

Survey Control Sheets

Survey Control Plan Sheets

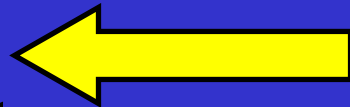
- Assure that Baseline and GPS control is made available and accessible
- Reduce problem associated with GPS (RTK) of coordinate system
- Provide documentation for future survey needs in re-establishing rights of way or design centerlines.

Project Flow Modification

Control the Project with GPS

Localize Project

Complete Surveys



1.) GPS Site Calibration

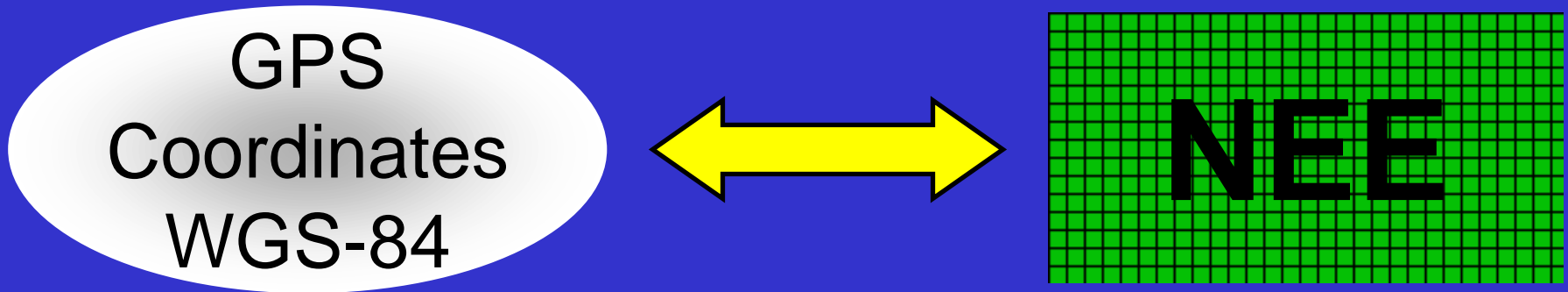
Transmit Files

Design is completed

Property Ties

Stake Right of Way

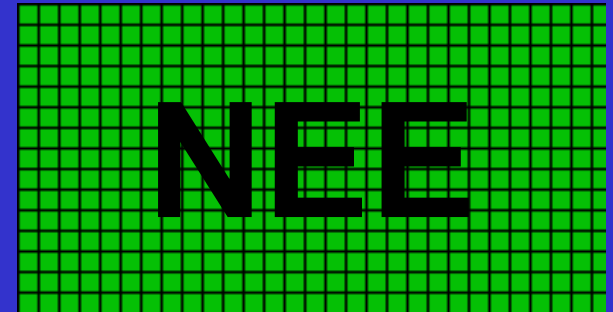
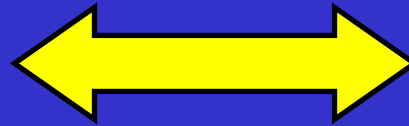
GPS Site Calibration



- Allows the GPS to work in your Local coordinates
- Defines the relationship between GPS Coordinates and Local North, East, and Elevation

GPS Site Calibration

GPS
Coordinates
WGS-84



Combined Grid Factor

Latitude

Northing(Y)

Longitude

Easting(X)

Ellipsoid Height

Orthometric Elevation

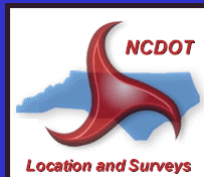
Angle of North Grid is used (currently Grid 99) for ALTA GPS projects, this model the difference between Ellipsoid Height and Orthometric Elevation so that they now relate.

What Values Are Good?



Calibration.html

- **Maximum Horizontal & Vertical Residuals**
 - Dependent on quality of measurements, control, and their source
 - Using HARN and NAVD88 to control projects should produce very small residuals
- **Scale Factor**
 - Either the reciprocal of the Combined Grid Factor or 1 depending on method
- **Rotation**
 - Since our Local system is based on NAD 83/95, rotation is zero “0”



Project Flow Modification

Control the Project with GPS

Localize Project

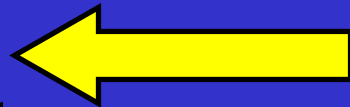
Complete Surveys

Transmit Files

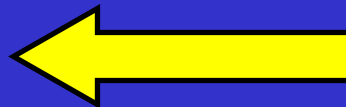
Design is completed

Property Ties

Stake Right of Way



1.) GPS Site Calibration



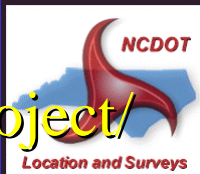
2.) Three additional files for Calibration

GPS Calibration files

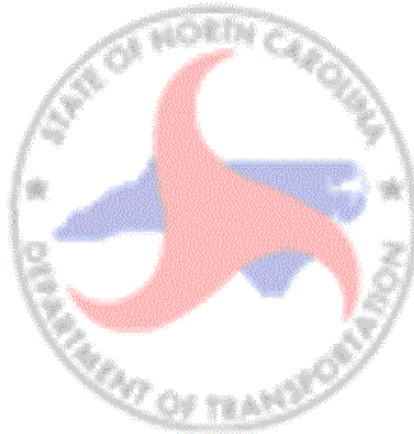
- GPS Calibration report (html file from TGO)
 - TIP#_ls_gpscalib_020711.html
 - TGO_Templates_v1_5_021115.exe must be downloaded
 - This may be a text file depending on equipment used
- Ref. Coordinates - WGS84 (comma delimited text file)
 - Name, Latitude, Longitude, Ellipsoid Height
 - TIP#_ls_wgs84_020711.txt
- Adj. Coordinates - Local (comma delimited text file)
 - Name, Northing, Easting, Elevation
 - TIP#_ls_local_020711.txt

