9.5 M (31.0 FT) SOUTHEAST OF THE CENTERLINE OF THE TAXIWAY.

THE 1100-METER MARK IS A NCGS HORIZONTAL CONTROL DISK STAMPED ---JNX B 1997--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE CYLINDER FLUSH WITH THE SURFACE OF THE GROUND. IT IS: 38.0 M (124.6 FT) NORTHWEST OF A WIND SOCK POLE, 36.0 M (118.2 FT) SOUTHWEST OF A TAXIWAY LIGHT, 28.4 M (93.0 FT) SOUTH SOUTHEAST OF A STORM DRAIN GRATE ACROSS THE TAXIWAY, 21.9 M (71.8 FT) NORTHEAST OF A TAXIWAY LIGHT, 18.9 M (62.1 FT) WEST NORTHWEST OF A STORM DRAIN GRATE, AND 9.7 M (31.8 FT) SOUTHEAST OF THE CENTERLINE OF THE TAXIWAY.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY.

FOR INTERVISIBILITY BETWEEN ALL MARKS, SET TRIPODS AT APPROXIMATELY:
1.53 M (5.0 FT) ABOVE THE 0-METER MARK
1.57 M (5.2 FT) ABOVE THE 150-METER MARK
1.49 M (4.9 FT) ABOVE THE 400-METER MARK
1.53 M (5.0 FT) ABOVE THE 1100-METER MARK

THE FOLLOWING COORDINATES WERE ESTABLISH USING GPS.

PID	DESIGNATION	LATITUDE	LONGITUDE
AH5665	SMITHFIELD CBL 000	N35 32 41.48	W078 23 22.56
AH5666	SMITHFIELD CBL 150	N35 32 37.02	W078 23 24.93
AH5667	SMITHFIELD CBL 400	N35 32 29.57	W078 23 28.88
AH5668	JNX B	N35 32 08.73	W078 23 39.92

THE BASE LINE WAS ESTABLISHED BY THE NORTH CAROLINA GEODETIC SURVEY. JOHNSTON COUNTY AIRPORT OWNERSHIP-- PUBLIC, JOHNSTON COUNTY, FOR PERMISSION TO ENTER AIRPORT, CONTACT AIRPORT MANAGER, ROY DIXON, TELEPHONE 919-934-0992. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607, PHONE: (919) 733-3836, FAX: (919) 733-4407.

Return to top of page

Star EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: STAR CBL
PROJECT ACCESSION NUMBER:
NEAREST TOWN: STAR

QUAD:
STATE: NC
COUNTY: MONTGOMERY

LIST OF ADJUSTED DISTANCES (1/19/2017)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
STAR 000	174.410	STAR 180	176.934	179.9963	180.0141	0.0
STAR 000	174.410	STAR 420	180.667	419.9945	420.0413	0.0
STAR 000	174.410	STAR 1110	191.158	1109.9943	1110.1221	0.0
STAR 180	176.934	STAR 420	180.667	239.9982	240.0274	0.0
STAR 180	176.934	STAR 1110	191.158	929.9980	930.1082	0.0
STAR 420	180.667	STAR 1110	191.158	689.9998	690.0808	0.0

DATE MEASURED 01/19/2017
CHIEF OF PARTY: W.M. KING

THE BASE LINE IS LOCATED AT THE MONTGOMERY COUNTY AIRPORT ABOUT 5.9 MI (9.6 KM) EAST-NORTHEAST OF TROY, NC, 1.6 MI (2.5 KM) NORTH-NORTHWEST OF BISCOE, NC AND 1.6 MI (2.6 KM) SOUTH-SOUTHWEST OF STAR, NC. ON THE WESTERN SIDE OF RUNWAY. CONTACT AIRPORT MANAGER FOR ACCESS.

THE BASE LINE IS A NORTHEAST-SOUTHWEST LINE WITH THE 0-METER MARK ON THE SOUTHWEST END. IT CONSISTS OF 000, 180 , 420, AND 1110 METER MARKS.

TO REACH THE 0-METER MARK FROM THE JUNCTION OF US-220 ALT. AND NC HIGHWAY 24 IN BISCOE, NC GO NORTH ALONG US-220 ALTERNATE FOR 2.1 MI (3.4 KM) TO AIRPORT ROAD(SR-1376) THENCE WEST ALONG AIRPORT ROAD FOR 0.15 MI (0.24 KM) TO THE MONTGOMERY COUNTY AIRPORT GATE. CONTACT AIRPORT MANAGER BEFORE PROCEEDING ACROSS RAMP TO RUNWAY 3-21. CONTINUE SOUTHWEST ALONG RUNWAY 3-21 FOR 0.6 MI (1.0 KM) TO THE 0-METER STATION ON THE WESTERN SIDE OF RUNWAY.

THE 0-METER MARK IS A STANDARD NCGS HORIZONTAL CONTROL DISK STAMPED ---STAR 000 2016--- SET IN THE TOP OF A 12 IN (30.5 CM) DIAMETER CONCRETE CYLINDER WHICH IS ABOUT 0.5 FT (15 CM) LOWER THAN THE CENTERLINE OF RUNWAY AND IS FLUSH WITH THE GROUND. LOCATED 73.0 FT (22.3 M) WEST-NORTHWEST OF THE CENTERLINE OF RUNWAY, 35.0 FT (10.7 M) WEST-NORTHWEST OF THE NORTHWEST EDGE OF RUNWAY PAVEMENT, 113.1 FT (34.5 M) NORTH-NORTHEAST OF THE SOUTHWEST CORNER OF RUNWAY PAVEMENT, 118.2 FT (36.0 M) NORTH-NORTHEAST OF THE WESTERNMOST RUNWAY END LIGHT AND 93.3 FT (28.4 M) SOUTHWEST OF A RUNWAY LIGHT.

THE 180-METER MARK IS A STANDARD NCGS HORIZONTAL CONTROL DISK STAMPED ---STAR 180 2016--- SET IN THE TOP OF A 12 IN (30.5 CM) DIAMETER CONCRETE CYLINDER WHICH IS ABOUT 0.5 FT (15 CM) LOWER THAN THE CENTERLINE OF RUNWAY AND IS RECESSED 2 INCHES (5 CM) BELOW THE GROUND. LOCATED 73.0 FT (22.3 M) WEST-NORTHWEST OF THE CENTERLINE OF THE RUNWAY, 35.0 FT (10.7 M) WEST-NORTHWEST OF THE NORTHWEST EDGE OF RUNWAY PAVEMENT, 56.2 FT (17.1 M) NORTHEAST OF THE TOP CENTER OF PAPI CONTROL BOX, 102.3 FT (31.2 M) NORTH-NORTHEAST OF A RUNWAY LIGHT AND 105.0 FT (32.0 M) SOUTHWEST OF A RUNWAY LIGHT.

THE 420-METER MARK IS A STANDARD NCGS HORIZONTAL CONTROL DISK STAMPED ---STAR 420 2016--- SET IN THE TOP OF A 12 IN (30.5 CM) DIAMETER CONCRETE CYLINDER WHICH IS ABOUT 0.5 FT (15 CM) LOWER THAN THE CENTERLINE OF RUNWAY AND IS RECESSED 2 INCHES (5 CM) BELOW THE GROUND. LOCATED 73.0 FT (22.3 M) WEST-NORTHWEST OF THE CENTERLINE OF THE RUNWAY, 35.0 FT (10.7 M) WEST-NORTHWEST OF THE NORTHWEST EDGE OF RUNWAY PAVEMENT, 120.9 FT(36.9 M) SOUTHWEST OF A RUNWAY LIGHT, 86.5 FT (26.4 M) NORTH-NORTHEAST OF A RUNWAY LIGHT AND 110.3 FT (33.6 M) SOUTHEAST OF A 12 INCH (30 CM) OAK TREE WITH REFERENCE TAG.

THE 1110-METER MARK IS A STANDARD NCGS HORIZONTAL CONTROL DISK STAMPED ---STAR 1110 2016--- SET IN THE TOP OF A 12 IN (30.5 CM) DIAMETER CONCRETE CYLINDER WHICH IS ABOUT 0.5 FT (15 CM) LOWER THAN THE CENTERLINE OF RUNWAY AND IS RECESSED 2 INCHES (5 CM) BELOW THE GROUND. LOCATED 73.0 FT (22.3 M) WEST-NORTHWEST OF THE CENTERLINE OF THE RUNWAY, 35.0 FT (10.7 M) WEST-NORTHWEST OF THE NORTHWEST EDGE OF RUNWAY PAVEMENT, 65.0 FT (19.8 M) SOUTHEAST OF THE CENTER OF A GRAVEL ROAD, 53.0 NORTH OF A RUNWAY LIGHT AND 111.3 FT (33.9 M) SOUTHWEST OF A RUNWAY LIGHT.

USER NOTES - CBL USERS MUST OBTAIN PERMISSION FROM AIRPORT MANAGER TO ACCCES BASE LINE. CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. THE FOLLOWING COORDINATES WERE ESTABLISHED USING A HANDHELD GPS RECEIVER.

STAR 000	N352247.57	W0794734.13
STAR 180	N352253.01	W0794731.53
STAR 420	N352300.26	W0794728.05
STAR 1110	N352321.10	W0794718.06

THE BASE LINE WAS ESTABLISHED BY THE NORTH CAROLINA GEODETIC SURVEY. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, AT THE NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607, PHONE: (919) 733-3836, FAX: (919) 733-4407.

Return to top of page

Statesville EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: STATESVILLE SVH CBL
PROJECT ACCESSION NUMBER:
NEAREST TOWN: STATESVILLE

QUAD:
STATE: NC
COUNTY: IREDELL

LIST OF ADJUSTED DISTANCES (1/31/2017)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
SVH 000	292.758	SVH 150	293.011	150.0096	150.0098	0.1
SVH 000	292.758	SVH 420	293.090	420.0096	420.0097	0.1
SVH 000	292.758	SVH 1080	291.603	1080.0133	1080.0138	0.1
SVH 150	293.011	SVH 420	293.090	269.9999	270.0000	0.1
SVH 150	293.011	SVH 1080	291.603	930.0037	930.0047	0.1
SVH 420	293.090	SVH 1080	291.603	660.0037	660.0053	0.1

YEAR MEASURED: 2017
AZIMUTH: 277 DEGREES TRUE NORTH
CHIEF OF PARTY: BWD

STATESVILLE SVH CBL WAS ESTABLISHED TO REPLACE STATESVILLE CBL (EST. 1982). THE ORIGINAL HAS SOME MARKS DESTROYED OR NOT USEABLE AND BUILDINGS CONSTRUCTED BLOCKING LINE OF SITE SO IT SHOULD BE CONSIDERED OBLITERATED. NCGS SET A NEW BASE LINE AT THE SAME FACILITY IN A DIFFERENT AREA.

