STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

MEMO TO: Highway Design Branch Unit Heads

FROM: Debbie Barbour, PE
Highway Design Branch Manager

SUBJECT: Survey Control Data for Plan Sheets

DATE: January 28, 2003

With increased usage of GPS in construction staking, and the increased importance of right of way location, it has become necessary to document the survey and mapping control network established on each project. In order to provide this documentation, as of March 1, 2003, we will require the attached information to be included in the right of way plans. This information should be developed by the survey group responsible for establishing control (most often, NCDOT Location & Surveys Unit). The information will be included on sheets 1 C through 1 E in the plans and as discussed in the attachments.

- For Highway Design Branch in-house procedures, this information should be requested from Location & Surveys when property ties are requested. The location and name of the plan sheet layout should be included with the letter of request.
- For PEF projects (those developed through Design Services with a survey subcontractor), the prime should contract this work with the sub, to be completed following the development of the plan sheet layout.
- PEF firms must be willing to provide the electronic data to Location & Surveys for publication on the Location & Surveys website. Formats of data may differ depending upon the GPS calibration developed, but all data included in these examples must be present.
- Control data for all Design Branch projects (in-house or PEF) will be maintained on the Location & Surveys website.
- For further reference, please view the Powerpoint slideshow entitled "Control Sheet Powerpoint" at: http://www.doh.dot.state.nc.us/preconstruct/highway/location/support/Manuals.htm

Thank you for your assistance in this matter. If you have any questions regarding this information, please contact Mr. Watson McNeil, PE, PLS, at 919-250-4112 or Mr. Emory Kincaid, PLS, at 919-250-4109.

DMB/mk
Attachments
cc w/att: Len Hill, PE
Emory Kincaid, PLS
Watson McNeil, PE, PLS

MAILING ADDRESS:
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HIGHWAY DESIGN BRANCH
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RALEIGH NC 27699-1584

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LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE A1
1000 BIRCH RIDGE DRIVE
RALEIGH NC

Required Survey Control Sheet Information

Sheet 1C

1) Graphics of project showing the primary GPS controls, with coordinates
2) Datum Description
3) Vicinity Map showing outer control network (HARN)
4) Notes (see Below)

Sheet 1D

5) Site Calibration or Mapping Transformation (May not be necessary on small projects)
6) Datum Description
7) Notes (see below)
8) Baseline Control may be added if space allows

Sheet 1E

9) Baseline data with Station and Offset to design alignment
10) Benchmark information with Station and Offset to design alignment
11) Datum Description
12) Notes (see below)

Notes (Items 4, 7, 12) – the same set of notes should appear on each page
For projects with site calibration:

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 such system such as VRS (Virtual Reference Station) is used, additional field ties may be 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/

The files to be found are as follows:

*Project Number*_ ls_ gpscalib_ *Date of latest revision (yr ,month, day)*.html
Example u4026_ls_gpscalib_030101.html
*Project Number*_ ls_ wgs84_ *Date of latest revision (yr ,month, day)*.txt
Example u4026_ls_wgs84_030101.txt
*Project Number*_ ls_ local_ *Date of latest revision (yr ,month, day)*.txt
Example u4026_ls_local_030101.txt
*Project Number*_ ls_ baseline_ *Date of latest revision (yr ,month, day)*.txt
Example u4026_ls_baseline_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 NCDOT Location & Surveys Unit.

For smaller projects not requiring a site calibration

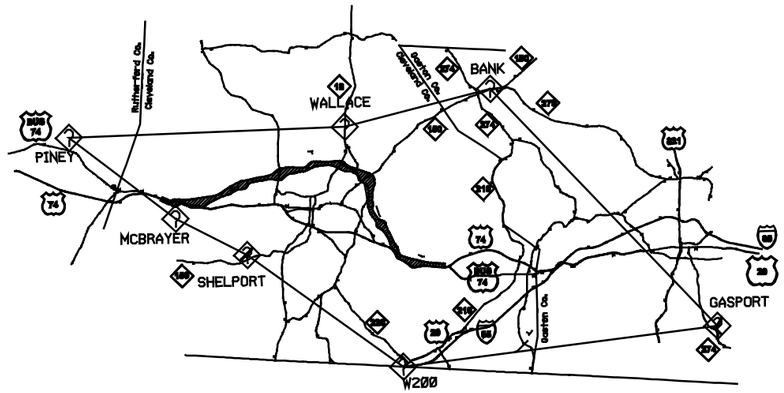
1. Site calibration has not been provided for this project. If further information is needed, please contact the NCDOT Location & Surveys Unit.
2. The control data for this project can be found electronically by selecting "Project Control Data" at http://www.doh.dot.state.nc.us/preconstruct/highway/location/project/

The files to be found are as follows:

*Project Number*_ ls_ baseline_ *Date of latest revision (yr ,month, day)*.txt
Example b4026_ls_baseline_030101.txt

PROJECT REFERENCE NO.	SHEET NO.
8.0000000	1 C
LOCATION AND SURVEYS	

SURVEY CONTROL SHEET



GPS CONTROL NETWORK

NOT TO SCALE

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 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/

