

**REPORT  
OF  
FIELD SURVEY**

**RAVENNA ARMY ARSENAL**

**PORTAGE COUNTY, OHIO**

*Additional monuments*

Photo Science, Inc.





2670 Wilhite Drive • Lexington, Kentucky 40503 • Phone 606-277-8700 • FAX 606-277-8901

Photogrammetry  
GIS Services

## **Report of Field Survey**

### **Ravenna Army Arsenal**

### **Portage County, OH**

Photo Science began work on this project in October 1998. The field surveys for this project started with the construction of intervisible pairs of concrete monuments. After construction, these points were sketched and referenced for the monument description sheets included in this report.

A four-man GPS field crew was mobilized to the site in late October. The crews were equipped with dual frequency Trimble 4000 SSI and 4000 SSE units to establish horizontal and vertical control for the project. Fast Static sessions lasting 25 minutes were observed on the monuments and Static hour long sessions were observed on the horizontal control in the area. After processing each of the baselines obtained from these sessions and adjusting the network using GPSurvey 2.30, excellent results were achieved for closure.

The basis for horizontal control is **RAVPORT AZ MK**, and **RAV GAR**. Both stations are B order control and are located in Portage County, OH. Six stations that were previously established by the Corps of Engineers in December 1997 serve as the basis for GPS vertical elevations for this project. The stations are **RAV 1**, **RAV 4**, **RAV 6**, **RAV 7**, **RAV 11**, and **RAV 12**. Data sheets are provided for each of the Corps of Engineers stations as well as the two horizontal control stations at the back of this report. The horizontal datum is based on NAD 83 (1995) while the vertical datum is NAVD 88. All mapping was performed on Ohio State Plane North Zone. All positions are listed in both metric and imperial (U.S. survey foot definition) units.

# GPS Project Summary

**Project**

Ravenna Army Arsenal

**Location**

Portage Country, OH

**Date**

6-Jan-99

**Person Responsible for GPS Calculations**

Mark Meade

Coordinate Projection

Ohio State Plane - North Zone

Applicable Datum

NAD 83 (1995)

Units (USF, Feet, Meters)

USF

Geoid Model Employed

GEOID96

GPS Hardware Used

Trimble 4000 SSI

Single or Dual Frequency

Dual

Crew Size for GPS Operations

4 person

Observation Methodology

Static and Rapid Static

Maximum Baseline Length

21,446 m

GPS Software Employed

GPSurvey 2.30

Ephemerides - Broadcast or Precise

Broadcast

Number of Network Points (Known &amp; Unknown)

25

Number of Known Horizontal Points Held in Final Soln

2

Number of Known Vertical Points Held in Final Soln

6

Number of Independent Baselines

34

Ratio -- Independent Baselines to Network Points

1.36

**Horizontal Control Points Employed**

RAVPORT AZ MK

RAV GAR

**Accuracy of Control**

B-order

B-order

**Vertical Control Points Employed**

RAV 1

3rd Order

RAV 4

3rd Order

RAV 6

3rd Order

RAV 7

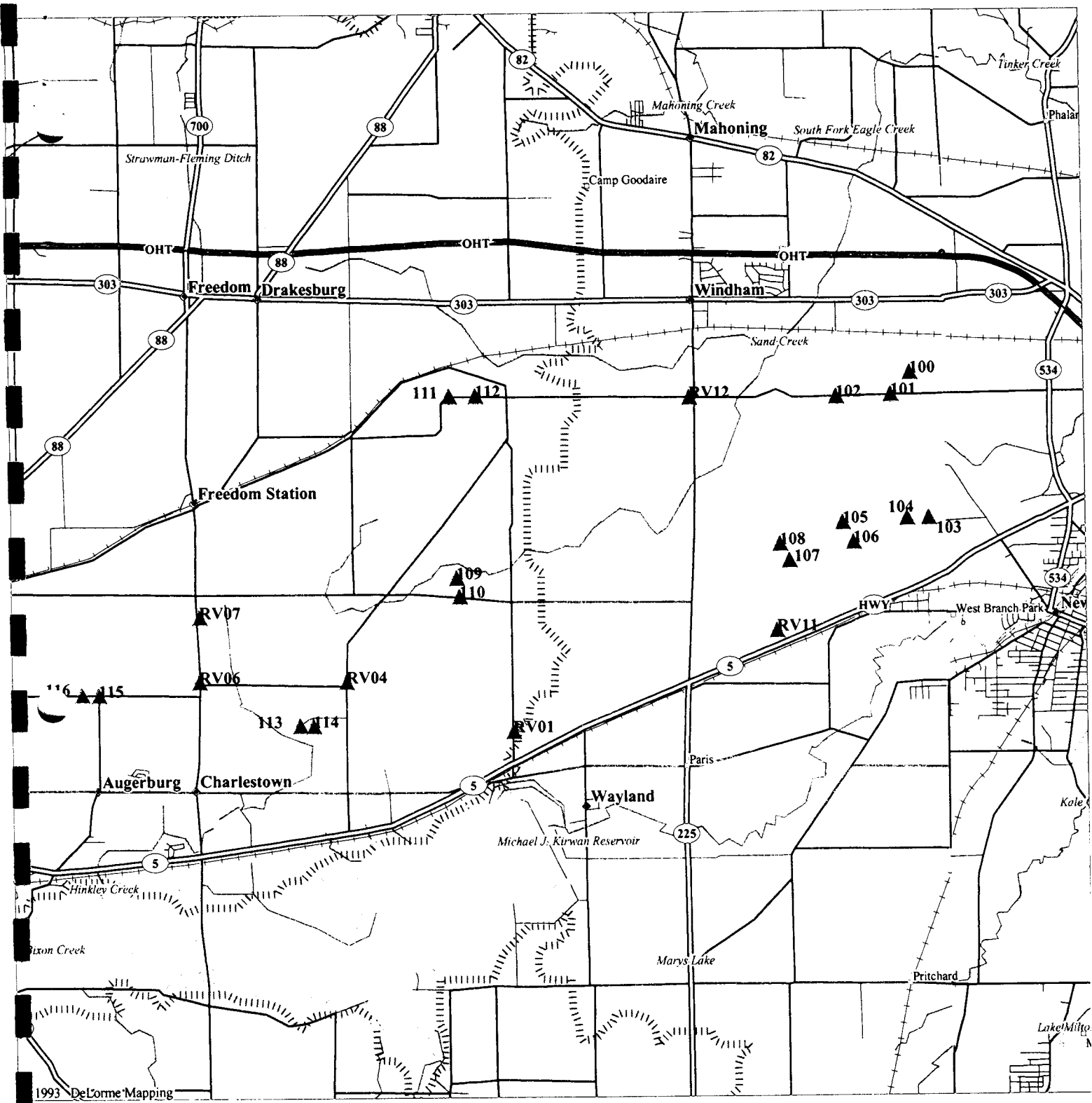
3rd Order

RAV 11

3rd Order

RAV 12

3rd Order



1993 DeLorme Mapping

- LEGEND**
- State Route
  - Major Street/Road
  - Interstate Highway
  - Geo Feature
  - Town, Small City
  - Interstate, Turnpike
  - Railroad
  - County Boundary
  - Population Center
  - Street, Road
  - River
  - Hwy Ramp
  - Land Mass
  - Open Water
  - Contours

Scale 1:87,500 (at center)

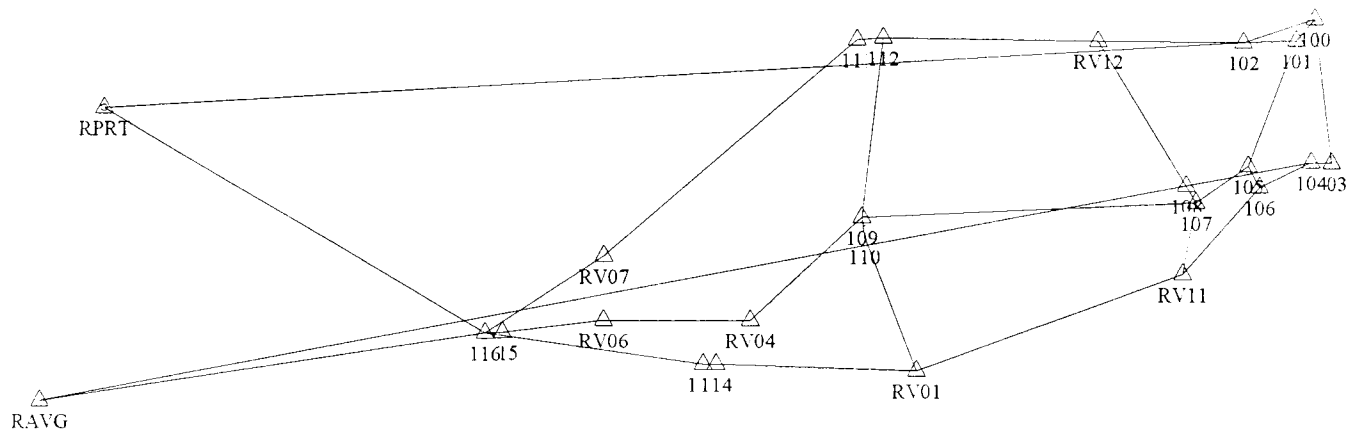
2 Miles

2 KM

Mag 12.78

Fri Nov 20 10:44:05 1998

# Network Map: Ravenna



2000m



# Coordinate Summary

***Project Summary***  
***Comparison of Field and GPS Elevations***

**Project**        Ravenna  
**Horiz Datum**   Ohio North  
**Vert Datum**    NAVD 88

| <b>Station</b> | <b>Northing<br/>(m)</b> | <b>Easting<br/>(m)</b> | <b>Geoid<br/>Ht (m)</b> | <b>HAE<br/>(m)</b> | <b>GPS<br/>Elev (m)</b> |
|----------------|-------------------------|------------------------|-------------------------|--------------------|-------------------------|
| 100            | 174025.675              | 725194.746             | -33.811                 | 253.523            | 287.334                 |
| 101            | 173662.996              | 724890.138             | -33.807                 | 252.301            | 286.108                 |
| 102            | 173621.758              | 723999.257             | -33.801                 | 255.814            | 289.615                 |
| 103            | 171650.107              | 725517.841             | -33.804                 | 250.335            | 284.140                 |
| 104            | 171638.979              | 725165.832             | -33.802                 | 255.352            | 289.154                 |
| 105            | 171558.999              | 724115.682             | -33.793                 | 275.968            | 309.761                 |
| 106            | 171241.609              | 724297.663             | -33.793                 | 277.710            | 311.503                 |
| 107            | 170932.229              | 723248.336             | -33.783                 | 275.390            | 309.173                 |
| 108            | 171202.771              | 723091.476             | -33.783                 | 274.544            | 308.327                 |
| 109            | 170588.177              | 717753.696             | -33.733                 | 293.211            | 326.944                 |
| 110            | 170288.270              | 717801.871             | -33.732                 | 296.882            | 330.613                 |
| 111            | 173560.867              | 717617.424             | -33.747                 | 297.903            | 331.649                 |
| 112            | 173570.824              | 718045.887             | -33.750                 | 288.612            | 322.362                 |
| 113            | 168142.320              | 715171.197             | -33.698                 | 296.293            | 329.991                 |
| 114            | 168137.282              | 715395.255             | -33.700                 | 293.607            | 327.306                 |
| 115            | 168603.377              | 711838.997             | -33.674                 | 326.610            | 360.283                 |
| 116            | 168607.828              | 711558.260             | -33.672                 | 329.313            | 362.985                 |
| RAVG           | 167368.581              | 704151.723             | -33.620                 | 297.006            | 330.626                 |
| RPRT           | 172229.347              | 705178.479             | -33.663                 | 329.854            | 363.517                 |
| RV01           | 168088.918              | 718696.419             | -33.730                 | 278.361            | 312.091                 |
| RV04           | 168870.797              | 715936.410             | -33.708                 | 303.255            | 336.963                 |
| RV06           | 168839.577              | 713510.470             | -33.688                 | 306.942            | 340.630                 |
| RV07           | 169902.357              | 713506.250             | -33.692                 | 307.886            | 341.578                 |
| RV11           | 169788.303              | 723050.114             | -33.777                 | 270.637            | 304.414                 |
| RV12           | 173587.493              | 721583.442             | -33.782                 | 260.119            | 293.901                 |

