

# GPS Calibration Report

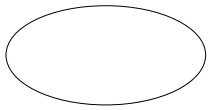
**Project : u4019a**

|                          |                                |                        |                     |
|--------------------------|--------------------------------|------------------------|---------------------|
| <b>TIP Number</b>        | u4019                          | <b>Date &amp; Time</b> | 9:46:53 AM 8/22/03  |
| <b>User name</b>         | pwoodard                       | <b>Zone</b>            | North Carolina 3200 |
| <b>Coordinate System</b> | US State Plane 1983(at ground) | <b>Geoid Model</b>     | GEOID99 (Conus)     |
| <b>Horizontal Datum</b>  | NAD 1983 (Conus)               |                        |                     |
| <b>Vertical Datum</b>    | NAVD88                         |                        |                     |
| <b>Coordinate Units</b>  | Meters                         |                        |                     |
| <b>Distance Units</b>    | Meters                         |                        |                     |
| <b>Height Units</b>      | Meters                         |                        |                     |

---

## LOCAL SITE INFORMATION

|                   |                  |
|-------------------|------------------|
| Localized around  | u4019-10         |
| Latitude          | 35°59'07.78174"N |
| Longitude         | 77°50'26.02039"W |
| Site Scale Factor | 1.00004901       |



The North Carolina Department of Transportation us a **Localized Coordinate System** which is very similar to North Carolina Zone 3200 from which it is derived.  
**Please take care in utilizing these coordinates to eliminate confusion of the two systems.**  
This file is to aid in the use of Real Time Kinematic (RTK) GPS during construction layout.

---

## Datum Transformation Parameters

Datum Transformation computation not requested

---

## Updated Default Projection (Transverse Mercator) Definition

Updated default projection not requested

---

## Horizontal Adjustment Parameters

|  |             |
|--|-------------|
| Northing coordinate of rotation center | 245109.000m |
| Easting coordinate of rotation center  | 715849.954m |
| Rotation about the center point        | 0°00'00"    |
| Translation north                      | -0.003m     |
| Translation east                       | -0.002m     |
| Scale factor                           | 1.00000003  |

---

## Vertical Adjustment Parameters

|                                     |             |
|-------------------------------------|-------------|
| Northing coordinate of origin point | 254191.509m |
| Easting coordinate of origin point  | 708353.232m |
| Vertical separation at origin       | 0.044m      |
| Slope north                         | 0.513ppm    |
| Slope east                          | -0.134ppm   |

---

# Geoid Model Definition

GEOID99 (Conus)

## Residual Differences Between GPS (WGS84) And Local Coordinates

### Summary

|                   | Maximum error | Root Mean Square error | Point        |
|-------------------|---------------|------------------------|--------------|
| Horizontal        | 0.003m        | 0.001                  | SHINGLED_GPS |
| Vertical          | 0.044m        | 0.013                  | RED OAK_GPS  |
| Three-dimensional | 0.044m        | 0.013                  | RED OAK_GPS  |

### Point Residuals

#### WGS84 Coordinates

|           |                  |
|-----------|------------------|
| Point     | RED OAK_GPS      |
| Latitude  | 36°02'11.25738"N |
| Longitude | 77°54'15.04949"W |
| Height    | 29.762m          |

#### Calculated point FOR DISPLAY ONLY

|            |               |
|------------|---------------|
| Northing   | 254191.509m   |
| Easting    | 708353.232m   |
| Elevation  | 64.404m       |
| Horz error | <b>0.002m</b> |
| Vert error | <b>0.044m</b> |
| 3D error   | <b>0.044m</b> |

