STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

July 8, 2010

To: Group Leaders
Area Engineers

From: Charles W. Brown, PE, PLS
State Location & Surveys Engineer

Subject: Proc 2010-1
Table of Right Of Way/Easement Points

Beginning now, we will implement a new procedure which will involve the creation of a table of right of way monuments and permanent easement, to be included in the TIP plans. These tables will provide station and offset and North/East coordinates. The attached letter to Jay Bennett, PE, State Roadway Design Engineer, provides details as to the process and timeline. The attached plan sheet samples show the full set of pages that L&S is responsible for in plans, including examples of the new tables of points. Emory Kincaid will be sending out instructions on use of an mdl application that will assist in the development of these tables.

You will now receive an LS number associated with preliminary field inspections. Under this number you should review plans for accuracy and completeness, including

- Verify/update planimetrics and any property (property subdivisions, name changes, etc.)
- Create initial monument/easement chart; verify correct placement (computed station/offset vs text).

Any completed or anticipated revisions should be reported at the field inspection.

You already receive an LS number for Right Of Way staking. This will now include creation of the preliminary tables to be included in right of way plans. Any revisions to monuments/easements should be updated as you get them.

You already receive an LS number for final field verification of all right of way monuments. This will now include completion of the final and correct tables of monuments/easements, to be included in recorded plans.

This process should reduce or eliminate a small portion of the work you do. The surveyors that I have spoken to in North Carolina are very excited about this. This will help them in doing their work, and hopefully minimize your involvement. Designers are excited about the use of the program, to help them check point placement, which should minimize your corrections.

Thank you for your assistance in making this happen. If you have questions or comments, please don't hesitate to pass those on to your Regional Engineer or call Dale Burton or me directly.

CWB

**MAILING ADDRESS:**
NC DEPARTMENT OF TRANSPORTATION
LOCATION & SURVEYS UNIT
1588 MAIL SERVICE CENTER
RALEIGH NC 27699-1588

TELEPHONE: 919-250-4109
FAX: 919-250-4223

*WEBSITE: WWW.DOH.DOT.STATE.NC.US*

**LOCATION:**
CENTURY CENTER COMPLEX
BUILDING B -ENTRANCE B4
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610
Proc 2010-1.doc

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

June 10, 2010

To: Mr. J. A. Bennett, PE
State Roadway Design Engineer

From: Charles W. Brown, PE, PLS
State Location & Surveys Engineer

Subject: Addition of Survey Sheets to Highway Plans
Centerline Control Points Coordinate List
Right Of Way/Easement Points Coordinate List

In addition to the survey control data already included in the highway plans (baseline control, calibration data), Location & Surveys will be adding pages containing charts for coordinates of all centerline control points, right of way monuments, and permanent easement points. These sheets will be included in the Survey Data sheets (1A, 1B, etc.) on highway plans, beginning with the October 2010 Construction Let plans. Attached is a sample set of Survey Data Sheets, with proposed coordinate list included.

The creation of these sheets will be the responsibility of Location & Surveys personnel, with assistance from your staff. The process as defined will be:

**Design**

- L&S will prepare Project Calibration/Baseline Control sheets at time of RDU sending project to Hydro, for inclusion in plans (this has not changed)

**Final Design Field Inspection/Combined Field Inspection (prior to Right Of Way authorization)**

- At the time of printing and sending out the Final Design Field Inspection/Combined Field Inspection plans, RDU includes L&S in notification (current procedure). Upon receipt of the preliminary Right Of Way plans for Field Inspection, the L&S field office runs program to check monument locations for accuracy and reports to RDU at field inspection (Project Control sheets should be included at this time - if not, L&S prepares those at this time); RDU makes revisions to right of way based on field inspection comments

**Right Of Way Plans Submittal**

- RDU provides L&S a link to final R/W plans prior to R/W Plans distribution (email to L&S Unit head is sufficient – this is forwarded to appropriate field office)

- L&S creates file of Centerline and R/W-Easement charts (labeled "Preliminary") for inclusion in plans. These charts go to RDU and to R/W Branch (Grady Morris) within 2 weeks of R/W Plans submittal.
- Grady Morris sends this file along with preliminary plans to County GIS/Tax offices
- RDU includes these sheets in any further transmittals of the R/W Plans

**Final/Pre-Let Activities**

- 12 weeks prior to Let – RDU sends plans for plan checking, includes L&S in notification (current procedure)
- 10 weeks prior to Let – L&S sends final r/w-easement chart (labeled "Final") to RDU for inclusion in plans
- Right Of Way Branch includes all sheets (1A, 1B, etc.) in plans to be recorded.

The inclusion of these right of way and easement point coordinates will help permanently monument NCDOT rights of way and easements, with or without the existence of monuments in the ground. This information will assist in NCDOT or private surveyors in the re-establishment of rights of way after construction has been completed. As such, it is imperative that an up-to-date and correct set of coordinates be included in future plans recorded in the appropriate Registers of Deeds offices.

The process described above does not alter or replace the intent of the memo dated April 7, 2008 with Subject "Right Of Way Plan Sheet Revisions".

Thank you for your assistance in this matter. Someone from my staff will be available if needed to discuss the intent or actions involved in this procedure with the Roadway Design Unit, upon your request. Please do not hesitate to contact me with any questions or comments.