THE BASE LINE IS LOCATED ABOUT 5.8 MI (9.3 KM) NORTHWEST OF TROUTMAN, 3.8 MI (6.1 KM) WEST-SOUTHWEST OF STATESVILLE AND 1.8 MI (2.9 KM) SOUTHWEST OF STATESVILLE WEST, AT THE STATESVILLE REGIONAL AIRPORT.

THE BASE LINE IS AN EAST-WEST LINE WITH THE 0-METER MARK ON THE EAST END. IT CONSISTS OF THE 000, 150, 420, AND 1080-METER MARKS.

TO REACH THE 0-METER MARK FROM I-40(EXIT 146) PROCEED ALONG SR 1753-STAMEY FARM ROAD FOR 0.9 MI (1.4 KM) SOUTHEAST, THENCE EAST FOR 1.1 MI (1.8 KM) ALONG HIGHWAY 70, THENCE SOUTH FOR 0.6 MI (1.0 KM) ALONG SR 1379-AIRPORT ROAD TO THE AIRPORT ENTRANCE, OBTAIN PERMISSION AND PROCEED THROUGH THE ENTRANCE GATE TO THE NORTH SIDE OF THE TAXIWAY NEAR THE SOUTHWEST CORNER OF THE OUTDOOR PLANE PARKING AREA.

THE 0-METER MARK IS A NCGS HORIZONTAL DISK STAMPED ---SVH 000 2016--- SET IN THE TOP OF A 12.0 IN (30.5 CM) DIAMETER ROUND CONCRETE MONUMENT, RECESSED 2 INCHES BELOW THE SURFACE OF THE GROUND. IT IS 32.5 FT (9.9 M) NORTH-NORTHEAST OF THE CENTERLINE OF THE TAXIWAY, 21.0 FT (6.4 M) WEST-NORTHWEST OF A TAXIWAY LIGHT, 37.6 FT (11.5 M) EAST OF A TAXIWAY LIGHT, 127.0 FT (38.7 M) NORTH-NORTHWEST OF THE CENTERLINE OF THE 28-10F SIGN, 194.0 FT (59.1 M) EAST-NORTHEAST OF A DRAINAGE INLET, 338.0 FT (103.0 M) SOUTH-SOUTHWEST OF A DRAINAGE INLET.

THE 150-METER MARK IS A NCGS HORIZONTAL DISK STAMPED ---SVH 150 2016--- SET IN THE TOP OF A 12.0 IN (30.5 CM) DIAMETER ROUND CONCRETE MONUMENT, RECESSED 2 INCHES BELOW THE SURFACE OF THE GROUND. IT IS 32.5 FT (9.9 M) NORTH-NORTHEAST OF THE CENTERLINE OF THE TAXIWAY, 37.3 FT (11.4 M) WEST-SOUTHWEST OF A DRAINAGE INLET, 58.2 FT (17.7 M) EAST OF A TAXIWAY LIGHT, 77.0 FT (23.5 M) WEST-NORTHWEST OF A TAXIWAY LIGHT, 93.1 FT (28.4 M) NORTH OF A DRAINAGE INLET.

THE 420-METER MARK IS A NCGS HORIZONTAL DISK STAMPED ---SVH 420 2016--- SET IN THE TOP OF A 12.0 IN (30.5 CM) DIAMETER ROUND CONCRETE MONUMENT, RECESSED 2 INCHES BELOW THE SURFACE OF THE GROUND. IT IS 32.5 FT (9.9 M) NORTH-NORTHEAST OF THE CENTERLINE OF THE TAXIWAY, 22.0 FT (6.7 M) WEST-NORTHWEST OF A TAXIWAY LIGHT, 81.4 FT (24.8 M) SOUTH OF A CHAIN LINK FENCE, 128.8 FT (39.3 M) EAST-NORTHEAST OF A DRAINAGE INLET, 166.7 FT (50.8 M) EAST OF A TAXIWAY LIGHT.

THE 1080-METER MARK IS A NCGS HORIZONTAL DISK STAMPED ---SVH 1080 2016--- SET IN THE TOP OF A 12.0 IN (30.5 CM) DIAMETER ROUND CONCRETE MONUMENT, RECESSED 2 INCHES BELOW THE SURFACE OF THE GROUND. IT IS 33.0 FT (10.1 M) NORTH-NORTHEAST OF THE CENTERLINE OF THE TAXIWAY, 10.4 FT (3.2 M) NORTHWEST OF A TAXIWAY LIGHT, 36.0 FT (11.0 M) EAST OF A TAXIWAY LIGHT, 37.3 FT (11.4 M) EAST-SOUTHEAST OF THE SOUTHEAST CORNER OF A CONCRETE SIGN BASE, 81.9 FT (25.0 M) SOUTH OF A CHAIN LINK FENCE, 110.5 FT (33.7 M) NORTH OF THE CENTERLINE OF THE 28-10J SIGN.

USER NOTES - STATESVILLE 2 CBL WAS ESTABLISHED TO REPLACE THE ORIGINAL STATESVILLE CBL (EST. 1982). IT HAS SOME MARKS DESTROYED OR NOT USEABLE AND BUILDINGS CONSTRUCTED BLOCKING LINE OF SITE SO IT SHOULD BE CONSIDERED OBLITERATED. NCGS SET A NEW

BASE LINE AT THE SAME FACILITY IN A DIFFERENT AREA. CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. THE FOLLOWING COORDINATES WERE ESTABLISHED USING GPS.

SVH 000	N35 45 56.72	W080 57 08.14
SVH 150	N35 45 57.30	W080 57 14.07
SVH 420	N35 45 58.34	W080 57 24.75
SVH 1080	N35 46 00.90	W080 57 50.83

THE BASE LINE WAS ESTABLISHED BY THE NORTH CAROLINA GEODETIC SURVEY. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607, PHONE: (919) 733-3836, FAX: (919) 733-4407.

Return to top of page

Sylva EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: SYLVA CBL
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: CULLOWHEE

QUAD: N350832
NORTH CAROLINA
JACKSON COUNTY

LIST OF ADJUSTED DISTANCES (11/ 3/2011)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
SYLVA 0	850.000	SYLVA 150	850.446	150.0134	150.0141	0.1
SYLVA 0	850.000	SYLVA 420	852.566	420.0062	420.0141	0.1
SYLVA 0	850.000	SYLVA 1100	865.368	1100.0094	1100.1167	0.2
SYLVA 150	850.446	SYLVA 420	852.566	269.9928	270.0011	0.1
SYLVA 150	850.446	SYLVA 1100	865.368	949.9958	950.1130	0.1
SYLVA 420	852.566	SYLVA 1100	865.368	680.0029	680.1234	0.1

YEAR MEASURED: 2011
DATE VERIFIED: 01/26/2017
AZIMUTH: 322 DEGREES TRUE NORTH
CHIEF OF PARTY: MDB

THE BASE LINE IS A NORTHWEST-SOUTHEAST LINE WITH THE 0-METER MARK ON THE SOUTHEAT END. IT CONSIST OF THE 0, 140, 420, AND 1100 METER MARKS.

THE BASE LINE IS LOCATED ABOUT 5.5 MI (8.8 KM) WEST-NORTHWEST OF TUCKASEGEE, 4.3 MI (6.9 KM) SOUTH-SOUTHEAST OF SYLVA AND 3.4 MI (5.5 KM) EAST-SOUTHEAST OF GREENS CREEK AT THE JACKSON COUNTY AIRPORT.

TO REACH THE 0-METER MARK FROM THE INTERSECTION OF NC 107 AND NC 116 GO SOUTH-SOUTHEAST ON NC 107 FOR 3.5 MI (5.6 KM) TO SR 1367-LITTLE SAVANNAH ROAD (ACROSS FROM WESTERN CAROLINA UNIVERSITY). TURN RIGHT AND GO WEST ON SR 1367-LITTLE SAVANNAH ROAD FOR 1.6 MI (2.6 KM) TO SR 1535-AIRPORT ROAD. TURN RIGHT AND GO NORTH ON SR 1535-AIRPORT ROAD FOR 0.65 MI (1.0 KM) TO THE JACKSON COUNTY AIRPORT AND THE 0-METER MARK SOUTHWEST OF THE AIRPORT OFFICE AND ACROSS THE APRON IN THE GRASS AREA.

THE 0-METER MARK IS A NCGS HORIZONTAL DISK STAMPED ---SYLVA 000 2009--- SET IN THE TOP OF A 30.5 CM (12 IN) DIAMETER ROUND CONCRETE MONUMENT, FLUSH WITH THE SURFACE OF THE GROUND. LOCATED 269.3 FT (82.1 M) SOUTHWEST OF THE NORTHWEST CORNER OF THE HANGER, 115.5 FT (35.2 M) SOUTHWEST OF THE SOUTHWEST EDGE OF THE PAVEMENT OF THE PARKING APRON, 139.0 FT (42.4 M) SOUTH-SOUTHWEST OF THE CENTERLINE OF THE TAXI RAMP AND 254.5 FT (77.6 M) NORTHWEST OF THE WEST MOST PERIMETER FENCE.

THE 150-METER MARK IS A NCGS HORIZONTAL DISK STAMPED ---SYLVA 150 2009--- SET IN THE TOP OF A 30.5 CM (12 IN) DIAMETER ROUND CONCRETE MONUMENT, FLUSH WITH THE SURFACE OF THE GROUND. LOCATED 64.0 FT (19.5 M) NORTHEAST OF THE CENTERLINE OF THE RUNWAY 179.8 FT (54.8 M) SOUTH-SOUTHEAST OF THE CENTER OF A SEDIMENT POND DROP INLET, 121.0 FT (36.9 M) WEST-NORTHWEST OF THE NORTHWEST END OF A 24-INCH (61 CM) CONCRETE CULVERT PIPE AND 13.2 FT (4.0 M) NORTH OF THE NORTHEAST MOST RED AND BLUE RUNWAY LIGHT.

THE 420-METER MARK IS A NCGS HORIZONTAL DISK STAMPED ---SYLVA 420 2009--- SET IN THE TOP OF A 30.5 CM (12 IN) DIAMETER ROUND CONCRETE MONUMENT, FLUSH WITH THE SURFACE OF THE GROUND. LOCATED 61.5 FT (18.7 M) NORTHEAST OF THE CENTERLINE OF THE RUNWAY 109.8 FT (33.5 M) NORTH-NORTHWEST OF A RUNWAY LIGHT, 89.0 FT (27.1 M) SOUTHEAST OF A RUNWAY LIGHT AND 443.0 FT (135.0 M) WEST-NORTHWEST OF THE WINDSOCK.

THE 1100-METER MARK IS A NCGS HORIZONTAL DISK STAMPED ---SYLVA 1100 2009--- SET IN THE TOP OF A 30.5 CM (12 IN) DIAMETER ROUND CONCRETE MONUMENT, FLUSH WITH THE SURFACE OF THE GROUND. LOCATED 56.5 FT (17.2 M) NORTHEAST OF THE PROLONGATION OF THE RUNWAY, 78.0 FT (23.8 M) NORTH OF THE NORTH MOST CORNER OF THE RUNWAY PAVEMENT AND 210.0 FT (64.0 M) WEST-NORTHWEST OF A 10-INCH DOUBLE MAPLE WITH REFERENCE TAG.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. THE FOLLOWING COORDINATES WERE ESTABLISHED USING GPS.

