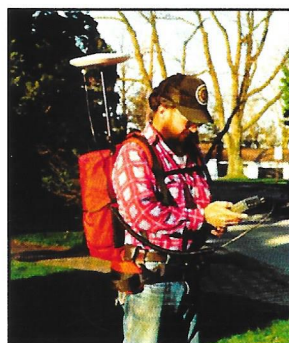
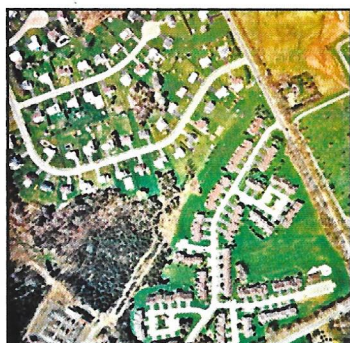


Survey Control Booklet

Cambria County Pennsylvania



Revised April 2003
March 2002

 **Kimball**
L. Robert Kimball & Associates
Architects and Engineers

CAMBRIA COUNTY
PENNSYLVANIA

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 - 4. Traverse Solution Report – Shows Unadjusted Coordinates of Traverse Loop
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 - a. April 15, 2003
 - D. Field GPS Sketches of Panels and Photo Identities (Revised April 2003)
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IV. CONTROL DIAGRAM

**CAMBRIA COUNTY
PENNSYLVANIA**

DESCRIPTION OF METHOD AND EQUIPMENT USED

MARCH 2002

(REVISED APRIL 2003)

In April 2001, the Mapping Division of L. Robert Kimball & Associates, Inc., was contracted to provide county-wide aerial photography for scales 1"=400', 1"=200' and 1"=100'. Horizontal and vertical control was established using Airborne GPS for Phase I. The GPS ground control necessary for the Phase II project began in November 2001. To accomplish this task, three Leica 530 and three Ashtech Z-12 Sensor dual frequency GPS (Global Positioning System) receivers were used for the ground control to establish X, Y, Z coordinates on 25 paneled points (set iron pins, spike or hub and tack). Also coordinates were established on 18 photo-identifiable points. Ground control GPS surveying was done from November 1, 2001, to March 8, 2002. Airborne GPS was collected on April 12, 14, 23, 25, 26 and November 19, 2001. Airborne data was recorded at one second epochs and provided coordinates for each exposure of photography. Three Ashtech Z-12 Sensor dual frequency GPS receivers were used for the airborne mission.

Three NGS stations were used to constrain the ground control GPS networks horizontally and vertically. The stations were Bossler, Gospel Hill RM 2, and JST ARP 1964 STA B. These 3 geodetic coordinates and ellipsoid heights were used to produce project latitudes and longitudes in NAD83 (1983 North American Datum) and to produce project elevations in NAVD88 (1988 North American Vertical Datum) in meters. Five additional stations were located as horizontal and/or vertical check points.

Two receivers remained at base stations Bossler and either Gospel Hill RM 2 or JST ARP 1964 STA B for the sessions and one receiver acted as the rover, traveling to the remaining points. This allowed each point to be included in a minimum of two vectors, one to each base station. There is sufficient redundancy so that the elimination of a few vectors does not weaken the final solution. Ten days of sessions were observed, resulting in 217 vectors with X, Y, Z accuracies within standards that meet or exceed the requirements of the photography. Collection at each station lasted a minimum of 20 minutes and was observed when at least 5 satellites were in view, having a Pdrop less than 5.0. Pdrop is an indicator of satellite geometry, with a lower Pdrop indicating better geometry.

The raw data from the GPS receivers was post processed using GrafNav/GrafNet 6.02 software, producing the Adjusted Geodetic Coordinates, the Network Adjustment Report, the Session Solution Report, and the Traverse Solution Report. Adjusted latitudes and longitudes were converted to Pennsylvania South Zone State Plane Coordinates NAD83 in feet, and the elevations were converted from meters to feet in NAVD88, using GrafNet 6.02 software.

In April 2003, the county-wide aerial photography was re-flown. The same photo control was used, and iron pins and monuments were re-paneled, except for 2 points. OG01 and VINT were not able to be recovered, and were reset in different locations. New ground control GPS surveying of the 2 points was completed on April 15, 2003. New airborne GPS was collected on April 13, 14, and 15, 2003. Airborne data was recorded at one second epochs and provided coordinates for each exposure of the new photography. The stations Bossler and Gospel Hill RM 2 were used to constrain the 2 new photo control points, and were used as base stations for the airborne GPS mission. The methods and equipment used were the same as for the original control.