Files will be placed on Location and Surveys Web Page and can be accessed at the following address:

<http://www.doh.dot.state.nc.us/preconstruct/highway/location/project/>



North Carolina Department of Transportation

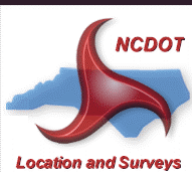


Location & Surveys Project Information

- [Staff](#)
- [PEF Information](#)
- [Support](#)
- [General Information](#)
- [Project Information](#)

Location and Surveys is constantly challenged with the organization and distribution of all the statewide survey information conducted by our Unit and the Private Engineering Firms. This information consists of, but is not limited to, control coordinates, centerline/baseline alignment data, contract cost estimates, easement locations, underground utilities, etc. This data must be made available to both the units here in the NCDOT and various outside agencies.

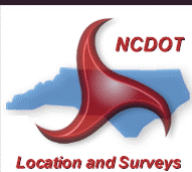
Project Control Data (New)		Assignment/Progress Reports (New)	
Project Schedules	.ssf Solution Retriever	GPS Control Database	
Project Assignment Tools (Central Office)		L-S Admin	



Microsoft Internet Explorer window showing a directory listing for <http://207.4.62.65/GPSDataFTP/>. The page title is "Location & Surveys Project Controls". The directory listing shows four folders:

Folder Name	Type
B4200	dir
R2000g	dir
R2303C	dir
U3316	dir

Windows taskbar showing the Start button and several open applications: "CPI winners - Inb...", "Microsoft Power...", "North Carolina D...", "Hotmail Messag...", "RealPlayer: DOT...", and "http://207.4...". The system tray on the right shows the "Internet" icon and other background processes.



Project Flow Modification

Control the Project with GPS

Localize Project

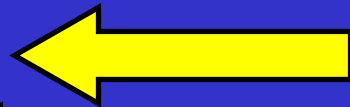
Complete Surveys

Transmit Files

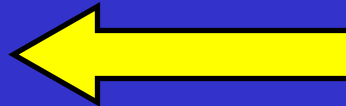
Design is completed

Property Ties

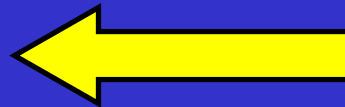
Stake Right of Way



1.) GPS Site Calibration



2.) Three additional files for Calibration



3.) Preparation of Control sheets and Control data file

Location and Surveys will complete entire Datum Description

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT
IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY
NCDOT FOR MONUMENT "R-2905-1"

WITH NAVD 1983/95 STATE PLANE GRID COORDINATES OF
NORTHING: 1111111.0000(11) EASTING: 1111111.0000(11)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT
(GROUND TO GRID) IS: 1.00000000

THE N.C. LAMBERT GRID BEARING AND
LOCALIZED HORIZONTAL GROUND DISTANCE FROM
"NCDOT GPS -1" TO -L- STATION (~~supplied by 1000000~~) IS

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

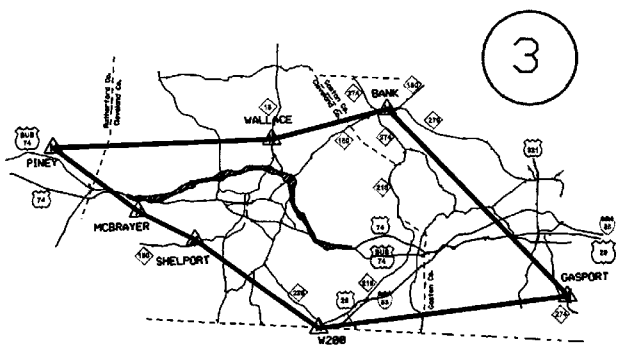
1C - Graphics Sheet

A picture is worth a thousand words

- Datum Description
- Outer Control Network (HARN)
- Primary GPS controls on Project
- Notes
- TIP#_ls_1c_DATE.dgn

SURVEY CONTROL SHEET

Example



GPS CONTROL NETWORK

NOT TO SCALE

NOTES

1. THE SITE CALIBRATION SHOWN IS BASED UPON A NETWORK TIED TO THE NAD 83 HIGH ACCURACY REFERENCE NETWORK AND IS 2.00 ADJUSTMENT. THIS CALIBRATION WILL ALLOW THE END USER TO WORK WITHIN THE SAME COORDINATE SYSTEM WHEN USING THE REAL TIME KINEMATIC GPS AND A LOCAL BASE STATION. IF ANOTHER SYSTEM SUCH AS VRS (VIRTUAL REFERENCE STATION) IS USED, ADDITIONAL FIELD TIES MAYBE NEEDED TO REDUCE POSSIBLE ERRORS, OR BIASES.
2. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT [HTTP://WWW.DOH.DOT.STATE.NC.US/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/](http://www.doh.dot.state.nc.us/preconstruct/highway/location/project/) THE FILES TO BE FOUND ARE AS FOLLOWS:
 UMS2.SLS.GPSCAL.IS.030181.HTM
 UMS2.SLS.WS24.S20181.TXT
 UMS2.SLS.LOC.S20181.TXT
 UMS2.SLS.S20181.LIN.S20181.TXT
 THE WS24 AND LOCAL FILES ARE COMMA DELIMITED AND CAN BE USED TO REPRODUCE THE SITE CALIBRATION FOR THE END USER'S GPS EQUIPMENT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