PID	DESIGNATION	LATITUDE	LONGITUDE
DP7408	SYLVA 000	N35 18 47.32	W083 12 19.94
DP7409	SYLVA 150	N35 18 51.14	W083 12 23.61
DP7410	SYLVA 420	N35 18 58.02	W083 12 30.22
DP7411	SYLVA 1100	N35 19 15.36	W083 12 46.87

THIS BASE LINE WAS ESTABLISHED IN CONJUNCTION WITH NORTH CAROLINA GEODETIC SURVEY. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON AT THE NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607, PHONE: (919) 733-3836, FAX: (919) 733-4407.

Return to top of page

Wallace EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
ROCKVILLE MD 20852 - MARCH 29, 1993

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: WALLACE CBL
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: WALLACE

QUAD: N340781
NORTH CAROLINA
PENDER COUNTY

LIST OF ADJUSTED DISTANCES (MARCH 22, 1993)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
WALLACE 0	11.397	WALLACE 150	11.043	149.9995	149.9999	0.1
WALLACE 0	11.397	WALLACE 430	10.490	429.9956	429.9966	0.2
WALLACE 0	11.397	WALLACE 1170	8.890	1169.9548	1169.9575	0.3
WALLACE 150	11.043	WALLACE 430	10.490	279.9962	279.9967	0.1
WALLACE 150	11.043	WALLACE 1170	8.890	1019.9553	1019.9576	0.2
WALLACE 430	10.490	WALLACE 1170	8.890	739.9591	739.9609	0.1

DESCRIPTION OF WALLACE BASE LINE
YEAR MEASURED: 1982
YEAR REMEASURED: 1993
CHIEF OF PARTY: KM

THE BASE LINE IS LOCATED ABOUT 20.9 KM (13.0 MI) NORTH-NORTHWEST OF BURGAW, 11.3 KM (7.0 MI) SOUTH-SOUTHEAST OF ROSE HILL, AND 0.8 KM (0.5 MI) SOUTHWEST OF WALLACE AT THE WALLACE AIRPORT. THE BASE LINE RUNS ALONG AND IS APPROXIMATELY PARALLEL WITH THE NORTH EDGE OF RUNWAY (9-27).

THE BASE LINE IS AN EAST-WEST LINE WITH THE 0-METER MARK ON THE WEST END. IT CONSISTS OF THE 0, 150, 430, AND 1170 METER MARKS. THE BASE LINE DISKS ARE NORTH CAROLINA GEODETIC SURVEY TRIANGULATION DISKS.

TO REACH THE 0-METER MARK FROM THE JUNCTION OF U.S. HIGHWAY 117 (NORWOOD STREET) AND STATE HIGHWAY 41 (MAIN STREET), LOCATED IN DOWNTOWN WALLACE, GO WESTERLY ON STATE HIGHWAY 41 FOR 0.9 KM (0.6 MI) TO THE INTERSECTION OF ROCKFISH STREET ON THE LEFT. TURN LEFT AND GO SOUTHERLY ON ROCKFISH STREET FOR 0.8 KM (0.5 MI) TO A CONCRETE BRIDGE OVER ROCKFISH CREEK AT THE DUPLIN-PENDER COUNTY LINE. CONTINUE SOUTHWESTERLY ON WALLACE AIRPORT ROAD FOR 0.9 KM (0.6 MI) TO THE INTERSECTION OF AIRPORT ROAD ON THE LEFT. TURN LEFT AND GO SOUTH CURVING TO EAST ON AIRPORT ROAD FOR 0.4 KM (0.2 MI) TO THE AIRPORT OFFICE AND GATE LEADING TO THE AIRCRAFT PARKING AREA. PASS THROUGH THE GATE AND GO SOUTHERLY CROSSING THE AIRCRAFT PARKING AREA ONTO THE TAXIWAY FOR 0.10 KM (0.06 MI) TO THE NORTH EDGE OF RUNWAY (9-27). TURN RIGHT AND GO WEST PARALLELING THE NORTH EDGE OF RUNWAY (9-27) FOR 0.53 KM (0.33 MI) TO THE 0-METER MARK NEAR THE WESTERN ONE OF TWO VASI LIGHTS.

THE 0-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---WALLACE 000--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 61.1 M (200.5 FT) EAST OF THE WEST EDGE OF RUNWAY (9-27), 9.4 M (30.8 FT) SOUTH OF THE SOUTHWEST CORNER OF A CONCRETE APPROACH LIGHT FOUNDATION, 7.2 M (23.6 FT) EAST-NORTHEAST OF RUNWAY LIGHT # 45, AND 5.2 M (17.1 FT) NORTH OF THE NORTH EDGE OF RUNWAY (9-27).

THE 150-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---WALLACE 150--- SET IN THE TOP OF A 36 CM (14 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 16.1 M (52.8 FT) WEST-NORTHWEST OF A RUNWAY LIGHT, 9.6 M (31.5 FT) SOUTH-SOUTHWEST OF THE SOUTHWEST CORNER OF A CONCRETE APPROACH LIGHT FOUNDATION, AND 5.2 M (17.1 FT) NORTH OF THE NORTH EDGE OF RUNWAY (9-27).

THE 430-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---WALLACE 430--- SET IN THE TOP OF A 41 CM (16 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 33.8 M (110.9 FT) EAST-NORTHEAST OF RUNWAY LIGHT # 31, 23.9 M (78.4 FT) WEST-NORTHWEST OF RUNWAY LIGHT # 29, AND 5.0 M (16.4 FT) NORTH OF THE NORTH EDGE OF RUNWAY (9-27).

THE 1170-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY DISK STAMPED ---WALLACE 1170--- SET IN THE TOP OF A 46 CM (18 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 30.1 M (98.8 FT) NORTHEAST OF THE SOUTHEAST CORNER OF RUNWAY (9-27), 20.8 M (68.2 FT) SOUTHEAST OF THE NORTHEAST CORNER OF AN AIRCRAFT TURNAROUND, 12.0 M (39.4 FT) EAST OF THE EAST EDGE OF AN AIRCRAFT TURNAROUND, AND 4.8 M (15.7 FT) EAST-NORTHEAST OF THE EASTERN MOST RUNWAY END LIGHT.

USER NOTES: CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. DRIVING ON THE RUNWAYS IS STRICTLY PROHIBITED AND ALL AIRCRAFT HAVE THE RIGHT-OF-WAY. THE WALLACE AIRPORT IS UNCONTROLLED. FOR INFORMATION ABOUT AIRPORT ACTIVITIES PLEASE CONTACT MR. WAYNE RICH (919) 285-2027.

THIS CALIBRATION BASE LINE WAS ESTABLISHED AND REMEASURED WITH ASSISTANCE FROM THE NORTH CAROLINA GEODETIC SURVEY.

FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, AT: NORTH CAROLINA GEODETIC SURVEY, 512 NORTH SALISBURY STREET, RALEIGH, NC 27604. PHONE: (919) 733-3836 FAX: (919) 733-4407.

Return to top of page

West Jefferson EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: WEST JEFFERSON CBL
PROJECT ACCESSION NUMBER: 1
NEAREST TOWN: WEST JEFFERSON

QUAD: N360812
STATE: NC
COUNTY: ASHE

LIST OF ADJUSTED DISTANCES (2/28/2017)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
WEST JEFFERSON CBL 000	968.835	W JEFFPORT	966.255	149.9736	149.9958	0.1
WEST JEFFERSON CBL 000	968.835	WEST JEFFERSON CBL 430	961.297	429.9666	430.0324	0.1
WEST JEFFERSON CBL 000	968.835	WEST JEFFERSON CBL 1400	943.840	1399.9401	1400.1605	0.1
W JEFFPORT	966.255	WEST JEFFERSON CBL 430	961.297	279.9930	280.0367	0.1
W JEFFPORT	966.255	WEST JEFFERSON CBL 1400	943.840	1249.9665	1250.1648	0.1
WEST JEFFERSON CBL 430	961.297	WEST JEFFERSON CBL 1400	943.840	969.9735	970.1281	0.1

YEAR MEASURED: 1998
DATE RE-MEASURED: 02/27/2017
AZIMUTH: 89 DEGREES TRUE NORTH
CHIEF OF PARTY: MDB

THE BASE LINE IS LOCATED ABOUT 7.1 KM (4.4. MI) EAST NORTHEAST OF WEST JEFFERSON AT THE ASHE COUNTY AIRPORT ON THE NORTH SIDE AND PARALLEL TO THE RUNWAY.

THE BASE LINE IS AN EAST-WEST LINE WITH THE 0-METER MARK ON THE WEST END. THE BASE LINE CONSISTS OF THE 0, 150, 430, AND 1400 METER MARKS.

TO REACH THE 0-METER MARK FROM THE INTERSECTION OF U.S. HIGHWAY 221 AND SR 1582 (FRIENDSHIP CHURCH RD), GO EAST ON SR 1582 FOR 1.1 KM (0.7 MI) TO THE INTERSECTION OF SR1582 AND SR1583, GO NORTH ON SR 1583 FOR 0.7 KM (0.4 MI) TO AIRPORT RD ON THE RIGHT, TURN RIGHT ON AIRPORT RD AND GO EAST FOR 0.4 KM (0.3 MI) TO A ROAD LEFT, TURN LEFT AND GO NORTH ABOUT 200 M (700 FT) TO THE END OF THE ROAD, CONTINUE ABOUT ANOTHER 90 M (300 FT) TO THE WEST END OF THE RUNWAY AND THE 0-METER MARK.

THE 0-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY (NCGS) HORIZONTAL DISK STAMPED ---000 1990--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER ROUND CONCRETE MONUMENT, FLUSH WITH THE SURFACE OF THE GROUND. LOCATED 81.4 M (267.0 FT) WEST OF THE NORTH

MOST LIGHT AT THE WEST END OF THE RUNWAY, 57.4 M (188.5 FT) NORTHWEST OF THE CENTER OF RUNWAY AT THE WEST END OF THE PAVEMENT, 56.8 M (186.3 FT) OF A FENCE POST WITH A NC REFERENCE TAG, 54.86 M (180 FT) WEST-NORTHWEST OF THE NORTHWEST CORNER OF THE RUNWAY, 17.5 M (57.4 FT) NORTH OF THE PROJECTED CENTERLINE OF THE RUNWAY, 7.0 M (23.0 FT) WEST-SOUTHWEST OF THE SOUTHWEST CORNER OF A CONCRETE DRAIN DITCH.