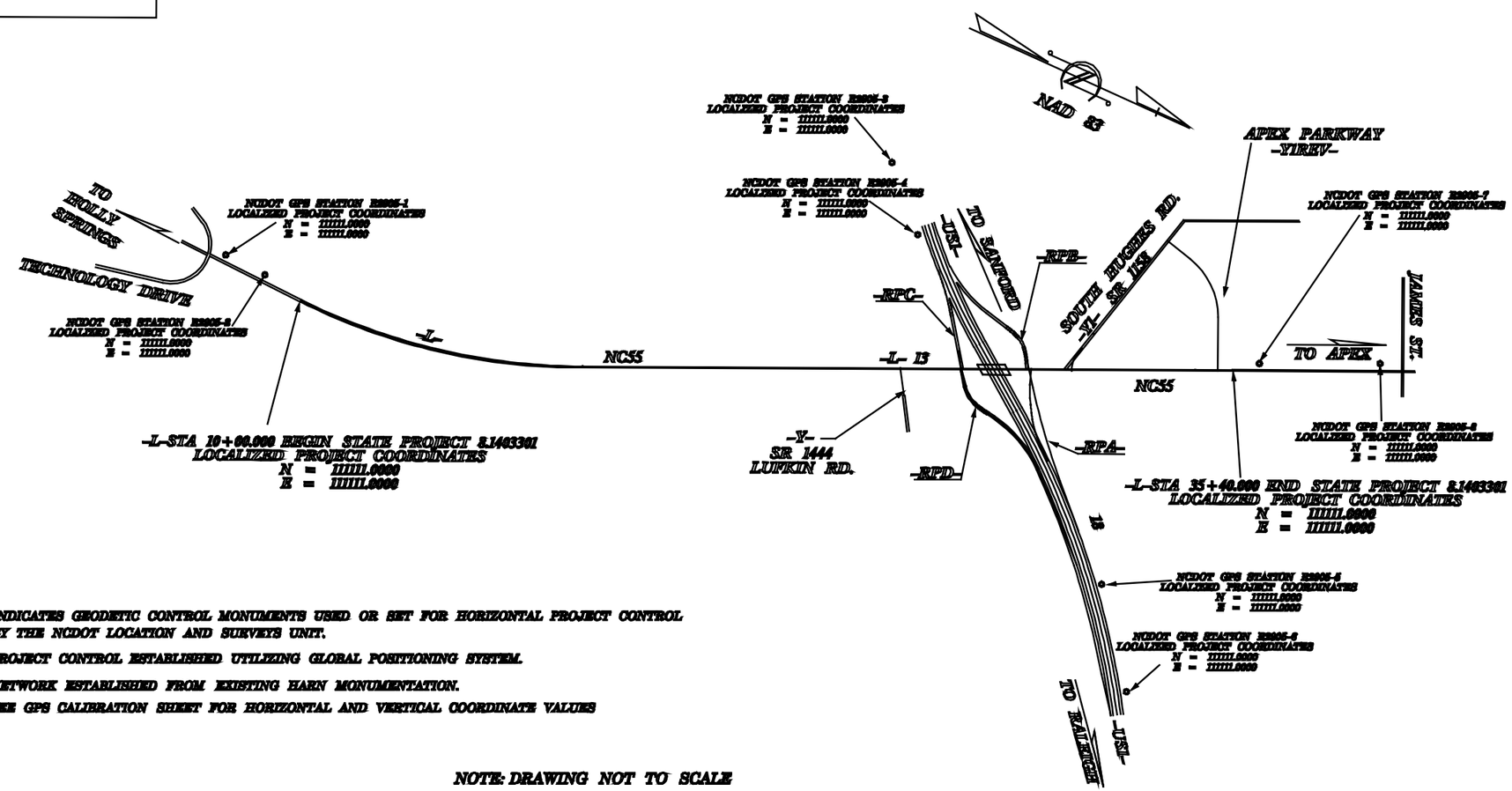
   THE FILES TO BE FOUND ARE AS FOLLOWS:

   U4026_LS_GPSCALIB_030101.HTML
   U4026_LS_WGS84_030101.TXT
   U4026_LS_LOCAL_030101.TXT
   U4026_LS_BASELINE_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.

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: 1111111.0000(ft) EASTING: 11111111.0000(ft)
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 roadway) IS 50000
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88



△ 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 HARN MONUMENTATION.

SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES

NOTE: DRAWING NOT TO SCALE

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
8.0000000	1 D
LOCATION AND SURVEYS	

SURVEY CONTROL SHEET U-4026

GPS CALIBRATION REPORT

PROJECT : R2707 CALIBRATION 1 GROUND

TIP NUMBER			
USER NAME	EKINCAID	DATE & TIME	9:56:01 AM 12/18/02
COORDINATE SYSTEM	US STATE PLANE 1983(AT GROUND)	ZONE	NORTH CAROLINA 3200
HORIZONTAL DATUM	NAD 1983 (CONUS)		
VERTICAL DATUM		GEOID MODEL	GEOID99 NC SUB GRID
COORDINATE UNITS	US SURVEY FEET		
DISTANCE UNITS	US SURVEY FEET		
HEIGHT UNITS	US SURVEY FEET		

LOCAL SITE INFORMATION
LOCALIZED AROUND
LATITUDE 35°17'53.47519"N
LONGITUDE 81°32'14.97764"W
SITE SCALE FACTOR 1.00016693

THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION USES 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	571110.665FT
EASTING COORDINATE OF ROTATION CENTER	1245634.944FT
ROTATION ABOUT THE CENTER POINT	0°00'00"
TRANSLATION NORTH	0.003FT
TRANSLATION EAST	0.000FT
SCALE FACTOR	1.00000000

VERTICAL ADJUSTMENT PARAMETERS

NORTHING COORDINATE OF ORIGIN POINT	581073.122FT
EASTING COORDINATE OF ORIGIN POINT	1206029.125FT
VERTICAL SEPARATION AT ORIGIN	0.108FT
SLOPE NORTH	0.023PPM
SLOPE EAST	-0.424PPM

GEOID MODEL DEFINITION

GEOID99 NC SUB GRID

RESIDUAL DIFFERENCES BETWEEN GPS (WGS84) AND LOCAL COORDINATES

SUMMARY

	MAXIMUM ERROR	ROOT MEAN SQUARE ERROR	POINT
HORIZONTAL	0.001FT	0.000	PINEY_WGS84
VERTICAL	0.003FT	0.005	SHELPORT_WGS84
THREE-DIMENSIONAL	0.003FT	0.005	SHELPORT_WGS84

POINT RESIDUALS

WGS84 COORDINATES	CALCULATED POINT FOR DISPLAY ONLY	LOCAL COORDINATES
POINT PINEY_WGS84	NORTHING 592421.608FT	POINT PINEY_LOCAL
LATITUDE 35°28'45.98727"N	EASTING 1173917.454FT	NORTHING 592421.607FT
LONGITUDE 81°46'14.08895"W	ELEVATION 1020.471FT	EASTING 1173917.455FT
HEIGHT 915.300FT	HORZ ERROR 0.001FT	ELEVATION 1020.339FT
	VERT ERROR ?	UTILIZED HORIZONTAL
	3D ERROR 0.001FT	QUALITY SURVEY QUALITY
POINT LATT-2_WGS84	NORTHING 581073.122FT	POINT LATT-2_LOCAL
LATITUDE 35°19'02.46268"N	EASTING 1206029.125FT	NORTHING 581073.122FT
LONGITUDE 81°39'42.94607"W	ELEVATION 925.999FT	EASTING 1206029.125FT
HEIGHT 821.019FT	HORZ ERROR 0.001FT	ELEVATION 925.978FT
	VERT ERROR 0.023FT	UTILIZED HORZ AND VERT
	3D ERROR 0.023FT	QUALITY SURVEY QUALITY
POINT R2707-2_WGS84	NORTHING 574596.515FT	POINT R2707-2_LOCAL
LATITUDE 35°17'57.75551"N	EASTING 1203479.521FT	NORTHING 574596.515FT
LONGITUDE 81°40'11.59792"W	ELEVATION 881.489FT	EASTING 1203479.521FT
HEIGHT 778.521FT	HORZ ERROR 0.001FT	ELEVATION 881.465FT
	VERT ERROR 0.024FT	UTILIZED HORZ AND VERT
	3D ERROR 0.024FT	QUALITY SURVEY QUALITY
POINT R2707-1_WGS84	NORTHING 573421.567FT	POINT R2707-1_LOCAL
LATITUDE 35°17'46.16223"N	EASTING 1203564.965FT	NORTHING 573421.567FT
LONGITUDE 81°40'18.18768"W	ELEVATION 857.804FT	EASTING 1203564.965FT
HEIGHT 752.943FT	HORZ ERROR 0.000FT	ELEVATION 857.784FT
	VERT ERROR 0.020FT	UTILIZED HORZ AND VERT
	3D ERROR 0.020FT	QUALITY SURVEY QUALITY
POINT MCBRAYER_WGS84	NORTHING 568742.428FT	POINT MCBRAYER_LOCAL
LATITUDE 35°16'59.95798"N	EASTING 1203773.299FT	NORTHING 568742.428FT
LONGITUDE 81°40'06.15784"W	ELEVATION 866.783FT	EASTING 1203773.299FT
HEIGHT 751.862FT	HORZ ERROR 0.000FT	ELEVATION 866.774FT
	VERT ERROR 0.009FT	UTILIZED HORZ AND VERT
	3D ERROR 0.009FT	QUALITY SURVEY QUALITY
POINT R2707-30_WGS84	NORTHING 574306.375FT	POINT R2707-30_LOCAL
LATITUDE 35°17'56.24309"N	EASTING 1206696.428FT	NORTHING 574306.375FT
LONGITUDE 81°39'09.79749"W	ELEVATION 902.613FT	EASTING 1206696.428FT
HEIGHT 797.696FT	HORZ ERROR 0.001FT	ELEVATION 902.604FT
	VERT ERROR 0.009FT	UTILIZED HORZ AND VERT
	3D ERROR 0.009FT	QUALITY SURVEY QUALITY
POINT R2707-31_WGS84	NORTHING 573379.965FT	POINT R2707-31_LOCAL
LATITUDE 35°17'46.97164"N	EASTING 1208167.873FT	NORTHING 573379.965FT
LONGITUDE 81°39'14.66874"W	ELEVATION 903.365FT	EASTING 1208167.873FT
HEIGHT 798.440FT	HORZ ERROR 0.001FT	ELEVATION 903.360FT
	VERT ERROR 0.007FT	UTILIZED HORZ AND VERT