4

2

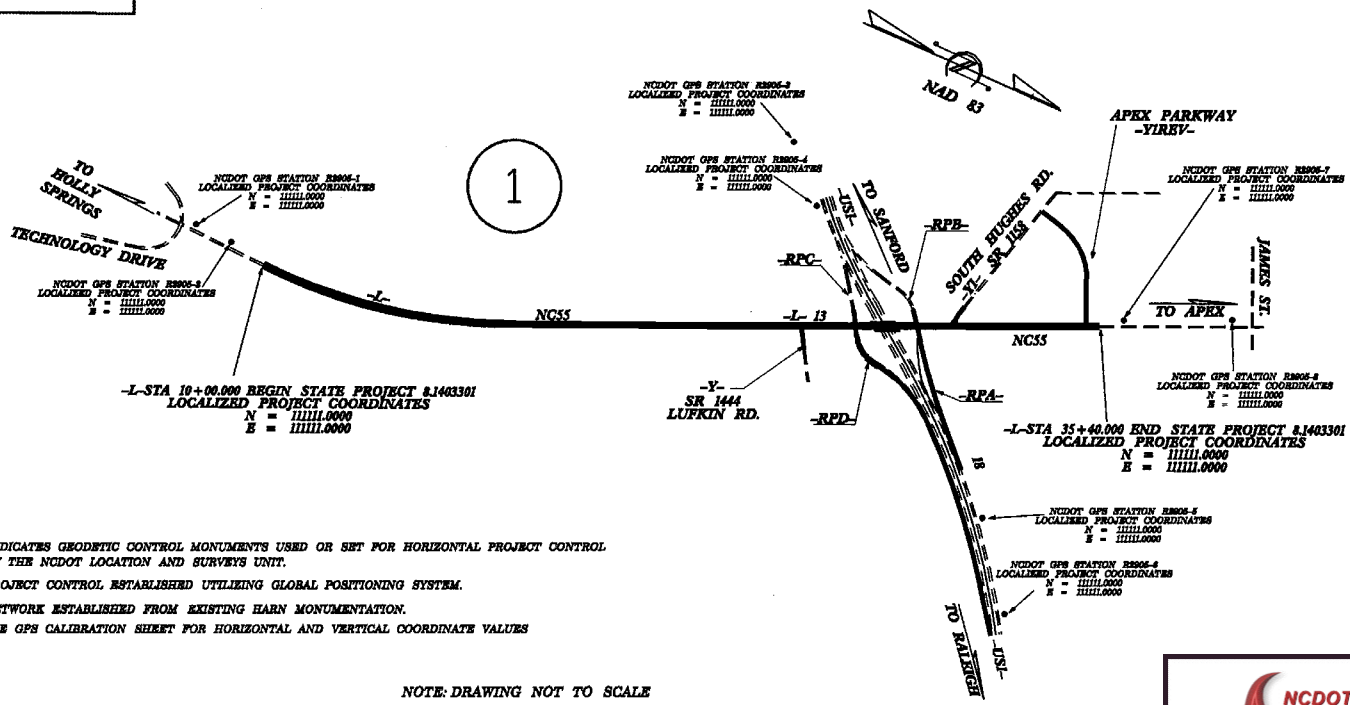
DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R-2905-1" WITH NAD 1983/95 STATE PLANE GRID COORDINATES OF NORTHING 1111111.00000(1) EASTING 1111111.00000(1) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.0000000

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "NCDOT GPS -1" TO ± STATION (supplied by roadway) IS 50000

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS MVD 88

1



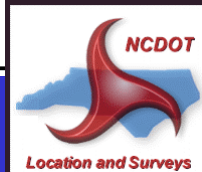
ⓐ INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.

PROJECT CONTROL ESTABLISHED UTILIZING GLOBAL POSITIONING SYSTEM.

NETWORK ESTABLISHED FROM EXISTING BARN MONUMENTATION.

SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES

NOTE: DRAWING NOT TO SCALE



1D - Site Calibration

- Site Calibration
- A Site Calibration is not necessary for Small projects such as Bridges
- Notes
- Baseline Control can be added (If there is room)
- Datum Description
- TIP#_ls_1d_DATE.dgn

SURVEY CONTROL SHEET U-4026

PROJECT REFERENCE NO.	SHEET NO.
8.000000	1 D
LOCATION AND SURVEYS	

5

GPS CALIBRATION REPORT
PROJECT : R2878 CALIBRATION 1 GROUND

TIP NUMBER
USER NAME
COORDINATE SYSTEM
HORIZONTAL DATUM
VERTICAL DATUM
COORDINATE UNITS
DISTANCE UNITS
HEIGHT UNITS
LOCAL SITE INFORMATION
LOCALIZED AROUND
LATITUDE
LONGITUDE
SITE SCALE FACTOR