**CAMBRIA COUNTY , PENNSYLVANIA
MONUMENTS AND BENCH MARKS USED
PUBLISHED COORDINATES AND ELEVATIONS
MARCH 2002**

STATION NAME	GPS NAME	COUNTY	PA S.-NAD83 (ft) NORTHING	PA S.-NAD83 (ft) EASTING	NAVD88 (ft) ELEVATION	TYPE OF USE *
BOSSLER	BOSS	CAMBRIA	412253.559	1682918.970		H,B,AB
GOSPEL HILL RM 2	GSH2	BLAIR	431449.583	1786093.810	1329.49	H,V,B,AB
JST ARP 1964 STA B	STAB	CAMBRIA	362544.295	1663829.704	2266.76	H,V,B,AB
LINE 2	LIN2	SOMERSET	346206.525	1603353.020		C
PAVIA	PAVI	BEDFORD	349842.719	1734860.395		C
SNYDER	SNYR	BLAIR	508758.848	1809967.141		C
SOLLEY	SOLL	CLEARFIELD	533307.008	1688004.226		C
SPRING	SPRI	CAMBRIA	383304.824	1742212.644		C

*** TYPE OF USE**

H = Horizontal Control for GPS Network

V = Vertical Control for GPS Network

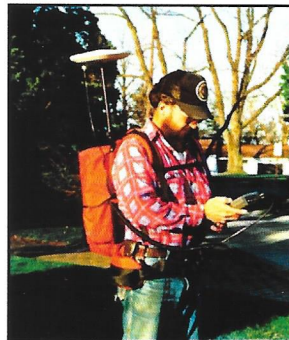
C = Check Point for GPS Network

B = Base Station for GPS Sessions

AB = Base Station for Airborne GPS Sessions

Survey Control Booklet

Cambria County Pennsylvania



Supplemental

Revised July 2007
Revised April 2003
March 2002

 **Kimball**
L. Robert Kimball & Associates
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CAMBRIA COUNTY
PENNSYLVANIA

CONTROL BOOKLET INDEX

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- C. GPS Computations (July 2007)
 - C-3. 1. Adjusted GPS Coordinates (PA S.-NAD 83) and Elevations (NAVD88)
 - a. Adjusted Feet
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 - c. Adjusted Latitude and Longitude (Geodetic Coordinates)
 - 1. Weighted GPS Network Adjustment Report – Shows Final Output Vector Residuals and Final Output Station Coordinates in Latitude and Longitude
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 - 4. Traverse Solution Report – Shows Unadjusted Coordinates of Traverse Loop
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 - a. June 9, 2006
 - b. October 2, 2006

**CAMBRIA COUNTY
PENNSYLVANIA**

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MARCH 2002

(REVISED APRIL 2003)

(REVISED JULY 2007)

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CAMBRIA COUNTY, PENNSYLVANIA
GPS COORDINATES AND ELEVATIONS FOR ALL POINTS
MARCH 2002
(REVISED JULY 2007)