**Project Summary**  
**Final Position Summary**

**Project** Ravenna  
**Horiz Datum** Ohio North  
**Vert Datum** NAVD 88

*GPS elevations based on the  
 GEOID93 undulation model*

| <b>Station</b> | <b>Northing<br/>(m)</b> | <b>Easting<br/>(m)</b> | <b>Elev<br/>(m)</b> | <b>Elev.<br/>Type</b> |
|----------------|-------------------------|------------------------|---------------------|-----------------------|
| 100            | 174025.675              | 725194.746             | 287.334             | GPS                   |
| 101            | 173662.996              | 724890.138             | 286.108             | GPS                   |
| 102            | 173621.758              | 723999.257             | 289.615             | GPS                   |
| 103            | 171650.107              | 725517.841             | 284.140             | GPS                   |
| 104            | 171638.979              | 725165.832             | 289.154             | GPS                   |
| 105            | 171558.999              | 724115.682             | 309.761             | GPS                   |
| 106            | 171241.609              | 724297.663             | 311.503             | GPS                   |
| 107            | 170932.229              | 723248.336             | 309.173             | GPS                   |
| 108            | 171202.771              | 723091.476             | 308.327             | GPS                   |
| 109            | 170588.177              | 717753.696             | 326.944             | GPS                   |
| 110            | 170288.270              | 717801.871             | 330.613             | GPS                   |
| 111            | 173560.867              | 717617.424             | 331.649             | GPS                   |
| 112            | 173570.824              | 718045.887             | 322.362             | GPS                   |
| 113            | 168142.320              | 715171.197             | 329.991             | GPS                   |
| 114            | 168137.282              | 715395.255             | 327.306             | GPS                   |
| 115            | 168603.377              | 711838.997             | 360.283             | GPS                   |
| 116            | 168607.828              | 711558.260             | 362.985             | GPS                   |
| RAVG           | 167368.581              | 704151.723             | 330.626             | GPS                   |
| RPRT           | 172229.347              | 705178.479             | 363.517             | GPS                   |
| RV01           | 168088.918              | 718696.419             | 312.091             | GPS                   |
| RV04           | 168870.797              | 715936.410             | 336.963             | GPS                   |
| RV06           | 168839.577              | 713510.470             | 340.630             | GPS                   |
| RV07           | 169902.357              | 713506.250             | 341.578             | GPS                   |
| RV11           | 169788.303              | 723050.114             | 304.414             | GPS                   |
| RV12           | 173587.493              | 721583.442             | 293.901             | GPS                   |



***Project Summary***  
***Coordinate Positions in Metric and English Units***

**Project**        Ravenna  
**Horiz Datum**    Ohio North  
**Vert Datum**     NAVD 88

*Conversions based on the  
 US Survey foot definition  
 3.28083333333333 ft m*

| <b>Station</b> | <b>Northing<br/>(m)</b> | <b>Easting<br/>(m)</b> | <b>Elev<br/>(m)</b> | <b>Northing<br/>(ft)</b> | <b>Easting<br/>(ft)</b> | <b>Elev<br/>(ft)</b> |
|----------------|-------------------------|------------------------|---------------------|--------------------------|-------------------------|----------------------|
| 100            | 174025.675              | 725194.746             | 287.334             | 570949.23                | 2379243.10              | 942.69               |
| 101            | 173662.996              | 724890.138             | 286.108             | 569759.35                | 2378243.73              | 938.67               |
| 102            | 173621.758              | 723999.257             | 289.615             | 569624.05                | 2375320.90              | 950.18               |
| 103            | 171650.107              | 725517.841             | 284.140             | 563155.39                | 2380303.12              | 932.21               |
| 104            | 171638.979              | 725165.832             | 289.154             | 563118.88                | 2379148.24              | 948.67               |
| 105            | 171558.999              | 724115.682             | 309.761             | 562856.48                | 2375702.87              | 1016.28              |
| 106            | 171241.609              | 724297.663             | 311.503             | 561815.18                | 2376299.92              | 1021.99              |
| 107            | 170932.229              | 723248.336             | 309.173             | 560800.16                | 2372857.25              | 1014.34              |
| 108            | 171202.771              | 723091.476             | 308.327             | 561687.76                | 2372342.62              | 1011.57              |
| 109            | 170588.177              | 717753.696             | 326.944             | 559671.38                | 2354830.25              | 1072.65              |
| 110            | 170288.270              | 717801.871             | 330.613             | 558687.43                | 2354988.31              | 1084.69              |
| 111            | 173560.867              | 717617.424             | 331.649             | 569424.28                | 2354383.17              | 1088.09              |
| 112            | 173570.824              | 718045.887             | 322.362             | 569456.95                | 2355788.88              | 1057.62              |
| 113            | 168142.320              | 715171.197             | 329.991             | 551646.93                | 2346357.50              | 1082.64              |
| 114            | 168137.282              | 715395.255             | 327.306             | 551630.40                | 2347092.60              | 1073.84              |
| 115            | 168603.377              | 711838.997             | 360.283             | 553159.58                | 2335425.11              | 1182.03              |
| 116            | 168607.828              | 711558.260             | 362.985             | 553174.18                | 2334504.06              | 1190.89              |
| RAVG           | 167368.581              | 704151.723             | 330.626             | 549108.42                | 2310204.44              | 1084.73              |
| RPRT           | 172229.347              | 705178.479             | 363.517             | 565055.78                | 2313573.06              | 1192.64              |
| RV01           | 168088.918              | 718696.419             | 312.091             | 551471.72                | 2357923.17              | 1023.92              |
| RV04           | 168870.797              | 715936.410             | 336.963             | 554036.94                | 2348868.04              | 1105.52              |
| RV06           | 168839.577              | 713510.470             | 340.630             | 553934.51                | 2340908.94              | 1117.55              |
| RV07           | 169902.357              | 713506.250             | 341.578             | 557421.32                | 2340895.09              | 1120.66              |
| RV11           | 169788.303              | 723050.114             | 304.414             | 557047.12                | 2372206.92              | 998.73               |
| RV12           | 173587.493              | 721583.442             | 293.901             | 569511.63                | 2367395.01              | 964.24               |

# Network Summary

|    |      |                                |                    |      |      |
|----|------|--------------------------------|--------------------|------|------|
| 1  | 100  | 174025.674873<br>725194.745929 | 253.5234<br>0.0000 | ---- | YXH- |
| 2  | 101  | 173662.995971<br>724890.137957 | 252.3011<br>0.0000 | ---- | YXH- |
| 3  | 102  | 173621.757804<br>723999.256961 | 255.8141<br>0.0000 | ---- | YXH- |
| 4  | 103  | 171650.107009<br>725517.840589 | 250.3352<br>0.0000 | ---- | YXH- |
| 5  | 104  | 171638.978535<br>725165.832395 | 255.3522<br>0.0000 | ---- | YXH- |
| 6  | 105  | 171558.999453<br>724115.682079 | 275.9684<br>0.0000 | ---- | YXH- |
| 7  | 106  | 171241.609449<br>724297.662851 | 277.7101<br>0.0000 | ---- | YXH- |
| 8  | 107  | 170932.229467<br>723248.336036 | 275.3898<br>0.0000 | ---- | YXH- |
| 9  | 108  | 171202.771126<br>723091.476242 | 274.5435<br>0.0000 | ---- | YXH- |
| 10 | 109  | 170588.177155<br>717753.695697 | 293.2112<br>0.0000 | ---- | YXH- |
| 11 | 110  | 170288.269567<br>717801.871493 | 296.8819<br>0.0000 | ---- | YXH- |
| 12 | 111  | 173560.867208<br>717617.424198 | 297.9026<br>0.0000 | ---- | YXH- |
| 13 | 112  | 173570.824042<br>718045.887266 | 288.6118<br>0.0000 | ---- | YXH- |
| 14 | 113  | 168142.320161<br>715171.196995 | 296.2928<br>0.0000 | ---- | YXH- |
| 15 | 114  | 168137.281868<br>715395.254939 | 293.6066<br>0.0000 | ---- | YXH- |
| 16 | 115  | 168603.377490<br>711838.996639 | 326.6095<br>0.0000 | ---- | YXH- |
| 17 | 116  | 168607.827603<br>711558.259854 | 329.3128<br>0.0000 | ---- | YXH- |
| 18 | RAVG | 167368.581000<br>704151.723000 | 297.0061<br>0.0000 | YX-- | YXH- |
| 19 | RPRT | 172229.347000<br>705178.479000 | 329.8539<br>0.0000 | YX-- | YXH- |

|    |      |                                |                    |      |      |
|----|------|--------------------------------|--------------------|------|------|
| 20 | RV01 | 168088.917669<br>718696.419273 | 278.3610<br>0.0000 | --H- | YXH- |
| 21 | RV04 | 168870.796542<br>715936.410319 | 303.2550<br>0.0000 | --H- | YXH- |
| 22 | RV06 | 168839.577408<br>713510.470423 | 306.9420<br>0.0000 | --H- | YXH- |
| 23 | RV07 | 169902.356661<br>713506.250232 | 307.8860<br>0.0000 | --H- | YXH- |
| 24 | RV11 | 169788.302994<br>723050.114202 | 270.6370<br>0.0000 | --H- | YXH- |
| 25 | RV12 | 173587.493131<br>721583.441721 | 260.1190<br>0.0000 | --H- | YXH- |

#### SYSTEM PARAMETERS

Network status = reduced computed adjusted  
 Datum = NAD-83  
 Coordinate System = 1983 State Plane Lambert  
 Zone = Ohio North  
 Linear units = meter

ADJUSTMENT STATISTICS SUMMARY  
NETWORK = Ravenna  
TIME = Thu Oct 29 13:39:22 1998

ADJUSTMENT SUMMARY

Network Reference Factor = 1.18  
Chi-Square Test ( $\alpha = 95\%$ ) = PASS  
Degrees of Freedom = 33.00

GPS OBSERVATIONS

Reference Factor = 1.18  
r = 33.00

|              |    |                    |      |     |      |
|--------------|----|--------------------|------|-----|------|
| GPS Solution | 1  | Reference Factor = | 0.49 | r = | 0.62 |
| GPS Solution | 2  | Reference Factor = | 0.51 | r = | 1.15 |
| GPS Solution | 3  | Reference Factor = | 0.46 | r = | 0.62 |
| GPS Solution | 4  | Reference Factor = | 1.69 | r = | 0.88 |
| GPS Solution | 5  | Reference Factor = | 1.08 | r = | 1.36 |
| GPS Solution | 6  | Reference Factor = | 1.56 | r = | 0.98 |
| GPS Solution | 7  | Reference Factor = | 1.78 | r = | 0.62 |
| GPS Solution | 8  | Reference Factor = | 0.77 | r = | 1.52 |
| GPS Solution | 9  | Reference Factor = | 0.45 | r = | 0.70 |
| GPS Solution | 10 | Reference Factor = | 0.97 | r = | 0.90 |
| GPS Solution | 11 | Reference Factor = | 1.25 | r = | 0.96 |
| GPS Solution | 12 | Reference Factor = | 1.36 | r = | 0.64 |
| GPS Solution | 13 | Reference Factor = | 1.25 | r = | 1.10 |
| GPS Solution | 14 | Reference Factor = | 1.36 | r = | 0.97 |
| GPS Solution | 15 | Reference Factor = | 0.92 | r = | 0.84 |
| GPS Solution | 16 | Reference Factor = | 1.68 | r = | 1.22 |
| GPS Solution | 17 | Reference Factor = | 0.54 | r = | 0.83 |
| GPS Solution | 18 | Reference Factor = | 1.40 | r = | 1.69 |
| GPS Solution | 19 | Reference Factor = | 0.55 | r = | 1.03 |
| GPS Solution | 20 | Reference Factor = | 0.63 | r = | 0.97 |
| GPS Solution | 21 | Reference Factor = | 0.25 | r = | 0.89 |
| GPS Solution | 22 | Reference Factor = | 0.79 | r = | 1.18 |
| GPS Solution | 23 | Reference Factor = | 0.98 | r = | 1.21 |
| GPS Solution | 24 | Reference Factor = | 0.21 | r = | 0.89 |
| GPS Solution | 25 | Reference Factor = | 0.56 | r = | 1.23 |
| GPS Solution | 26 | Reference Factor = | 0.21 | r = | 0.86 |
| GPS Solution | 27 | Reference Factor = | 2.14 | r = | 1.14 |
| GPS Solution | 28 | Reference Factor = | 2.39 | r = | 0.78 |
| GPS Solution | 29 | Reference Factor = | 1.12 | r = | 1.01 |
| GPS Solution | 30 | Reference Factor = | 1.28 | r = | 1.24 |
| GPS Solution | 31 | Reference Factor = | 1.79 | r = | 0.67 |
| GPS Solution | 32 | Reference Factor = | 1.86 | r = | 0.55 |
| GPS Solution | 33 | Reference Factor = | 0.81 | r = | 0.58 |
| GPS Solution | 34 | Reference Factor = | 0.77 | r = | 1.17 |

WEIGHTING STRATEGIES:

GPS OBSERVATIONS:

Scalar Weighting Strategy:  
Alternative Scalar Set Applied Globally = 3.43

No summation weighting strategy was used

Station Error Strategy:  
H.I. error = 0.0080  
Tribrach error = 0.0040

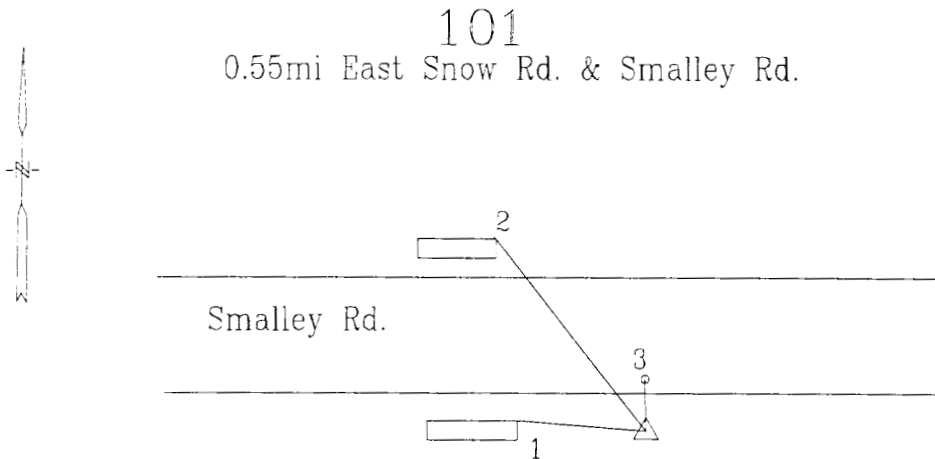
# Monument Description Sheets



Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|                                    |                                    |                               |  |
|------------------------------------|------------------------------------|-------------------------------|--|
| Project Name: Ravenna Army Arsenal |                                    |                               | Agency: Army Corps of Engineers        |
| Quad Sheet:<br>Windham             | County:<br>Portage                 | State:<br>OH                  | Date Set:<br>10/20/98                  |
| Station:<br>101                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV101   | Established By:<br>Photo Science, Inc. |
| Elev (FT):<br>938.67               | Elev (M):<br>286.108               | Datum:<br>NAVD 1988           |  |
| Northing (FT):<br>569,759.350      | Easting (FT):<br>2,378,243.730     | Datum:<br>OH North            |  |
| Northing (M):<br>173,662.996       | Easting (M):<br>724,890.138        | Datum:<br>OH North            |  |
| Latitude:<br>41°13'15.3883"        | Longitude:<br>81° 00' 37.6532"     | Datum:<br>NAD 83              |  |
| Ahead Station: 102                 | Ahead Bearing: SW 87° 20' 59"      | Ahead Distance (ft): 891.8349 |  |
| Back Station:                      | Back Bearing: ° ' "                | Back Distance (ft): 0         |  |
| Data Entry:                        | Checked By:                        | Date: 11/17/98                |  |



1. 12.5' to SE corner of HDWL
2. 27.1' to NE corner of HDWL
3. 1.9' to nail in edge of rd.



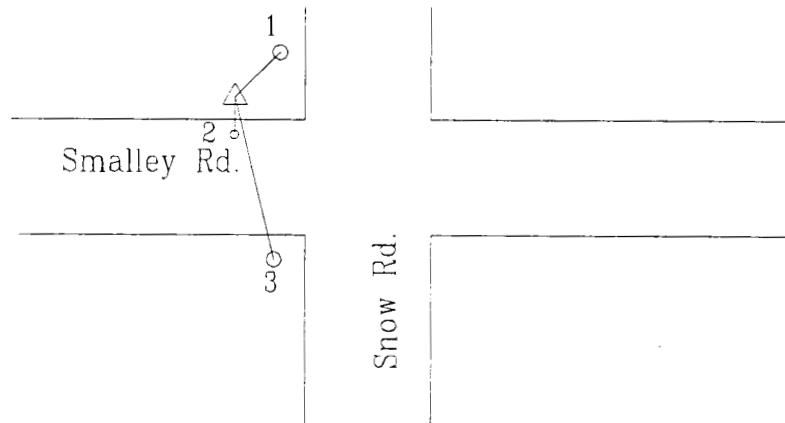
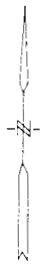


Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|                                    |                                    |                              |  |  |  |
|------------------------------------|------------------------------------|------------------------------|--|--|--|
| Project Name: Ravenna Army Arsenal |                                    |                              | Agency: Army Corps of Engineers        |  |  |
| Quad Sheet:<br>Windham             | County:<br>Portage                 | State:<br>OH                 | Date Set:<br>10/20/98                  |  |  |
| Station:<br>102                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV102  | Established By:<br>Photo Science, Inc. |  |  |
| Elev (FT):<br>950.18               | Elev (M):<br>289.615               | Datum:<br>NAVD 1988          |  |  |  |
| Northing (FT):<br>569,624.050      | Easting (FT):<br>2,375,320.900     | Datum:<br>OH North           |  |  |  |
| Northing (M):<br>173,621.758       | Easting (M):<br>723,999.257        | Datum:<br>OH North           |  |  |  |
| Latitude:<br>41°13'14.5431"        | Longitude:<br>81° 01' 15.9272"     | Datum:<br>NAD 83             |  |  |  |
| Ahead Station:                     | Ahead Bearing:<br>° ' "            | Ahead Distance (ft): 0       |  |  |  |
| Back Station: 101                  | Back Bearing: NE 87° 20' 59"       | Back Distance (ft): 891.8349 |  |  |  |
| Data Entry:                        | Checked By:                        | Date: 11/17/98               |  |  |  |

102



1. 7.7' to route sign post
2. 1.7' to nail in edge of rd.
3. 37.0' to road sign post

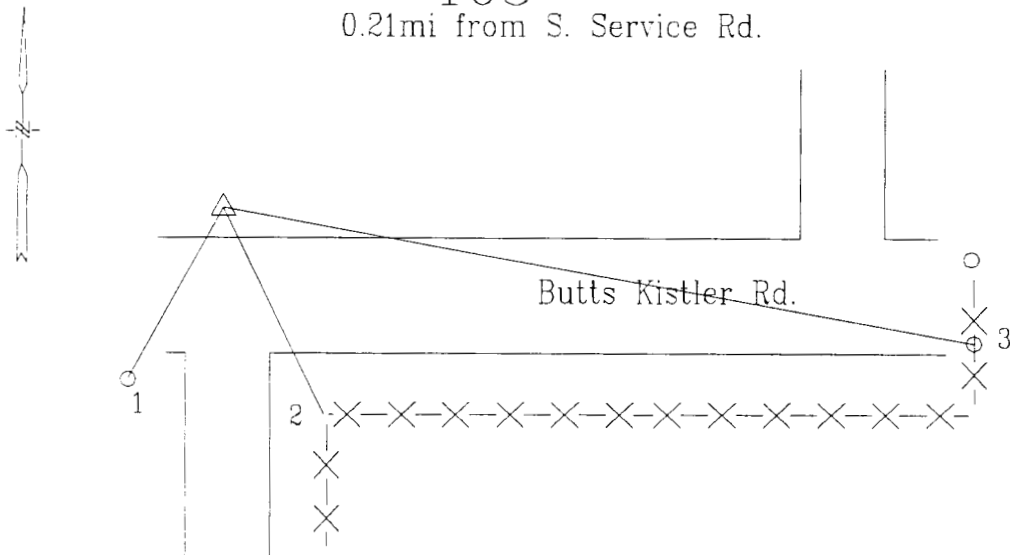


Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|                                    |                                    |                             |  |                       |
|------------------------------------|------------------------------------|-----------------------------|--|-----------------------|
| Project Name: Ravenna Army Arsenal |                                    |                             | Agency: Army Corps of Engineers        |                       |
| Quad Sheet:<br>Windham             | County:<br>Portage                 | State:<br>OH                |  | Date Set:<br>10/20/98 |
| Station:<br>103                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV103 | Established By:<br>Photo Science, Inc. |                       |
| Elev (FT):<br>932.21               | Elev (M):<br>284.140               | Datum:<br>NAVD 1988         |  |                       |
| Northing (FT):<br>563,155.390      | Easting (FT):<br>2,380,303.120     | Datum:<br>OH North          |  |                       |
| Northing (M):<br>171,650.107       | Easting (M):<br>725,517.841        | Datum:<br>OH North          |  |                       |
| Latitude:<br>41°12'09.7969"        | Longitude:<br>81° 00' 12.1900"     | Datum:<br>NAD 83            |  |                       |
| Ahead Station: 104                 | Ahead Bearing: SW 88° 11' 20"      | Ahead Distance (ft): 352.18 |  |                       |
| Back Station:                      | Back Bearing: ° ' "                | Back Distance (ft): 0       |  |                       |
| Data Entry:                        | Checked By:                        | Date: 11/17/98              |  |                       |

103  
0.21mi from S. Service Rd.



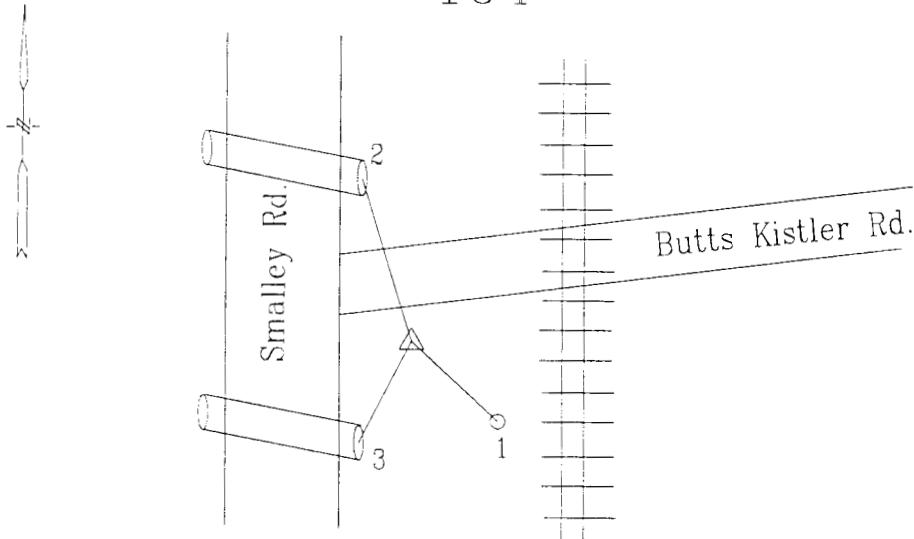
1. 41.5' to monitoring well #LL2MW64
2. 29.6' to corner of fence
3. 140.1' to SE Gate Post



# CONTROL REFERENCE SUMMARY

|                                    |                                    |                             |  |
|------------------------------------|------------------------------------|-----------------------------|--|
| Project Name: Ravenna Army Arsenal |                                    |                             | Agency: Army Corps of Engineers        |
| Quad Sheet:<br>Windham             | County:<br>Portage                 | State:<br>OH                | Date Set:<br>10/20/98                  |
| Station:<br>104                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV104 | Established By:<br>Photo Science, Inc. |
| Elev (FT):<br>948.67               | Elev (M):<br>289.154               | Datum:<br>NAVD 1988         |  |
| Northing (FT):<br>563,118.880      | Easting (FT):<br>2,379,148.240     | Datum:<br>OH North          |  |
| Northing (M):<br>171,638.979       | Easting (M):<br>725,165.832        | Datum:<br>OH North          |  |
| Latitude:<br>41°12'09.6318"        | Longitude:<br>81° 00' 27.3051"     | Datum:<br>NAD 83            |  |
| Ahead Station:                     | Ahead Bearing:<br>° ' "            | Ahead Distance (ft): 0      |  |
| Back Station: 103                  | Back Bearing: NE 88° 11' 20"       | Back Distance (ft): 352.18  |  |
| Data Entry:                        | Checked By:                        | Date: 11/17/98              |  |

104



1. 39.6' to nail in P.P. #RR561 South of Rd.
2. 37.4' to East end of 24" CMP under South Service Rd.
3. 55.4' to SE end of 24" CMP under South Service Rd.



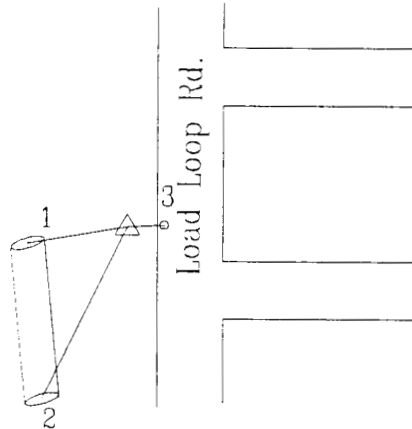
Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|                                    |                                    |                              |  |  |
|------------------------------------|------------------------------------|------------------------------|--|--|
| Project Name: Ravenna Army Arsenal |                                    |                              | Agency: Army Corps of Engineers        |  |
| Quad Sheet:<br>Windham             | County:<br>Portage                 | State:<br>OH                 | Date Set:<br>10/20/98                  |  |
| Station:<br>105                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV105  | Established By:<br>Photo Science, Inc. |  |
| Elev (FT):<br>1,016.28             | Elev (M):<br>309.761               | Datum:<br>NAVD 1988          |  |  |
| Northing (FT):<br>562,856.480      | Easting (FT):<br>2,375,702.870     | Datum:<br>OH North           |  |  |
| Northing (M):<br>171,558.999       | Easting (M):<br>724,115.682        | Datum:<br>OH North           |  |  |
| Latitude:<br>41°12'07.6195"        | Longitude:<br>81° 01' 12.4320"     | Datum:<br>NAD 83             |  |  |
| Ahead Station: 106                 | Ahead Bearing: SE 29° 49' 40"      | Ahead Distance (ft): 365.859 |  |  |
| Back Station:                      | Back Bearing: ° ' "                | Back Distance (ft): 0        |  |  |
| Data Entry:                        | Checked By:                        | Date: 11/17/98               |  |  |

105

0.6 mi South of Load Line 1



1. 21.3' to North end of 18" CMP
2. 47.4' to South end of 18" CMP
3. 3.8' to nail in west edge of rd.