EXTENOID
DATE & TIME
ZONE
GEOID MODEL
US STATE PLANE
1983 (CONUS)
US SURVEY FEET
US SURVEY FEET
US SURVEY FEET
1983 (CONUS)
GEOID99 NC SUB
OR
25-17-53.47519°N
81-32-14.87764°W
1.00010003

THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION USES A LOCALIZED COORDINATE SYSTEM WHICH IS VERY SIMILAR TO NORTH CAROLINA ZONE 2208 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
EASTING COORDINATE OF ROTATION CENTER
NOTATION CENTER
TRANSLATION NORTH
TRANSLATION EAST
SCALE FACTOR

POINT R2787-3_W0884
LATITUDE 35-18-06.86195°N
LONGITUDE 81-37-01.7392°W
HEIGHT 773.61795FT
NORTHING 1214235.2665FT
EASTING 1219236.5662FT
ELEVATION 878.4769FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-3_LOCAL
LATITUDE 35-18-06.86195°N
LONGITUDE 81-37-01.7392°W
HEIGHT 773.61795FT
NORTHING 1214235.2665FT
EASTING 1219236.5662FT
ELEVATION 878.4769FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-6_W0884
LATITUDE 35-17-53.47519°N
LONGITUDE 81-32-14.87764°W
HEIGHT 776.5796FT
NORTHING 578481.4948FT
EASTING 1223232.3492FT
ELEVATION 881.4293FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-6_LOCAL
LATITUDE 35-17-53.47519°N
LONGITUDE 81-32-14.87764°W
HEIGHT 776.5796FT
NORTHING 578481.4948FT
EASTING 1223232.3492FT
ELEVATION 881.4293FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-5_W0884
LATITUDE 35-18-31.8072°N
LONGITUDE 81-34-01.13713°W
HEIGHT 762.6359FT
NORTHING 577465.9885FT
EASTING 1224323.7995FT
ELEVATION 887.4785FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

VERTICAL ADJUSTMENT PARAMETERS
NORTHING COORDINATE OF ORIGIN
EASTING COORDINATE OF ORIGIN
POINT
VERTICAL SEPARATION AT ORIGIN
SLOPE NORTH
SLOPE EAST

POINT R2787-7_W0884
LATITUDE 35-18-49.38628°N
LONGITUDE 81-34-17.2978°W
HEIGHT 857.4825FT
NORTHING 577886.8296FT
EASTING 1233137.4583FT
ELEVATION 816.7473FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT WALLACE_W0884
LATITUDE 35-21-21.83688°N
LONGITUDE 81-38-18.7498°W
HEIGHT 864.6465FT
NORTHING 579388.4995FT
EASTING 1250313.7485FT
ELEVATION 868.7473FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT WALLACE_LOCAL
LATITUDE 35-21-21.83688°N
LONGITUDE 81-38-18.7498°W
HEIGHT 864.6465FT
NORTHING 579388.4995FT
EASTING 1250313.7485FT
ELEVATION 868.7473FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT BANK_W0884
LATITUDE 35-23-18.84588°N
LONGITUDE 81-32-47.2978°W
HEIGHT 857.4825FT
NORTHING 603283.3156FT
EASTING 1249482.1543FT
ELEVATION 861.8425FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT BANK_LOCAL
LATITUDE 35-23-18.84588°N
LONGITUDE 81-32-47.2978°W
HEIGHT 857.4825FT
NORTHING 603283.3156FT
EASTING 1249482.1543FT
ELEVATION 861.8425FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

RESIDUAL DIFFERENCES BETWEEN OPS (W0884) AND LOCAL COORDINATES
SUMMARY

POINT R2787-9_W0884
LATITUDE 35-19-04.91827°N
LONGITUDE 81-34-01.13713°W
HEIGHT 786.9495FT
NORTHING 583244.2885FT
EASTING 1244823.7995FT
ELEVATION 873.6423FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-9_LOCAL
LATITUDE 35-19-04.91827°N
LONGITUDE 81-34-01.13713°W
HEIGHT 786.9495FT
NORTHING 583244.2885FT
EASTING 1244823.7995FT
ELEVATION 873.6423FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT H77_W0884
LATITUDE 35-17-53.47519°N
LONGITUDE 81-32-14.87764°W
HEIGHT 747.6368FT
NORTHING 573167.8229FT
EASTING 1242471.6289FT
ELEVATION 852.2613FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT H77_LOCAL
LATITUDE 35-17-53.47519°N
LONGITUDE 81-32-14.87764°W
HEIGHT 747.6368FT
NORTHING 573167.8229FT
EASTING 1242471.6289FT
ELEVATION 852.2613FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-12_LOCAL
LATITUDE 35-19-42.81111°N
LONGITUDE 81-36-36.86294°W
HEIGHT 841.9379FT
NORTHING 589372.9879FT
EASTING 1251363.4729FT
ELEVATION 846.5795FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT RESIDUALS
W0884 COORDINATES
CALCULATED POINT FOR DISPLAY ONLY
LOCAL COORDINATES