THE 150-METER MARK IS AN NGS DISK STAMPED ---W JEFFPORT 1985--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER ROUND CONCRETE MONUMENT, FLUSH WITH THE SURFACE OF THE GROUND. LOCATED 30.0 M (128.0 FT) EAST OF A RUNWAY LIGHT, 20.9 M (68.5 FT) WEST-NORTHWEST OF A RUNWAY LIGHT, 17.4 M (57.0 FT) NORTH OF THE CENTERLINE OF THE RUNWAY, 4.1 M (13.4 FT) SOUTHEAST OF THE SOUTHEAST CORNER OF A 3 X 4 FT CONCRETE PAD.

THE 430-METER MARK IS AN NCGS HORIZONTAL DISK STAMPED ---430 1990--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER ROUND CONCRETE MONUMENT, FLUSH WITH THE SURFACE OF THE GROUND. LOCATED ON THE NORTH SIDE OF THE RUNWAY ACROSS FROM A WINDSOCK, 53.6 M (176.0 FT) WEST-NORTHWEST OF THE CLENTERLINE INTERSECTION OF THE RUNWAY AND A TAXI RAMP, 46.8 M (153.5 FT) WEST-SOUTHWEST OF THE CENTER OF A DROP INLET, 39.0 FT (128.0 FT) WEST OF A RUNWAY LIGHT, 20.9 M (68.5 FT) EAST-NORTHEAST OF A RUNWAY LIGHT, 17.4 M (57.0 FT) NORTH OF THE CENTERLINE OF THE RUNWAY.

THE 1400-METER MARK IS AN NCGS HORIZONTAL DISK STAMPED ---1400 1990--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER ROUND CONCRETE MONUMENT RECESSED 5 CM BELOW THE GROUND. LOCATED AT THE EAST END OF THE RUNWAY, 49.6 M (162.7 FT NORTHEAST OF THE NORTH MOST RELI-A-LIGHT, 36.7 M (120.5 FT) EAST OF A RUNWAY LIGHT, 22.1 M (72.5 FT) WEST-SOUTHWEST OF DROP INLET, 18.3 M (60.0 FT) WEST-NORTHWEST OF A RUNWAY LIGHT, 17.4 M (57.0 FT) NORTH OF THE CENTERLINE OF THE RUNWAY.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. THE FOLLOWING COORDINATES WERE ESTABLISHED USING GPS.

PID	DESIGNATION	LATITUDE	LONGITUDE
AJ6928	WEST JEFFERSON CBL 000	N36 25 56.90	W081 25 39.37
FZ2190	W JEFFPORT	N36 25 57.00	W081 25 33.35
AJ6929	WEST JEFFERSON CBL 430	N36 25 57.17	W081 25 22.11
AH5657	WEST JEFFERSON CBL 1400	N36 25 57.79	W081 24 43.18

THE BASE LINE WAS ESTABLISHED IN CONJUNCTION WITH THE NORTH CAROLINA GEODETIC SURVEY. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON AT THE NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607. PHONE: (919) 733-3836 FAX: (919) 733-4407.

Return to top of page

Whiteville EDM Calibration Baseline

US DEPARTMENT OF COMMERCE - NOAA
NOS - NATIONAL GEODETIC SURVEY
SILVER SPRING MD 20910 - May 15, 2000

CALIBRATION BASE LINE DATA
BASE LINE DESIGNATION: WHITEVILLE CBL
PROJECT ACCESSION NUMBER: 15482
NEAREST TOWN: WHITEVILLE

QUAD: N340783
NORTH CAROLINA
COLUMBUS COUNTY

LIST OF ADJUSTED DISTANCES (May 10, 2000)

FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	ADJ. DIST.(M) HORIZONTAL	ADJ. DIST.(M) MARK - MARK	STD. ERROR(MM)
WHITEVILLE 0	26.520	WHITEVILLE 150	26.066	150.0043	150.0050	0.1
WHITEVILLE 0	26.520	WHITEVILLE 430	24.850	430.0093	430.0125	0.2
WHITEVILLE 0	26.520	WHITEPORT AZ MK	21.038	1030.0282	1030.0428	0.2
WHITEVILLE 150	26.066	WHITEVILLE 430	24.850	280.0050	280.0076	0.1
WHITEVILLE 150	26.066	WHITEPORT AZ MK	21.038	880.0239	880.0383	0.2
WHITEVILLE 430	24.850	WHITEPORT AZ MK	21.038	600.0189	600.0310	0.1

YEAR MEASURED: 1999
DATE VERIFIED: 02/16/2017
AZIMUTH: 48 DEGREES TRUE NORTH
CHIEF OF PARTY: W.M. KING

THE BASE LINE IS LOCATED ABOUT 7.4 KM (4.6 MI) SOUTH OF WHITEVILLE AT THE COLUMBUS COUNTY MUNICIPAL AIRPORT, 11.6 KM (7.2 MI) EAST-SOUTHEAST OF CHADBOURN, AND 20.1 KM (12.5 MI) NORTHEAST OF TABOR CITY.

THE BASE LINE IS A SOUTHWEST-NORTHEAST LINE WITH THE 0-METER MARK ON THE SOUTHWEST END. THE BASE LINE CONSISTS OF THE 000-, 150-, 430-, AND 1030-METER MARKS. THE BASE LINE IS ON THE SOUTHEAST SIDE OF THE AIRPORT RUNWAY AND RUNS PARALLEL TO IT. THERE IS NO 100-FOOT TAPE CALIBRATION STATION LOCATED AT THIS BASE LINE.

TO REACH THE 0-METER MARK FROM THE JUNCTION OF U.S. 701 BUSINESS AND STATE ROUTE 130 SOUTH-SOUTHWEST OF WHITEVILLE, GO SOUTHEAST ON STATE ROUTE 130 (VINSON BOULEVARD) FOR 2.49 KM (1.55 MI) TO STATE ROUTE 1170, TURN RIGHT ON STATE ROUTE 1170 AND GO SOUTHWEST FOR 1.6 KM (1.0 MI) TO STATE ROUTE 1181, TURN LEFT ON STATE ROUTE 1181 AND GO SOUTHEAST FOR 0.80 KM (0.50 MI) TO COLUMBUS COUNTY MUNICIPAL AIRPORT TERMINAL BUILDING AND AIRPORT GATE, CONTINUE EAST THROUGH THE GATE FOR 0.16 KM (0.10 MI) TO THE RUNWAY, TURN RIGHT AND GO SOUTHWEST ALONG THE RUNWAY FOR 0.40 KM (0.25 MI) TO THE 0-METER MARK AT THE SOUTHWEST END OF THE RUNWAY.

THE 0-METER MARK IS A NORTH CAROLINA GEODETIC CONTROL DISK STAMPED ---WHITEVILLE 000 1989--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 77.2 M (253.2 FT) NORTHEAST OF AN ELECTRICAL BOX WITH A LIGHT, 40.6 M (133.2 FT) SOUTHWEST OF THE SECOND LANDING LIGHT, 23.6 M (77.5 FT) SOUTHEAST OF THE CENTERLINE OF THE RUNWAY, AND 20.5 M (67.1 FT) EAST-NORTHEAST OF THE FIRST LANDING LIGHT FROM THE SOUTHWEST END OF THE RUNWAY.

THE 150-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY CONTROL DISK, STAMPED ---WHITEVILLE 150 1989--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 53.6 M (175.7 FT) EAST-NORTHEAST OF THE THIRD LANDING LIGHT FROM THE SOUTHWEST END OF THE RUNWAY, 23.7 M (77.6 FT) SOUTHEAST OF THE CENTERLINE OF THE RUNWAY, AND 10.4 M (34.0 FT) SOUTH OF THE FOURTH LANDING LIGHT.

THE 430-METER MARK IS A NORTH CAROLINA GEODETIC SURVEY CONTROL DISK, STAMPED ---WHITEVILLE 430 1989--- SET IN THE TOP OF A 30 CM (12 IN) DIAMETER CONCRETE POST FLUSH WITH THE SURFACE OF THE GROUND. IT IS 47.9 M (157.0 FT) EAST-NORTHEAST OF A LANDING LIGHT AT THE CENTERLINE OF THE TAXIWAY, 28.0 M (91.9 FT) NORTHEAST OF THE NORTHEAST END OF A CONCRETE CULVERT, 23.7 M (77.8 FT) SOUTHEAST OF THE CENTERLINE OF THE RUNWAY, AND 14.8 M (48.4 FT) SOUTH- SOUTHWEST OF THE SECOND LANDING LIGHT FROM THE CENTER OF THE TAXIWAY.

THE 1030-METER MARK IS A NGS AZIMUTH MARK DISK STAMPED ---WHITEPORT 1986--- SET IN THE TOP OF 30 CM (12 IN) DIAMETER CONCRETE POST FLUSH WITH SURFACE OF THE GROUND. IT IS 33.2 M (109.0 FT) SOUTH-SOUTHWEST FROM THE APPROXIMATE CENTERLINE OF THE RUNWAY AT THE END OF THE PAVEMENT, 27.0 M (88.5 FT) NORTHEAST OF A VASI LIGHT, 23.8 M (78.0 FT) SOUTHEAST OF THE CENTERLINE OF THE RUNWAY, AND 6.7 M (22.0 FT) NORTHWEST OF A WITNESS POST.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL MARKS. ELEVATIONS ARE FOR CBL USE ONLY. THE FOLLOWING COORDINATES WERE ESTABLISHED BY GPS:

PID	DESIGNATION	LATITUDE	LONGITUDE
AI2171	WHITEVILLE CBL 000	34 16 17.07	78 42 59.56
AI2168	WHITEVILLE CBL 150	34 16 20.35	78 42 55.23
AI2167	WHITEVILLE CBL 430	34 16 26.47	78 42 47.14

EB3111 WHITEPORT AZ MK 34 16 39.58 78 42 29.80

THE BASE LINE WAS ESTABLISHED BY THE NORTH CAROLINA GEODETIC SURVEY. OWNERSHIP - PUBLIC, COLUMBUS COUNTY, 467 AIRPORT ROAD, WHITEVILLE, N.C. 28472. TELEPHONE (910) 642-6187. MANAGER, JACK DUFFELL. FOR MORE INFORMATION PLEASE CONTACT MR. GARY THOMPSON, NORTH CAROLINA GEODETIC SURVEY, CLAUDE T BOWERS BUILDING, NORTH CAROLINA NATIONAL GUARD COMPLEX, 4105 REEDY CREEK ROAD RALEIGH, NC 27607, PHONE: (919) 733-3836, FAX: (919) 733-4407.

Return to top of page

About NCGS

The purpose of the Geodetic Survey section is to establish precisely located monuments on the North Carolina Grid System and Bench Marks referenced to a vertical datum (NGVD 1929 and NAVD 1988).

Sign In

United States Department of the Interior
GEOLOGICAL SURVEY
BOX 25046 M.S. 968
DENVER FEDERAL CENTER
DENVER, COLORADO 80225
IN REPLY REFER TO:
Branch of Global Seismology and Geomagnetism

Values of Magnetic Declination

These tables give the estimated values of magnetic declination at each degree of latitude and longitude covering the area of interest of your inquiry. Where available the values are given from 1750 to 1900 at ten-year intervals, and from 1900 to 1995 at five-year intervals, in degrees and minutes of arc. Values for intervening years may be found by interpolation; similarly, values for a few years beyond 1995 may be derived by extrapolation.