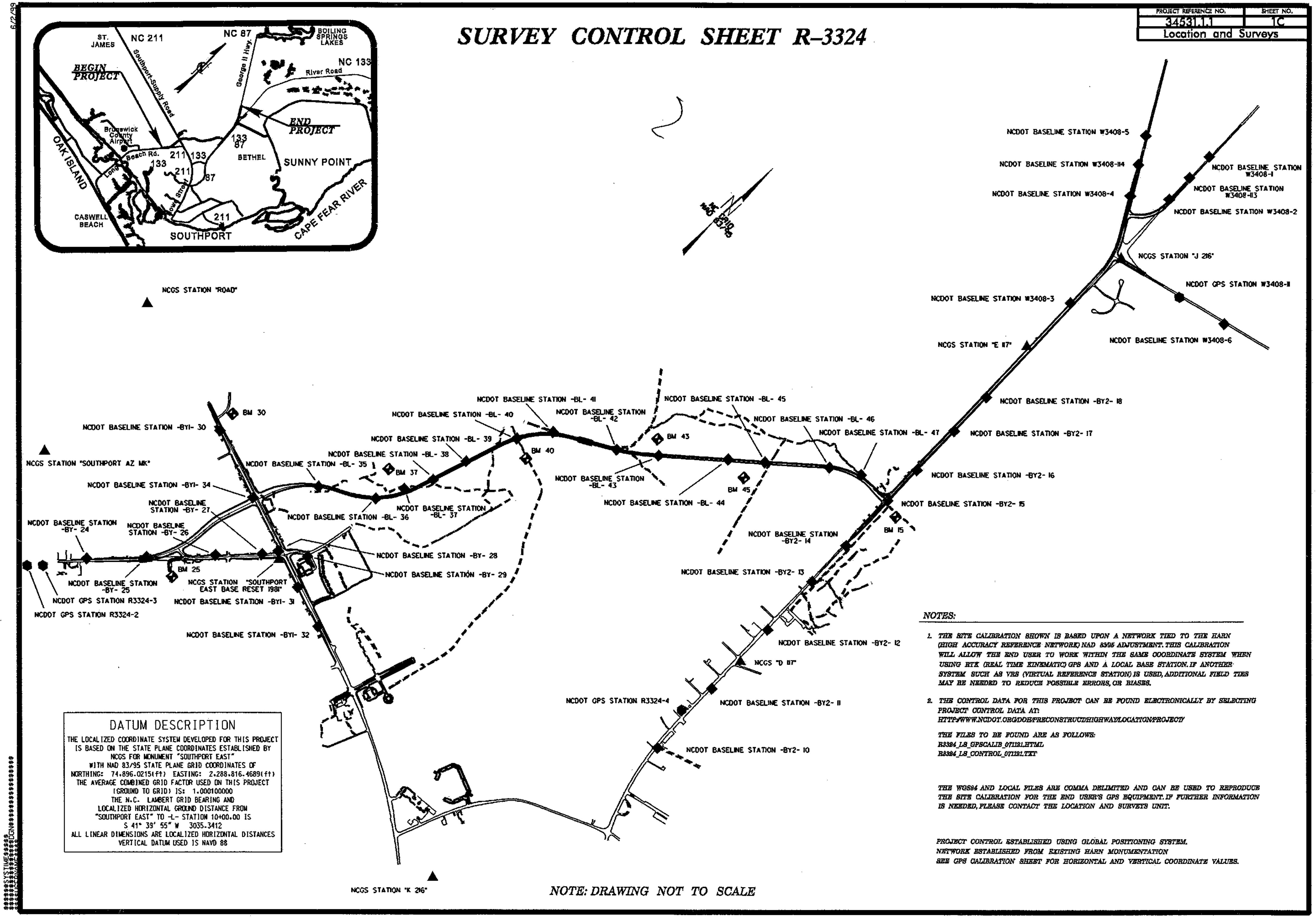
CWB

Attachment: Sample Survey Control Sheets Pages 1C – 1H

Cc: Mr. Art McMillan, PE
Ms. Judy Joines
Mr. Virgil Pridemore

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| 34531.1.1 | 1C |
| Location and Surveys | |

# *SURVEY CONTROL SHEET R-3324*



## DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT
IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY
NCGS FOR MONUMENT "SOUTHPORT EAST"
WITH NAD 83/95 STATE PLANE GRID COORDINATES OF
NORTHING: 74,896.0215(ft) EASTING: 2,288,816.4689(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT
(GROUND TO GRID) IS: 1.000100000
THE N.C. LAMBERT GRID BEARING AND
LOCALIZED HORIZONTAL GROUND DISTANCE FROM
"SOUTHPORT EAST" TO -L- STATION 10+00.00 IS
S 41° 39' 55" W 3035.3412
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 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.*

2. *THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:*
*HTTP://WWW.NCDOT.ORG/DOH/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/*

*THE FILES TO BE FOUND ARE AS FOLLOWS:*
*R3324_LS_GPSCALIB_071121.HTML*
*R3324_LS_CONTROL_071121.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.*

*PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.*
*NETWORK ESTABLISHED FROM EXISTING HARN MONUMENTATION*
*SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.*

*NOTE: DRAWING NOT TO SCALE*

6/2/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| 34531.1.1 | 1D |
| Location and Surveys | |