POINT PINNEY_W0884
LATITUDE 35-28-45.36727°N
LONGITUDE 81-48-14.88099°W
HEIGHT 915.3885FT
NORTHING 624241.6885FT
EASTING 1173911.4545FT
ELEVATION 1828.3285FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT PINNEY_LOCAL
LATITUDE 35-28-45.36727°N
LONGITUDE 81-48-14.88099°W
HEIGHT 915.3885FT
NORTHING 624241.6885FT
EASTING 1173911.4545FT
ELEVATION 1828.3285FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-11_W0884
LATITUDE 35-19-32.80449°N
LONGITUDE 81-38-47.8157°W
HEIGHT 835.8715FT
NORTHING 582968.2979FT
EASTING 1250289.3885FT
ELEVATION 829.7329FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-11_LOCAL
LATITUDE 35-19-32.80449°N
LONGITUDE 81-38-47.8157°W
HEIGHT 835.8715FT
NORTHING 582968.2979FT
EASTING 1250289.3885FT
ELEVATION 829.7329FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-16_W0884
LATITUDE 35-18-06.86195°N
LONGITUDE 81-29-18.91486°W
HEIGHT 785.2288FT
NORTHING 579428.1378FT
EASTING 1274813.5185FT
ELEVATION 819.7668FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-2_W0884
LATITUDE 35-18-06.86195°N
LONGITUDE 81-37-01.7392°W
HEIGHT 773.61795FT
NORTHING 587496.9158FT
EASTING 1250749.5158FT
ELEVATION 861.4995FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-2_LOCAL
LATITUDE 35-18-06.86195°N
LONGITUDE 81-37-01.7392°W
HEIGHT 773.61795FT
NORTHING 587496.9158FT
EASTING 1250749.5158FT
ELEVATION 861.4995FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-18_W0884
LATITUDE 35-17-53.47519°N
LONGITUDE 81-32-14.87764°W
HEIGHT 776.5796FT
NORTHING 573218.5229FT
EASTING 1244482.4329FT
ELEVATION 848.4839FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-18_LOCAL
LATITUDE 35-17-53.47519°N
LONGITUDE 81-32-14.87764°W
HEIGHT 776.5796FT
NORTHING 573218.5229FT
EASTING 1244482.4329FT
ELEVATION 848.4839FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-15_W0884
LATITUDE 35-18-06.86195°N
LONGITUDE 81-29-18.91486°W
HEIGHT 785.2288FT
NORTHING 579428.1378FT
EASTING 1274813.5185FT
ELEVATION 819.7668FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-15_LOCAL
LATITUDE 35-18-06.86195°N
LONGITUDE 81-29-18.91486°W
HEIGHT 785.2288FT
NORTHING 579428.1378FT
EASTING 1274813.5185FT
ELEVATION 819.7668FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT HCBAYNER_W0884
LATITUDE 35-18-06.86195°N
LONGITUDE 81-48-06.15784°W
HEIGHT 791.0525FT
NORTHING 568742.4285FT
EASTING 1283773.2995FT
ELEVATION 806.7839FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT HCBAYNER_LOCAL
LATITUDE 35-18-06.86195°N
LONGITUDE 81-48-06.15784°W
HEIGHT 791.0525FT
NORTHING 568742.4285FT
EASTING 1283773.2995FT
ELEVATION 806.7839FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-17_W0884
LATITUDE 35-18-06.86195°N
LONGITUDE 81-37-01.7392°W
HEIGHT 773.61795FT
NORTHING 574388.3795FT
EASTING 1250749.5158FT
ELEVATION 862.8158FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-17_LOCAL
LATITUDE 35-18-06.86195°N
LONGITUDE 81-37-01.7392°W
HEIGHT 773.61795FT
NORTHING 574388.3795FT
EASTING 1250749.5158FT
ELEVATION 862.8158FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-17_W0884
LATITUDE 35-17-53.47519°N
LONGITUDE 81-32-14.87764°W
HEIGHT 776.5796FT
NORTHING 573218.5229FT
EASTING 1244482.4329FT
ELEVATION 848.4839FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-17_LOCAL
LATITUDE 35-17-53.47519°N
LONGITUDE 81-32-14.87764°W
HEIGHT 776.5796FT
NORTHING 573218.5229FT
EASTING 1244482.4329FT
ELEVATION 848.4839FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-31_W0884
LATITUDE 35-17-46.57184°N
LONGITUDE 81-37-14.68511°W
HEIGHT 796.4465FT
NORTHING 573373.9055FT
EASTING 1280187.8735FT
ELEVATION 809.9655FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-31_LOCAL
LATITUDE 35-17-46.57184°N
LONGITUDE 81-37-14.68511°W
HEIGHT 796.4465FT
NORTHING 573373.9055FT
EASTING 1280187.8735FT
ELEVATION 809.9655FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-17_W0884
LATITUDE 35-18-06.86195°N
LONGITUDE 81-37-01.7392°W
HEIGHT 773.61795FT
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EASTING 1250749.5158FT
ELEVATION 862.8158FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-17_LOCAL
LATITUDE 35-18-06.86195°N
LONGITUDE 81-37-01.7392°W
HEIGHT 773.61795FT
NORTHING 574388.3795FT
EASTING 1250749.5158FT
ELEVATION 862.8158FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-16_W0884
LATITUDE 35-18-06.86195°N
LONGITUDE 81-29-18.91486°W
HEIGHT 785.2288FT
NORTHING 579428.1378FT
EASTING 1274813.5185FT
ELEVATION 819.7668FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-16_LOCAL
LATITUDE 35-18-06.86195°N
LONGITUDE 81-29-18.91486°W
HEIGHT 785.2288FT
NORTHING 579428.1378FT
EASTING 1274813.5185FT
ELEVATION 819.7668FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-4_W0884
LATITUDE 35-18-17.64738°N
LONGITUDE 81-37-14.68511°W
HEIGHT 776.2485FT
NORTHING 576194.7695FT
EASTING 1219811.5485FT
ELEVATION 876.1185FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-4_LOCAL
LATITUDE 35-18-17.64738°N
LONGITUDE 81-37-14.68511°W
HEIGHT 776.2485FT
NORTHING 576194.7695FT
EASTING 1219811.5485FT
ELEVATION 876.1185FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-18_W0884
LATITUDE 35-17-53.47519°N
LONGITUDE 81-32-14.87764°W
HEIGHT 776.5796FT
NORTHING 573218.5229FT
EASTING 1244482.4329FT
ELEVATION 848.4839FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-18_LOCAL
LATITUDE 35-17-53.47519°N
LONGITUDE 81-32-14.87764°W
HEIGHT 776.5796FT
NORTHING 573218.5229FT
EASTING 1244482.4329FT
ELEVATION 848.4839FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-18_W0884
LATITUDE 35-18-06.86195°N
LONGITUDE 81-29-18.91486°W
HEIGHT 785.2288FT
NORTHING 579428.1378FT
EASTING 1274813.5185FT
ELEVATION 819.7668FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