Values of declination prior to 1955 were derived using the source data of Table 4 of Coast and Geodetic Survey Publication 40-2, "United States Magnetic Tables for 1960." Values from 1955 through 1967.5 were derived from the 3077 Magnetic Chart Series of the Coast and Geodetic Survey for 1955, 1960, and 1965. Values of declination from 1967.5 through 1972.5 were obtained using the model for USGS Map I-911, Magnetic Declination in the United States - Epoch 1975.0. Values from 1972.5 to 1984.5 were derived using the model for USGS Map I-1283, Magnetic Declination in the United States - Epoch 1980.0 Declination values subsequent to 1984.5 were obtained using the U.S. Spherical Harmonic Models for 1985 and 1990 (USCON85 and USCON90) of the U.S. Geological Survey Branch of Global Seismology and Geomagnetism.

The accuracy of the 1995 values is generally within one-half degree, but natural or artificial disturbances could cause differences of several degrees. The values of declination have been given to the nearest minute so that secular change may be properly illustrated.

The accuracy of the secular change for the more recent decades is probably within a few minutes for a ten-year period. For the earlier part of the table the secular change is less reliable.

U.S. Geological Survey (GS&G)
Mail Stop 968
Box 25046, Denver Federal Center
Denver, CO 80225-0046

V A L U E S O F M A G N E T I C D E C L I N A T I O N

LAT	33	33	33	33	33	33	33	33	33	LAT
LONG	75	74	73	72	71	70	69	68	67	LONG
1750	na	na	na	na	na	na	na	na	na	1750
1760	na	na	na	na	na	na	na	na	na	1760
1770	na	na	na	na	na	na	na	na	na	1770
1780	na	na	na	na	na	na	na	na	na	1780
1790	na	na	na	na	na	na	na	na	na	1790
1800	na	na	na	na	na	na	na	na	na	1800
1810	na	na	na	na	na	na	na	na	na	1810
1820	na	na	na	na	na	na	na	na	na	1820
1830	na	na	na	na	na	na	na	na	na	1830
1840	na	na	na	na	na	na	na	na	na	1840
1850	na	na	na	na	na	na	na	na	na	1850
1860	na	na	na	na	na	na	na	na	na	1860
1870	na	na	na	na	na	na	na	na	na	1870
1880	na	na	na	na	na	na	na	na	na	1880
1890	na	na	na	na	na	na	na	na	na	1890
1900	na	na	na	na	na	na	na	na	na	1900
1905	na	na	na	na	na	na	na	na	na	1905
1910	na	na	na	na	na	na	na	na	na	1910
1915	na	na	na	na	na	na	na	na	na	1915
1920	na	na	na	na	na	na	na	na	na	1920
1925	na	na	na	na	na	na	na	na	na	1925
1930	na	na	na	na	na	na	na	na	na	1930
1935	na	na	na	na	na	na	na	na	na	1935
1940	na	na	na	na	na	na	na	na	na	1940
1945	na	na	na	na	na	na	na	na	na	1945
1950	na	na	na	na	na	na	na	na	na	1950
1955	na	na	na	na	na	na	na	na	na	1955
1960	na	na	na	na	na	na	na	na	na	1960
1965	na	na	na	na	na	na	na	na	na	1965
1970	na	na	na	na	na	na	na	na	na	1970
1975	na	na	na	na	na	na	na	na	na	1975
1980	na	na	na	na	na	na	na	na	na	1980
1985	8 46W	9 31W	10 14W	10 57W	11 38W	12 18W	12 56W	13 33W	14 9W	1985
1990	9 17W	10 0W	10 42W	11 23W	12 3W	12 41W	13 17W	13 52W	14 25W	1990
1995	9 47W	10 29W	11 9W	11 49W	12 26W	13 3W	13 37W	14 10W	14 41W	1995

TABLE PREPARED BY NATIONAL GEOPHYSICAL DATA CENTER,
N E S D I S, N O A A. 12/18/1991

V A L U E S O F M A G N E T I C D E C L I N A T I O N

LAT	33	33	33	33	33	33	33	33	33	LAT
LONG	84	83	82	81	80	79	78	77	76	LONG
1750	2 57E	2 38E	2 20E	2 2E	1 43E	1 19E	na	na	na	1750
1760	3 34	3 14	2 56	2 38	2 18	1 53	na	na	na	1760
1770	4 9	3 49	3 30	3 11	2 51	2 25	na	na	na	1770
1780	4 42	4 21	4 1	3 40	3 18	2 51	na	na	na	1780
1790	5 8	4 45	4 23	4 1	3 38	3 9	na	na	na	1790
1800	5 26	5 2	4 39	4 15	3 49	3 18	na	na	na	1800
1810	5 36	5 10	4 46	4 20	3 52	3 19	na	na	na	1810
1820	5 37	5 10	4 44	4 16	3 47	3 13	na	na	na	1820
1830	5 31	5 1	4 34	4 4	3 33	2 57	na	na	na	1830
1840	5 15	4 44	4 14	3 44	3 11	2 33	na	na	na	1840
1850	4 53	4 20	3 49	3 17	2 42	2 3	na	na	na	1850
1860	4 23	3 49	3 18	2 45	2 9	1 30	na	na	na	1860
1870	3 49	3 14	2 41	2 7	1 31	0 51	na	na	na	1870
1880	3 10	2 35	2 2	1 29	0 53	0 14E	na	na	na	1880
1890	2 30	1 57	1 25	0 52	0 17E	0 22W	na	na	na	1890
1900	2 0	1 26	0 53	0 20	0 15W	0 55	na	na	na	1900
1905	1 53	1 17	0 42	0 8E	0 29	1 10	na	na	na	1905
1910	1 43	1 5	0 29	0 8W	0 46	1 28	na	na	na	1910
1915	1 40	1 1	0 23	0 15	0 56	1 40	na	na	na	1915
1920	1 40	0 59	0 20	0 20	1 2	1 47	na	na	na	1920
1925	1 32	0 51	0 11	0 31	1 14	2 1	na	na	na	1925
1930	1 26	0 44	0 2E	0 40	1 25	2 13	na	na	na	1930
1935	1 24	0 40	0 2W	0 46	1 32	2 22	na	na	na	1935
1940	1 33	0 48	0 4E	0 41	1 28	2 18	na	na	na	1940
1945	1 35	0 50	0 6	0 40	1 28	2 19	na	na	na	1945
1950	1 36	0 50	0 6E	0 41	1 29	2 21	na	na	na	1950
1955	1 26	0 39	0 6W	0 53	1 41	2 33	na	na	na	1955
1960	1 8	0 22E	0 24	1 11	1 59	2 51	na	na	na	1960
1965	0 42	0 5W	0 50	1 37	2 25	3 17	na	na	na	1965
1970	0 9E	0 38	1 24	2 10	2 58	3 49	na	na	na	1970
1975	0 34W	1 20	2 6	2 52	3 39	4 29	na	na	na	1975
1980	1 21W	2 7W	2 52W	3 38W	4 25W	5 14W	na	na	na	1980
1985	1 49W	2 35W	3 21W	4 8W	4 55W	5 42W	6 28W	7 15W	8 1W	1985
1990	2 24W	3 11W	3 57W	4 43W	5 30W	6 16W	7 2W	7 48W	8 33W	1990
1995	3 0W	3 46W	4 32W	5 18W	6 5W	6 50W	7 35W	8 20W	9 4W	1995

TABLE PREPARED BY NATIONAL GEOPHYSICAL DATA CENTER,
N E S D I S, N O A A. 12/18/1991

VALUES OF MAGNETIC DECLINATION

LAT	34	34	34	34	34	34	34	34	34	LAT
LONG	79	78	77	76	75	74	73	72	71	LONG
1750	0 58E	0 35E	0 15E	0 5W	na	na	na	na	na	1750
1760	1 33	1 9	0 49	0 28E	na	na	na	na	na	1760
1770	2 5	1 40	1 18	0 56	na	na	na	na	na	1770
1780	2 32	2 5	1 41	1 17	na	na	na	na	na	1780
1790	2 50	2 22	1 56	1 30	na	na	na	na	na	1790
1800	3 0	2 30	2 1	1 32	na	na	na	na	na	1800
1810	3 2	2 30	1 59	1 28	na	na	na	na	na	1810
1820	2 55	2 22	1 49	1 16	na	na	na	na	na	1820
1830	2 39	2 4	1 30	0 55	na	na	na	na	na	1830
1840	2 16	1 39	1 4	0 28E	na	na	na	na	na	1840
1850	1 45	1 7	0 31E	0 6W	na	na	na	na	na	1850
1860	1 12	0 33E	0 4W	0 42	na	na	na	na	na	1860
1870	0 33E	0 7W	0 44	1 22	na	na	na	na	na	1870
1880	0 5W	0 43	1 20	1 57	na	na	na	na	na	1880
1890	0 41	1 19	1 54	2 30	na	na	na	na	na	1890
1900	1 14	1 53	2 28	3 4	na	na	na	na	na	1900
1905	1 30	2 9	2 47	3 24	na	na	na	na	na	1905
1910	1 49	2 30	3 9	3 48	na	na	na	na	na	1910
1915	2 1	2 44	3 25	4 6	na	na	na	na	na	1915
1920	2 9	2 53	3 36	4 19	na	na	na	na	na	1920
1925	2 23	3 9	3 54	4 38	na	na	na	na	na	1925
1930	2 36	3 23	4 9	4 55	na	na	na	na	na	1930
1935	2 45	3 34	4 21	5 8	na	na	na	na	na	1935
1940	2 42	3 31	4 20	5 8	na	na	na	na	na	1940
1945	2 42	3 33	4 23	5 12	na	na	na	na	na	1945
1950	2 43	3 34	4 25	5 15	na	na	na	na	na	1950
1955	2 54	3 45	4 36	5 26	na	na	na	na	na	1955
1960	3 10	4 1	4 51	5 41	na	na	na	na	na	1960
1965	3 35	4 26	5 15	6 4	na	na	na	na	na	1965
1970	4 6	4 56	5 45	6 33	na	na	na	na	na	1970
1975	4 46	5 35	6 22	7 9	na	na	na	na	na	1975
1980	5 30W	6 18W	7 4W	7 49W	na	na	na	na	na	1980
1985	6 0W	6 48W	7 35W	8 21W	9 7W	9 52W	10 36W	11 18W	12 0W	1985
1990	6 34W	7 20W	8 6W	8 52W	9 36W	10 20W	11 2W	11 43W	12 23W	1990
1995	7 7W	7 53W	8 38W	9 22W	10 5W	10 47W	11 28W	12 7W	12 45W	1995