# SURVEY CONTROL SHEET R-3324

```
                    GPS CALIBRATION REPORT

                       PROJECT : R3324

TIP NUMBER         R3324

USER NAME          JNEAL               DATE & TIME        11:52:31 AM
                                                           10/10/2005

COORDINATE SYSTEM  US STATE PLANE      ZONE               NORTH CAROLINA
                   1983(AT GROUND)                        3200
HORIZONTAL DATUM   NAD 1983 (CONUS)

VERTICAL DATUM     NAVD 88             GEOID MODEL        GEOID03 (CONUS) NC
                                                           SUB GRID
COORDINATE UNITS   US SURVEY FEET
DISTANCE UNITS     US SURVEY FEET
HEIGHT UNITS       US SURVEY FEET
  ----------------------------------------------------------------
LOCAL SITE INFORMATION
LOCALIZED AROUND
LATITUDE           33*57'07.08872"N
LONGITUDE          78*02'51.95161"W
SITE SCALE FACTOR  0.9999000100
HEIGHT             -87.8847SFT
  ----------------------------------------------------------------

 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              76973.8767SFT
 EASTING COORDINATE OF
 ROTATION CENTER            2288670.7106SFT
 ROTATION ABOUT THE CENTER
 POINT                             0*00'00"
 TRANSLATION NORTH              -0.0018SFT
 TRANSLATION EAST               -0.0220SFT
 SCALE FACTOR                   1.00000183

  ----------------------------------------------------------------
VERTICAL ADJUSTMENT PARAMETERS

 NORTHING COORDINATE OF
 ORIGIN POINT                 86560.1485SFT
 EASTING COORDINATE OF ORIGIN
 POINT                      2294460.6210SFT
 VERTICAL SEPARATION AT
 ORIGIN                         -0.0522SFT
 SLOPE NORTH                     -5.209PPM
 SLOPE EAST                       0.521PPM


  ----------------------------------------------------------------
GEOID MODEL DEFINITION

GEOID03 (CONUS) NC SUB GRID

  ----------------------------------------------------------------
RESIDUAL DIFFERENCES BETWEEN GPS (WGS84) AND LOCAL COORDINATES

                            SUMMARY

                   MAXIMUM ERROR  ROOT MEAN SQUARE ERROR    POINT
 HORIZONTAL          0.041SFT             0.007           K 216_GPS
 VERTICAL            0.006SFT             0.001          R3324-3_GPS
 THREE-DIMENSIONAL   0.041SFT             0.007           K 216_GPS
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                               POINT RESIDUALS

   WGS84 COORDINATES              CALCULATED POINT         LOCAL COORDINATES
                                  FOR DISPLAY ONLY

POINT          W3408-11_GPS  NORTHING      86560.1485SFT  POINT  W3408-11
LATITUDE  33*59'01.92596"N  EASTING     2294460.6210SFT  NORTHING   86560.1335SFT
LONGITUDE 78*01'43.60234"W  ELEVATION        36.8964SFT  EASTING  2294460.6221SFT
HEIGHT          -84.5267SFT  HORZ ERROR         0.015SFT  ELEVATION      36.8963SFT
                             VERT ERROR         0.000SFT  UTILIZED   HORZ AND VERT
                             3D ERROR           0.015SFT                  ADJUSTED
                                                           QUALITY
                                                                           QUALITY

POINT             J 216_GPS  NORTHING      86318.0862SFT  POINT  J 216
LATITUDE  33*58'59.62175"N  EASTING     2293527.0193SFT  NORTHING   86318.0651SFT
LONGITUDE 78*01'54.71623"W  ELEVATION        39.4448SFT  EASTING  2293527.0187SFT
HEIGHT          -81.9499SFT  HORZ ERROR         0.021SFT  ELEVATION      39.4455SFT
                             VERT ERROR         0.001SFT  UTILIZED   HORZ AND VERT
                             3D ERROR           0.021SFT  QUALITY  CONTROL QUALITY

POINT             E 117_GPS  NORTHING      84538.1043SFT  POINT  E 117
LATITUDE  33*58'42.01259"N  EASTING     2293548.4460SFT  NORTHING   84538.0924SFT
LONGITUDE 78*01'54.66794"W  ELEVATION        35.9634SFT  EASTING  2293548.4502SFT
HEIGHT          -85.4793SFT  HORZ ERROR         0.013SFT  ELEVATION      35.9678SFT
                             VERT ERROR         0.004SFT  UTILIZED   HORZ AND VERT
                             3D ERROR           0.013SFT  QUALITY  CONTROL QUALITY

POINT             D 117_GPS  NORTHING      78695.5268SFT  POINT  D 117
LATITUDE  33*57'44.16419"N  EASTING     2294122.0299SFT  NORTHING   78695.5292SFT
LONGITUDE 78*01'48.53524"W  ELEVATION        31.0203SFT  EASTING  2294122.0391SFT
HEIGHT          -90.5931SFT  HORZ ERROR         0.010SFT  ELEVATION      31.0175SFT
                             VERT ERROR         0.003SFT  UTILIZED   HORZ AND VERT
                             3D ERROR           0.010SFT                  ADJUSTED
                                                           QUALITY
                                                                           QUALITY

POINT          R3324-4_GPS  NORTHING      77658.0739SFT  POINT  R3324-4
LATITUDE  33*57'33.90333"N  EASTING     2294108.6372SFT  NORTHING   77658.0872SFT
LONGITUDE 78*01'48.81454"W  ELEVATION        30.8585SFT  EASTING  2294108.6471SFT
HEIGHT          -90.7804SFT  HORZ ERROR         0.017SFT  ELEVATION      30.8559SFT
                             VERT ERROR         0.003SFT  UTILIZED   HORZ AND VERT
                             3D ERROR           0.017SFT                  ADJUSTED
                                                           QUALITY
                                                                           QUALITY

POINT             K 216_GPS  NORTHING      70153.6678SFT  POINT  K 216
LATITUDE  33*56'19.55166"N  EASTING     2295355.3399SFT  NORTHING   70153.7066SFT
LONGITUDE 78*01'34.88894"W  ELEVATION        22.6212SFT  EASTING  2295355.3525SFT
HEIGHT          -99.2481SFT  HORZ ERROR         0.041SFT  ELEVATION      22.6213SFT
                             VERT ERROR         0.000SFT  UTILIZED   HORZ AND VERT
                             3D ERROR           0.041SFT  QUALITY  CONTROL QUALITY
```

```
POINT    SOUTHPORT EB_GPS  NORTHING      74896.0158SFT  POINT  SOUTHPORT EB
LATITUDE  33*57'07.08872"N  EASTING     2288816.4465SFT  NORTHING   74896.0215SFT
LONGITUDE 78*02'51.95161"W  ELEVATION        33.6079SFT  EASTING  2288816.4689SFT
HEIGHT          -87.8941SFT  HORZ ERROR         0.023SFT  ELEVATION      33.6023SFT
                             VERT ERROR         0.006SFT  UTILIZED   HORZ AND VERT
                             3D ERROR           0.024SFT  QUALITY  CONTROL QUALITY

POINT          R3324-3_GPS  NORTHING      71868.6673SFT  POINT  R3324-3
LATITUDE  33*56'37.39808"N  EASTING     2286117.3215SFT  NORTHING   71868.6731SFT
LONGITUDE 78*03'24.33096"W  ELEVATION        35.5067SFT  EASTING  2286117.3230SFT
HEIGHT          -85.9584SFT  HORZ ERROR         0.006SFT  ELEVATION      35.5132SFT
                             VERT ERROR         0.006SFT  UTILIZED   HORZ AND VERT
                             3D ERROR           0.009SFT                  ADJUSTED
                                                           QUALITY
                                                                           QUALITY

POINT          R3324-2_GPS  NORTHING      70968.5914SFT  POINT  R3324-2
LATITUDE  33*56'28.56678"N  EASTING     2285350.7807SFT  NORTHING   70968.5936SFT
LONGITUDE 78*03'33.52993"W  ELEVATION        19.0419SFT  EASTING  2285350.7670SFT
HEIGHT         -102.4122SFT  HORZ ERROR         0.014SFT  ELEVATION      19.0429SFT
                             VERT ERROR         0.001SFT  UTILIZED   HORZ AND VERT
                             3D ERROR           0.014SFT                  ADJUSTED
                                                           QUALITY
                                                                           QUALITY

POINT    SOUTHPORT AZ MK_  NORTHING      65045.3128SFT  POINT  SOUTHPORT AZ MK
LATITUDE  33*55'30.52359"N  EASTING     2279444.5691SFT  NORTHING   65045.3104SFT
LONGITUDE 78*04'44.27846"W  ELEVATION        16.9423SFT  EASTING  2279444.5312SFT
HEIGHT         -104.3983SFT  HORZ ERROR         0.038SFT  ELEVATION      16.9422SFT
                             VERT ERROR         0.000SFT  UTILIZED   HORZ AND VERT
                             3D ERROR           0.038SFT  QUALITY  CONTROL QUALITY

POINT              ROAD_GPS  NORTHING      80010.4292SFT  POINT  ROAD
LATITUDE  33*57'59.35969"N  EASTING     2270526.3631SFT  NORTHING   80010.4111SFT
LONGITUDE 78*06'28.50573"W  ELEVATION        51.3332SFT  EASTING  2270526.3545SFT
HEIGHT          -69.3078SFT  HORZ ERROR         0.020SFT  ELEVATION      51.3319SFT
                             VERT ERROR         0.001SFT  UTILIZED   HORZ AND VERT
                             3D ERROR           0.020SFT                  ADJUSTED
                                                           QUALITY
                                                                           QUALITY
```

## DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT
IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY
NCGS FOR MONUMENT "SOUTHPORT EAST BASE RESET 1981 "
WITH NAD 83/95 STATE PLANE GRID COORDINATES OF
NORTHING: 74,896.0215(ft) EASTING: 2,288,816.4689(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT
(GROUND TO GRID) IS: 1.00010000
THE N.C. LAMBERT GRID BEARING AND
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"SOUTHPORT EAST " TO -L- STATION 10+00.00 IS
S 41°39' 55" W 3035.3412
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 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.*

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   *HTTP://WWW.NCDOT.ORG/DOH/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/*

   *THE FILES TO BE FOUND ARE AS FOLLOWS:*
   *R3324_LS_GPSCALIB_071121.HTML*
   *R3324_LS_CONTROL_071121.TXT*

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*PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.*
*NETWORK ESTABLISHED FROM EXISTING HARN MONUMENTATION*
*SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.*