	3D ERROR 0.007FT	QUALITY SURVEY QUALITY
POINT R2707-4_WGS84	NORTHING 576194.769FT	POINT R2707-4_LOCAL
LATITUDE 35°18'17.64738"N	EASTING 1219011.548FT	NORTHING 576194.769FT
LONGITUDE 81°37'04.79726"W	ELEVATION 875.103FT	EASTING 1219011.548FT
HEIGHT 778.246FT	HORZ ERROR 0.000FT	ELEVATION 875.110FT
	VERT ERROR 0.005FT	UTILIZED HORZ AND VERT
	3D ERROR 0.005FT	QUALITY SURVEY QUALITY
POINT R2707-3_WGS84	NORTHING 575077.671FT	POINT R2707-3_LOCAL
LATITUDE 35°18'06.56165"N	EASTING 1219236.668FT	NORTHING 575077.671FT
LONGITUDE 81°37'01.73995"W	ELEVATION 878.468FT	EASTING 1219236.668FT
HEIGHT 773.619FT	HORZ ERROR 0.000FT	ELEVATION 878.476FT
	VERT ERROR 0.018FT	UTILIZED HORZ AND VERT
	3D ERROR 0.018FT	QUALITY SURVEY QUALITY
POINT R2707-6_WGS84	NORTHING 578841.494FT	POINT R2707-6_LOCAL
LATITUDE 35°18'37.82597"N	EASTING 1223321.387FT	NORTHING 578841.494FT
LONGITUDE 81°36'13.48386"W	ELEVATION 881.425FT	EASTING 1223321.387FT
HEIGHT 776.598FT	HORZ ERROR 0.001FT	ELEVATION 881.432FT
	VERT ERROR 0.007FT	UTILIZED HORZ AND VERT
	3D ERROR 0.007FT	QUALITY SURVEY QUALITY
POINT R2707-5_WGS84	NORTHING 577485.588FT	POINT R2707-5_LOCAL
LATITUDE 35°18'31.78972"N	EASTING 1224323.796FT	NORTHING 577485.588FT
LONGITUDE 81°36'01.13713"W	ELEVATION 887.479FT	EASTING 1224323.796FT
HEIGHT 782.653FT	HORZ ERROR 0.001FT	ELEVATION 887.469FT
	VERT ERROR 0.011FT	UTILIZED HORZ AND VERT
	3D ERROR 0.011FT	QUALITY SURVEY QUALITY
POINT SHELPORT_WGS84	NORTHING 557914.351FT	POINT SHELPORT_LOCAL
LATITUDE 35°15'10.19796"N	EASTING 1223941.239FT	NORTHING 557914.351FT
LONGITUDE 81°35'59.56761"W	ELEVATION 851.363FT	EASTING 1223941.239FT
HEIGHT 746.672FT	HORZ ERROR 0.000FT	ELEVATION 851.426FT
	VERT ERROR 0.063FT	UTILIZED HORZ AND VERT
	3D ERROR 0.063FT	QUALITY SURVEY QUALITY
POINT R2707-8_WGS84	NORTHING 580239.339FT	POINT R2707-8_LOCAL
LATITUDE 35°19'01.36750"N	EASTING 1233459.617FT	NORTHING 580239.339FT
LONGITUDE 81°34'11.80911"W	ELEVATION 811.626FT	EASTING 1233459.617FT
HEIGHT 706.747FT	HORZ ERROR 0.000FT	ELEVATION 811.534FT
	VERT ERROR 0.007FT	UTILIZED HORZ AND VERT
	3D ERROR 0.007FT	QUALITY SURVEY QUALITY
POINT R2707-7_WGS84	NORTHING 579086.829FT	POINT R2707-7_LOCAL
LATITUDE 35°19'49.09968"N	EASTING 1233137.456FT	NORTHING 579086.829FT
LONGITUDE 81°34'15.30998"W	ELEVATION 816.989FT	EASTING 1233137.456FT
HEIGHT 712.197FT	HORZ ERROR 0.000FT	ELEVATION 816.977FT
	VERT ERROR 0.009FT	UTILIZED HORZ AND VERT
	3D ERROR 0.009FT	QUALITY SURVEY QUALITY
POINT WALLACE_WGS84	NORTHING 593880.489FT	POINT WALLACE_LOCAL
LATITUDE 35°21'21.03068"N	EASTING 1252431.749FT	NORTHING 593880.490FT
LONGITUDE 81°30'27.11496"W	ELEVATION 968.747FT	EASTING 1252431.739FT
HEIGHT 864.040FT	HORZ ERROR 0.001FT	ELEVATION 968.735FT
	VERT ERROR 0.012FT	UTILIZED HORZ AND VERT
	3D ERROR 0.012FT	QUALITY SURVEY QUALITY
POINT BANK_WGS84	NORTHING 603883.315FT	POINT BANK_LOCAL
LATITUDE 35°23'10.84506"N	EASTING 1294092.154FT	NORTHING 603883.315FT
LONGITUDE 81°22'07.20970"W	ELEVATION 961.942FT	EASTING 1294092.154FT
HEIGHT 867.462FT	HORZ ERROR 0.000FT	ELEVATION 961.826FT
	VERT ERROR 0.016FT	UTILIZED HORZ AND VERT
	3D ERROR 0.016FT	QUALITY SURVEY QUALITY
POINT R2707-10_WGS84	NORTHING 584283.797FT	POINT R2707-10_LOCAL