#### Local Coordinates

|           |                 |
|-----------|-----------------|
| Point     | RED OAK         |
| Northing  | 254191.511m     |
| Easting   | 708353.233m     |
| Elevation | 64.360m         |
| Utilized  | Horz and Vert   |
| Quality   | Control quality |

|           |                  |
|-----------|------------------|
| Point     | CUTOFF_GPS       |
| Latitude  | 36°00'14.53319"N |
| Longitude | 77°30'04.24587"W |
| Height    | -5.951m          |

|            |             |
|------------|-------------|
| Northing   | 251068.829m |
| Easting    | 744724.303m |
| Elevation  | 29.291m     |
| Horz error | 0.002m      |
| Vert error | 0.014m      |
| 3D error   | 0.014m      |

|           |                 |
|-----------|-----------------|
| Point     | CUTOFF          |
| Northing  | 251068.831m     |
| Easting   | 744724.302m     |
| Elevation | 29.277m         |
| Utilized  | Horz and Vert   |
| Quality   | Control quality |

|           |                  |
|-----------|------------------|
| Point     | SHINGLED_GPS     |
| Latitude  | 35°45'10.19717"N |
| Longitude | 77°38'02.50654"W |
| Height    | -3.608m          |

|            |               |
|------------|---------------|
| Northing   | 223026.315m   |
| Easting    | 733131.316m   |
| Elevation  | 31.803m       |
| Horz error | <b>0.003m</b> |
| Vert error | <b>0.001m</b> |
| 3D error   | <b>0.004m</b> |

|           |                 |
|-----------|-----------------|
| Point     | SHINGLED        |
| Northing  | 223026.312m     |
| Easting   | 733131.314m     |
| Elevation | 31.804m         |
| Utilized  | Horz and Vert   |
| Quality   | Control quality |

|           |                  |
|-----------|------------------|
| Point     | WILSONPORT_GPS   |
| Latitude  | 35°46'11.32257"N |
| Longitude | 77°58'08.01527"W |
| Height    | 11.411m          |

|            |             |
|------------|-------------|
| Northing   | 224544.433m |
| Easting    | 702828.726m |
| Elevation  | 46.168m     |
| Horz error | 0.002m      |
| Vert error | 0.016m      |
| 3D error   | 0.016m      |

|           |                 |
|-----------|-----------------|
| Point     | WILSONPORT      |
| Northing  | 224544.432m     |
| Easting   | 702828.728m     |
| Elevation | 46.152m         |
| Utilized  | Horz and Vert   |
| Quality   | Control quality |

|           |                  |
|-----------|------------------|
| Point     | u4019-1_GPS      |
| Latitude  | 35°57'31.68001"N |
| Longitude | 77°50'55.59791"W |
| Height    | 3.464m           |

|            |             |
|------------|-------------|
| Northing   | 245631.429m |
| Easting    | 713445.976m |
| Elevation  | 38.318m     |
| Horz error | 0.001m      |
| Vert error | 0.004m      |
| 3D error   | 0.004m      |

|           |                  |
|-----------|------------------|
| Point     | u4019-1          |
| Northing  | 245631.428m      |
| Easting   | 713445.975m      |
| Elevation | 38.322m          |
| Utilized  | Horz and Vert    |
| Quality   | Adjusted quality |

|          |                  |
|----------|------------------|
| Point    | u4019-2_GPS      |
| Latitude | 35°57'43.25372"N |

|          |             |
|----------|-------------|
| Northing | 245987.600m |
| Easting  | 713396.448m |

|          |             |
|----------|-------------|
| Point    | u4019-2     |
| Northing | 245987.599m |

|                  |                  |
|------------------|------------------|
| <b>Longitude</b> | 77°50'57.40951"W |
| <b>Height</b>    | 6.925m           |

|                   |         |
|-------------------|---------|
| <b>Elevation</b>  | 41.774m |
| <b>Horz error</b> | 0.001m  |
| <b>Vert error</b> | 0.004m  |
| <b>3D error</b>   | 0.004m  |

|                  |                  |
|------------------|------------------|
| <b>Easting</b>   | 713396.448m      |
| <b>Elevation</b> | 41.778m          |
| <b>Utilized</b>  | Horz and Vert    |
| <b>Quality</b>   | Adjusted quality |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-3_GPS      |
| <b>Latitude</b>  | 35°58'22.78081"N |
| <b>Longitude</b> | 77°50'54.62748"W |
| <b>Height</b>    | 8.001m           |