*NOTE: DRAWING NOT TO SCALE*

$$$$$$SYSTIME$$$$$$
$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$$$$$

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| 34531.1.1 | 1E |

Location and Surveys

# SURVEY CONTROL SHEET R-3324

BL

| POINT | DESC. | NORTH | EAST | ELEVATION | L STATION | OFFSET |
|---|---|---|---|---|---|---|
| A34 | BY1-34 | 75202.5510 | 2287943.7390 | 33.71 | 39+14.83 | 52.90 LT |
| 35 | BL-35 | 75973.7430 | 2288432.4490 | 33.53 | 48+34.87 | 11.08 RT |
| 36 | BL-36 | 76455.7410 | 2289086.9850 | 33.45 | 56+50.15 | 10.71 RT |
| 37 | BL-37 | 76835.2150 | 2289248.9890 | 36.71 | 60+66.63 | 52.85 LT |
| 38 | BL-38 | 77217.3900 | 2289426.1850 | 32.48 | 64+89.09 | 7.26 RT |
| 39 | BL-39 | 77730.4660 | 2289545.0610 | 33.41 | 70+15.39 | 12.40 LT |
| 40 | BL-40 | 78456.1520 | 2289776.2710 | 33.09 | 77+77.62 | 1.86 RT |
| 41 | BL-41 | 78885.4310 | 2290046.0910 | 31.46 | 82+81.82 | 28.28 LT |
| 42 | BL-42 | 79375.0050 | 2290810.7150 | 30.37 | 91+85.92 | 1.06 RT |
| 43 | BL-43 | 79756.2380 | 2291262.9340 | 32.36 | 97+78.07 | 4.53 RT |
| 44 | BL-44 | 80434.9440 | 2291943.3550 | 33.13 | 107+39.05 | 6.72 LT |
| 45 | BL-45 | 80783.8300 | 2292311.0410 | 36.10 | 112+45.88 | 0.00 LT |
| 46 | BL-46 | 81400.4490 | 2292965.1360 | 31.50 | 121+45.44 | 12.13 RT |
| 47 | BL-47 | 81658.5470 | 2293330.6540 | 29.80 | 125+88.40 | 36.81 LT |
| A15 | BY2-15 | 81695.4690 | 2293846.2790 | 32.70 | OUTSIDE PROJECT LIMITS | |

BY

| POINT | DESC. | NORTH | EAST | ELEVATION | L STATION | OFFSET |
|---|---|---|---|---|---|---|
| 24 | BY-24 | 72935.5128 | 2287028.8782 | 33.74 | 13+82.96 | 24.63 LT |
| 25 | BY-25 | 73562.8979 | 2287562.8770 | 11.95 | 22+09.08 | 17.22 LT |

BY

| POINT | DESC. | NORTH | EAST | ELEVATION | Y STATION | OFFSET |
|---|---|---|---|---|---|---|
| 26 | BY-26 | 74287.8300 | 2288185.0560 | 28.52 | 15+68.53 | 29.82 LT |
| 27 | BY-27 | 74775.1852 | 2288603.7110 | 35.15 | 22+11.00 | 25.27 LT |
| 28 | BY-28 | 74968.1233 | 2288723.3796 | 35.61 | 24+35.57 | 58.63 LT |

BY

| POINT | DESC. | NORTH | EAST | ELEVATION | Y5 STATION | OFFSET |
|---|---|---|---|---|---|---|
| 29 | BY-29 | 75222.2089 | 2289047.3788 | 34.84 | 13+26.92 | 43.08 RT |

BY1

| POINT | DESC. | NORTH | EAST | ELEVATION | Y1 STATION | OFFSET |
|---|---|---|---|---|---|---|
| 30 | BY1-30 | 75483.9370 | 2286957.9690 | 30.17 | 14+06.12 | 28.05 RT |
| 34 | BY1-34 | 75202.5510 | 2287943.7390 | 33.71 | 24+31.23 | 36.80 RT |
| A28 | BY-28 | 74968.1233 | 2288723.3796 | 35.61 | 32+45.15 | 55.17 RT |
| 31 | BY1-31 | 74833.9320 | 2289272.5890 | 32.91 | 38+10.26 | 38.28 RT |
| 32 | BY1-32 | 74679.9330 | 2289860.7030 | 27.99 | 44+18.15 | 30.12 RT |

BY2

| POINT | DESC. | NORTH | EAST | ELEVATION | Y2 STATION | OFFSET |
|---|---|---|---|---|---|---|
| 10 | BY2-10 | 77049.6000 | 2294238.9720 | 29.07 | OUTSIDE PROJECT LIMITS | |
| 11 | BY2-11 | 78154.4880 | 2294137.8630 | 31.00 | OUTSIDE PROJECT LIMITS | |
| D117 | NCGS D 117 | 78695.5290 | 2294122.0390 | 31.02 | OUTSIDE PROJECT LIMITS | |
| 12 | BY2-12 | 79267.9830 | 2294046.6640 | 30.89 | OUTSIDE PROJECT LIMITS | |
| 13 | BY2-13 | 80168.8470 | 2293969.0540 | 31.93 | OUTSIDE PROJECT LIMITS | |
| 14 | BY2-14 | 80850.2390 | 2293913.9220 | 30.87 | 15+22.19 | 18.55 RT |
| 15 | BY2-15 | 81695.4690 | 2293846.2790 | 32.70 | 23+70.16 | 18.55 RT |
| 16 | BY2-16 | 82278.9570 | 2293799.7080 | 33.16 | 29+55.50 | 17.61 RT |
| 17 | BY2-17 | 83015.5630 | 2293740.3640 | 33.26 | 36+94.49 | 15.87 RT |
| 18 | BY2-18 | 83654.9040 | 2293688.5810 | 33.81 | 43+35.92 | 14.08 RT |
| E117 | NCGS E 117 | 84538.0920 | 2293548.4500 | 35.97 | 52+27.35 | 56.78 LT |
| W3 | W3408-3 | 85388.3730 | 2293509.7670 | 35.49 | 60+78.06 | 29.06 LT |
| J216 | NCGS J 116 | 86318.0650 | 2293527.0190 | 39.45 | 69+78.29 | 108.37 RT |

BY2

| POINT | DESC. | NORTH | EAST | ELEVATION | Y4 STATION | OFFSET |
|---|---|---|---|---|---|---|
| W2 | W3408-2 | 87353.1690 | 2293369.5530 | 38.78 | 16+62.03 | 18.56 LT |
| W113 | W3408-113 | 87759.5650 | 2293338.6700 | 38.79 | 20+69.59 | 18.50 LT |
| W1 | W3408-1 | 88157.1400 | 2293308.4580 | 39.01 | 24+68.31 | 18.44 LT |

BY4

| POINT | DESC. | NORTH | EAST | ELEVATION | Y2 STATION | OFFSET |
|---|---|---|---|---|---|---|
| W5 | W3408-5 | 87699.0560 | 2292504.3530 | 38.32 | 86+71.71 | 17.15 LT |
| W114 | W3408-114 | 87356.7850 | 2292730.5580 | 37.68 | 82+61.44 | 17.53 LT |
| W4 | W3408-4 | 86986.0020 | 2292975.6170 | 37.31 | 78+16.99 | 17.94 LT |

BY4

| POINT | DESC. | NORTH | EAST | ELEVATION | Y3 STATION | OFFSET |
|---|---|---|---|---|---|---|
| J216 | NCGS J 216 | 86318.0650 | 2293527.0190 | 39.45 | 11+07.56 | 21.91 LT |
| W11 | W3408-11 | 86560.1340 | 2294460.6220 | 36.90 | OUTSIDE PROJECT LIMITS | |
| W6 | W3408-6 | 86777.3810 | 2295147.7760 | 35.75 | OUTSIDE PROJECT LIMITS | |