LATITUDE 35°19'44.15035"N	EASTING 1244462.432FT	NORTHING 584283.796FT
LONGITUDE 81°32'00.33374"W	ELEVATION 848.403FT	EASTING 1244462.432FT
HEIGHT 743.696FT	HORZ ERROR 0.001FT	ELEVATION 848.484FT
	VERT ERROR 0.001FT	UTILIZED HORZ AND VERT
	3D ERROR 0.002FT	QUALITY SURVEY QUALITY
POINT R2707-9_WGS84	NORTHING 583249.208FT	POINT R2707-9_LOCAL
LATITUDE 35°19'34.02834"N	EASTING 1244885.092FT	NORTHING 583249.208FT
LONGITUDE 81°31'54.91627"W	ELEVATION 873.642FT	EASTING 1244885.092FT
HEIGHT 768.949FT	HORZ ERROR 0.000FT	ELEVATION 873.644FT
	VERT ERROR 0.002FT	UTILIZED HORZ AND VERT
	3D ERROR 0.002FT	QUALITY SURVEY QUALITY
POINT W77_WGS84	NORTHING 573127.522FT	POINT W77_LOCAL
LATITUDE 35°17'53.47515"N	EASTING 1242971.658FT	NORTHING 573127.522FT
LONGITUDE 81°32'14.97764"W	ELEVATION 852.261FT	EASTING 1242971.658FT
HEIGHT 747.636FT	HORZ ERROR 0.000FT	ELEVATION 852.279FT
	VERT ERROR 0.018FT	UTILIZED HORZ AND VERT
	3D ERROR 0.018FT	QUALITY SURVEY QUALITY
POINT R2707-12_WGS84	NORTHING 583972.987FT	POINT R2707-12_LOCAL
LATITUDE 35°19'42.81111"N	EASTING 1251363.472FT	NORTHING 583972.987FT
LONGITUDE 81°30'36.98294"W	ELEVATION 948.573FT	EASTING 1251363.471FT
HEIGHT 841.937FT	HORZ ERROR 0.001FT	ELEVATION 948.573FT
	VERT ERROR 0.000FT	UTILIZED HORZ AND VERT
	3D ERROR 0.001FT	QUALITY SURVEY QUALITY
POINT R2707-11_WGS84	NORTHING 582985.297FT	POINT R2707-11_LOCAL
LATITUDE 35°19'32.88649"N	EASTING 1250689.306FT	NORTHING 582985.297FT
LONGITUDE 81°30'44.79014"W	ELEVATION 939.703FT	EASTING 1250689.306FT
HEIGHT 835.071FT	HORZ ERROR 0.000FT	ELEVATION 939.707FT
	VERT ERROR 0.004FT	UTILIZED HORZ AND VERT
	3D ERROR 0.004FT	QUALITY SURVEY QUALITY
POINT R2707-16_WGS84	NORTHING 579298.137FT	POINT R2707-16_LOCAL
LATITUDE 35°18'58.26736"N	EASTING 1258413.510FT	NORTHING 579298.137FT
LONGITUDE 81°29'18.51486"W	ELEVATION 889.764FT	EASTING 1258413.510FT
HEIGHT 785.228FT	HORZ ERROR 0.000FT	ELEVATION 889.766FT
	VERT ERROR 0.002FT	UTILIZED HORZ AND VERT
	3D ERROR 0.002FT	QUALITY SURVEY QUALITY
POINT R2707-15_WGS84	NORTHING 578350.547FT	POINT R2707-15_LOCAL
LATITUDE 35°18'48.68591"N	EASTING 1257235.439FT	NORTHING 578350.547FT
LONGITUDE 81°29'24.44011"W	ELEVATION 936.744FT	EASTING 1257235.438FT
HEIGHT 832.286FT	HORZ ERROR 0.000FT	ELEVATION 936.747FT
	VERT ERROR 0.003FT	UTILIZED HORZ AND VERT
	3D ERROR 0.003FT	QUALITY SURVEY QUALITY
POINT R2707-18_WGS84	NORTHING 570707.866FT	POINT R2707-18_LOCAL
LATITUDE 35°17'34.55212"N	EASTING 1260246.230FT	NORTHING 570707.867FT
LONGITUDE 81°28'45.84463"W	ELEVATION 881.620FT	EASTING 1260246.230FT
HEIGHT 777.174FT	HORZ ERROR 0.001FT	ELEVATION 881.628FT
	VERT ERROR 0.006FT	UTILIZED HORZ AND VERT
	3D ERROR 0.006FT	QUALITY SURVEY QUALITY
POINT R2707-17_WGS84	NORTHING 571191.295FT	POINT R2707-17_LOCAL
LATITUDE 35°17'38.25296"N	EASTING 1259848.939FT	NORTHING 571191.296FT
LONGITUDE 81°29'00.40170"W	ELEVATION 903.346FT	EASTING 1259848.939FT
HEIGHT 798.886FT	HORZ ERROR 0.001FT	ELEVATION 903.350FT
	VERT ERROR 0.009FT	UTILIZED HORZ AND VERT
	3D ERROR 0.009FT	QUALITY SURVEY QUALITY
POINT B2815-2_WGS84	NORTHING 566310.519FT	POINT B2815-2_LOCAL
LATITUDE 35°16'53.62962"N	EASTING 1274293.152FT	NORTHING 566310.519FT
LONGITUDE 81°25'55.12764"W	ELEVATION 730.628FT	EASTING 1274293.152FT