|                   |             |
|-------------------|-------------|
| <b>Northing</b>   | 247206.621m |
| <b>Easting</b>    | 713452.022m |
| <b>Elevation</b>  | 42.841m     |
| <b>Horz error</b> | 0.000m      |
| <b>Vert error</b> | 0.006m      |
| <b>3D error</b>   | 0.006m      |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-3          |
| <b>Northing</b>  | 247206.621m      |
| <b>Easting</b>   | 713452.023m      |
| <b>Elevation</b> | 42.847m          |
| <b>Utilized</b>  | Horz and Vert    |
| <b>Quality</b>   | Adjusted quality |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-4_GPS      |
| <b>Latitude</b>  | 35°58'16.03572"N |
| <b>Longitude</b> | 77°50'45.20191"W |
| <b>Height</b>    | 2.875m           |

|                   |             |
|-------------------|-------------|
| <b>Northing</b>   | 247001.481m |
| <b>Easting</b>    | 713690.572m |
| <b>Elevation</b>  | 37.724m     |
| <b>Horz error</b> | 0.000m      |
| <b>Vert error</b> | 0.005m      |
| <b>3D error</b>   | 0.005m      |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-4          |
| <b>Northing</b>  | 247001.481m      |
| <b>Easting</b>   | 713690.572m      |
| <b>Elevation</b> | 37.729m          |
| <b>Utilized</b>  | Horz and Vert    |
| <b>Quality</b>   | Adjusted quality |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-5_GPS      |
| <b>Latitude</b>  | 35°58'47.44313"N |
| <b>Longitude</b> | 77°51'12.92897"W |
| <b>Height</b>    | 13.350m          |

|                   |             |
|-------------------|-------------|
| <b>Northing</b>   | 247961.402m |
| <b>Easting</b>    | 712984.749m |
| <b>Elevation</b>  | 48.172m     |
| <b>Horz error</b> | 0.001m      |
| <b>Vert error</b> | 0.008m      |
| <b>3D error</b>   | 0.008m      |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-5          |
| <b>Northing</b>  | 247961.403m      |
| <b>Easting</b>   | 712984.750m      |
| <b>Elevation</b> | 48.180m          |
| <b>Utilized</b>  | Horz and Vert    |
| <b>Quality</b>   | Adjusted quality |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-6_GPS      |
| <b>Latitude</b>  | 35°58'42.66619"N |
| <b>Longitude</b> | 77°51'06.21711"W |
| <b>Height</b>    | 12.857m          |

|                   |             |
|-------------------|-------------|
| <b>Northing</b>   | 247816.121m |
| <b>Easting</b>    | 713154.586m |
| <b>Elevation</b>  | 47.684m     |
| <b>Horz error</b> | 0.001m      |
| <b>Vert error</b> | 0.007m      |
| <b>3D error</b>   | 0.007m      |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-6          |
| <b>Northing</b>  | 247816.121m      |
| <b>Easting</b>   | 713154.586m      |
| <b>Elevation</b> | 47.692m          |
| <b>Utilized</b>  | Horz and Vert    |
| <b>Quality</b>   | Adjusted quality |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-7_GPS      |
| <b>Latitude</b>  | 35°58'33.65734"N |
| <b>Longitude</b> | 77°50'48.83046"W |
| <b>Height</b>    | 14.851m          |

|                   |             |
|-------------------|-------------|
| <b>Northing</b>   | 247543.519m |
| <b>Easting</b>    | 713593.358m |
| <b>Elevation</b>  | 49.692m     |
| <b>Horz error</b> | 0.000m      |
| <b>Vert error</b> | 0.006m      |
| <b>3D error</b>   | 0.006m      |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-7          |
| <b>Northing</b>  | 247543.519m      |
| <b>Easting</b>   | 713593.358m      |
| <b>Elevation</b> | 49.698m          |
| <b>Utilized</b>  | Horz and Vert    |
| <b>Quality</b>   | Adjusted quality |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-8_GPS      |
| <b>Latitude</b>  | 35°58'19.85230"N |
| <b>Longitude</b> | 77°50'32.41054"W |
| <b>Height</b>    | 1.971m           |