POINT R2787-18_LOCAL
LATITUDE 35-18-06.86195°N
LONGITUDE 81-29-18.91486°W
HEIGHT 785.2288FT
NORTHING 579428.1378FT
EASTING 1274813.5185FT
ELEVATION 819.7668FT
VERT ERROR 0.8895FT
QUALITY SURVEY QUALITY
30 ERROR

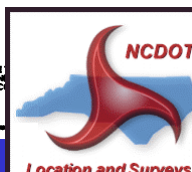
Example

7

DATUM DESCRIPTION
THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE GRID COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R2905-1" WITH MD 1983/95 STATE PLANE GRID COORDINATES OF NORTHING 1111111.000001° EASTING 1111111.000001° THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (ROUND TO GRID IS 1.000000) THE NCDOT MONUMENT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "NCDOT GPS-1" TO C- STATION (occupied by roadway) IS 5.0000 VERTICAL DATUM USED IS NAV 88

6

NOTES
1. THE SITE CALIBRATION SHOWN IS BASED UPON A NETWORK TIED TO THE MONUMENT (HORIZONTAL ACCURACY REFERENCE NETWORK) AND IS/NO ADJUSTMENT. THIS CALIBRATION WILL ALLOW THE END USER TO WORK WITHIN THE SAME COORDINATE SYSTEM WHEN USING RTK (REAL TIME KINEMATIC) GPS AND A LOCAL BASE STATION. IF ANOTHER CATCH SURVEY OR A VERTICAL REFERENCE STATION IS USED, ADDITIONAL FIELD TIES MAYBE NEEDED TO REDUCE POSSIBLE ERRORS, OR BIASES.
2. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SETTING PROJECT CONTROL POINTS TO THE FOLLOWING URL: HTTP://WWW.DOT.STATE.NC.US/PREDCONSTRUCT/HIGHWAY/LOCATION/PROJECT/ THE FILES TO BE DOWN LOADED ARE AS FOLLOWS:
UR26.LL.SPICALB1.030101.HTML
UR26.LL.SPICALB1.030101.TXT
UR26.LL.SPICALB1.030101.DAT
UR26.LL.SPICALB1.030101.TXT
THE W0884 AND LOCAL FILES ARE COMMON DELIMITED REPRODUCE THE SITE CALIBRATION FOR THE END IF FURTHER INFORMATION IS NEEDED. PLEASE CONTACT LOCATION AND SURVEYS UNIT.



5/28/09 1:00 PM C:\Users\jgordon\Documents\GIS\Projects\U-4026\U-4026.dwg

1E - Baseline Control

- Datum Description
- Baseline Data
- Benchmarks
- Station and Offset to the design alignment
- Notes
- TIP#_ls_1e_DATE.dgn

SURVEY CONTROL SHEET U-4026

12

NOTES

- THE SITE CALIBRATION (SHOW) IS BASED UPON A NETWORK TIED TO THE NAD83 (HIGH ACCURACY REFERENCE NETWORK) AND 83/95 ADJUSTMENT. THIS CALIBRATION WILL ALLOW THE END USER TO WORK WITHIN THE SAME COORDINATE SYSTEM WHEN USING RTK (REAL TIME KINEMATIC) GPS AND A LOCAL BASE STATION. IF ANOTHER SYSTEM SUCH AS NAD 83 (VIRTUAL REFERENCE STATION) IS USED, ADDITIONAL FIELD TIES MAYBE NEEDED TO REDUCE POSSIBLE ERRORS OR BIASES.
- THE CONTROL DATA FOR THIS PROJECT WAS OBTAINED ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA FROM THE STATE PLANE DATUM (STATE PLANE DATUM) THROUGH LOCATION/PROJECT/... THE FILES TO BE PROVIDED TO THE USER ARE: ...