HEIGHT 626.367FT	HORZ ERROR 0.001FT	ELEVATION 730.628FT
	VERT ERROR 0.002FT	UTILIZED HORZ AND VERT
	3D ERROR 0.002FT	QUALITY SURVEY QUALITY
POINT R2707-20_WGS84	NORTHING 566205.197FT	POINT R2707-20_LOCAL
LATITUDE 35°16'50.02947"N	EASTING 1262995.052FT	NORTHING 566205.197FT
LONGITUDE 81°26'11.31182"W	ELEVATION 755.084FT	EASTING 1262995.052FT
HEIGHT 651.219FT	HORZ ERROR 0.000FT	ELEVATION 755.089FT
	VERT ERROR 0.000FT	UTILIZED HORZ AND VERT
	3D ERROR 0.000FT	QUALITY SURVEY QUALITY
POINT R2707-19_WGS84	NORTHING 565153.743FT	POINT R2707-19_LOCAL
LATITUDE 35°16'39.35407"N	EASTING 1261859.618FT	NORTHING 565153.743FT
LONGITUDE 81°26'24.69568"W	ELEVATION 836.017FT	EASTING 1261859.618FT
HEIGHT 731.632FT	HORZ ERROR 0.000FT	ELEVATION 836.026FT
	VERT ERROR 0.009FT	UTILIZED HORZ AND VERT
	3D ERROR 0.009FT	QUALITY SURVEY QUALITY
POINT R2707-22_WGS84	NORTHING 556504.193FT	POINT R2707-22_LOCAL
LATITUDE 35°15'14.59228"N	EASTING 1266566.389FT	NORTHING 556504.193FT
LONGITUDE 81°27'25.36528"W	ELEVATION 666.709FT	EASTING 1266566.389FT
HEIGHT 562.458FT	HORZ ERROR 0.000FT	ELEVATION 666.712FT
	VERT ERROR 0.003FT	UTILIZED HORZ AND VERT
	3D ERROR 0.003FT	QUALITY SURVEY QUALITY
POINT R2707-21_WGS84	NORTHING 555483.744FT	POINT R2707-21_LOCAL
LATITUDE 35°15'04.06344"N	EASTING 1266367.405FT	NORTHING 555483.745FT
LONGITUDE 81°27'27.43526"W	ELEVATION 728.798FT	EASTING 1266367.405FT
HEIGHT 624.838FT	HORZ ERROR 0.001FT	ELEVATION 728.782FT
	VERT ERROR 0.002FT	UTILIZED HORZ AND VERT
	3D ERROR 0.002FT	QUALITY SURVEY QUALITY
POINT 2-JS-13_WGS84	NORTHING 553976.476FT	POINT 2-JS-13_LOCAL
LATITUDE 35°14'52.34165"N	EASTING 1276402.958FT	NORTHING 553976.474FT
LONGITUDE 81°25'28.00083"W	ELEVATION 874.018FT	EASTING 1276402.958FT
HEIGHT 769.979FT	HORZ ERROR 0.001FT	ELEVATION 874.077FT
	VERT ERROR 0.004FT	UTILIZED HORZ AND VERT
	3D ERROR 0.004FT	QUALITY SURVEY QUALITY
POINT R2707-23_WGS84	NORTHING 553669.095FT	POINT R2707-23_LOCAL
LATITUDE 35°14'49.18428"N	EASTING 1275622.041FT	NORTHING 553669.094FT
LONGITUDE 81°25'35.37087"W	ELEVATION 867.422FT	EASTING 1275622.041FT
HEIGHT 769.312FT	HORZ ERROR 0.001FT	ELEVATION 867.417FT
	VERT ERROR 0.005FT	UTILIZED HORZ AND VERT
	3D ERROR 0.005FT	QUALITY SURVEY QUALITY
POINT R2625-4_WGS84	NORTHING 544729.474FT	POINT R2625-4_LOCAL
LATITUDE 35°13'23.79458"N	EASTING 1288217.099FT	NORTHING 544729.474FT
LONGITUDE 81°23'00.98849"W	ELEVATION 949.777FT	EASTING 1288217.099FT
HEIGHT 846.051FT	HORZ ERROR 0.000FT	ELEVATION 949.786FT
	VERT ERROR 0.011FT	UTILIZED HORZ AND VERT
	3D ERROR 0.011FT	QUALITY SURVEY QUALITY
POINT W200_WGS84	NORTHING 525158.976FT	POINT W200_LOCAL
LATITUDE 35°10'05.38298"N	EASTING 1267723.712FT	NORTHING 525158.976FT
LONGITUDE 81°27'02.00780"W	ELEVATION 880.258FT	EASTING 1267723.712FT
HEIGHT 776.419FT	HORZ ERROR 0.000FT	ELEVATION 880.222FT
	VERT ERROR 0.028FT	UTILIZED HORZ AND VERT
	3D ERROR 0.028FT	QUALITY SURVEY QUALITY
POINT GASPORT_WGS84	NORTHING 534948.769FT	POINT GASPORT_LOCAL
LATITUDE 35°12'02.71084"N	EASTING 1357377.589FT	NORTHING 534948.769FT
LONGITUDE 81°09'05.07428"W	ELEVATION 795.454FT	EASTING 1357377.589FT
HEIGHT 893.194FT	HORZ ERROR 0.000FT	ELEVATION 795.456FT
	VERT ERROR 0.001FT	UTILIZED HORZ AND VERT
	3D ERROR 0.001FT	QUALITY SURVEY QUALITY