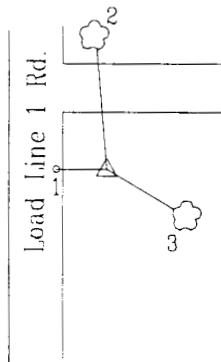
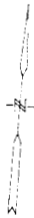


Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|   |   |                                       |  |   |  |
|---|---|---------------------------------------|--|---|--|
| <b>Project Name:</b> Ravenna Army Arsenal |   |                                       | <b>Agency:</b> Army Corps of Engineers |   |  |
| <b>Quad Sheet:</b><br>Windham             | <b>County:</b><br>Portage                 | <b>State:</b><br>OH                   |  | <b>Date Set:</b><br>10/20/98                  |  |
| <b>Station:</b><br>106                    | <b>Type of Mark:</b><br>Concrete Monument | <b>Stamping on Mark:</b><br>RAV106    |  | <b>Established By:</b><br>Photo Science, Inc. |  |
| <b>Elev (FT):</b><br>1,021.99             |   | <b>Elev (M):</b><br>311.503           |  | <b>Datum:</b><br>NAVD 1988                    |  |
| <b>Northing (FT):</b><br>561,815.180      |   | <b>Easting (FT):</b><br>2,376,299.920 |  | <b>Datum:</b><br>OH North                     |  |
| <b>Northing (M):</b><br>171,241.609       |   | <b>Easting (M):</b><br>724,297.663    |  | <b>Datum:</b><br>OH North                     |  |
| <b>Latitude:</b><br>41°11'57.2318"        |   | <b>Longitude:</b><br>81° 01' 04.8536" |  | <b>Datum:</b><br>NAD 83                       |  |
| <b>Ahead Station:</b>                     |   | <b>Ahead Bearing:</b> ° ' "           |  | <b>Ahead Distance (ft):</b> 0                 |  |
| <b>Back Station:</b> 105                  |   | <b>Back Bearing:</b> NW 29° 49' 40"   |  | <b>Back Distance (ft):</b> 365.859            |  |
| <b>Data Entry:</b>                        |   | <b>Checked By:</b>                    |  | <b>Date:</b> 11/17/98                         |  |

106  
0.8 mi South of Ramesdell



1. 6.0' to nail in East side of rd.
2. 38.9' tp nail in 6" Ash Tree
3. 29.6' to nail in 4" Maple Tree



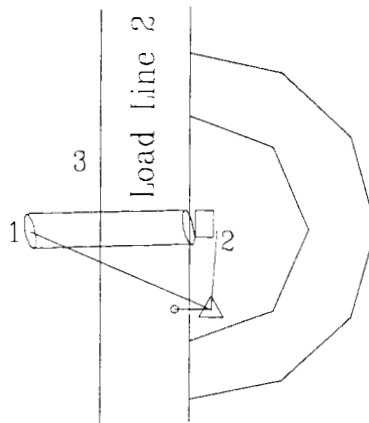
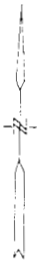
Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|                                    |                                    |                                |                                 |  |  |
|------------------------------------|------------------------------------|--------------------------------|---------------------------------|--|--|
| Project Name: Ravenna Army Arsenal |                                    |                                | Agency: Army Corps of Engineers |  |  |
| Quad Sheet:<br>Windham             | County:<br>Portage                 | State:<br>OH                   |                                 | Date Set:<br>10/20/98                  |  |
| Station:<br>107                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV107    |                                 | Established By:<br>Photo Science, Inc. |  |
| Elev (FT):<br>1,014.34             |                                    | Elev (M):<br>309.173           |                                 | Datum:<br>NAVD 1988                    |  |
| Northing (FT):<br>560,800.160      |                                    | Easting (FT):<br>2,372,857.250 |                                 | Datum:<br>OH North                     |  |
| Northing (M):<br>170,932.229       |                                    | Easting (M):<br>723,248.336    |                                 | Datum:<br>OH North                     |  |
| Latitude:<br>41°11'47.7795"        |                                    | Longitude:<br>81° 01' 50.1083" |                                 | Datum:<br>NAD 83                       |  |
| Ahead Station: 108                 |                                    | Ahead Bearing: W 30° 6' 20"    |                                 | Ahead Distance (ft): 312.726           |  |
| Back Station:                      |                                    | Back Bearing: ° ' "            |                                 | Back Distance (ft): 0                  |  |
| Data Entry:                        |                                    | Checked By:                    |                                 | Date: 11/17/98                         |  |

107

0.8mi South on Load Line 1



1. 44.5' to West end of 12" CMP
2. 11.6m to SE corner of concrete junction box
3. 3.4' to nail in pavement on East edge of rd.



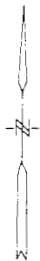
Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

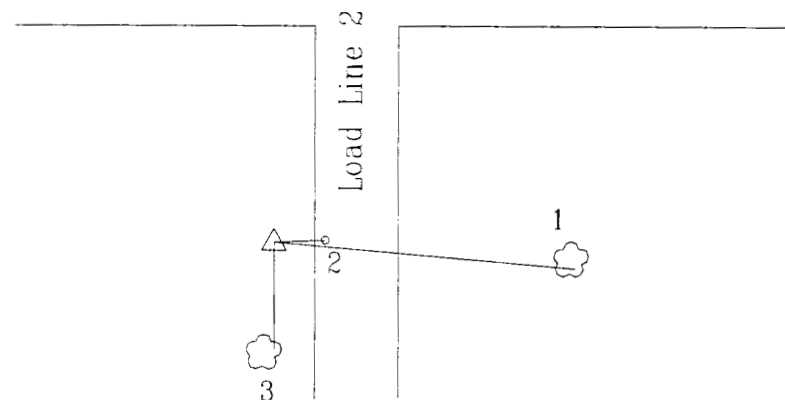
|                                    |                                    |                                |                                 |  |  |
|------------------------------------|------------------------------------|--------------------------------|---------------------------------|--|--|
| Project Name: Ravenna Army Arsenal |                                    |                                | Agency: Army Corps of Engineers |  |  |
| Quad Sheet:<br>Windham             | County:<br>Portage                 | State:<br>OH                   |                                 | Date Set:<br>10/20/98                  |  |
| Station:<br>108                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV108    |                                 | Established By:<br>Photo Science, Inc. |  |
| Elev (FT):<br>1,011.57             |                                    | Elev (M):<br>308.327           |                                 | Datum:<br>NAVD 1988                    |  |
| Northing (FT):<br>561,687.760      |                                    | Easting (FT):<br>2,372,342.620 |                                 | Datum:<br>OH North                     |  |
| Northing (M):<br>171,202.771       |                                    | Easting (M):<br>723,091.476    |                                 | Datum:<br>OH North                     |  |
| Latitude:<br>41°11'56.6341"        |                                    | Longitude:<br>81° 01' 56.6441" |                                 | Datum:<br>NAD 83                       |  |
| Ahead Station:                     |                                    | Ahead Bearing: ° ' "           |                                 | Ahead Distance (ft): 0                 |  |
| Back Station: 107                  |                                    | Back Bearing: SE 30° 6' 20"    |                                 | Back Distance (ft): 312.73             |  |
| Data Entry:                        |                                    | Checked By:                    |                                 | Date: 11/17/98                         |  |

108

0.31mi South of Intersection with Remalia



Remalia rd.



1. 95.1' to nail in 12" Pine Tree
2. 3.9' to nail in West side of Pavement
3. 67.6' to 12" Apple Tree

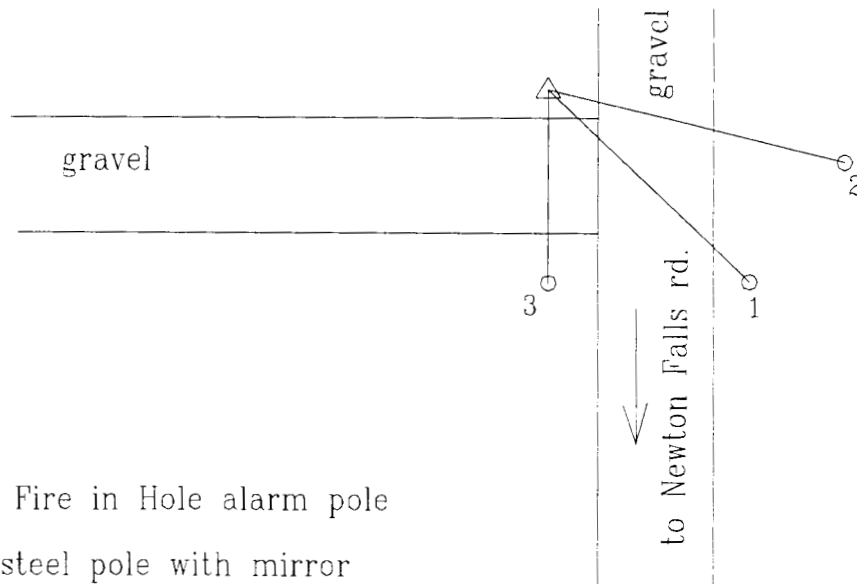
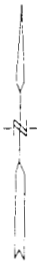


Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|                                    |                                    |                              |                                 |  |  |
|------------------------------------|------------------------------------|------------------------------|---------------------------------|--|--|
| Project Name: Ravenna Army Arsenal |                                    |                              | Agency: Army Corps of Engineers |  |  |
| Quad Sheet:<br>Windham             | County:<br>Portage                 | State:<br>OH                 |                                 | Date Set:<br>10/20/98                  |  |
| Station:<br>109                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV109  |                                 | Established By:<br>Photo Science, Inc. |  |
| Elev (FT):<br>1,072.65             | Elev (M):<br>326.944               | Datum:<br>NAVD 1988          |                                 |  |  |
| Northing (FT):<br>559,671.380      | Easting (FT):<br>2,354,830.250     | Datum:<br>OH North           |                                 |  |  |
| Northing (M):<br>170,588.177       | Easting (M):<br>717,753.696        | Datum:<br>OH North           |                                 |  |  |
| Latitude:<br>41°11'39.5617"        | Longitude:<br>81° 05' 46.1375"     | Datum:<br>NAD 83             |                                 |  |  |
| Ahead Station: 110                 | Ahead Bearing: SE 9° 7' 30"        | Ahead Distance (ft): 303.752 |                                 |  |  |
| Back Station:                      | Back Bearing: ° ' "                | Back Distance (ft): 0        |                                 |  |  |
| Data Entry:                        | Checked By:                        | Date: 11/17/98               |                                 |  |  |

109



1. 105.8' to Fire in Hole alarm pole
2. 80.7' to steel pole with mirror
3. 75.5' to nail in abandoned power pole



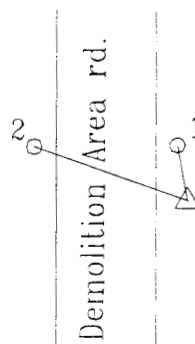
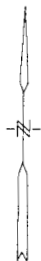


Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|                                    |                                    |                             |  |
|------------------------------------|------------------------------------|-----------------------------|--|
| Project Name: Ravenna Army Arsenal |                                    |                             | Agency: Army Corps of Engineers        |
| Quad Sheet:<br>Windham             | County:<br>Portage                 | State:<br>OH                | Date Set:<br>10/20/98                  |
| Station:<br>110                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV110 | Established By:<br>Photo Science, Inc. |
| Elev (FT):<br>1,084.69             | Elev (M):<br>330.613               | Datum:<br>NAVD 1988         |  |
| Northing (FT):<br>558,687.430      | Easting (FT):<br>2,354,988.310     | Datum:<br>OH North          |  |
| Northing (M):<br>170,288.270       | Easting (M):<br>717,801.871        | Datum:<br>OH North          |  |
| Latitude:<br>41°11'29.8155"        | Longitude:<br>81°05'44.2774"       | Datum:<br>NAD 83            |  |
| Ahead Station:                     | Ahead Bearing:<br>° ' "            | Ahead Distance (ft): 0      |  |
| Back Station: 109                  | Back Bearing: NW 9° 7' 30"         | Back Distance (ft): 303.75  |  |
| Data Entry:                        | Checked By:                        | Date: 11/17/98              |  |

110



Newton Falls rd.