TABLE PREPARED BY NATIONAL GEOPHYSICAL DATA CENTER,
N E S D I S, N O A A. 12/18/1991

V A L U E S O F M A G N E T I C D E C L I N A T I O N

LAT	34	34	34	34	34	34	34	34	34	LAT
LONG	88	87	86	85	84	83	82	81	80	LONG
1750	4 11E	3 48E	3 25E	3 2E	2 43E	2 22E	2 4E	1 43E	1 20E	1750
1760	4 49	4 26	4 3	3 40	3 20	2 59	2 41	2 19	1 56	1760
1770	5 28	5 4	4 41	4 17	3 56	3 35	3 16	2 54	2 30	1770
1780	6 3	5 39	5 15	4 51	4 30	4 7	3 47	3 23	2 58	1780
1790	6 33	6 8	5 43	5 18	4 56	4 32	4 10	3 45	3 18	1790
1800	6 57	6 31	6 5	5 38	5 15	4 49	4 26	3 59	3 30	1800
1810	7 14	6 46	6 18	5 50	5 25	4 58	4 33	4 4	3 33	1810
1820	7 22	6 52	6 23	5 53	5 26	4 57	4 31	4 0	3 28	1820
1830	7 22	6 51	6 20	5 48	5 19	4 49	4 21	3 48	3 14	1830
1840	7 14	6 41	6 8	5 34	5 3	4 31	4 1	3 27	2 52	1840
1850	6 58	6 23	5 48	5 12	4 40	4 6	3 35	3 0	2 23	1850
1860	6 35	5 58	5 21	4 44	4 10	3 36	3 4	2 28	1 50	1860
1870	6 6	5 28	4 50	4 11	3 36	3 0	2 27	1 50	1 12	1870
1880	5 28	4 49	4 10	3 31	2 56	2 20	1 47	1 11	0 33E	1880
1890	4 47	4 8	3 29	2 51	2 16	1 41	1 9	0 34	0 4W	1890
1900	4 19	3 39	2 59	2 20	1 45	1 9	0 36	0 1E	0 37	1900
1905	4 17	3 35	2 54	2 14	1 37	1 0	0 25	0 12W	0 51	1905
1910	4 13	3 29	2 46	2 5	1 27	0 48	0 10	0 28	1 8	1910
1915	4 15	3 30	2 46	2 3	1 23	0 42	0 3E	0 37	1 19	1915
1920	4 16	3 31	2 46	2 2	1 22	0 40	0 1W	0 42	1 25	1920
1925	4 10	3 25	2 39	1 55	1 13	0 31	0 11	0 53	1 38	1925
1930	4 8	3 21	2 35	1 49	1 7	0 23	0 20	1 3	1 49	1930
1935	4 10	3 22	2 34	1 48	1 4	0 19	0 24	1 10	1 57	1935
1940	4 20	3 32	2 44	1 57	1 13	0 27	0 18	1 4	1 52	1940
1945	4 24	3 36	2 48	2 0	1 15	0 29	0 16	1 3	1 52	1945
1950	4 28	3 39	2 50	2 2	1 17	0 30	0 16	1 3	1 52	1950
1955	4 20	3 31	2 42	1 54	1 8	0 20	0 26	1 14	2 3	1955
1960	4 4	3 15	2 26	1 38	0 52	0 4E	0 43	1 30	2 19	1960
1965	3 39	2 50	2 1	1 12	0 26E	0 22W	1 9	1 56	2 45	1965
1970	3 9	2 19	1 30	0 41E	0 6W	0 54	1 40	2 28	3 16	1970
1975	2 28	1 38	0 49	0 1W	0 48	1 35	2 22	3 8	3 57	1975
1980	1 41E	0 51E	0 1E	0 48W	1 35W	2 22W	3 8W	3 54W	4 42W	1980
1985	0 58E	0 14E	0 31W	1 16W	2 3W	2 50W	3 37W	4 25W	5 13W	1985
1990	0 25E	0 20W	1 5W	1 51W	2 38W	3 25W	4 12W	5 0W	5 47W	1990
1995	0 8W	0 54W	1 40W	2 26W	3 13W	4 0W	4 47W	5 34W	6 21W	1995

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N E S D I S, N O A A. 12/18/1991

VALUES OF MAGNETIC DECLINATION

LAT	35	35	35	35	35	35	35	35	35	LAT
LONG	83	82	81	80	79	78	77	76	75	LONG
1750	2 4E	1 44E	1 21E	0 57E	0 34E	0 10E	0 12W	0 33W	na	1750
1760	2 42	2 22	1 59	1 34	1 10	0 45	0 23E	0 1E	na	1760
1770	3 19	2 58	2 34	2 9	1 43	1 17	0 53	0 30	na	1770
1780	3 51	3 29	3 4	2 38	2 10	1 43	1 17	0 51	na	1780
1790	4 17	3 53	3 27	2 59	2 30	2 1	1 32	1 5	na	1790
1800	4 35	4 10	3 42	3 12	2 41	2 10	1 38	1 8	na	1800
1810	4 43	4 17	3 47	3 15	2 43	2 10	1 37	1 4	na	1810
1820	4 43	4 15	3 43	3 10	2 36	2 2	1 27	0 52	na	1820
1830	4 34	4 5	3 31	2 56	2 20	1 44	1 7	0 31	na	1830
1840	4 16	3 45	3 10	2 34	1 56	1 19	0 41	0 4E	na	1840
1850	3 51	3 19	2 43	2 5	1 26	0 47	0 8E	0 31W	na	1850
1860	3 21	2 47	2 10	1 31	0 52	0 12E	0 28W	1 7	na	1860
1870	2 45	2 10	1 32	0 53	0 13E	0 28W	1 8	1 47	na	1870
1880	2 5	1 30	0 53	0 13E	0 26W	1 5	1 44	2 22	na	1880
1890	1 25	0 51	0 15E	0 23W	1 2	1 41	2 18	2 55	na	1890
1900	0 53	0 18	0 18W	0 57	1 36	2 16	2 53	3 30	na	1900
1905	0 43	0 7E	0 31	1 11	1 51	2 32	3 12	3 51	na	1905
1910	0 31	0 7W	0 47	1 29	2 11	2 53	3 34	4 15	na	1910
1915	0 24	0 16	0 57	1 40	2 24	3 8	3 51	4 33	na	1915
1920	0 20	0 21	1 4	1 48	2 33	3 18	4 3	4 47	na	1920
1925	0 10	0 32	1 16	2 2	2 48	3 35	4 21	5 7	na	1925
1930	0 1E	0 42	1 27	2 14	3 1	3 50	4 37	5 24	na	1930
1935	0 3W	0 47	1 34	2 21	3 10	4 0	4 49	5 37	na	1935
1940	0 5E	0 41	1 28	2 17	3 7	3 58	4 48	5 37	na	1940
1945	0 7	0 39	1 27	2 16	3 7	3 59	4 50	5 40	na	1945
1950	0 9	0 38	1 26	2 16	3 8	4 0	4 52	5 43	na	1950
1955	~~na~~ 0 E	0 47	1 36	2 26	3 17	4 10	5 2	5 53	na	1955
1960	0 15W	1 3	1 51	2 41	3 33	4 25	5 17	6 7	na	1960
1965	0 40	1 28	2 16	3 6	3 57	4 48	5 39	6 29	na	1965
1970	1 11	1 58	2 46	3 35	4 26	5 17	6 7	6 56	na	1970
1975	1 51	2 38	3 25	4 14	5 3	5 54	6 42	7 30	na	1975
1980	2 38W	3 24W	4 11W	4 59W	5 47W	6 36W	7 23W	8 9W	na	1980
1985	3 6W	3 54W	4 43W	5 31W	6 20W	7 8W	7 55W	8 42W	9 28W	1985
1990	3 41W	4 29W	5 17W	6 5W	6 52W	7 39W	8 26W	9 12W	9 56W	1990
1995	4 15W	5 2W	5 50W	6 37W	7 24W	8 10W	8 56W	9 40W	10 24W	1995

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N E S D I S, N O A A. 12/18/1991

V A L U E S O F M A G N E T I C D E C L I N A T I O N

LAT	35	35	35	35	35	35	35	35	35	LAT
LONG	92	91	90	89	88	87	86	85	84	LONG
1750	na	na	na	na	na	3 38E	3 13E	2 49E	2 28E	1750
1760	na	na	na	na	na	4 16	3 51	3 28	3 6	1760
1770	na	na	na	na	na	4 56	4 30	4 6	3 43	1770
1780	na	na	na	na	na	5 31	5 5	4 40	4 17	1780
1790	na	na	na	na	na	6 1	5 34	5 8	4 44	1790
1800	8 7E	7 53E	7 40E	7 19E	6 54E	6 24	5 56	5 29	5 3	1800
1810	8 29	8 15	8 1	7 38	7 11	6 39	6 9	5 40	5 13	1810
1820	8 45	8 28	8 12	7 48	7 19	6 46	6 14	5 43	5 14	1820
1830	8 54	8 35	8 17	7 50	7 19	6 44	6 11	5 38	5 7	1830
1840	8 53	8 32	8 11	7 43	7 11	6 34	5 59	5 24	4 51	1840
1850	8 43	8 21	7 58	7 28	6 54	6 16	5 39	5 2	4 27	1850
1860	8 27	8 2	7 37	7 6	6 30	5 50	5 11	4 33	3 57	1860
1870	8 5	7 38	7 11	6 38	6 1	5 20	4 40	4 1	3 23	1870
1880	7 31	7 3	6 34	6 0	5 22	4 41	4 0	3 21	2 43	1880
1890	6 52	6 23	5 54	5 19	4 41	3 59	3 19	2 40	2 2	1890
1900	6 27	5 57	5 27	4 51	4 12	3 29	2 48	2 9	1 31	1900
1905	6 30	5 58	5 26	4 50	4 9	3 25	2 43	2 2	1 23	1905
1910	6 32	5 59	5 25	4 47	4 4	3 19	2 35	1 53	1 12	1910
1915	6 36	6 2	5 27	4 48	4 5	3 18	2 32	1 49	1 7	1915
1920	6 38	6 3	5 28	4 49	4 5	3 18	2 31	1 47	1 4	1920
1925	6 32	5 57	5 22	4 42	3 58	3 10	2 23	1 38	0 54	1925
1930	6 31	5 56	5 20	4 39	3 54	3 6	2 18	1 32	0 47	1930
1935	6 35	5 59	5 23	4 41	3 56	3 6	2 17	1 30	0 44	1935
1940	6 43	6 8	5 32	4 51	4 5	3 16	2 27	1 39	0 52	1940
1945	6 47	6 12	5 37	4 56	4 10	3 20	2 31	1 43	0 55	1945
1950	6 50	6 16	5 41	5 0	4 14	3 24	2 34	1 45	0 58	1950
1955	6 44	6 9	5 34	4 53	4 7	3 17	2 27	1 37	0 49	1955
1960	6 30	5 55	5 20	4 38	3 52	3 2	2 12	1 22	0 34	1960
1965	6 8	5 32	4 56	4 15	3 28	2 38	1 47	0 57	0 9E	1965
1970	5 41	5 5	4 29	3 46	2 59	2 8	1 18	0 28E	0 21W	1970
1975	5 3	4 26	3 49	3 6	2 19	1 28	0 37E	0 13W	1 3	1975
1980	4 17E	3 40E	3 2E	2 19E	1 31E	0 40E	0 11W	1 1W	1 50W	1980
1985	3 41E	2 59E	2 16E	1 33E	0 48E	0 2E	0 43W	1 30W	2 18W	1985
1990	3 11E	2 28E	1 45E	1 0E	0 15E	0 31W	1 18W	2 5W	2 53W	1990
1995	2 40E	1 56E	1 12E	0 27E	0 18W	1 5W	1 52W	2 39W	3 27W	1995