Example

BASELINE DATA

9

BL POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
101	BL-101	752041.7520	2845235.7820	318.01	0	0
102	BL-102	752780.8990	2845173.9420	303.94	0	0
1	GPS U4026-1	753432.1414	2846189.7879	337.00	18-28.66	37.87 RT
2	GPS U4026-2	754390.9020	2844991.8727	305.01	28-12.40	18.30 RT
183	BL-183	754070.5040	2844984.0580	278.21	24-03.90	21.30 RT
184	BL-184	755322.8810	2844824.9340	374.73	29-87.84	28.87 RT
185	BL-185	756187.3700	2844678.5220	377.51	39-86.69	17.19 RT
186	BL-186	756070.8000	2843709.9960	378.58	45-03.37	18.74 RT
187	BL-187	757294.2800	2843533.8680	389.87	53-27.89	36.13 RT
189	BL-189	758084.8870	2843185.9070	384.80	61-16.10	15.89 RT
110	BL-110	759038.2000	2842752.8180	385.21	67-41.31	39.70 RT
111	BL-111	759330.4740	2842088.7530	380.42	75-30.63	23.69 LT
4	MC08 MARK1	759963.8800	2842789.4200	378.80	81-59.94	26.11 RT
112	BL-112	760490.8180	2842794.4460	388.27	88-78.28	15.99 RT
3	U4026-3	760790.3800	2842833.1800	382.78	89-46.73	32.48 LT
113	BL-113	761734.7600	2842329.1100	385.10	110-36.96	18.84 RT
114	BL-114	762501.8540	2842323.8300	318.89	109-28.94	24.34 RT
115	BL-115	763283.4830	2842209.4780	389.10	110-36.96	18.84 RT
20	K2008-20	763907.2770	2841796.0800	384.18	127-18.74	15.84 RT
26	K2008-26	765141.2800	2842233.8190	291.08	140-87.61	21.90 LT
116	BL-116	765818.1630	2842077.5480	385.91	154-03.22	25.80 RT
117	BL-117	765743.2640	2842130.6000	327.74	160-28.16	32.08 RT
118	BL-118	767378.8210	2839422.8440	386.51	170-66.67	43.00 RT
119	BL-119	767986.5480	2837729.8870	295.62	184-35.82	21.80 LT
120	BL-120	768006.6410	2837862.9970	294.97	192-13.20	27.82 RT
121	BL-121	769151.8770	2837870.4320	291.82	197-45.16	28.49 RT
18	MC08 DEVELOPER	770189.1000	2838231.9980	289.80	208-05.08	09.69 RT
122	BL-122	771843.8520	2838814.8520	383.14	218-49.29	18.68 RT
123	BL-123	771441.2700	2838971.8620	387.48	223-06.53	25.62 RT
124	BL-124	771887.8470	2839433.8970	389.43	229-02.22	24.90 RT
125	BL-125	772895.2810	2840011.8180	318.11	238-01.83	38.58 RT
126	BL-126	772734.2110	2840708.2380	331.72	246-27.99	68.45 RT
127	BL-127	773518.9730	2840731.6320	341.98	253-06.78	08.48 RT
5	U4026-5	774289.8180	2840973.4620	348.99	268-09.28	73.54 RT
128	BL-128	776199.2400	2840818.7700	323.89	282-00	OUTSIDE PROJECT LIMITS
129	BL-129	776388.8400	2840818.7700	309.43	282-00	OUTSIDE PROJECT LIMITS
130	BL-130	777153.2400	2840838.4410	292.90	282-00	OUTSIDE PROJECT LIMITS
131	BL-131	777746.9000	2840468.2270	293.40	282-00	OUTSIDE PROJECT LIMITS
132	BL-132	778268.2400	2840818.7700	292.90	282-00	OUTSIDE PROJECT LIMITS
133	BL-133	778783.9830	2840828.2860	291.87	282-00	OUTSIDE PROJECT LIMITS
134	BL-134	779148.8310	2840836.4140	328.80	282-00	OUTSIDE PROJECT LIMITS
135	U4026-7	779622.8900	2841231.9980	321.85	282-00	OUTSIDE PROJECT LIMITS
8	U4026-8	780752.8970	2841884.9980	322.18	282-00	OUTSIDE PROJECT LIMITS

BY POINT	DESC.	NORTH	EAST	ELEVATION	Y6 STATION	OFFSET
210	BY-210	761734.7600	2843329.1100	328.48	18-28.63	14.31RT
218	BY-218	761813.9700	2843741.8840	337.47	11-02.89	13.99 RT

BY7 POINT	DESC.	NORTH	EAST	ELEVATION	Y7 STATION	OFFSET
219	BY7-219	760381.7430	2840826.6120	342.54	18-01.20	14.31RT
220	BY7-220	766743.3040	2839138.6800	327.74	12-03.72	14.31RT
221	BY7-221	767851.6130	2839394.3000	327.78	9-61.49	14.31RT

BY9 POINT	DESC.	NORTH	EAST	ELEVATION	Y9 STATION	OFFSET
222	BY9-222	772734.2110	2840708.2380	331.72	16-08.86	14.31RT
223	BY9-223	772897.1890	2841214.9880	346.54	11-18.92	14.31RT