BM25 ELEVATION = 20.24
N 73647 E 2288003
Y STATION 11+39 333' RIGHT
SQUARE CUT IN CONCRETE CURB

BM30 ELEVATION = 32.34
N 75768 E 2286901
Y1 STATION 12+75 231' LEFT
RR SPIKE IN BASE OF 10" PINE

BM37 ELEVATION = 34.91
N 76861 E 2288905
L STATION 59+13 374' LEFT
RR SPIKE IN BASE OF 10" BAY TREE

BM40 ELEVATION = 34.29
N 78368 E 2290066
L STATION 78+30 301' RIGHT
RR SPIKE IN BASE OF 15" PINE TREE

BM43 ELEVATION = 34.39
N 79897 E 2291083
L STATION 97+48 221' LEFT
RR SPIKE IN BASE OF 10" PINE

BM45 ELEVATION = 34.27
N 80429 E 2292273
L STATION 109+71 228' RIGHT
RR SPIKE IN BASE OF 12" PINE

BM15 ELEVATION = 40.92
N 81634 E 2294082
Y2 STATION 22+90 249' RIGHT
RR SPIKE IN BASE OF 14" PINE

## DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "SOUTHPORT EAST BASE RESET 1981" WITH NAD 83/95 STATE PLANE GRID COORDINATES OF NORTHING: 74,896.0215(ft) EASTING: 2,288,816.4689(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.000100000 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "SOUTHPORT EAST" TO -L- STATION 10+00.00 IS S 41°39' 55" W 3035.3412 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 HARN (HIGH ACCURACY REFERENCE NETWORK) NAD 8395 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.*
2. *THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:*
   *HTTP://WWW.NCDOT.ORG/DOH/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/*

   *THE FILES TO BE FOUND ARE AS FOLLOWS:*
   *R3324_LS_GPSCALIB_071121.HTML*
   *R3324_LS_CONTROL_071121.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.*

*PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.*
*NETWORK ESTABLISHED FROM EXISTING HARN MONUMENTATION*
*SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.*

*NOTE: DRAWING NOT TO SCALE*

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| 34531.1.1 | 1F |

Location and Surveys

# *SURVEY CONTROL SHEET R-3324*

## Design Alignments

L

| TYPE | STATION | NORTH | EAST |
|---|---|---|---|
| POT | 10+00.00 | 72628.4940 | 2286798.6440 |
| TS | 19+73.00 | 73367.8553 | 2287431.1579 |
| SC | 21+23.00 | 73483.4874 | 2287526.6769 |
| CS | 29+54.28 | 74248.1507 | 2287822.6445 |
| SRS | 31+04.28 | 74397.9589 | 2287829.8658 |
| SC | 32+54.28 | 74547.7246 | 2287837.7323 |
| CS | 33+78.60 | 74670.6048 | 2287856.1991 |
| ST | 35+28.60 | 74816.0672 | 2287892.7005 |
| TS | 40+48.60 | 75317.5858 | 2288030.1015 |
| SC | 41+98.60 | 75461.3727 | 2288072.7340 |
| CS | 49+94.47 | 76077.9146 | 2288552.7393 |
| SRS | 51+44.47 | 76154.5059 | 2288681.6810 |
| SC | 52+94.47 | 76230.9328 | 2288810.7238 |
| CS | 61+55.68 | 76898.3353 | 2289329.0413 |
| ST | 63+05.68 | 77042.2814 | 2289371.1443 |
| TS | 74+82.68 | 78178.1927 | 2289679.4207 |
| SC | 76+32.68 | 78322.1728 | 2289721.4136 |
| CS | 84+56.05 | 78976.6564 | 2290199.1746 |
| ST | 86+06.05 | 79060.5282 | 2290323.5095 |
| PC | 91+55.55 | 79359.2146 | 2290784.7434 |
| PT | 96+10.38 | 79642.4574 | 2291139.6637 |
| TS | 120+07.19 | 81315.1268 | 2292856.3089 |
| SC | 121+57.19 | 81417.2592 | 2292966.1234 |
| CS | 127+63.10 | 81661.5255 | 2293511.8751 |
| ST | 129+13.10 | 81675.3786 | 2293661.2014 |
| POT | 130+80.63 | 81686.9712 | 2293828.3326 |

Y

| TYPE | STATION | NORTH | EAST |
|---|---|---|---|
| POT | 10+81.68 | 74070.8509 | 2287796.8501 |
| PC | 12+51.59 | 74080.2776 | 2287966.5033 |
| PT | 14+14.13 | 74150.7248 | 2288108.0370 |
| POT | 25+23.46 | 74997.3110 | 2288824.9153 |

Y1

| TYPE | STATION | NORTH | EAST |
|---|---|---|---|
| POT | 10+00.00 | 75619.1169 | 2286573.9762 |
| POT | 51+00.00 | 74527.4095 | 2290525.9599 |

Y2

| TYPE | STATION | NORTH | EAST |
|---|---|---|---|
| POT | 10+00.00 | 80328.2317 | 2293937.1030 |
| POT | 23+63.09 | 81686.9712 | 2293828.3326 |
| TS | 65+86.68 | 85897.7176 | 2293499.0912 |
| SC | 67+36.68 | 86046.9467 | 2293484.1812 |
| CS | 71+74.68 | 86458.6423 | 2293342.4850 |
| ST | 73+24.68 | 86585.4376 | 2293262.3937 |
| POT | 97+44.52 | 88602.9923 | 2291926.3106 |

Y3

| TYPE | STATION | NORTH | EAST |
|---|---|---|---|
| POT | 10+00.00 | 86265.0834 | 2293430.8853 |
| POT | 18+00.00 | 86503.6319 | 2294194.4917 |

Y4

| TYPE | STATION | NORTH | EAST |
|---|---|---|---|
| POT | 10+00.00 | 86794.1431 | 2293124.1828 |
| PC | 10+56.44 | 86825.3070 | 2293171.2420 |
| PT | 15+87.38 | 87280.1451 | 2293393.7314 |
| POT | 30+87.38 | 88775.8158 | 2293279.8493 |

Y5

| TYPE | STATION | NORTH | EAST |
|---|---|---|---|
| POT | 10+00.00 | 74997.3110 | 2288824.9153 |
| PC | 11+25.00 | 75109.7115 | 2288879.6065 |
| PT | 12+02.33 | 75171.0652 | 2288925.8779 |
| POT | 13+43.80 | 75265.5481 | 2289031.1767 |

### DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT
IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY
NCGS FOR MONUMENT "SOUTHPORT EAST BASE RESET 1981 "
WITH NAD 83/95 STATE PLANE GRID COORDINATES OF
NORTHING: 74,896.0215(ft) EASTING: 2,288,816.4689(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT
(GROUND TO GRID) IS: 1.000100000
THE N.C. LAMBERT GRID BEARING AND
LOCALIZED HORIZONTAL GROUND DISTANCE FROM
"SOUTHPORT EAST " TO -L- STATION 10+00.00 IS
S 41°39′ 55″ W 3035.3412
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 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.*

2. *THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:*
*HTTP://WWW.NCDOT.ORG/DOH/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/*

*THE FILES TO BE FOUND ARE AS FOLLOWS:*
*R3324_LS_GPSCALIB_071121.HTML*
*R3324_LS_CONTROL_071121.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.*

*PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.*
*NETWORK ESTABLISHED FROM EXISTING HARN MONUMENTATION*
*SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.*

*NOTE: DRAWING NOT TO SCALE*

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| 34531.1.1 | 1G |
| Location and Surveys | |

