

SURVEY CONTROL SHEET R-2237B

GPS CALIBRATION REPORT

PROJECT : R2237B
 TIP NUMBER R-2237B
 USER NAME RGMILLER DATE & TIME 2:02:18 PM 7/29/2003

COORDINATE SYSTEM US STATE PLANE ZONE NORTH CAROLINA 3200
 HORIZONTAL DATUM NAD 1983 (CONUS)
 VERTICAL DATUM NGVD 29
 GEOID MODEL GEOID99 (CONUS)
 COORDINATE UNITS US SURVEY FEET
 DISTANCE UNITS US SURVEY FEET
 HEIGHT UNITS US SURVEY FEET

LOCAL SITE INFORMATION
 LOCALIZED AROUND
 LATITUDE 36°04'08.15088"N
 LONGITUDE 81°36'58.81643"W
 SITE SCALE FACTOR 1.0000915100

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 857299.4015FT
 EASTING COORDINATE OF ROTATION CENTER 1225185.4795FT
 ROTATION ABOUT THE CENTER
 POINT 0.00'00"
 TRANSLATION NORTH -0.0045FT
 TRANSLATION EAST -0.1495FT
 SCALE FACTOR 1.00000000

VERTICAL ADJUSTMENT PARAMETERS
 NORTHING COORDINATE OF ORIGIN POINT 839724.7825FT
 EASTING COORDINATE OF ORIGIN POINT 1234585.3365FT
 VERTICAL SEPARATION AT ORIGIN -0.0955FT
 SLOPE NORTH -1.446PPM
 SLOPE EAST 1.414PPM

GEOID MODEL DEFINITION
 GEOID99 (CONUS)

RESIDUAL DIFFERENCES BETWEEN GPS (WGS84) AND LOCAL COORDINATES

SUMMARY			
	MAXIMUM ERROR	ROOT MEAN SQUARE ERROR	POINT
HORIZONTAL	0.1305FT	0.019	BR-2 - WGS84
VERTICAL	0.0705FT	0.011	WILLOWDALE - WGS
THREE-DIMENSIONAL	0.1385FT	0.022	BR-2 - WGS84

POINT RESIDUALS

WGS84 COORDINATES	CALCULATED POINT FOR DISPLAY ONLY	LOCAL COORDINATES
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POINT R2237B-1 - WGS84 LATITUDE 36°01'47.26632"N LONGITUDE 81°35'19.91210"W HEIGHT 1277.4385FT	NORTHING 839724.7825FT EASTING 1234585.3365FT ELEVATION 1382.8335FT HORZ ERROR 0.0735FT VERT ERROR 0.0355FT 3D ERROR 0.0815FT	POINT R2237B-1 - LOCAL NORTHING 839724.7585FT EASTING 1234585.4055FT ELEVATION 1382.8685FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
POINT R2237B-2 - WGS84 LATITUDE 36°01'55.51013"N LONGITUDE 81°35'33.42179"W HEIGHT 1286.6125FT	NORTHING 840587.1335FT EASTING 1233497.7465FT ELEVATION 1391.9585FT HORZ ERROR 0.0675FT VERT ERROR 0.0215FT 3D ERROR 0.0715FT	POINT R2237B-2 - LOCAL NORTHING 840587.1155FT EASTING 1233497.8115FT ELEVATION 1391.9795FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
POINT R2237B-3 - WGS84 LATITUDE 36°02'46.16884"N LONGITUDE 81°35'36.58690"W HEIGHT 1688.6615FT	NORTHING 845715.2005FT EASTING 1233371.6645FT ELEVATION 1793.8655FT HORZ ERROR 0.0315FT VERT ERROR 0.0365FT 3D ERROR 0.0475FT	POINT R2237B-3 - LOCAL NORTHING 845715.1855FT EASTING 1233371.6915FT ELEVATION 1793.9015FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
POINT R2237B-4 - WGS84 LATITUDE 36°03'03.41318"N LONGITUDE 81°35'40.50504"W HEIGHT 1750.1975FT	NORTHING 847466.9085FT EASTING 1233095.5595FT ELEVATION 1855.3425FT HORZ ERROR 0.0175FT VERT ERROR 0.0395FT 3D ERROR 0.0425FT	POINT R2237B-4 - LOCAL NORTHING 847466.9015FT EASTING 1233095.5745FT ELEVATION 1855.3815FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY

POINT R2237B-5 - WGS84 LATITUDE 36°03'57.38432"N LONGITUDE 81°36'48.79658"W HEIGHT 2098.0405FT	NORTHING 853070.1535FT EASTING 1227632.9095FT ELEVATION 2202.8395FT HORZ ERROR 0.0065FT VERT ERROR 0.0025FT 3D ERROR 0.0075FT	POINT R2237B-5 - LOCAL NORTHING 853070.1555FT EASTING 1227632.9035FT ELEVATION 2202.8375FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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POINT R2237B-6 - WGS84 LATITUDE 36°04'08.15091"N LONGITUDE 81°36'58.81467"W HEIGHT 2248.1555FT	NORTHING 854180.2575FT EASTING 1226839.3315FT ELEVATION 2352.8875FT HORZ ERROR 0.0035FT VERT ERROR 0.0075FT 3D ERROR 0.0075FT	POINT R2237B-6 - LOCAL NORTHING 854180.2575FT EASTING 1226839.3285FT ELEVATION 2352.8805FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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POINT R2237B-7 - WGS84 LATITUDE 36°04'13.52915"N LONGITUDE 81°37'04.85797"W HEIGHT 2284.9795FT	NORTHING 854737.0455FT EASTING 1226357.6665FT ELEVATION 2389.6745FT HORZ ERROR 0.0025FT VERT ERROR 0.0135FT 3D ERROR 0.0135FT	POINT R2237B-7 - LOCAL NORTHING 854737.0465FT EASTING 1226357.6685FT ELEVATION 2389.6615FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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POINT R2237B-8 - WGS84 LATITUDE 36°04'46.90197"N LONGITUDE 81°37'44.24075"W HEIGHT 2409.0605FT	NORTHING 858196.2815FT EASTING 1223214.7395FT ELEVATION 2513.5015FT HORZ ERROR 0.0135FT VERT ERROR 0.0215FT 3D ERROR 0.0245FT	POINT R2237B-8 - LOCAL NORTHING 858196.2835FT EASTING 1223214.7265FT ELEVATION 2513.4805FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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POINT R2237B-9 - WGS84 LATITUDE 36°04'57.88425"N LONGITUDE 81°37'42.79853"W HEIGHT 2439.4965FT	NORTHING 859303.3955FT EASTING 1223362.4965FT ELEVATION 2543.8935FT HORZ ERROR 0.0215FT VERT ERROR 0.0235FT 3D ERROR 0.0315FT	POINT R2237B-9 - LOCAL NORTHING 859303.3965FT EASTING 1223362.4755FT ELEVATION 2543.8705FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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POINT R2237B-10 - WGS84 LATITUDE 36°05'35.61359"N LONGITUDE 81°38'15.65006"W HEIGHT 2846.1465FT	NORTHING 863189.1445FT EASTING 1220768.0325FT ELEVATION 2750.2735FT HORZ ERROR 0.0365FT VERT ERROR 0.0295FT 3D ERROR 0.0465FT	POINT R2237B-10 - LOCAL NORTHING 863189.1445FT EASTING 1220767.9985FT ELEVATION 2750.2445FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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POINT R2237B-11 - WGS84 LATITUDE 36°05'37.56598"N LONGITUDE 81°38'06.03942"W HEIGHT 2697.8525FT	NORTHING 863365.5765FT EASTING 1221561.8275FT ELEVATION 2802.0005FT HORZ ERROR 0.0845FT VERT ERROR 0.0465FT 3D ERROR 0.0965FT	POINT R2237B-11 - LOCAL NORTHING 863365.6005FT EASTING 1221561.7465FT ELEVATION 2801.9545FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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POINT BR-2 - WGS84 LATITUDE 36°06'18.24467"N LONGITUDE 81°38'46.96023"W HEIGHT 2860.8935FT	NORTHING 867567.3095FT EASTING 1218313.9415FT ELEVATION 