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(0000ft) EASTING: 111111111(0000ft)
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 roadway) IS 50000
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

NOTES

1. THE SITE CALIBRATION SHOWN IS BASED UPON A NETWORK TIED TO THE WARN (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 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/

   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_BASELINE_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.

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
8.0000000	1 E
LOCATION AND SURVEYS	

SURVEY CONTROL SHEET U-4026

BASELINE DATA

BL

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
101	BL-101	762841.7920	2845235.7820	318.51	OUTSIDE PROJECT LIMITS	
102	BL-102	762700.8890	2845173.9420	311.09	OUTSIDE PROJECT LIMITS	
1	GPS U4026-1	763432.1414	2845189.7679	337.88	18+29.66	37.87 RT
2	GPS U4026-2	764395.9650	2844991.5727	365.51	28+12.45	18.35 RT
103	BL-103	764870.5140	2844984.6580	378.21	24+93.98	21.35 RT
104	BL-104	765322.8610	2844692.9340	374.73	29+87.84	28.07 RT
105	BL-105	766107.3780	2844078.5220	377.51	39+86.69	17.19 RT
106	BL-106	766576.8550	2843759.9960	379.58	45+53.37	16.74 RT
107	BL-107	767299.2980	2843533.8660	389.87	53+27.89	38.13 RT
109	BL-109	768084.8890	2843165.9670	384.05	61+16.18	19.89 RT
110	BL-110	768630.5950	2842932.6180	365.21	67+91.31	39.78 RT
111	BL-111	769365.4740	2842685.7930	366.42	75+56.63	23.69 LT
9	NCDOT MAXI	769953.8080	2842789.4250	375.82	81+54.94	26.11 RT
112	BL-112	768458.8100	2842784.4460	368.27	86+78.28	19.99 RT
3	U4026-3	768786.3660	2842833.1060	352.78	89+96.73	32.48 LT
113	BL-113	761734.9840	2843239.1150	328.48	188+28.05	42.69 RT
114	BL-114	762581.0540	2842923.9330	318.88	189+28.94	24.34 RT
115	BL-115	763283.4630	2842269.4780	389.18	118+38.96	16.64 RT
25	R2000-25	763957.2770	2841796.9880	384.16	127+18.74	19.84 RT
26	R2000-26	765141.2860	2840223.8190	291.58	140+87.61	21.95 LT
116	BL-116	765918.1830	2839775.4380	385.91	154+93.22	25.65 RT
117	BL-117	766743.3540	2839136.6850	327.74	166+28.16	32.88 RT
118	BL-118	767378.8210	2838422.8440	386.51	175+66.67	43.55 RT
119	BL-119	767988.5460	2837739.0870	295.62	184+35.82	21.86 LT
120	BL-120	768658.6410	2837562.5570	294.97	192+13.55	27.82 RT
121	BL-121	769151.8770	2837693.4320	291.82	197+45.16	28.49 RT
10	NCDOT DEVELOPMEN	778169.1650	2838231.5960	289.88	288+95.58	59.89 RT
122	BL-122	771842.5520	2838614.8330	383.14	218+49.29	18.68 RT
123	BL-123	771441.2750	2838971.6620	387.48	223+98.83	25.62 RT
124	BL-124	771667.5470	2839433.6970	389.43	229+22.22	24.95 RT
125	BL-125	772892.2810	2840311.9180	318.11	238+91.83	38.58 RT
126	BL-126	772734.2110	2840788.2380	331.72	246+27.99	68.45 RT
127	BL-127	773516.9730	2840731.6320	341.96	253+96.78	58.48 RT
5	U4026-5	774289.8160	2840789.4620	348.99	268+89.82	73.54 RT
128	BL-128	775199.3480	2840610.7760	323.69	OUTSIDE PROJECT LIMITS	
129	BL-129	776288.0680	2840546.8440	389.63	OUTSIDE PROJECT LIMITS	
130	BL-130	777153.2450	2840536.4410	292.58	OUTSIDE PROJECT LIMITS	
131	BL-131	777748.9280	2840466.2270	293.45	OUTSIDE PROJECT LIMITS	
132	BL-132	778366.7760	2840487.2470	292.58	OUTSIDE PROJECT LIMITS	
133	BL-133	778783.9830	2840628.2660	291.67	OUTSIDE PROJECT LIMITS	
134	BL-134	779140.0310	2840835.4140	328.86	OUTSIDE PROJECT LIMITS	
7	U4026-7	779822.8960	2841231.8980	321.85	OUTSIDE PROJECT LIMITS	
8	U4026-8	780752.8970	2841684.8980	322.18	OUTSIDE PROJECT LIMITS	