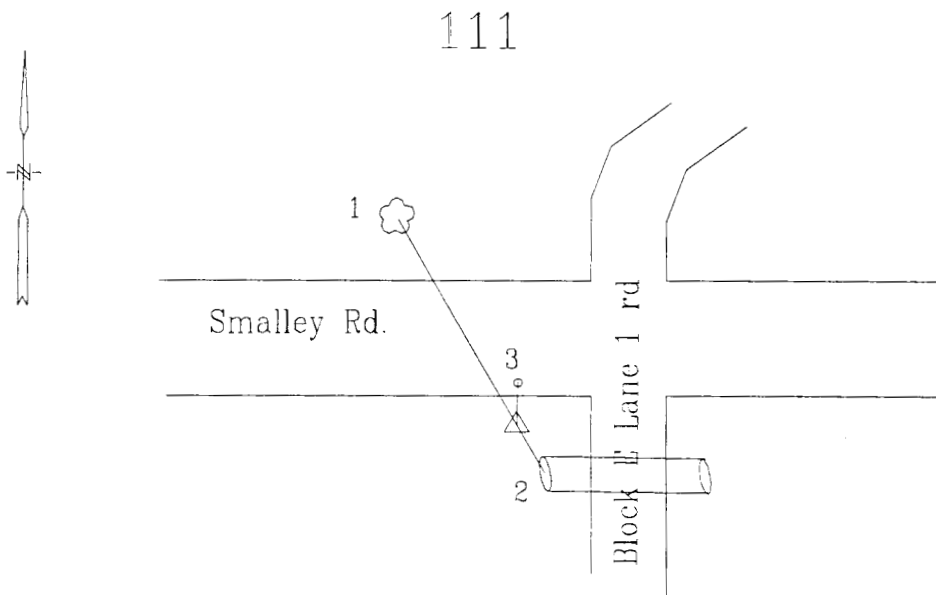
1. 61.8' to East steel post of chain gate
2. 65.3' to West steel post of chain gate
3. 69.0' to stop sign post



Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|                                    |                                    |                              |  |
|------------------------------------|------------------------------------|------------------------------|--|
| Project Name: Ravenna Army Arsenal |                                    |                              | Agency: Army Corps of Engineers        |
| Quad Sheet:<br>Windham             | County:<br>Portage                 | State:<br>OH                 | Date Set:<br>10/20/98                  |
| Station:<br>111                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV111  | Established By:<br>Photo Science, Inc. |
| Elev (FT):<br>1,088.09             | Elev (M):<br>331.649               | Datum:<br>NAVD 1988          |  |
| Northing (FT):<br>569,424.280      | Easting (FT):<br>2,354,383.170     | Datum:<br>OH North           |  |
| Northing (M):<br>173,560.867       | Easting (M):<br>717,617.424        | Datum:<br>OH North           |  |
| Latitude:<br>41°13'15.9871"        | Longitude:<br>81° 05' 49.9331"     | Datum:<br>NAD 83             |  |
| Ahead Station: 112                 | Ahead Bearing: NE 88° 40' 8"       | Ahead Distance (ft): 428.578 |  |
| Back Station:                      | Back Bearing: ° ' "                | Back Distance (ft): 0        |  |
| Data Entry:                        | Checked By:                        | Date: 11/17/98               |  |



1. 84.3' to nail in 12" Maple Tree
2. 90.0' to West end of 12" CMP under block lane rd.
3. 2.5' to nail in edge of pavement

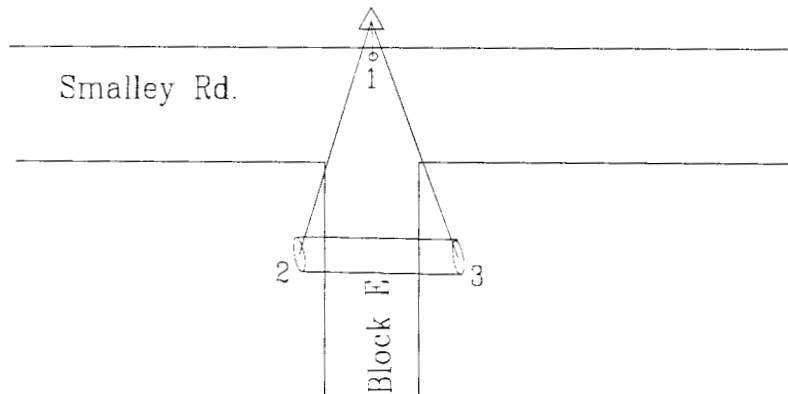
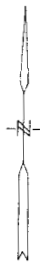


Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|                                    |                                    |                                |                                 |  |  |
|------------------------------------|------------------------------------|--------------------------------|---------------------------------|--|--|
| Project Name: Ravenna Army Arsenal |                                    |                                | Agency: Army Corps of Engineers |  |  |
| Quad Sheet:<br>Windham             | County:<br>Portage                 | State:<br>OH                   |                                 | Date Set:<br>10/20/98                  |  |
| Station:<br>112                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV112    |                                 | Established By:<br>Photo Science, Inc. |  |
| Elev (FT):<br>1,057.62             |                                    | Elev (M):<br>322.362           |                                 | Datum:<br>NAVD 1988                    |  |
| Northing (FT):<br>569,456.950      |                                    | Easting (FT):<br>2,355,788.880 |                                 | Datum:<br>OH North                     |  |
| Northing (M):<br>173,570.824       |                                    | Easting (M):<br>718,045.887    |                                 | Datum:<br>OH North                     |  |
| Latitude:<br>41°13'16.0861"        |                                    | Longitude:<br>81°05'31.5328"   |                                 | Datum:<br>NAD 83                       |  |
| Ahead Station:                     |                                    | Ahead Bearing: ° ' "           |                                 | Ahead Distance (ft): 0                 |  |
| Back Station: 111                  |                                    | Back Bearing: SW 88°40'8"      |                                 | Back Distance (ft): 428.578            |  |
| Data Entry:                        |                                    | Checked By:                    |                                 | Date: 11/17/98                         |  |

112

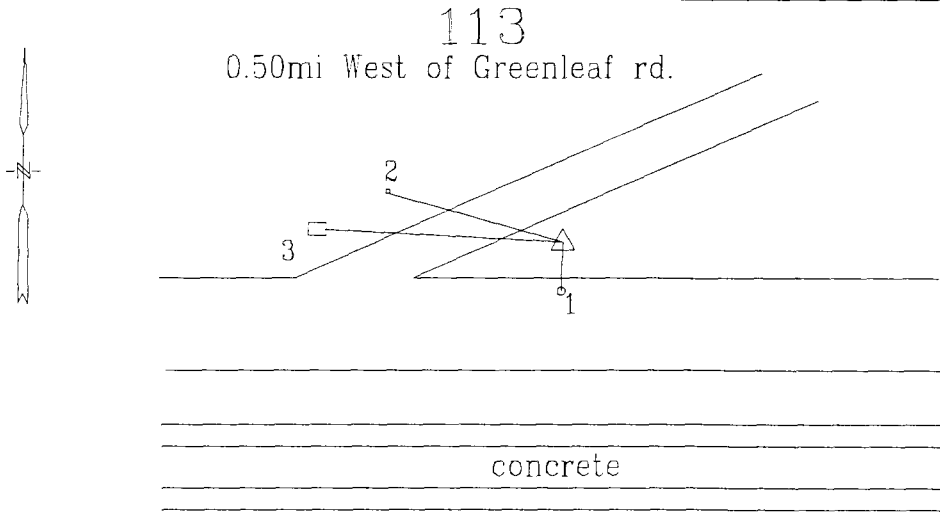


1. 2.7' to nail in edge of pavement
2. 46.8' to West end of 15" CMP
3. 47.2' to East end of 12" CMP



# CONTROL REFERENCE SUMMARY

|   |   |                                      |   |
|---|---|--------------------------------------|---|
| <b>Project Name:</b> Ravenna Army Arsenal |   |                                      | <b>Agency:</b> Army Corps of Engineers        |
| <b>Quad Sheet:</b><br>Ravenna             | <b>County:</b><br>Portage                 | <b>State:</b><br>OH                  | <b>Date Set:</b><br>10/20/98                  |
| <b>Station:</b><br>113                    | <b>Type of Mark:</b><br>Concrete Monument | <b>Stamping on Mark:</b><br>RAV113   | <b>Established By:</b><br>Photo Science, Inc. |
| <b>Elev (FT):</b><br>1,082.64             | <b>Elev (M):</b><br>329.991               | <b>Datum:</b><br>NAVD 1988           |   |
| <b>Northing (FT):</b><br>551,646.930      | <b>Easting (FT):</b><br>2,346,357.500     | <b>Datum:</b><br>OH North            |   |
| <b>Northing (M):</b><br>168,142.320       | <b>Easting (M):</b><br>715,171.197        | <b>Datum:</b><br>OH North            |   |
| <b>Latitude:</b><br>41°10'21.6155"        | <b>Longitude:</b><br>81° 07' 38.6090"     | <b>Datum:</b><br>NAD 83              |   |
| <b>Ahead Station:</b> 114                 | <b>Ahead Bearing:</b> SE 88° 42' 40"      | <b>Ahead Distance (ft):</b> 224.1145 |   |
| <b>Back Station:</b>                      | <b>Back Bearing:</b> ° ' "                | <b>Back Distance (ft):</b> 0         |   |
| <b>Data Entry:</b>                        | <b>Checked By:</b>                        | <b>Date:</b> 11/17/98                |   |



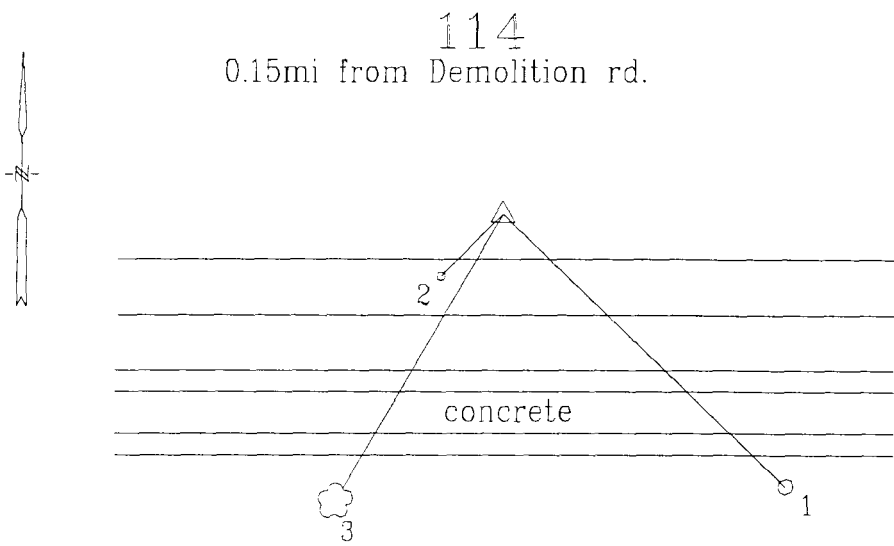
1. 29' to nail in concrete expansion joint
2. 31.4' to steel sign post "33"
3. 37.2' to 24"x24" concrete cube w/ steel loop on top



Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|                                    |                                    |                              |  |
|------------------------------------|------------------------------------|------------------------------|--|
| Project Name: Ravenna Army Arsenal |                                    |                              | Agency: Army Corps of Engineers        |
| Quad Sheet:<br>Windham             | County:<br>Portage                 | State:<br>OH                 | Date Set:<br>10/20/98                  |
| Station:<br>114                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV114  | Established By:<br>Photo Science, Inc. |
| Elev (FT):<br>1,073.84             | Elev (M):<br>327.306               | Datum:<br>NAVD 1988          |  |
| Northing (FT):<br>551,630.400      | Easting (FT):<br>2,347,092.600     | Datum:<br>OH North           |  |
| Northing (M):<br>168,137.282       | Easting (M):<br>715,395.255        | Datum:<br>OH North           |  |
| Latitude:<br>41°10'21.3378"        | Longitude:<br>81° 07' 29.0009"     | Datum:<br>NAD 83             |  |
| Ahead Station:                     | Ahead Bearing:<br>° ' "            | Ahead Distance (ft): 0       |  |
| Back Station: 113                  | Back Bearing: NW 88° 42' 40"       | Back Distance (ft): 224.1145 |  |
| Data Entry:                        | Checked By:                        | Date: 11/17/98               |  |



1. 68.0' to sign post "red & yellow" reflective sign
2. 0.6' to nail in concrete
3. 105.5' to nail in 15" Wild Cherry Tree

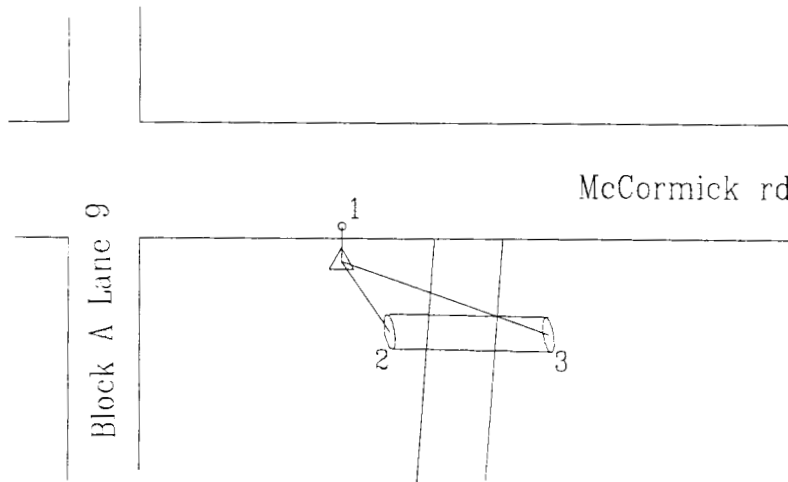
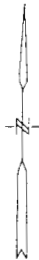


Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|                                    |                                    |                                |                                 |  |  |
|------------------------------------|------------------------------------|--------------------------------|---------------------------------|--|--|
| Project Name: Ravenna Army Arsenal |                                    |                                | Agency: Army Corps of Engineers |  |  |
| Quad Sheet:<br>Ravenna             | County:<br>Portage                 | State:<br>OH                   |                                 | Date Set:<br>10/20/98                  |  |
| Station:<br>115                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV115    |                                 | Established By:<br>Photo Science, Inc. |  |
| Elev (FT):<br>1,182.03             |                                    | Elev (M):<br>360.283           |                                 | Datum:<br>NAVD 1988                    |  |
| Northing (FT):<br>553,159.580      |                                    | Easting (FT):<br>2,335,425.110 |                                 | Datum:<br>OH North                     |  |
| Northing (M):<br>168,603.377       |                                    | Easting (M):<br>711,838.997    |                                 | Datum:<br>OH North                     |  |
| Latitude:<br>41°10'38.2356"        |                                    | Longitude:<br>81° 10' 01.2513" |                                 | Datum:<br>NAD 83                       |  |
| Ahead Station: 116                 |                                    | Ahead Bearing: W 89° 5' 30"    |                                 | Ahead Distance (ft): 280.772           |  |
| Back Station:                      |                                    | Back Bearing: ° ' "            |                                 | Back Distance (ft): 0                  |  |
| Data Entry:                        |                                    | Checked By:                    |                                 | Date: 11/17/98                         |  |

115



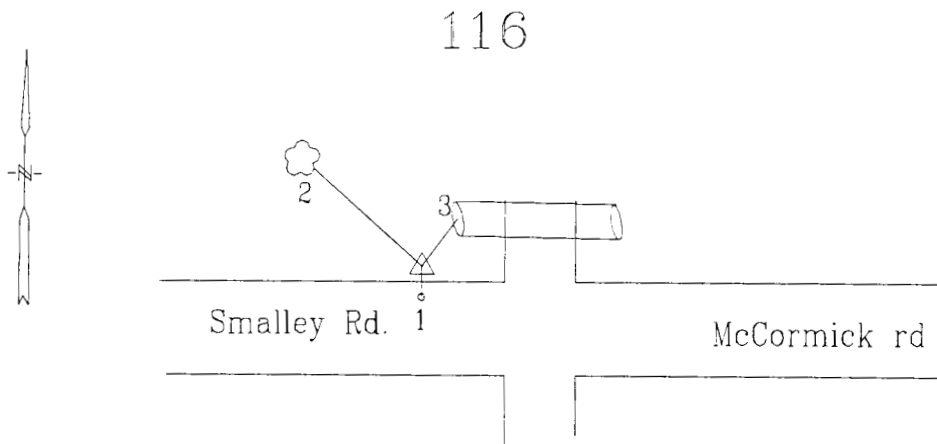
1. 4.4' to nail in South side of rd.
2. 5.1' to West end of 12" RCP under Knapp Rd.
3. 23.2' to East end of 12" RCP under Knapp Rd.



Photo Science, Inc.

# CONTROL REFERENCE SUMMARY

|                                    |                                    |                             |  |
|------------------------------------|------------------------------------|-----------------------------|--|
| Project Name: Ravenna Army Arsenal |                                    |                             | Agency: Army Corps of Engineers        |
| Quad Sheet:<br>Ravenna             | County:<br>Portage                 | State:<br>OH                | Date Set:<br>10/20/98                  |
| Station:<br>116                    | Type of Mark:<br>Concrete Monument | Stamping on Mark:<br>RAV116 | Established By:<br>Photo Science, Inc. |
| Elev (FT):<br>1,190.89             | Elev (M):<br>362.985               | Datum:<br>NAVD 1988         |  |
| Northing (FT):<br>553,174.180      | Easting (FT):<br>2,334,504.060     | Datum:<br>OH North          |  |
| Northing (M):<br>168,607.828       | Easting (M):<br>711,558.260        | Datum:<br>OH North          |  |
| Latitude:<br>41°10'38.5187"        | Longitude:<br>81° 10' 13.2923"     | Datum:<br>NAD 83            |  |
| Ahead Station:                     | Ahead Bearing: ° ' "               | Ahead Distance (ft): 0      |  |
| Back Station: 115                  | Back Bearing: SE 89° 5' 30"        | Back Distance (ft): 280.772 |  |
| Data Entry:                        | Checked By:                        | Date: 11/17/98              |  |



1. 3.7' to nail in North edge of pavement
2. 45.5' to nail in 20" Wild Cherry Tree
3. 38.2' to West end of 12" CMP under Block Lane 9

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# Control Ties



# The NGS Data Sheet

DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 5.70

Starting Datasheet Retrieval...

1 National Geodetic Survey, Retrieval Date = NOVEMBER 18, 1998

MB3002 \*\*\*\*\*

MB3002 CBN - This is a Cooperative Base Network Control Station.

MB3002 PACS - This is a Primary Airport Control Station.

MB3002 DESIGNATION - RAVPORT AZ MK

MB3002 PID - MB3002

MB3002 STATE/COUNTY- OH/PORTAGE

MB3002 USGS QUAD - RAVENNA (1981)

MB3002

MB3002 \*CURRENT SURVEY CONTROL

MB3002

MB3002\* NAD 83(1995)- 41 12 38.96993(N) 081 14 44.76057(W) ADJUSTED

MB3002\* NAVD 88 - 363.60 (meters) 1192.9 (feet) GPS OBS

MB3002

MB3002 X - 731,371.656 (meters) COMP

MB3002 Y - -4,749,464.058 (meters) COMP

MB3002 Z - 4,180,282.583 (meters) COMP

MB3002 LAPLACE CORR- -0.60 (seconds) DEFLEC96

MB3002 ELLIP HEIGHT- 329.96 (meters) GPS OBS

MB3002 GEOID HEIGHT- -33.66 (meters) GEOID96

MB3002

MB3002 HORZ ORDER - B

MB3002 ELLP ORDER - FOURTH CLASS II

MB3002

MB3002.This mark is at Portage County Airport (29G)

MB3002

MB3002.The horizontal coordinates were established by GPS observations

MB3002.and adjusted by the National Geodetic Survey in August 1996.

MB3002.This is a SPECIAL STATUS position. See SPECIAL STATUS under the

MB3002.DATUM ITEM on the data sheet items page.

MB3002

MB3002.The orthometric height was determined by GPS observations.

MB3002

MB3002.GPS derived orthometric heights for airport stations designated as

MB3002.PACS or SACS are published to 2 decimal places. This maintains

MB3002.centimeter relative accuracy between the PACS and SACS. It does

MB3002.not indicate centimeter accuracy relative to other marks which are

MB3002.part of the NAVD 88 network.

MB3002

MB3002.The X, Y, and Z were computed from the position and the ellipsoidal ht.

MB3002

MB3002.The Laplace correction was computed from DEFLEC96 derived deflections.

MB3002

MB3002.The ellipsoidal height was determined by GPS observations

MB3002.and is referenced to NAD 83.

MB3002

MB3002.The geoid height was determined by GEOID96.

MB3002

MB3002; North East Units Scale Converg.

MB3002;SPC OH N - 172,229.347 705,178.479 MT 0.99994225 +0 49 26.3

MB3002;UTM 17 - 4,562,190.177 479,396.626 MT 0.99960522 -0 09 42.9

MB3002

MB3002: Primary Azimuth Mark Grid Az

MB3002:SPC OH N - RAVPORT 264 16 41.3

MB3002:UTM 17 - RAVPORT 265 15 50.5

MB3002

MB3002|-----|

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MB3002| PID      Reference Object          Distance      Geod. Az |
MB3002|          |          |          |          |
MB3002| MB2999 RAVPORT          442.585 METERS 2650607.6 |
MB3002|-----|-----|-----|-----|
MB3002
MB3002
MB3002          SUPERSEDED SURVEY CONTROL
MB3002
MB3002 NAD 83(1986)- 41 12 38.97934(N) 081 14 44.76762(W) AD(      ) 3
MB3002 NAD 27      - 41 12 38.77564(N) 081 14 45.37146(W) AD(      ) 3
MB3002 NGVD 29    -      363.6      (m)      1193.      (f) GPS OBS
MB3002

```

MB3002.Superseded values are not recommended for survey control.  
 MB3002.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.  
 MB3002.See file format.dat to determine how the superseded data were derived.

```

MB3002
MB3002_MARKER: DZ = AZIMUTH MARK DISK
MB3002_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT (ROUND)
MB3002_STAMPING: RAVPORT 1986
MB3002_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
MB3002+STABILITY: SURFACE MOTION
MB3002_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
MB3002+SATELLITE: SATELLITE OBSERVATIONS - July 24, 1995

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MB3002
MB3002 HISTORY      - Date      Condition      Recov. By
MB3002 HISTORY      - 1986      MONUMENTED    NGS
MB3002 HISTORY      - 19871026 GOOD
MB3002 HISTORY      - 19950724 GOOD          NGS

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MB3002
MB3002          STATION DESCRIPTION

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MB3002'DESCRIBED BY NATIONAL GEODETIC SURVEY 1986
MB3002'STATION IS LOCATED ABOUT 3.5 MILES NORTH OF RAVENNA, ALONG STATE
MB3002'HIGHWAY 44 AT THE PORTAGE COUNTY AIRPORT, ACROSS RUNWAY FROM AIRPORT
MB3002'BUILDINGS, MIDWAY ALONG THE RUNWAY, AT THE AIRPORT TEE, ON A BENCH
MB3002'ABOUT 0.5 METERS ABOVE RUNWAY. OWNERSHIP PORTAGE COUNTY AIRPORT, C/O
MB3002'MANAGER JERRY NOVAK, 8101 STATE ROUTE 44, BUILDING A, RAVENNA OH 44266
MB3002'216-297-0087.

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MB3002'TO REACH FROM THE JUNCTION OF STATE HIGHWAYS 14 AND 44 ( ABOUT 1.6
MB3002'MILES NORTH OF RAVENNA, GO NORTH ON HIGHWAY 44 FOR 1.4 MILE TO
MB3002'THE AIRPORT ENTRANCE ROAD ON THE LEFT. CONTINUE NORTH FOR 0.2 MILE
MB3002'TO A GRAVEL ROAD. TURN LEFT, WEST FOR 0.1 MILE TO A CONCRETE TAXI
MB3002'STRIP AND A HANGER ON THE LEFT. TURN LEFT, SOUTH, ON TAXI STRIP FOR
MB3002'0.05 MILE TO A TAXI STRIP AND THE AZIMUTH MARK ON THE RIGHT. TURN
MB3002'RIGHT, WEST 0.3 MILE TO ITS JUNCTION WITH THE RUNWAY, AND STATION
MB3002'ON ELEVATED BENCH.

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MB3002'AZIMUTH MARKS ARE STANDARD NGS AZIMUTH DISKS STAMPED --RAVPORT
MB3002'F1986--. THE SURFACE DISK IS SET IN THE TOP OF A 25 CM ROUND CONCRETE
MB3002'POST PROJECTING 1 CM. IT 28.9 METERS NORTH OF THE RUNWAY CENTER, 12.5
MB3002'METERS SOUTH OF THE GRAVEL TAXI STRIP CENTER, 26.8 METERS WEST OF THE
MB3002'EXTENDED CENTER OF THE CONCRETE TAXI STRIP, 8.5 METERS WEST-NORTHWEST
MB3002'OF A TAXI LIGHT, AND 4.4 METERS NORTH OF A FIBERGLASS CONCRETE MASS
MB3002'ABOUT 1.2 METERS BELOW GROUND.

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MB3002'DESCRIBED BY G. R. HEID. TYPED BY JAMES MALONEY 9/08/87.

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MB3002
MB3002          STATION RECOVERY (1987)

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MB3002
MB3002'RECOVERED 1987
MB3002'RECOVERED IN GOOD CONDITION.

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MB3002
MB3002          STATION RECOVERY (1995)

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MB3002
MB3002'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1995 (AJL)
MB3002'THE STATION IS LOCATED ABOUT 5.6 KM (3.45 MI) NORTH OF RAVENNA, ALONG

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# The NGS Data Sheet

DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 5.70

Starting Datasheet Retrieval...

1 National Geodetic Survey, Retrieval Date = NOVEMBER 18, 1998

AB6120 \*\*\*\*\*

AB6120 CBN - This is a Cooperative Base Network Control Station.

AB6120 DESIGNATION - RAV GAR

AB6120 PID - AB6120

AB6120 STATE/COUNTY- OH/PORTAGE

AB6120 USGS QUAD - KENT (1984)

AB6120

AB6120 \*CURRENT SURVEY CONTROL

AB6120\* NAD 83(1995)- 41 10 01.88825(N) 081 15 31.80193(W) ADJUSTED

AB6120\* NAVD 88 - 330.7 (meters) 1085. (feet) GPS OBS

AB6120

AB6120 X - 730,769.698 (meters) COMP

AB6120 Y - -4,752,760.595 (meters) COMP

AB6120 Z - 4,176,614.046 (meters) COMP

AB6120 LAPLACE CORR- -0.90 (seconds) DEFLEC96

AB6120 ELLIP HEIGHT- 297.09 (meters) GPS OBS

AB6120 GEOID HEIGHT- -33.62 (meters) GEOID96

AB6120

AB6120 HORZ ORDER - B

AB6120 ELLP ORDER - FOURTH CLASS II

AB6120

AB6120.The horizontal coordinates were established by GPS observations

AB6120.and adjusted by the National Geodetic Survey in August 1996.