2964.7185FT HORZ ERROR 0.1305FT VERT ERROR 0.0485FT 3D ERROR 0.1385FT	POINT BR-2 - LOCAL NORTHING 867567.3585FT EASTING 1218313.8215FT ELEVATION 2964.6705FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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POINT BR-2A - WGS84 LATITUDE 36°06'42.84479"N LONGITUDE 81°38'39.32621"W HEIGHT 2791.4185FT	NORTHING 870037.5745FT EASTING 1219006.4755FT ELEVATION 2895.1435FT HORZ ERROR 0.1255FT VERT ERROR 0.0145FT 3D ERROR 0.1265FT	POINT BR-2A - LOCAL NORTHING 870037.6055FT EASTING 1219006.3545FT ELEVATION 2895.1295FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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POINT HAPPY - WGS84 LATITUDE 35°59'41.22196"N LONGITUDE 81°33'34.01302"W HEIGHT 1124.9355FT	NORTHING 826756.9865FT EASTING 1242952.7805FT ELEVATION 1230.8155FT HORZ ERROR 0.0865FT VERT ERROR 0.0665FT 3D ERROR 0.1085FT	POINT HAPPY - LOCAL NORTHING 826756.9535FT EASTING 1242952.8605FT ELEVATION 1230.8815FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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POINT MORRISON - WGS84 LATITUDE 35°57'01.20957"N LONGITUDE 82°00'06.62407"W HEIGHT 2578.0955FT	NORTHING 814248.3215FT EASTING 1111635.2515FT ELEVATION 2679.4905FT HORZ ERROR 0.0475FT VERT ERROR 0.0335FT 3D ERROR 0.0575FT	POINT MORRISON - LOCAL NORTHING 814248.3245FT EASTING 1111635.2975FT ELEVATION 2679.4575FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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POINT WILLOWDALE - WGS LATITUDE 36°15'16.55533"N LONGITUDE 81°46'15.38319"W HEIGHT 2637.9805FT	NORTHING 922991.7385FT EASTING 1183046.2225FT ELEVATION 2739.4895FT HORZ ERROR 0.0795FT VERT ERROR 0.0705FT 3D ERROR 0.1065FT	POINT WILLOWDALE - LOCAL NORTHING 922991.7345FT EASTING 1183046.3015FT ELEVATION 2739.5595FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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POINT B90 - WGS84 LATITUDE 36°11'00.73005"N LONGITUDE 81°12'22.90388"W HEIGHT 1228.2655FT	NORTHING 892951.9445FT EASTING 1348908.6415FT ELEVATION 1336.1385FT HORZ ERROR 0.0285FT VERT ERROR 0.0315FT 3D ERROR 0.0425FT	POINT B90 - LOCAL NORTHING 892951.9205FT EASTING 1348908.6565FT ELEVATION 1336.1075FT UTILIZED HORZ AND VERT QUALITY SURVEY QUALITY
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DATUM DESCRIPTION
 THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R2237B-6" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 854180.257(ft) EASTING: 1226839.328(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 999908500 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R2237B-6" TO L- STATION 9+86.41 IS S 25°54'16" E 14811.13' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NGVD 29

NOTES

- THE SITE CALIBRATION SHOWN IS BASED UPON A NETWORK TIED TO THE NAD 83 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.
- 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:
 R2237B_LS_GPSCALIB_030101.HTML
 R2237B_LS_WGS84_030101.TXT
 R2237B_LS_LOCAL_030101.TXT
 R2237B_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.