BM4 ELEVATION = 388.98
 N 758888 E 2843008
 L STATION 48-37 09 LEFT
 RR SPIKE IN BASE OF 15" PINE

 BM7 ELEVATION = 318.91
 N 762347 E 2840801
 L STATION 186-83 51 LEFT
 RR SPIKE IN BASE OF 12" PINE

 BM8 ELEVATION = 312.94
 N 763227 E 2842142
 L STATION 119-23 09 LEFT
 RR SPIKE IN BASE OF 24" PINE

 BM9 ELEVATION = 252.25
 N 764288 E 2841923
 L STATION 132-68 62 LEFT
 "X" CUT IN COR OF CONC HW

 BM11 ELEVATION = 386.29
 N 768244 E 2837317
 L STATION 180-69 282 LEFT
 "X" CUT IN SE COR OF CONC RETAINING WALL

 BM13 ELEVATION = 315.27
 N 772894 E 2839318
 L STATION 229-29 331 LEFT
 RR SPIKE IN BASE OF 22" PINE

10

BY POINT	DESC.	NORTH	EAST	ELEVATION	Y STATION	OFFSET
281	BY-281	753822.9880	2844785.9280	329.62	7-28.98	22.98 LT
282	BY-282	753514.7340	2844828.8580	338.09	18-57.18	18.88 LT
283	U4026-1	753432.1414	2846189.7879	337.00	14-55.82	42.48 LT
284	BY-284	753385.4880	2845611.1480	335.52	19-01.81	13.38 LT
285	BY-285	753182.4800	2845961.4990	321.18	22-47.81	15.83 LT

BY1 POINT	DESC.	NORTH	EAST	ELEVATION	Y1 STATION	OFFSET
286	BY1-286	754985.8940	2844277.1730	365.94	9-03.82	14.92 LT
287	BY1-287	755322.8810	2844824.9340	374.73	12-64.29	18.24 LT

BY2 POINT	DESC.	NORTH	EAST	ELEVATION	Y2 STATION	OFFSET
288	BY2-288	756415.9540	2843294.8700	364.84	11-57.83	14.33 LT
289	BY2-289	756578.8500	2843709.9960	374.58	18-11.64	16.82 LT

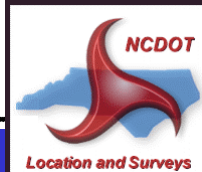
BY3 POINT	DESC.	NORTH	EAST	ELEVATION	Y3 STATION	OFFSET
218	BY3-218	757294.2800	2843533.8680	389.87	9-51.86	12.99 LT
211	BY3-211	757365.2840	2840759.5040	388.62	14-01.32	11.26 LT

BY4 POINT	DESC.	NORTH	EAST	ELEVATION	Y4 STATION	OFFSET
212	BY4-212	758034.9920	2842334.1980	386.44	8-09.41	13.90 LT
213	BY4-213	758038.5000	2842732.8180	388.35	11-81.93	12.85 LT
214	BY4-214	758494.7620	2843345.1670	374.80	15-73.17	18.29 LT

BY5 POINT	DESC.	NORTH	EAST	ELEVATION	Y5 STATION	OFFSET
215	BY5-215	768682.5450	2842241.8000	378.16	9-03.69	15.88 LT
216	BY5-216	768458.8180	2842784.4460	368.27	13-85.52	14.84 LT

This Baseline Data including Benchmarks is to be transmitted as a text file and placed on the web site with the site calibration files.

TIP#_ls_control_DATE.txt



Notes

- 1 The site calibration shown is based upon a network tied to the HARN (High Accuracy Reference Network) NAD 83/95 Adjustment. This calibration will allow the end user to work within the same coordinate system when using RTK (Real Time Kinematic) GPS and a local base station. If another system such as VRS (Virtual Reference Station) is used, additional field ties may be needed to reduce possible errors, or biases.

Notes

2. The control data for this project can be found electronically by selecting Project Control Data at:

<http://www.doh.dot.state.nc.us/preconstruct/highway/location/project/>

The files to be found are as follows:

u4026_ls_gpscalib_030101.html

u4026_ls_wgs84_030101.txt

u4026_ls_local_030101.txt

u4026_ls_control_030101.txt

The wgs84 and local files are comma delimited and can be used to reproduce the site calibration for the end user's GPS equipment. If further information is needed, please contact the Location and Surveys Unit.

Notes

2. The control data for this project can be found electronically by selecting Project Control Data at:

<http://www.doh.dot.state.nc.us/preconstruct/highway/location/project/>

The files to be found are as follows:

b4026_ls_baseline_030101.txt

Site calibration information has not been provided for this project. If further information is needed, please contact the Location and Surveys Unit.

Project Flow Modification

Control the Project with GPS

Localize Project

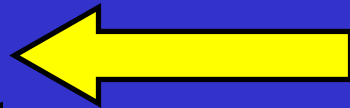
Complete Surveys

Transmit Files

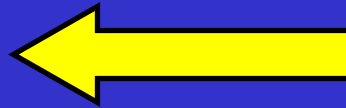
Design is completed

Property Ties

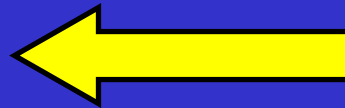
Stake Right of Way



1.) GPS Site Calibration



2.) Three additional files for Calibration



3.) Preparation of Control sheets and Control data file