AB6120.This is a SPECIAL STATUS position. See SPECIAL STATUS under the

AB6120.DATUM ITEM on the data sheet items page.

AB6120

AB6120.The orthometric height was determined by GPS observations.

AB6120

AB6120.The X, Y, and Z were computed from the position and the ellipsoidal ht.

AB6120

AB6120.The Laplace correction was computed from DEFLEC96 derived deflections.

AB6120

AB6120.The ellipsoidal height was determined by GPS observations

AB6120.and is referenced to NAD 83.

AB6120

AB6120.The geoid height was determined by GEOID96.

AB6120

AB6120; North East Units Scale Converg.

AB6120;SPC OH N - 167,368.581 704,151.723 MT 0.99994064 +0 48 55.4

AB6120;UTM 17 - 4,557,349.423 478,286.765 MT 0.99960580 -0 10 13.4

AB6120

AB6120 SUPERSEDED SURVEY CONTROL

AB6120

AB6120.No superseded survey control is available for this station.

AB6120

AB6120\_MARKER: I = METAL ROD

AB6120\_SETTING: 60 = ALUMINUM ALLOY ROD IN SLEEVE (10 FT.+)

AB6120\_STAMPING: RAV GAR 1995

AB6120\_PROJECTION: FLUSH

AB6120\_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL

AB6120\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

AB6120+SATELLITE: SATELLITE OBSERVATIONS - 1995

AB6120\_ROD/PIPE-DEPTH: 11.5 meters

AB6120\_SLEEVE-DEPTH : 1.0 meters

AB6120

| AB6120 | HISTORY | - Date | Condition  | Recov. By |
|--------|---------|--------|------------|-----------|
| AB6120 | HISTORY | - 1995 | MONUMENTED | OHDT      |

AB6120

AB6120

## STATION DESCRIPTION

AB6120

AB6120'DESCRIBED BY OHIO DEPARTMENT OF TRANSPORTATION 1995 (RR)  
AB6120'THE STATION IS LOCATED AT THE ODOT DISTRICT 4 HEADQUARTERS, 705  
AB6120'OAKWOOD STREET, RAVENNA, OHIO, NEAR THE HELIPAD AT THE BACK OF THE  
AB6120'LOT. TO REACH THE STATION FROM THE INTERSECTION OF SR 43 AND SR 59 IN  
AB6120'THE CITY OF KENT, PROCEED EAST ON SR 59 FOR 7.0 KM (4.35 MI) TO THE  
AB6120'INTERSECTION OF SR 59 AND OAKWOOD STREET IN RAVENNA. TURN LEFT ON  
AB6120'OAKWOOD AND GO NORTH FOR 0.8 KM (0.50 MI) TO ODOT DISTRICT 4  
AB6120'HEADQUARTERS ON THE LEFT. THE MARK IS 20 M (65.6 FT) EAST OF THE  
AB6120'STOCKYARD ACCESS DRIVE, 1 M (3.3 FT) NORTH OF THE HELIPAD, AND 15 M  
AB6120'(49.2 FT) EAST OF THE EAST EDGE OF THE HELIPAD. OWNERSHIP--STATE OF  
AB6120'OHIO, DEPARTMENT OF TRANSPORTATION, DISTRICT 4 DEPUTY DIRECTOR, 705  
AB6120'OAKWOOD STREET, RAVENNA, OHIO 44266. THE STATION IS ACCESSIBLE ONLY  
AB6120'BY ARRANGEMENT. CONTACT THE SURVEY OPERATIONS MANAGER, 330-297-0801,  
AB6120'EXTENSION 295, FOR ACCESS TO MARK. NOTE--SLEEVE DEPTH DOES NOT MEET  
AB6120'CLASS A REQUIREMENTS.

Elapsed Time = 00:00:02

MB3002'STATE HIGHWAY 44 AT THE PORTAGE COUNTY AIRPORT. NEAR THE EAST END OF  
MB3002'A GRASS MEDIAN BETWEEN THE RUNWAY AND THE TAXI. NEAR THE NORTHEAST  
MB3002'END OF RUNWAY END 27. OWNERSHIP--PORTAGE COUNTY AIRPORT, 8095 STATE  
MB3002'ROUTE 44, RAVENNA, OHIO, 44266. AIRPORT MANAGER ROBERT CHINN, PHONE  
MB3002'330-297-1478. TO REACH THE STATION FROM THE JUNCTION OF STATE  
MB3002'HIGHWAYS 44 AND 14 ON THE NORTH SIDE OF RAVENNA, GO NORTH, 3.2 KM  
MB3002'(2.00 MI) ALONG HIGHWAY 44 TO THE AIRPORT ENTRANCE ON THE LEFT. TURN  
MB3002'LEFT, WEST, 0.5 KM (0.30 MI) TO A FORK. TURN RIGHT, NORTH, 0.09 KM  
MB3002'(0.05 MI) TO THE OFFICE ON THE LEFT. CONTINUE NORTH, 0.11 KM (0.05  
MB3002'MI) ACROSS APRON AND RUNWAY TO THE WIND TEE. TURN RIGHT, EAST, 0.42  
MB3002'KM (0.25 MI) ALONG TAXI TO THE STATION ON THE RIGHT. STATION IS 29.0  
MB3002'M (95.1 FT) NORTH OF THE RUNWAY CENTERLINE, 25.4 M (83.3 FT) WEST OF  
MB3002'THE RAMP CENTERLINE AND IN LINE WITH THE MOST NORTHERLY SOLID PAINTED  
MB3002'HOLD BAR, 12.2 M (40.0 FT) SOUTH OF THE TAXI CENTERLINE, 4.5 M (14.8  
MB3002'FT) NORTH OF A WITNESS POST, AND THE MONUMENT IS 0.2 M (0.7 FT) ABOVE  
MB3002'THE LEVEL OF THE RUNWAY AND FLUSH WITH THE GROUND SURFACE.  
Elapsed Time = 00:00:03



U.S. ARMY ENGINEER DISTRICT, LOUISVILLE

CORPS OF ENGINEERS

P.O. BOX 59

LOUISVILLE, KY 40201

US Army Corps of Engineers

PROJECT: RAVENNA ARSENAL

DATE: DEC 1997

STATION RAV 1 1997

GEOGRAPHIC COORDINATES (NAD 83)

LATITUDE 41° 10' 18.06583" N

LONGITUDE 81° 05' 07.42132" W

ELEVATION 1023.92' DATUM NAVD 88

STATE PLANE COORDINATES (NAD 83)

UNITS (FEET or METERS) FEET

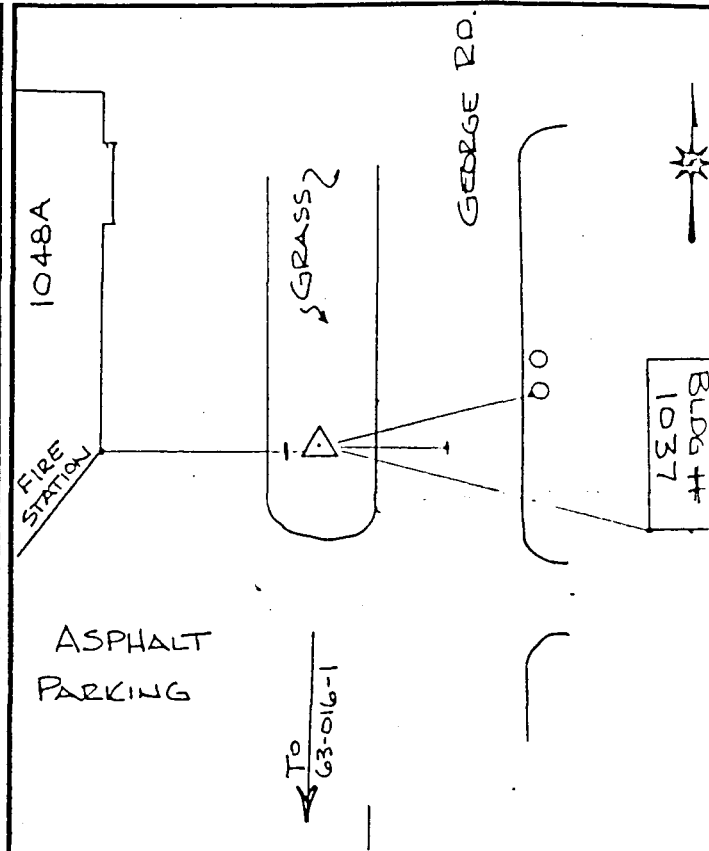
NORTHING 551,472.462

EASTING 2,357,923.326

STATE OH ZONE 3401

CONV.  $\leftrightarrow$  0° 55' 45.57115

COMB. FACTOR 0.999891807



SKETCH OF STATION

142.5' from Ref 1, SW Corner of Bldg. 1037

55.1' from Ref 2, Face of S one of 2 trans. poles

57.8' from Ref 3, Corner of Fire Station

30.5' from Ref 4, c/l Asphalt Road

1.0' East of Carsonite Witness Post

The station is a brass Corps. Of Engineers disk stamped "RAV 1 1997" set in a 36" concrete post 12" in diameter and belled to 18" at base, and flush with ground.

QUAD: WINDHAM, OH



US Army Corps  
of Engineers

U.S. ARMY ENGINEER DISTRICT, LOUISVILLE  
CORPS OF ENGINEERS  
P.O. BOX 59  
LOUISVILLE, KY 40201

PROJECT: RAVENNA ARSENAL

DATE: DEZ 1997

STATION RAV 4 1997

GEOGRAPHIC COORDINATES (NAD 83 )

LATITUDE 41° 10' 44.84364" N

LONGITUDE 81° 07' 05.28520" W

ELEVATION 1105.52' DATUM NAVD88

STATE PLANE COORDINATES (NAD 83 )

UNITS (FEET or METERS) FEET

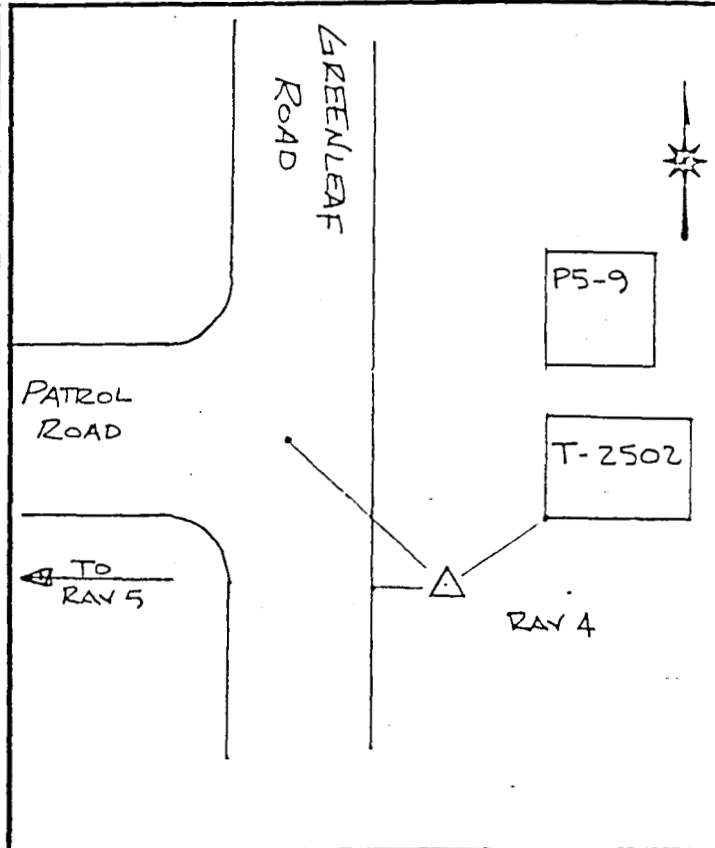
NORTHING 554,037.682

EASTING 2,348,868.243

STATE OH ZONE 3401

CONV. 0° 54' 28.14044"

COMB. FACTOR 0.999888150



SKETCH OF STATION

The station is a brass Corps. Of Engineers disk stamped "RAV 4 1997" set in a 36" concrete post 12" in diameter and belled to 18" at base, and flush with ground.