BY

POINT	DESC.	NORTH	EAST	ELEVATION	Y STATION	OFFSET
281	BY-281	763622.9880	2844475.9280	329.62	7+26.95	22.98 LT
282	BY-282	763514.7340	2844628.8560	336.59	18+77.18	16.86 LT
283	U4026-1	763432.1414	2845189.7679	337.88	14+55.62	42.48 LT
284	BY-284	763295.4850	2845611.1480	335.52	19+81.21	13.38 LT
285	BY-285	763182.4650	2845961.4590	321.18	22+47.61	15.83 LT

BY1

POINT	DESC.	NORTH	EAST	ELEVATION	Y1 STATION	OFFSET
286	BY1-286	764985.8940	2844277.1730	365.94	9+53.82	14.92 LT
287	BY1-287	765322.8610	2844692.9340	374.73	12+64.29	18.24 LT

BY2

POINT	DESC.	NORTH	EAST	ELEVATION	Y2 STATION	OFFSET
288	BY2-288	766415.3940	2843294.8750	364.04	11+57.03	14.33 LT
289	BY2-289	766576.8550	2843759.9960	379.58	15+11.64	16.82 LT

BY3

POINT	DESC.	NORTH	EAST	ELEVATION	Y3 STATION	OFFSET
210	BY3-210	767299.2980	2843533.8660	389.87	9+51.66	12.99 LT
211	BY3-211	767365.2940	2843739.5840	388.62	14+81.32	11.26 LT

BY4

POINT	DESC.	NORTH	EAST	ELEVATION	Y4 STATION	OFFSET
212	BY4-212	768524.9920	2842334.1960	385.44	8+99.41	13.95 LT
213	BY4-213	768630.5850	2842932.6180	388.35	11+61.93	12.65 LT
214	BY4-214	768989.7620	2843345.1670	374.88	15+73.17	16.29 LT

BY5

POINT	DESC.	NORTH	EAST	ELEVATION	Y5 STATION	OFFSET
215	BY5-215	768562.5450	2842241.8590	378.16	9+93.69	19.68 LT
216	BY5-216	768458.8180	2842784.4460	368.27	13+85.52	14.84 LT

BY6

POINT	DESC.	NORTH	EAST	ELEVATION	Y6 STATION	OFFSET
217	BY6-217	761734.9840	2843239.1150	328.48	15+26.63	14.31RT
218	BY6-218	761813.9760	2843741.8640	337.47	11+52.69	13.99 RT

BY7

POINT	DESC.	NORTH	EAST	ELEVATION	Y7 STATION	OFFSET
219	BY7-219	766361.7430	2839628.6120	342.54	16+21.28	26.35 RT
220	BY7-220	766743.3540	2839136.6850	327.74	12+93.72	21.88 RT
221	BY7-221	767831.6130	2839399.3550	327.78	9+61.49	12.29 RT

BY9

POINT	DESC.	NORTH	EAST	ELEVATION	Y9 STATION	OFFSET
222	BY9-222	772734.2110	2840788.2380	331.72	18+38.86	15.62 RT
223	BY9-223	772697.1690	2841214.9680	346.54	11+18.92	12.44 RT

BY10

POINT	DESC.	NORTH	EAST	ELEVATION	Y10 STATION	OFFSET
224	U4026-6	774118.8210	2839758.4310	358.93	21+81.77	18.89 RT
225	U4026-5	774289.8160	2840789.4620	348.99	14+55.43	12.73 RT
226	BY10-226	774322.2280	2841275.6340	359.33	18+86.59	11.68 RT

****
BM4 ELEVATION - 388.98
N 766685 E 2843658
L STATION 46+37 59 LEFT
RR SPIKE IN BASE OF 15" PINE
****

****
BM7 ELEVATION - 318.91
N 762347 E 2843881
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 59 LEFT
RR SPIKE IN BASE OF 24" PINE
****

****
BM9 ELEVATION - 292.25
N 764266 E 2841363
L STATION 132+68 62 LEFT
"X" CUT IN COR OF CONC HW
****

****
BM11 ELEVATION - 388.29
N 768244 E 2837317
L STATION 188+69 262 LEFT
"X" CUT IN SE COR OF CONC RETAINING WALL
****

****
BM13 ELEVATION - 319.27
N 772884 E 2839315
L STATION 229+29 331 LEFT
RR SPIKE IN BASE OF 22" PINE
****

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 MAYBE NEEDED TO REDUCE POSSIBLE ERRORS. OR BIASES.

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   U4026_LS_BASELINE_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.

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R-2000-26"
WITH NAD 1983/95 STATE PLANE GRID COORDINATES OF
NORTHING= 1111111.0000(ft) EASTING= 1111111.0000(ft)
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-Y STATION (supplied by roadway) IS 50000
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

SYSTEM=
DGN=
USERNAME=