|                   |             |
|-------------------|-------------|
| <b>Northing</b>   | 247122.839m |
| <b>Easting</b>    | 714009.661m |
| <b>Elevation</b>  | 36.827m     |
| <b>Horz error</b> | 0.001m      |
| <b>Vert error</b> | 0.005m      |
| <b>3D error</b>   | 0.005m      |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-8          |
| <b>Northing</b>  | 247122.838m      |
| <b>Easting</b>   | 714009.660m      |
| <b>Elevation</b> | 36.832m          |
| <b>Utilized</b>  | Horz and Vert    |
| <b>Quality</b>   | Adjusted quality |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-9_GPS      |
| <b>Latitude</b>  | 35°58'16.19954"N |
| <b>Longitude</b> | 77°50'24.99943"W |
| <b>Height</b>    | 0.916m           |

|                   |             |
|-------------------|-------------|
| <b>Northing</b>   | 247012.429m |
| <b>Easting</b>    | 714196.644m |
| <b>Elevation</b>  | 35.778m     |
| <b>Horz error</b> | 0.001m      |
| <b>Vert error</b> | 0.005m      |
| <b>3D error</b>   | 0.005m      |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-9          |
| <b>Northing</b>  | 247012.429m      |
| <b>Easting</b>   | 714196.643m      |
| <b>Elevation</b> | 35.783m          |
| <b>Utilized</b>  | Horz and Vert    |
| <b>Quality</b>   | Adjusted quality |

|                 |                  |
|-----------------|------------------|
| <b>Point</b>    | u4019-10_GPS     |
| <b>Latitude</b> | 35°59'07.78182"N |

|                 |             |
|-----------------|-------------|
| <b>Northing</b> | 248601.885m |
| <b>Easting</b>  | 714152.499m |

|                 |             |
|-----------------|-------------|
| <b>Point</b>    | u4019-10    |
| <b>Northing</b> | 248601.885m |

|                  |                  |
|------------------|------------------|
| <b>Longitude</b> | 77°50'26.02033"W |
| <b>Height</b>    | 12.095m          |

|                   |         |
|-------------------|---------|
| <b>Elevation</b>  | 46.942m |
| <b>Horz error</b> | 0.000m  |
| <b>Vert error</b> | 0.008m  |
| <b>3D error</b>   | 0.008m  |

|                  |                  |
|------------------|------------------|
| <b>Easting</b>   | 714152.499m      |
| <b>Elevation</b> | 46.950m          |
| <b>Utilized</b>  | Horz and Vert    |
| <b>Quality</b>   | Adjusted quality |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-11_GPS     |
| <b>Latitude</b>  | 35°59'09.70750"N |
| <b>Longitude</b> | 77°50'35.05503"W |
| <b>Height</b>    | 14.346m          |

|                   |             |
|-------------------|-------------|
| <b>Northing</b>   | 248658.594m |
| <b>Easting</b>    | 713925.502m |
| <b>Elevation</b>  | 49.187m     |
| <b>Horz error</b> | 0.001m      |
| <b>Vert error</b> | 0.008m      |
| <b>3D error</b>   | 0.008m      |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | u4019-11         |
| <b>Northing</b>  | 248658.594m      |
| <b>Easting</b>   | 713925.502m      |
| <b>Elevation</b> | 49.195m          |
| <b>Utilized</b>  | Horz and Vert    |
| <b>Quality</b>   | Adjusted quality |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | p21_GPS          |
| <b>Latitude</b>  | 35°59'00.07035"N |
| <b>Longitude</b> | 77°50'09.87765"W |
| <b>Height</b>    | 8.470m           |

|                   |             |
|-------------------|-------------|
| <b>Northing</b>   | 248368.951m |
| <b>Easting</b>    | 714559.634m |
| <b>Elevation</b>  | 43.330m     |
| <b>Horz error</b> | 0.001m      |
| <b>Vert error</b> | 0.007m      |
| <b>3D error</b>   | 0.007m      |

|                  |                  |
|------------------|------------------|
| <b>Point</b>     | p21              |
| <b>Northing</b>  | 248368.951m      |
| <b>Easting</b>   | 714559.634m      |
| <b>Elevation</b> | 43.337m          |
| <b>Utilized</b>  | Horz and Vert    |
| <b>Quality</b>   | Adjusted quality |