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N E S D I S, N O A A. 12/18/1991

V A L U E S O F M A G N E T I C D E C L I N A T I O N

LAT	36	36	36	36	36	36	36	36	36	LAT
LONG	78	77	76	75	74	73	72	71	70	LONG
1750	0 17W	0 41W	1 4W	na	na	na	na	na	na	1750
1760	0 19E	0 5W	0 29W	na	na	na	na	na	na	1760
1770	0 52	0 26E	0 1E	na	na	na	na	na	na	1770
1780	1 18	0 50	0 23	na	na	na	na	na	na	1780
1790	1 37	1 7	0 37	na	na	na	na	na	na	1790
1800	1 47	1 14	0 41	na	na	na	na	na	na	1800
1810	1 48	1 13	0 38	na	na	na	na	na	na	1810
1820	1 40	1 3	0 26	na	na	na	na	na	na	1820
1830	1 22	0 43	0 5E	na	na	na	na	na	na	1830
1840	0 56	0 16E	0 23W	na	na	na	na	na	na	1840
1850	0 24E	0 17W	0 58	na	na	na	na	na	na	1850
1860	0 11W	0 53	1 34	na	na	na	na	na	na	1860
1870	0 51	1 33	2 14	na	na	na	na	na	na	1870
1880	1 29	2 10	2 50	na	na	na	na	na	na	1880
1890	2 5	2 44	3 23	na	na	na	na	na	na	1890
1900	2 40	3 20	3 59	na	na	na	na	na	na	1900
1905	2 57	3 39	4 19	na	na	na	na	na	na	1905
1910	3 18	4 1	4 43	na	na	na	na	na	na	1910
1915	3 34	4 19	5 3	na	na	na	na	na	na	1915
1920	3 45	4 31	5 17	na	na	na	na	na	na	1920
1925	4 2	4 50	5 37	na	na	na	na	na	na	1925
1930	4 17	5 6	5 54	na	na	na	na	na	na	1930
1935	4 28	5 18	6 7	na	na	na	na	na	na	1935
1940	4 25	5 17	6 7	na	na	na	na	na	na	1940
1945	4 27	5 19	6 10	na	na	na	na	na	na	1945
1950	4 27	5 20	6 11	na	na	na	na	na	na	1950
1955	4 36	5 29	6 20	na	na	na	na	na	na	1955
1960	4 50	5 43	6 34	na	na	na	na	na	na	1960
1965	5 12	6 4	6 54	na	na	na	na	na	na	1965
1970	5 38	6 29	7 19	na	na	na	na	na	na	1970
1975	6 14	7 3	7 52	na	na	na	na	na	na	1975
1980	6 55W	7 43W	8 30W	na	na	na	na	na	na	1980
1985	7 29W	8 17W	9 4W	9 51W	10 37W	11 21W	12 4W	12 46W	13 26W	1985
1990	7 59W	8 46W	9 32W	10 18W	11 2W	11 44W	12 26W	13 5W	13 43W	1990
1995	8 29W	9 15W	10 0W	10 43W	11 26W	12 7W	12 46W	13 24W	14 0W	1995

TABLE PREPARED BY NATIONAL GEOPHYSICAL DATA CENTER,
N E S D I S, N O A A. 12/18/1991

V A L U E S O F M A G N E T I C D E C L I N A T I O N

LAT	36	36	36	36	36	36	36	36	36	LAT
LONG	87	86	85	84	83	82	81	80	79	LONG
1750	na	3 1E	2 36E	2 13E	1 48E	1 22E	0 59E	0 34E	0 9E	1750
1760	na	3 40	3 15	2 52	2 27	2 1	1 38	1 12	0 46	1760
1770	na	4 20	3 54	3 30	3 4	2 38	2 14	1 47	1 20	1770
1780	na	4 55	4 28	4 4	3 37	3 10	2 45	2 17	1 48	1780
1790	na	5 25	4 57	4 31	4 3	3 35	3 8	2 39	2 9	1790
1800	6 18E	5 48	5 18	4 51	4 22	3 53	3 24	2 53	2 21	1800
1810	6 33	6 1	5 30	5 1	4 31	4 0	3 30	2 57	2 23	1810
1820	6 40	6 6	5 33	5 2	4 30	3 58	3 26	2 52	2 17	1820
1830	6 38	6 2	5 27	4 55	4 21	3 47	3 14	2 38	2 1	1830
1840	6 28	5 50	5 13	4 38	4 3	3 27	2 52	2 15	1 36	1840
1850	6 9	5 30	4 51	4 14	3 38	3 1	2 25	1 46	1 6	1850
1860	5 43	5 2	4 22	3 44	3 7	2 29	1 52	1 12	0 31E	1860
1870	5 13	4 31	3 49	3 9	2 31	1 52	1 14	0 33E	0 8W	1870
1880	4 33	3 51	3 9	2 29	1 51	1 12	0 34E	0 7W	0 47	1880
1890	3 51	3 9	2 27	1 48	1 10	0 32E	0 5W	0 44	1 24	1890
1900	3 20	2 38	1 56	1 16	0 38	0 1W	0 38	1 18	1 58	1900
1905	3 16	2 32	1 48	1 7	0 28	0 12	0 51	1 32	2 14	1905
1910	3 9	2 23	1 38	0 56	0 14	0 27	1 8	1 50	2 33	1910
1915	3 6	2 19	1 33	0 49	0 6	0 37	1 19	2 3	2 48	1915
1920	3 4	2 16	1 30	0 45	0 1E	0 43	1 26	2 11	2 57	1920
1925	2 56	2 7	1 20	0 34	0 11W	0 56	1 40	2 26	3 13	1925
1930	2 50	2 0	1 12	0 26	0 20	1 6	1 52	2 39	3 27	1930
1935	2 50	2 0	1 10	0 23	0 24	1 12	1 58	2 46	3 37	1935
1940	3 0	2 9	1 19	0 31	0 17	1 5	1 53	2 42	3 33	1940
1945	3 4	2 14	1 23	0 34	0 15	1 3	1 51	2 41	3 33	1945
1950	3 9	2 18	1 26	0 37	0 12	1 1	1 50	2 40	3 33	1950
1955	3 2	2 11	1 19	0 29	0 20	1 9	1 58	2 48	3 41	1955
1960	2 48	1 56	1 4	0 15E	0 35	1 24	2 13	3 3	3 56	1960
1965	2 24	1 33	0 40	0 10W	0 59	1 48	2 36	3 26	4 19	1965
1970	1 57	1 5	0 12E	0 38	1 28	2 16	3 4	3 54	4 46	1970
1975	1 16	0 24E	0 28W	1 19	2 7	2 55	3 43	4 32	5 22	1975
1980	0 28E	0 24W	1 16W	2 6W	2 54W	3 41W	4 28W	5 16W	6 5W	1980
1985	0 9W	0 56W	1 45W	2 33W	3 23W	4 12W	5 1W	5 51W	6 40W	1985
1990	0 43W	1 31W	2 19W	3 8W	3 56W	4 45W	5 34W	6 23W	7 11W	1990
1995	1 16W	2 4W	2 53W	3 41W	4 30W	5 19W	6 7W	6 55W	7 42W	1995

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N E S D I S, N O A A. 12/18/1991

VALUES OF MAGNETIC DECLINATION

LAT	37	37	37	37	37	37	37	37	37	LAT
LONG	82	81	80	79	78	77	76	75	74	LONG
1750	0 59E	0 33E	0 7E	0 20W	0 46W	1 13W	1 39W	na	na	1750
1760	1 38	1 12	0 46	0 19E	0 8W	0 37	1 3	na	na	1760
1770	2 16	1 49	1 22	0 54	0 26E	0 4W	0 32	na	na	1770
1780	2 49	2 20	1 52	1 22	0 53	0 21E	0 9W	na	na	1780
1790	3 15	2 45	2 15	1 44	1 12	0 38	0 6E	na	na	1790
1800	3 33	3 1	2 30	1 56	1 23	0 46	0 11	na	na	1800
1810	3 41	3 7	2 34	1 59	1 24	0 45	0 8E	na	na	1810
1820	3 39	3 4	2 29	1 53	1 16	0 35	0 4W	na	na	1820
1830	3 28	2 51	2 15	1 37	0 58	0 16E	0 25	na	na	1830
1840	3 8	2 30	1 52	1 12	0 32E	0 12W	0 53	na	na	1840
1850	2 41	2 2	1 23	0 41	0 1W	0 46	1 29	na	na	1850
1860	2 9	1 29	0 49	0 7E	0 36	1 22	2 5	na	na	1860
1870	1 32	0 52	0 11E	0 33W	1 16	2 2	2 45	na	na	1870
1880	0 52	0 12E	0 30W	1 12	1 55	2 40	3 22	na	na	1880
1890	0 12E	0 27W	1 7	1 49	2 31	3 14	3 55	na	na	1890
1900	0 21W	1 2	1 42	2 24	3 7	3 50	4 32	na	na	1900
1905	0 33	1 15	1 56	2 40	3 24	4 9	4 52	na	na	1905
1910	0 48	1 31	2 14	3 0	3 45	4 31	5 16	na	na	1910
1915	1 0	1 44	2 29	3 16	4 2	4 51	5 37	na	na	1915
1920	1 7	1 52	2 38	3 26	4 14	5 4	5 51	na	na	1920
1925	1 21	2 7	2 54	3 43	4 32	5 23	6 12	na	na	1925
1930	1 32	2 20	3 7	3 58	4 48	5 40	6 30	na	na	1930
1935	1 38	2 27	3 15	4 7	4 59	5 52	6 43	na	na	1935
1940	1 31	2 21	3 11	4 4	4 56	5 50	6 42	na	na	1940
1945	1 29	2 20	3 10	4 4	4 57	5 52	6 45	na	na	1945
1950	1 26	2 17	3 8	4 2	4 56	5 52	6 45	na	na	1950
1955	1 33	2 24	3 15	4 9	5 4	6 0	6 53	na	na	1955
1960	1 47	2 37	3 28	4 23	5 17	6 12	7 5	na	na	1960
1965	2 9	3 0	3 50	4 44	5 37	6 31	7 24	na	na	1965
1970	2 36	3 26	4 15	5 8	6 1	6 55	7 46	na	na	1970
1975	3 14	4 3	4 52	5 43	6 35	7 27	8 16	na	na	1975
1980	3 59W	4 47W	5 35W	6 25W	7 15W	8 5W	8 53W	na	na	1980
1985	4 30W	5 21W	6 11W	7 1W	7 51W	8 40W	9 28W	10 15W	11 1W	1985
1990	5 3W	5 53W	6 42W	7 31W	8 20W	9 7W	9 54W	10 40W	11 24W	1990
1995	5 35W	6 24W	7 13W	8 1W	8 48W	9 35W	10 20W	11 4W	11 47W	1995