REFERENCES:

- 9.7' SW from SW corner of building T-2502
- 4.0' East from edge of road
- 22.5' SE from C/L of intersection

QUAD: WINDHAM, OH



US Army Corps  
of Engineers

U.S. ARMY ENGINEER DISTRICT, LOUISVILLE

CORPS OF ENGINEERS

P.O. BOX 59

LOUISVILLE, KY 40201

PROJECT: RAVENNA ARSENAL

DATE: DEC 1997

STATION RAV 6 1997

GEOGRAPHIC COORDINATES (NAD 83)

LATITUDE 41° 10' 45.06446" N

LONGITUDE 81° 08' 49.38323" W

ELEVATION 1117.55' DATUM NAVD88

STATE PLANE COORDINATES (NAD 83)

UNITS (FEET or METERS) FEET

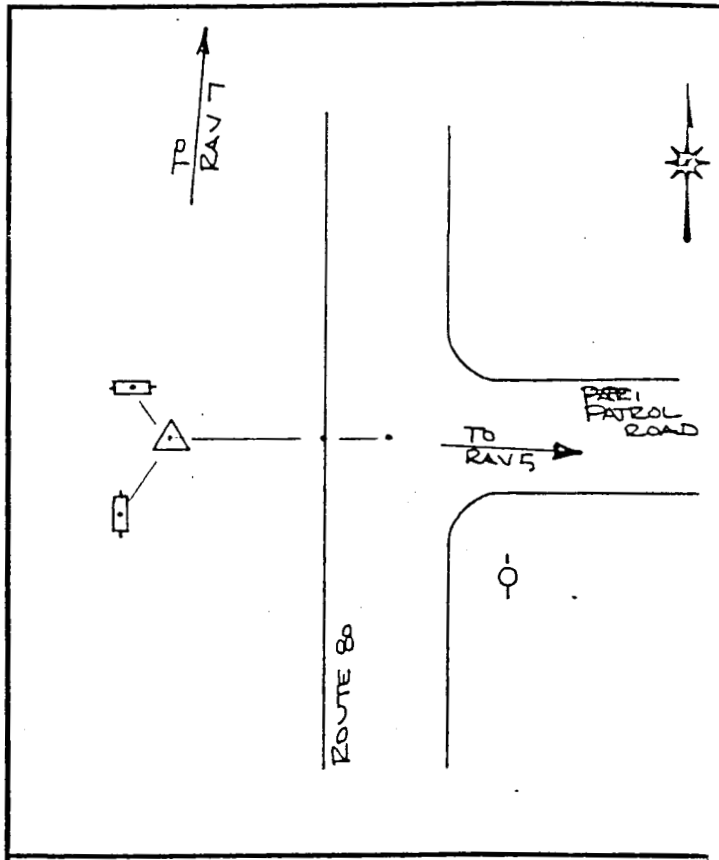
NORTHING 553,935.235

EASTING 2,340,909.174

STATE OH ZONE 3401

CONV.  $\leftarrow$  0° 53' 19.75321"

COMB. FACTOR 0.999887579



SKETCH OF STATION

The station is a brass Corps. Of Engineers disk stamped "RAV 6 1997" set in a 36" concrete post 12" in diameter and belled to 18" at base, and flush with ground.

REFERENCES:

- 6.5' NNE from street sign
- 6.8' SSE from convoy route sign
- 16' West of C/L of intersection
- 5' West of edge of road

QUAD: RAVENNA, OH





US Army Corps  
of Engineers

U.S. ARMY ENGINEER DISTRICT, LOUISVILLE

CORPS OF ENGINEERS

P.O. BOX 59

LOUISVILLE, KY 40201

PROJECT: RAVENNA ARSENAL

DATE: Dec. 1997

STATION RAV 7 1997

GEOGRAPHIC COORDINATES (NAD 83 )

LATITUDE 41 ° 11 ' 19.51510 " N

LONGITUDE 81 ° 08 ' 48.85724 " W

ELEVATION 1120.66 DATUM NAVD 88

STATE PLANE COORDINATES (NAD 83 )

UNITS (FEET or METERS) FEET

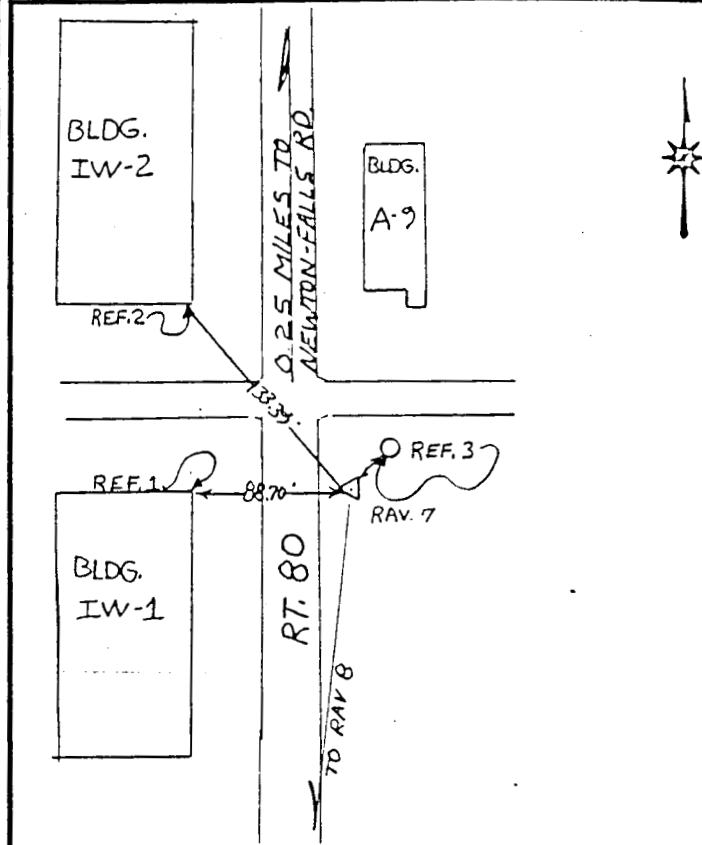
NORTHING 557,422.032

EASTING 2,340,895.298

STATE OH ZONE 3401

CONV.  $\angle$  0 ° 53 ' 20.09876

COMB. FACTOR 0.999887767



SKETCH OF STATION

RAV 7 - To Reach from RT.80 And Newton-Falls Rd. Intersection- Go South Along RT.80 0.25 Miles to STA. ON Left.

STATION IS: A COPPER COATED C.O.F.E. DISK (STAMPED RAV7 1997) SET IN A 36 Inch CONCRETE POST 12 INCHES IN DIA. AND BELLED TO 18 INCHES AT BASE, AND FLUSH W/GR.

References:

REF. 1 : IS THE NORTH-EAST CORNER OF BLDG. IW-1 88.70' West of STATION- 278.0 DEGREES

REF. 2 : IS THE SOUTH-EAST CORNER OF BLDG. IW-2 133.39' NORTH-West OF STATION- 327.2 DEGREES.

REF. 3 : IS THE SOUTH-WEST SIDE OF A POWER-POLE 19.70' NORTH-EA: OF STATION- 69.2 DEGREES

QUAD: RAVENNA, OH



U.S. ARMY ENGINEER DISTRICT, LOUISVILLE

CORPS OF ENGINEERS

P.O. BOX 59

LOUISVILLE, KY 40201

US Army Corps  
of Engineers

PROJECT: RAVENNA ARSENAL

DATE: DEC 1997

STATION RAV 11 1997

GEOGRAPHIC COORDINATES (NAD 83 )

LATITUDE 41 ° 11 ' 10.81772 " N

LONGITUDE 81 ° 01 ' 59.43913 " W

ELEVATION 998.73' DATUM NAVD88

STATE PLANE COORDINATES (NAD83 )

UNITS (FEET or METERS) FEET

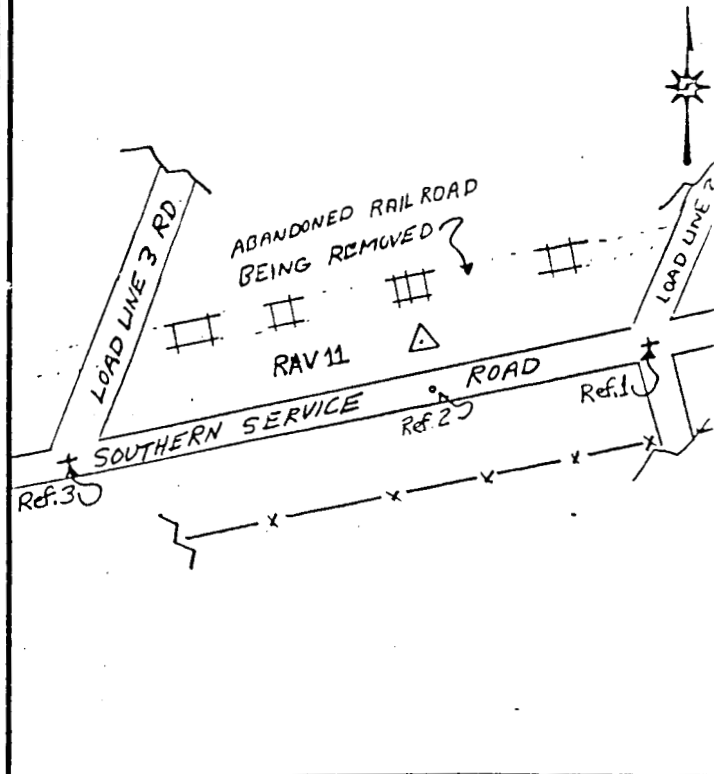
NORTHING 557,047.939

EASTING 2,372,206.979

STATE OH ZONE 3401

CONV. 0 ° 57 ' 49.06611"

COMB. FACTOR 0.999893507



SKETCH OF STATION

RAV 11: To Reach FROM SOUTHERN SERVICE RD AND PARIS WINHAM Rd. - GO EAST-NORTH-EAST ALONG SOUTHERN-SERVICE RD. 0.95 MILES TO STATION ON LEFT.

STATION IS: A COPPER COATED C. OF E. DISK (STAMPED "RAV 1997") SET IN A 36 INCH CONCRETE POST - 12 INCHES IN DIA. AND BELLED TO 18 INCHES AT BASE, FLUSH WITH GROUND.

REF. 1: IS THE CENTERLINE OF SOUTHERN SERVICE RD AND LOAD LINE 2 RD. E. NORTH-EAST OF STATION - 1096.6 FEET.

REF. 2: IS A PK. NAIL CENTERLINE OF SOUTHERN SERVICE RD. OPP. AND S.E. OF STATION - 25.91 FEET.

REF. 3: IS THE CENTERLINE OF SOUTHERN SERVICE RD. AND LOAD LINE 3 RD. W. SOUTH WEST OF STATION 0.25 MILES.

QUAD: WINDHAM, OH



US Army Corps  
of Engineers

U.S. ARMY ENGINEER DISTRICT, LOUISVILLE

CORPS OF ENGINEERS

P.O. BOX 59

LOUISVILLE, KY 40201

PROJECT: RAVENNA ARSENAL

DATE: DEC 1997

STATION RAV 12 1997

GEOGRAPHIC COORDINATES (NAD 83 )

LATITUDE 41° 13' 14.75460" N

LONGITUDE 81° 02' 59.65853" W

ELEVATION 964.24' DATUM NAVD88

STATE PLANE COORDINATES (NAD 83 )

UNITS (FEET or METERS) FEET

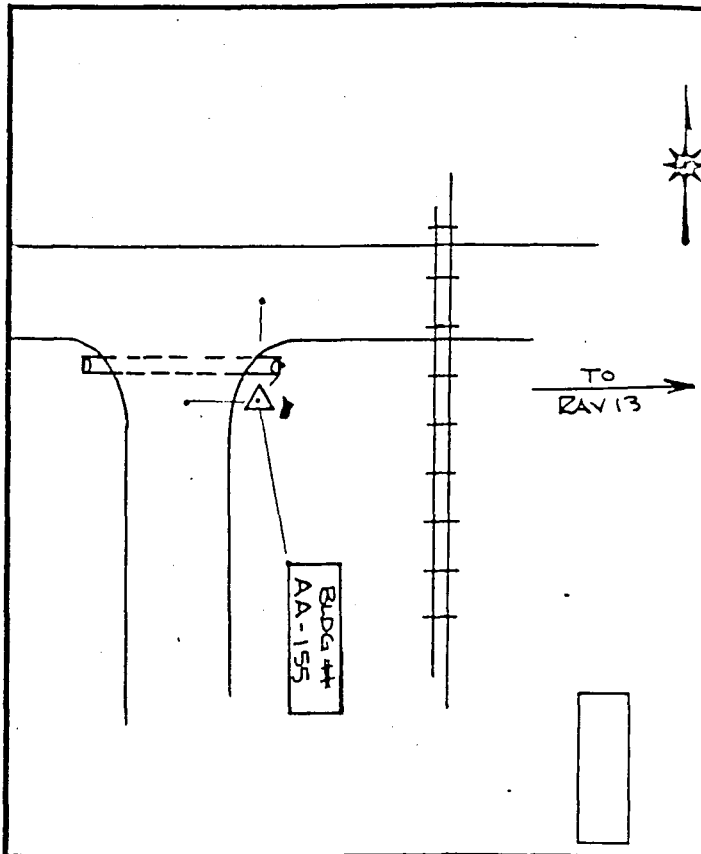
NORTHING 569,512.356

EASTING 2,367,394.999

STATE OH ZONE 3401

CONV. 0° 57' 09.50496"

COMB. FACTOR 0.999896583



SKETCH OF STATION

The station is a brass Corps. Of Engineers disk stamped "RAV 12 1997" set in a 36" concrete post 12" in diameter and belled to 18" at base, and flush with ground.

REFERENCES:

- 13.0' Ref 1, East end of culvert pipe
- 28.5' from Ref #2, C/L the East/West road
- 29.0' from Ref #3, C/L road leading South
- (About) 210' ± from Ref #4, NW corner of Bldg. AA-155
- 1.2' NW of carsonite witness post

QUAD: WINDHAM, OH