GPS STATION	NAD83 (FT.) NORTHING (PA-SOUTH)	NAD83 (FT.) EASTING (PA-SOUTH)	NAVD88 (FT.) ELEVATION	DESCRIPTION
AL01	450273.122	1776795.931	2553.54	PANEL-IRON PIN
B001	514065.140	1673914.875	1468.09	PANEL-IRON PIN
B002	489342.250	1678120.699	1483.11	PANEL-DOCK SPIKE (SET BY PENNDOT)
B003	476969.929	1688273.450	1492.28	PANEL-IRON PIN
BOSS	412253.526	1682918.918	2090.27	BOSSLER MONUMENT
BE01	351942.337	1700179.563	2405.03	POINT OF ROCK (1.6' ABOVE GROUND)
CA001	472929.209	1696674.364	1839.61	CORNER DRIVEWAY
CA002	470034.521	1709687.053	2041.98	CENTER OF POLE
CA003	463025.635	1692483.229	1680.30	CORNER DRIVEWAY
CA004	463929.262	1714648.765	1956.53	CORNER DRIVEWAY
CP01	482773.689	1753369.593	1466.47	PANEL-IRON PIN
CP02	510280.864	1753121.016	1385.18	PANEL-IRON PIN
CPP1	424389.079	1700814.151	2110.79	CORNER DRIVEWAY
CPP2	417049.645	1690971.888	2154.73	CORNER OF DROP INLET
CPP3	428995.063	1692324.343	1962.98	CORNER DRIVEWAY
CPP4	429297.142	1673545.546	2303.04	CORNER DRIVEWAY
CPP5	404337.123	1668623.110	1916.37	CORNER DRIVEWAY
CR01	411308.986	1734485.103	2038.42	PANEL-IRON PIN
CR02	420849.696	1747045.721	2369.83	PANEL-IRON PIN
CR03	383297.735	1742273.971	2796.16	PANEL-IRON PIN
EB01	419083.843	1701853.003	1964.89	PANEL-IRON PIN
EB02	385043.235	1710445.950	1670.88	CORNER SIDEWALK
EB001	428975.847	1692331.523	1964.13	CORNER DRIVEWAY
EB002	430584.235	1699945.620	2126.70	CORNER DRIVEWAY
FARM	432010.903	1722731.448	2026.50	PANEL-HUB & TACK
GL001	418534.476	1739863.548	2162.70	CORNER SIDEWALK
GSH2	431449.505	1786093.884	1329.36	GOSPEL HILL RM 2 MONUMENT & BM
GST1	352534.169	1671750.261	2112.96	PANEL-IRON PIN
GST2	372703.243	1671990.217	1870.22	PANEL-IRON PIN
GST4	351998.288	1657382.163	1934.21	CORNER DRIVEWAY
GST5	375645.967	1657159.095	1653.38	CORNER DRIVEWAY
H001	487012.749	1702717.934	1717.86	PANEL-IRON PIN
H002	511951.901	1707879.128	1375.61	PANEL-IRON PIN
H003	475763.016	1719307.288	1745.70	CORNER SIDEWALK, EDGE ROAD
JSO1	378221.091	1628195.402	2286.78	PANEL-IRON PIN
JSO2	352215.709	1641076.537	1381.17	CORNER CONCRETE PAD
JSO2x	352223.273	1641094.697	1377.32	CORNER CONCRETE PAD (USED FOR A.T.)
JSO3	335155.872	1647777.037	1563.12	CORNER DRIVEWAY
JSO4	377886.063	1642445.529	1695.69	CORNER CONCRETE PAD (OFF PHOTO)
JS04m	376736.285	1643391.343	1632.50	CORNER DRIVEWAY (CDW1)
JSO5	353265.156	1625451.957	1959.29	CORNER FENCE (OFF PHOTO)
JS05m	353705.295	1627598.929	1897.64	CORNER SIDEWALK (SWC1)
KOP1	373984.378	1635427.630	1233.73	PANEL-IRON PIN

LIN2	346205.803	1603353.390	2701.13	LINE 2 MONUMENT
LON1	352997.898	1657114.975	1927.86	PANEL-IRON PIN
LRK1	423856.018	1695402.706	2173.22	PANEL-IRON PIN
NATY	419776.787	1666470.919	1990.97	PANEL-IRON PIN
NG001	413940.786	1666045.109	1730.46	CORNER DROP INLET
OG01	330431.550	1720178.645	1985.09	PANEL-IRON PIN
OG01 (Rev.)	331272.996	1719571.726	1922.68	PANEL-IRON PIN
PA001	476993.011	1721074.090	1746.77	CORNER DRIVEWAY
PAVI	349842.075	1734861.476	2500.29	PAVIA MONUMENT
PE001	385275.116	1713422.795	1754.30	CORNER DROP INLET
RAC1	346201.996	1603342.967	2701.24	INSIDE CORNER OF CO. LINE MARKER
SNYR	508758.594	1809968.144	2621.51	SNYDER MONUMENT
SOLL	533306.588	1688004.276	1679.17	SOLLEY MONUMENT
SPRI	383303.691	1742213.713	2797.53	SPRING MONUMENT
STAB	362544.403	1663829.682	2266.93	JST ARP 1964 STA B MON. & BM
STO1	445595.001	1643882.320	1886.70	CORNER PARKING LOT
TIP1	510155.757	1809127.258	2594.49	PANEL-IRON PIN
VINT	412349.683	1630898.124	1355.11	PANEL-IRON PIN
VINT (Rev.)	412296.080	1630973.563	1357.52	CORNER OF CONCRETE
WIN1	333507.850	1661920.032	1674.11	PANEL-IRON PIN
WIN2	333038.501	1674836.944	2083.12	PANEL-IRON PIN
50	477319.450	1690976.170	1536.45	CONCRETE CORNER WALK
51	488763.780	1678731.450	1458.47	DROP INLET
52	484634.750	1700726.350	1752.50	CORNER CONCRETE DRIVE
53	489314.300	1703165.570	1767.64	CORNER CONCRETE ROAD