# *SURVEY CONTROL SHEET R-3324*

ROW MARKER IRON PIN AND CAP

| ALIGN | STATION | OFFSET | NORTH | EAST |
|---|---|---|---|---|
| L | 11+74.69 | -50.00 | 72793.7386 | 2286874.2085 |
| L | 11+74.71 | -28.04 | 72779.4820 | 2286890.9060 |
| L | 13+04.55 | 31.86 | 72839.2062 | 2287020.8269 |
| L | 13+04.57 | 65.00 | 72817.6741 | 2287046.0230 |
| L | 14+90.00 | 65.00 | 72958.5800 | 2287166.5683 |
| L | 16+00.27 | 86.00 | 73028.7196 | 2287254.2078 |
| L | 17+60.00 | 95.00 | 73144.2450 | 2287364.8823 |
| L | 18+25.00 | 70.00 | 73209.8888 | 2287388.1397 |
| L | 19+32.57 | -50.00 | 73369.6350 | 2287366.8804 |
| L | 19+73.00 | 70.00 | 73322.3507 | 2287484.3494 |
| L | 19+92.61 | -63.00 | 73423.6727 | 2287395.9933 |
| L | 21+00.00 | -63.00 | 73504.5182 | 2287463.1547 |
| L | 21+23.00 | -63.00 | 73521.9128 | 2287476.7499 |
| L | 21+35.00 | 100.00 | 73432.6942 | 2287613.7055 |
| L | 21+35.00 | 110.00 | 73426.6620 | 2287621.6791 |
| L | 21+97.50 | 110.00 | 73481.1477 | 2287661.0824 |
| L | 22+00.00 | -68.00 | 73584.2807 | 2287515.9846 |
| L | 22+10.00 | 61.23 | 73519.6155 | 2287628.3132 |
| L | 22+88.59 | -137.19 | 73690.9260 | 2287502.4198 |
| L | 23+80.10 | -119.92 | 73755.2634 | 2287558.2047 |
| L | 24+53.34 | -101.86 | 73808.1512 | 2287604.0619 |
| L | 27+50.00 | -120.00 | 74073.0274 | 2287674.5042 |
| L | 28+50.00 | -105.00 | 74160.7902 | 2287706.5593 |
| L | 28+85.00 | 85.00 | 74168.2156 | 2287899.5548 |
| L | 29+54.28 | 80.00 | 74241.5462 | 2287902.3714 |
| L | 29+54.28 | -110.00 | 74257.2318 | 2287713.0200 |
| L | 29+89.00 | 75.73 | 74278.1288 | 2287900.7173 |
| L | 29+94.00 | 68.84 | 74283.7215 | 2287894.1471 |
| L | 31+04.28 | -114.00 | 74401.4838 | 2287715.9187 |
| L | 31+04.28 | 65.00 | 74395.9496 | 2287894.8335 |
| L | 31+04.38 | 58.00 | 74396.2660 | 2287887.8399 |
| L | 31+70.00 | 66.50 | 74460.7570 | 2287898.6056 |
| L | 32+30.00 | 67.00 | 74518.4239 | 2287902.4577 |
| L | 32+54.28 | -120.00 | 74559.1763 | 2287718.2799 |
| L | 32+54.28 | 44.00 | 74543.5254 | 2287881.5298 |
| L | 33+10.00 | 40.00 | 74597.3163 | 2287883.9663 |
| L | 33+15.00 | -115.00 | 74624.9376 | 2287731.3603 |
| L | 33+78.60 | 75.00 | 74655.5028 | 2287929.6612 |
| L | 33+78.67 | -108.99 | 74692.6206 | 2287749.4597 |
| L | 34+22.00 | 98.00 | 74690.1649 | 2287960.9673 |
| L | 34+29.85 | -106.09 | 74745.7503 | 2287764.4308 |
| L | 34+76.00 | 99.50 | 74739.7726 | 2287975.1060 |
| L | 34+76.22 | -104.81 | 74792.4065 | 2287777.6901 |
| L | 35+28.60 | 100.27 | 74789.5713 | 2287989.4108 |
| L | 35+30.61 | -104.47 | 74845.6109 | 2287792.4717 |
| L | 38+40.00 | 101.50 | 75089.5788 | 2288072.8794 |
| L | 38+50.00 | -103.33 | 75153.3482 | 2287877.9681 |
| L | 41+10.00 | -95.00 | 75402.8069 | 2287955.1745 |
| L | 41+20.00 | 65.00 | 75368.2970 | 2288111.7310 |
| L | 41+98.60 | 63.00 | 75440.9633 | 2288132.3365 |
| L | 41+98.60 | -85.00 | 75488.9088 | 2287992.3178 |
| L | 43+00.00 | -80.00 | 75588.0150 | 2288036.3663 |
| L | 43+90.98 | 46.59 | 75615.6798 | 2288190.4498 |
| L | 45+04.24 | 54.00 | 75705.0724 | 2288252.3373 |
| L | 45+50.00 | -65.00 | 75810.4544 | 2288180.4831 |
| L | 46+00.00 | 55.00 | 75778.6257 | 2288306.5815 |
| L | 46+53.52 | -65.00 | 75896.2430 | 2288247.8753 |
| L | 47+53.52 | -65.00 | 75973.3044 | 2288319.7626 |
| L | 49+94.47 | 55.00 | 76031.8388 | 2288582.7730 |
| L | 49+94.47 | -65.00 | 76132.3677 | 2288517.2449 |
| L | 51+44.47 | 65.00 | 76097.9419 | 2288713.7048 |
| L | 51+44.47 | -60.00 | 76206.7185 | 2288652.1202 |
| L | 52+94.47 | -70.00 | 76289.7218 | 2288772.7258 |
| L | 52+94.47 | 75.00 | 76167.9446 | 2288851.4361 |
| L | 54+50.00 | -70.00 | 76376.8287 | 2288891.0471 |
| L | 54+50.00 | 75.00 | 76265.4986 | 2288983.9481 |
| L | 55+30.00 | 75.00 | 76321.7575 | 2289047.2346 |
| L | 55+30.00 | 115.00 | 76292.7078 | 2289074.7321 |
| L | 55+50.00 | 115.00 | 76307.8170 | 2289090.4439 |
| L | 55+50.00 | -70.00 | 76440.1671 | 2288961.1828 |
| L | 58+28.50 | -70.00 | 76643.0833 | 2289128.0899 |
| L | 59+00.00 | 115.00 | 76608.1462 | 2289323.7157 |
| L | 59+75.00 | -85.00 | 76769.7666 | 2289183.7138 |