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N E S D I S, N O A A. 12/18/1991

V A L U E S O F M A G N E T I C D E C L I N A T I O N

LAT	37	37	37	37	37	37	37	37	37	LAT
LONG	91	90	89	88	87	86	85	84	83	LONG
1750	na	na	na	na	na	na	na	na	1 24E	1750
1760	na	na	na	na	na	na	na	na	2 4	1760
1770	na	na	na	na	na	na	na	na	2 42	1770
1780	na	na	na	na	na	na	na	na	3 16	1780
1790	na	na	na	na	na	na	na	na	3 43	1790
1800	7 55E	7 35E	7 11E	6 44E	6 10E	5 37E	5 4E	4 34E	4 2	1800
1810	8 18	7 57	7 31	7 2	6 25	5 50	5 16	4 44	4 11	1810
1820	8 32	8 9	7 42	7 11	6 32	5 55	5 19	4 46	4 11	1820
1830	8 39	8 13	7 44	7 11	6 30	5 51	5 13	4 39	4 2	1830
1840	8 35	8 7	7 36	7 2	6 19	5 39	4 59	4 22	3 44	1840
1850	8 23	7 54	7 20	6 44	6 0	5 18	4 36	3 58	3 18	1850
1860	8 4	7 33	6 58	6 19	5 34	4 50	4 7	3 28	2 47	1860
1870	7 39	7 6	6 30	5 50	5 4	4 19	3 34	2 53	2 11	1870
1880	7 3	6 28	5 51	5 10	4 24	3 39	2 54	2 13	1 31	1880
1890	6 22	5 47	5 9	4 27	3 41	2 56	2 12	1 31	0 51	1890
1900	5 54	5 18	4 39	3 56	3 10	2 25	1 40	0 59	0 18	1900
1905	5 53	5 16	4 36	3 52	3 5	2 18	1 33	0 50	0 7E	1905
1910	5 52	5 13	4 32	3 46	2 57	2 9	1 22	0 38	0 6W	1910
1915	5 52	5 12	4 29	3 43	2 53	2 3	1 15	0 29	0 17	1915
1920	5 51	5 10	4 27	3 40	2 50	2 0	1 10	0 24	0 22	1920
1925	5 42	5 1	4 18	3 31	2 40	1 49	0 59	0 12	0 35	1925
1930	5 38	4 57	4 13	3 25	2 33	1 41	0 51	0 3E	0 46	1930
1935	5 40	4 59	4 14	3 25	2 32	1 40	0 48	0 1W	0 51	1935
1940	5 49	5 8	4 23	3 34	2 41	1 49	0 57	0 7E	0 43	1940
1945	5 53	5 13	4 28	3 39	2 46	1 54	1 1	0 11	0 41	1945
1950	5 58	5 17	4 33	3 44	2 51	1 58	1 5	0 15	0 37	1950
1955	5 52	5 12	4 28	3 39	2 46	1 53	0 59	0 9E	0 44	1955
1960	5 40	4 59	4 15	3 26	2 32	1 39	0 46	0 5W	0 58	1960
1965	5 18	4 37	3 52	3 3	2 9	1 16	0 23E	0 29	1 21	1965
1970	4 53	4 12	3 27	2 37	1 43	0 50	0 4W	0 55	1 47	1970
1975	4 14	3 32	2 47	1 57	1 3	0 10E	0 43	1 35	2 26	1975
1980	3 26E	2 44E	1 59E	1 9E	0 15E	0 38W	1 31W	2 22W	3 12W	1980
1985	2 45E	2 0E	1 13E	0 26E	0 21W	1 10W	2 0W	2 50W	3 40W	1985
1990	2 14E	1 28E	0 41E	0 7W	0 55W	1 44W	2 33W	3 23W	4 13W	1990
1995	1 42E	0 55E	0 8E	0 40W	1 28W	2 17W	3 7W	3 56W	4 46W	1995

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N.C. GRID CHECKLIST

-To properly tie a survey to the North Carolina Coordinate System, you need:

1. A grid distance from the control monument to a corner of the property that is being surveyed.

    a. Ellipsoid Correction Factor (Page 19 - 20)

    b. Scale Correction Factor (Page 23 - 24)

    c. Combined Factor (Page 23 - 24)

2. Azimuth (Grid) orientation - Remember Grid=True - Theta (Page 13)

-The above criteria are required when a parcel of land you are surveying is within 2000' of a horizontal control monument.

-The precision of the grid connection should equal or exceed the precision of the boundary survey being tied to grid.

-Remember to label the coordinates NAD 27 or NAD 83.

-Any coordinates issued by NCGS as preliminary should be labeled as such.

-If only one control monument is accessible or available, occupy the control station and observe a solar or polaris observation to orient your tie to grid.

-Magnetic Bearings should not be used when grid control is available.

-When grid monuments are used which, at the time of the survey, have no coordinates, then the angle and distance observed from the grid monuments should be shown on the plat.

TRANSFORMATION OF

NAD 27 to NAD 83
NAD 83 to NAD 27

Before you attempt to perform a datum transformation, you should answer the following questions. The answers to these questions will help you determine which method of transformation will meet your needs.

1. What datum are the existing coordinates on?
2. What datum do I want the new coordinates on?
3. How large a geographical area do I want to convert at one time?
4. How many points are common to both datums?
5. How are the common points distributed?
6. How accurate are the existing coordinates and how accurate do I want the new coordinates?

The National Geodetic Survey (NGS) recommends the following methods of datum transformation:

Method 1 - Recomputation and Adjustment of Original Adjustment

This method is by far the superior method to be used by land surveyors. It requires using the original field observations to recompute the survey using NAD 83 coordinates at the tie points. NGS will perform the datum transformation if the following criteria are met:

-Submit original field observations and station descriptions to NGS.

-Original field observation must be tied to the National Geodetic Horizontal Network.

-Field procedures must be performed to at least Third Order, Class I accuracy.

-Survey points must be monumented and described.

-Field observations must be submitted in a format that is compatible with NGS format (Blue Book). For information on the Blue Book format, see the Federal Geodetic Control Committee publication "Input Formats and Specifications of the National Geodetic Survey Data Base."

Method 2 - Rigorous Transformation

This method can be performed by the land surveyor and both NCGS and NGS. It uses one of the software packages that performs a least square transformation. NADCON and CORPSCON are two of the software packages that can perform this function; there are other packages available that will provide this service, also.

NADCON and CORPSCON are basically the same program; they differ in choices of data input and output. NADCON only allows entries by geographic position (latitude and longitude) and output is the same. CORPSCON allows input and output by geographic positions and state plane coordinates. For example, when using CORPSCON, you can input NAD 27 geographic positions and output NAD 83 state plane coordinates. Because of these options, CORPSCON is a more flexible program. Both NADCON and CORPSCON work very well but they have limitations that must be taken into consideration when performing a transformation.

Remember, the most accurate method of performing a datum transformation is Method 1.

Method 3: Simplified Transformation

In the area in which you need to perform the transformation, locate horizontal control monuments that are common to both datums (NAD 27 and NAD 83). Compute the shift between the two datums at each monument.

Compute an average shift by combining and meaning the shifts in the Northings and Eastings. Transform your NAD 27 coordinates to NAD 83 by applying the average shift to the NAD 27 coordinates or vice versa. Again, if you are working in a small area (5 miles or less), this method will provide satisfactory results. The quality of the NAD 83 coordinates will depend on the distribution of the common points that were used to compute the area's average shift. Points that are used to compute the average shift should be evenly distributed around the area that is to be transformed. You cannot improve the quality of the survey data by performing a transformation, but your quality can be diminished if the proper methods and techniques are not used.

Engineer Topographic Laboratories
Star Chamber Expedition

All input values are NAD 27, state plane zone 3200 (FEET).
All output values are NAD 83, state plane zone 3200 (Meters).

STATION			INPUT	(transformed to) OUTPUT
TROY			586173.024 N	178686.333 N
			1730972.714 E	527624.645 E
Convergence			0-31 14.80	-0 31 14.32
Scale Factor			0.99987428	0.99987429
Grid Shift (US Ft),	Delta North	= 67.054		
	Delta East	= 75.810		
Datum Shift(sec),	Delta Lat.	= 0.508		
	Delta Lon.	= -0.834		

All input values are NAD 27, state plane zone 3200 (FEET).
All output values are NAD 83, state plane zone 3200 (US Feet).

STATION			INPUT	(transformed to) OUTPUT
DANESE			619630.214 N	619680.755 N
			731768.078 E	731837.766 E
Convergence			-2 27 22.90	-2 27 22.62
Scale Factor			0.99987500	0.99987501
Grid Shift(US Ft),	Delta North	= 50.541		
	Delta East	= 69.688		
Datum Shift(sec),	Delta Lat.	= 0.359		
	Delta Lon.	= -0.466		

Corpscon costs $30.00 per copy.
To order write or call:

National Geodetic Information Center
N/CG174, Rockwall Building, Room 24
National Geodetic Survey, NOAA
Rockville, Maryland 20852
Telephone 1-301-443-8631

OR

North Carolina Geodetic Survey
512 North Salisbury St.
Raleigh, N.C. 27611
Telephone 919-733-3836 (Fax 919-733-4407)

BIBLIOGRAPHY

Dracup, Joseph A. and Kelley, Carl F., The National Geodetic Survey- Its Products and Their Application to Local Surveying Needs, presented at the 5th Land Surveyors Seminar, Genesee Land Surveyors Association, Rochester, New York (March 4, 1972)

Dracup, Joseph A., Kelley, Carl F., Lesley, George B., and Tomlinson, Raymond W., Lecture Notes for Use at Workshops on Surveying Instrumentation and Coordinate Computation, Office of National Geodetic Survey

Meade, Buford K., The Practical Use of the Oregon State Plane Coordinate System, Proceedings of the 1964 Surveying and Mapping Conference, Oregon State University, Corvallis, Oregon, also available from National Geodetic Survey

Simmons, Lansing G., Geodetic and Grid Angles - State Coordinate Systems, ESSA Technical Report C & GS 36, available through the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402

Stem, James E., State Plane Coordinate System of 1983, NOAA Manual NOS NGS 5, available through National Geodetic Information Center, NOAA, Rockville, Maryland 20852

For a listing of various National Geodetic Survey literature and workshop materials, contact the National Geodetic Information Center:

N/CG174, Rockwall Building - Room 24
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