ROW MARKER IRON PIN AND CAP

| | | | | |
|---|---|---|---|---|
| L | 60+00.00 | 75.00 | 76721.8031 | 2289338.3643 |
| L | 61+55.68 | 75.00 | 76874.4833 | 2289400.1474 |
| L | 61+55.68 | -105.00 | 76931.7282 | 2289229.4927 |
| L | 62+45.68 | -105.95 | 77013.1329 | 2289253.2659 |
| L | 62+45.68 | 70.95 | 76965.2003 | 2289423.5473 |
| L | 62+45.68 | -208.00 | 77040.7856 | 2289155.0291 |
| L | 63+05.68 | -105.00 | 77069.7828 | 2289269.8098 |
| L | 63+05.68 | 70.00 | 77023.9473 | 2289438.7007 |
| L | 63+06.55 | -207.68 | 77097.5155 | 2289170.9446 |
| L | 63+70.00 | -85.00 | 77126.6191 | 2289305.9582 |
| L | 65+25.00 | -85.00 | 77276.2081 | 2289346.5553 |
| L | 66+00.00 | 75.00 | 77306.6832 | 2289520.6136 |
| L | 71+00.00 | -60.00 | 77824.5880 | 2289521.2835 |
| L | 74+82.68 | -60.00 | 78193.9079 | 2289621.5154 |
| L | 74+82.68 | 60.00 | 78162.4779 | 2289737.3262 |
| L | 76+32.68 | 55.00 | 78304.8017 | 2289773.5983 |
| L | 76+32.68 | -65.00 | 78342.7024 | 2289659.7408 |
| L | 76+94.63 | -521.63 | 78568.0647 | 2289255.6091 |
| L | 77+46.31 | -65.00 | 78454.0393 | 2289702.1598 |
| L | 77+65.30 | -537.35 | 78665.2868 | 2289279.0540 |
| L | 77+66.11 | 55.00 | 78423.9467 | 2289820.0096 |
| L | 78+43.17 | -65.00 | 78545.7966 | 2289745.7018 |
| L | 78+72.83 | 55.00 | 78515.5221 | 2289865.5681 |
| L | 80+50.00 | -73.00 | 78734.4799 | 2289853.8446 |
| L | 80+70.00 | 90.03 | 78652.7265 | 2289996.2854 |
| L | 80+70.00 | 55.00 | 78673.9265 | 2289968.3950 |
| L | 83+75.00 | -75.00 | 78984.6317 | 2290087.3781 |
| L | 84+56.05 | -80.00 | 79041.2511 | 2290151.9780 |
| L | 84+56.05 | 85.00 | 78908.0245 | 2290249.3210 |
| L | 86+06.05 | -85.00 | 79131.8746 | 2290277.3067 |
| L | 86+06.05 | 85.00 | 78989.1817 | 2290369.7119 |
| L | 88+25.00 | -85.00 | 79250.8871 | 2290461.0868 |
| L | 91+55.55 | -70.00 | 79417.9705 | 2290746.6942 |
| L | 91+55.55 | 85.00 | 79287.8681 | 2290830.9460 |
| L | 92+10.00 | 85.00 | 79319.1168 | 2290877.9709 |
| L | 93+00.00 | -70.00 | 79497.7397 | 2290861.7829 |
| L | 93+00.00 | 75.00 | 79381.2177 | 2290948.0825 |
| L | 93+60.00 | -70.00 | 79532.9688 | 2290908.0746 |
| L | 93+60.00 | 75.00 | 79418.7376 | 2290997.3842 |
| L | 96+10.38 | -70.00 | 79692.5929 | 2291090.8126 |
| L | 96+10.38 | 75.00 | 79588.7408 | 2291192.0043 |
| L | 97+10.00 | 75.00 | 79658.2645 | 2291263.3557 |
| L | 97+45.00 | 90.00 | 79671.9467 | 2291298.8916 |
| L | 98+90.00 | 90.00 | 79773.1384 | 2291402.7436 |
| L | 100+25.00 | 75.00 | 79878.0946 | 2291488.9654 |
| L | 103+00.00 | 75.00 | 80070.0098 | 2291685.9262 |
| L | 103+00.00 | 75.00 | 80070.0098 | 2291685.9262 |
| L | 103+00.00 | -70.00 | 80173.8619 | 2291584.7345 |
| L | 103+60.00 | -70.00 | 80215.7343 | 2291627.7078 |
| L | 103+60.00 | 75.00 | 80111.8822 | 2291728.8994 |
| L | 106+50.00 | 80.00 | 80310.6844 | 2291940.0929 |
| L | 106+60.00 | -75.00 | 80428.6774 | 2291839.0848 |
| L | 112+10.00 | 70.00 | 80708.6557 | 2292334.1980 |
| L | 112+10.00 | 85.00 | 80697.9124 | 2292344.6661 |
| L | 112+60.00 | -70.00 | 80843.8204 | 2292272.3068 |
| L | 112+60.00 | -80.00 | 80850.9826 | 2292265.3280 |
| L | 112+95.00 | 65.00 | 80771.5561 | 2292391.5874 |
| L | 112+95.00 | 85.00 | 80757.2317 | 2292405.5449 |
| L | 113+50.00 | -80.00 | 80913.7912 | 2292329.7879 |
| L | 113+50.00 | -65.00 | 80903.0479 | 2292340.2561 |
| L | 120+07.19 | -55.00 | 81354.5223 | 2292817.9270 |
| L | 120+07.19 | 60.00 | 81272.1557 | 2292898.1836 |
| L | 121+57.19 | 65.00 | 81367.6578 | 2293008.1317 |
| L | 121+57.19 | -65.00 | 81466.8647 | 2292924.1199 |
| L | 122+50.00 | -65.00 | 81527.1501 | 2293001.8791 |
| L | 122+50.00 | 65.00 | 81421.0685 | 2293077.0237 |
| L | 123+10.00 | 65.00 | 81452.3533 | 2293123.9092 |
| L | 123+10.00 | -65.00 | 81562.4616 | 2293054.7994 |
| L | 126+90.00 | 65.00 | 81585.3316 | 2293453.2428 |
| L | 127+63.10 | -65.00 | 81725.8984 | 2293502.8680 |
| L | 127+63.10 | 80.00 | 81582.2973 | 2293522.9608 |
| L | 128+20.00 | -49.00 | 81716.8806 | 2293563.6883 |
| L | 128+80.00 | -40.00 | 81712.9472 | 2293625.2823 |
| L | 129+13.10 | 80.00 | 81595.5705 | 2293666.7394 |
| L | 129+20.00 | -40.00 | 81715.7603 | 2293665.3194 |
| L | 129+91.96 | -76.14 | 81756.7911 | 2293734.6047 |
| L | 129+95.00 | 80.00 | 81601.2393 | 2293748.4430 |

ROW MARKER IRON PIN AND CAP

| ALIGN | STATION | OFFSET | NORTH | EAST |
|---|---|---|---|---|
| Y | 14+14.13 | -44.00 | 74179.1597 | 2288074.4572 |
| Y | 12+51.59 | -70.00 | 74150.1706 | 2287962.6136 |
| Y | 13+00.00 | -57.00 | 74143.2538 | 2287997.3285 |
| Y | 24+04.09 | 52.00 | 74872.6066 | 2288787.4550 |
| Y | 23+49.32 | -44.00 | 74892.8485 | 2288678.8019 |
| Y | 18+30.00 | 38.91 | 74442.9548 | 2288406.4806 |
| Y | 19+40.00 | 55.00 | 74516.5037 | 2288489.8438 |
| Y | 19+67.00 | 52.00 | 74539.0474 | 2288505.0024 |
| Y | 13+50.00 | -44.00 | 74146.7761 | 2288036.6171 |

ROW MARKER IRON PIN AND CAP

| ALIGN | STATION | OFFSET | NORTH | EAST |
|---|---|---|---|---|
| Y1 | 23+50.00 | 75.85 | 75186.5412 | 2287855.0427 |
| Y1 | 26+20.00 | -95.00 | 75279.3301 | 2288160.7857 |
| Y1 | 23+40.00 | -95.00 | 75353.8858 | 2287890.8942 |
| Y1 | 18+05.64 | -95.00 | 75496.1684 | 2287375.8304 |
| Y1 | 26+10.00 | 76.04 | 75117.1258 | 2288105.6052 |
| Y1 | 18+05.50 | -74.55 | 75476.4967 | 2287370.2516 |
| Y1 | 26+80.00 | 76.09 | 75098.4371 | 2288173.0643 |
| Y1 | 23+20.00 | 75.83 | 75194.5511 | 2287826.1300 |
| Y1 | 19+10.00 | -95.00 | 75468.3814 | 2287476.4195 |
| Y1 | 28+00.00 | -90.00 | 75226.5816 | 2288332.9577 |
| Y1 | 27+10.00 | -95.00 | 75255.3654 | 2288247.5382 |
| Y1 | 35+80.00 | -90.00 | 75018.8909 | 2289084.7985 |
| Y1 | 35+80.00 | -73.24 | 75002.7379 | 2289080.3364 |
| Y1 | 34+25.00 | 76.64 | 74899.5353 | 2288891.0221 |
| Y1 | 43+71.90 | 77.34 | 74646.7301 | 2289803.5502 |
| Y1 | 45+58.91 | 77.48 | 74596.8025 | 2289983.7695 |
| Y1 | 32+55.00 | -73.48 | 75089.5091 | 2288767.1339 |
| Y1 | 29+02.04 | -90.00 | 75199.4135 | 2288431.3143 |
| Y1 | 29+01.92 | -73.75 | 75183.7761 | 2288426.8668 |
| Y1 | 32+70.00 | -90.00 | 75101.4346 | 2288785.9900 |
| Y1 | 34+10.00 | -90.00 | 75064.1568 | 2288920.9358 |

## DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT
IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY
NCGS FOR MONUMENT "SOUTHPORT EAST BASE RESET 1981 "
WITH NAD 83/95 STATE PLANE GRID COORDINATES OF
NORTHING: 74,896.0215(ft) EASTING: 2,288,816.4689(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT
(GROUND TO GRID) IS: 1.00010000
THE N.C. LAMBERT GRID BEARING AND
LOCALIZED HORIZONTAL GROUND DISTANCE FROM
"SOUTHPORT EAST " TO -L- STATION 10+00.00 IS
S 41°39' 55" W 3035.3412
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 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.*

2. *THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:*
   *HTTP://WWW.NCDOT.ORG/DOH/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/*

   *THE FILES TO BE FOUND ARE AS FOLLOWS:*
   *R3324_LS_GPSCALIB_071121.HTML*
   *R3324_LS_CONTROL_071121.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.*

*PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.*
*NETWORK ESTABLISHED FROM EXISTING HARN MONUMENTATION*
*SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.*

*NOTE: DRAWING NOT TO SCALE*

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| 34531.1.1 | 1H |

Location and Surveys

# *SURVEY CONTROL SHEET R-3324*

ROW MARKER IRON PIN AND CAP

| ALIGN | STATION | OFFSET | NORTH | EAST |
|---|---|---|---|---|
| Y2 | 25+00.00 | -60.00 | 81818.7912 | 2293757.8423 |
| Y2 | 71+57.56 | 171.83 | 86526.9341 | 2293501.2278 |
| Y2 | 77+00.00 | 75.00 | 86939.7716 | 2293117.6960 |
| Y2 | 16+49.95 | 50.34 | 80980.1238 | 2293935.4192 |
| Y2 | 83+50.00 | -75.00 | 87398.8923 | 2292633.7458 |
| Y2 | 72+33.30 | 101.53 | 86562.8624 | 2293398.2026 |
| Y2 | 28+85.00 | -60.00 | 82202.6195 | 2293727.8284 |
| Y2 | 31+20.00 | -60.00 | 82436.9044 | 2293709.5095 |
| Y2 | 26+77.73 | 50.30 | 82004.5755 | 2293853.9496 |
| Y2 | 26+76.60 | 75.30 | 82005.4010 | 2293878.9629 |
| Y2 | 22+13.84 | -50.04 | 81534.2040 | 2293790.3650 |
| Y2 | 72+44.03 | -74.51 | 86477.9524 | 2293243.6189 |
| Y2 | 66+64.54 | -74.50 | 85968.2009 | 2293418.4099 |
| Y2 | 63+46.02 | -75.59 | 85651.8891 | 2293442.4950 |
| Y2 | 48+84.85 | -79.17 | 84194.8866 | 2293552.8279 |
| Y2 | 43+30.44 | -78.57 | 83642.2131 | 2293596.6455 |
| Y2 | 63+45.68 | 74.41 | 85663.2466 | 2293592.0644 |
| Y2 | 48+84.74 | 70.83 | 84206.4775 | 2293702.3796 |
| Y2 | 43+30.75 | 71.43 | 83654.2183 | 2293746.1643 |
| Y2 | 33+84.27 | 74.36 | 82710.8400 | 2293822.8628 |
| Y2 | 31+23.77 | -75.30 | 82439.4739 | 2293693.9676 |
| Y2 | 32+65.00 | -75.48 | 82580.2565 | 2293682.7739 |
| Y2 | 33+40.00 | -85.00 | 82654.2861 | 2293667.4360 |
| Y2 | 34+55.00 | -85.00 | 82768.9362 | 2293658.4714 |
| Y2 | 36+00.00 | -76.31 | 82914.1726 | 2293655.8345 |
| Y2 | 27+60.00 | -60.00 | 82078.0000 | 2293737.5746 |
| Y2 | 26+72.00 | -60.00 | 81990.2678 | 2293744.4345 |
| Y2 | 26+12.00 | -60.00 | 81930.4504 | 2293749.1116 |
| Y2 | 31+55.00 | -75.34 | 82470.6024 | 2293691.4921 |
| Y2 | 32+15.00 | -75.42 | 82530.4136 | 2293686.7356 |
| Y2 | 32+75.00 | 74.51 | 82601.9179 | 2293831.5249 |
| Y2 | 32+15.00 | 74.58 | 82542.1067 | 2293836.2814 |
| Y2 | 59+99.82 | 73.57 | 85318.3729 | 2293618.1803 |
| Y2 | 60+59.82 | 73.71 | 85378.2014 | 2293613.6497 |
| Y2 | 60+00.17 | -76.43 | 85307.0269 | 2293468.6100 |
| Y2 | 60+60.19 | -76.29 | 85366.8750 | 2293464.0780 |
| Y2 | 37+15.00 | 73.15 | 83040.4736 | 2293795.8769 |
| Y2 | 37+15.00 | 275.00 | 83056.2082 | 2293997.1103 |
| Y2 | 37+75.00 | 275.00 | 83116.0256 | 2293992.4331 |
| Y2 | 37+75.00 | 73.15 | 83100.2910 | 2293791.1997 |
| Y2 | 68+92.99 | 101.37 | 86227.4619 | 2293549.1031 |
| Y2 | 70+96.45 | 194.05 | 86474.4087 | 2293553.5469 |
| Y2 | 69+12.65 | 127.60 | 86255.5899 | 2293568.1828 |
| Y2 | 70+07.00 | 163.00 | 86367.4512 | 2293566.6816 |

ROW MARKER IRON PIN AND CAP

| ALIGN | STATION | OFFSET | NORTH | EAST |
|---|---|---|---|---|
| Y4 | 11+50.38 | -60.00 | 86927.1591 | 2293202.3538 |
| Y4 | 12+68.61 | 60.00 | 86943.9938 | 2293369.1805 |
| Y4 | 11+00.32 | 60.00 | 86804.1777 | 2293244.1016 |
| Y4 | 15+27.83 | -60.00 | 87223.2269 | 2293334.7659 |
| Y4 | 14+48.37 | 71.87 | 87127.4362 | 2293455.4109 |
| Y4 | 20+00.00 | 50.00 | 87695.3739 | 2293412.2586 |
| Y4 | 20+00.00 | -50.00 | 87687.7815 | 2293312.5473 |
| Y4 | 15+87.38 | -60.00 | 87275.5898 | 2293333.9046 |
| Y4 | 16+40.00 | -50.00 | 87328.8194 | 2293339.8781 |

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S 41°39' 55" W 3035.3412
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