1995 Report Of Survey

from

Geometrics, GPS Inc.

REPORT OF SURVEY

INTRODUCTION

Kucera International contracted with GeoMetrics GPS Inc. to provide survey control in Richland County, Ohio. The purpose of the survey is to support an aerotriangulation solution accurate enough for mapping and/or orthoimages at scales up to 1:1200 and contour intervals of up to two foot. This report details the work done by GeoMetrics on the project.

GeoMetrics used the Global Positioning System (GPS) as the primary method of survey. Classic static differential GPS methodology was used. Positions were established on 167 stations. There were 129 networked stations occupied with GPS. Nine (9) existing horizontal stations were occupied directly so that their published position could be used. Nine (9) benchmarks were tied in the GPS network. Three (3) benchmarks were occupied directly. Six (6) marks could not be occupied. Differential levels were used to transfer an elevation to a nearby eccentric station. The eccentric station was then occupied with GPS.

The remaining 38 positions are photo points. There were calculated using either a single vector GPS observation from the network above or a offset from a GPS station. The offsets consist of a magnetic bearing and distance observed from points occupied by GPS to a nearby photo identifiable point. The magnetic bearing was corrected for declination. The calculated positions of the photo identifiable objects will be used as additional aero triangulation points.

Information related to the horizontal control can be found in the **Existing Horizontal Control** section of this report. Information related to the vertical control can be found in the **Existing Vertical Control** section of this report.

A total of 120 targets were placed. Of this total 54 were painted in the road. Sixty-six were material targets. Six of the material targets were NGS monuments. All target placement was completed by March 22, 1995. GeoMetrics used railroad spikes, hubs, and iron rods to mark the targeted points. The County replaced some of the marks with brass disks before and during the photography. This resulted in additional points having to be surveyed. The type of mark at each station is tabulated in the **New Station** section.

The Horizontal Positioning Accuracy is intended to achieve Second Order Class II results. The Vertical Positioning Accuracy is intended to achieve Third Order results.

POINTS OF CONTACT

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DATES OF FIELD OPERATIONS

GPS field observations took place between June 7 and June 25, 1995. The majority of the GPS sessions were three receiver sessions and the number of sessions per day varied.

DATE	MODIFIED JULIAN DATE	NO. OF SESSIONS
6/7/95	158	7
6/8/95	159	9
6/9/95	160	11
6/10/95	161	11
6/11/95	162	9
6/12/95	163	11
6/13/95	164	11
6/14/95	165	9
6/21/95	172	8
6/22/95	173	4
6/23/95	174	12
6/24/95	175	7

EXISTING HORIZONTAL CONTROL

Nine (9) existing National Spatial Reference System (NSRS) horizontal control stations were recovered and used in the project. Two (2) First Order marks were occupied. Seven (7) Second Order marks were occupied. One (1) First Order, and six (6) Second Order stations were held in the final adjustment. The NAD83/86 datum was used.

PID	DESIGNATION	LATITUDE (N)	LONGITUDE (W)	ORDER	REMARKS
KZ1920	APRON	40°48'57.67294"	82°30'48.42997"	2nd	HELD
KZ1936	CRESTLINE	40°45'03.31889"	82°43'30.85029"	2nd	HELD
KZ1049	G 249	40°52'38.95665"	82°41'45.68991"	2nd	HELD
KZ1782	HANLEY	40°41'43.93845"	82°28'38.34574"	1st	HELD
KZ1780	JELLO	40°31'07.32812"	82°23'00.13761"	1st	NOT HELD
KZ1799	MADISON	40°46'04.72775"	82°29'20.03140"	2nd	HELD
KZ1958	MANSFIELD	40°44'01.24966"	82°32'29.65513"	2nd	HELD
KZ1957	NOBLET	40°43'39.12557"	82°37'00.61411"	2nd	HELD
MC1092	RUGGLES	41°01'45.90794"	82°23'28.00589"	2nd	NOT HELD

All marks were recovered in good condition. An analysis of existing control is detailed later in this report.

EXISTING VERTICAL CONTROL

Nine (9) NSRS benchmarks were tied in the GPS network. Three (3) NSRS benchmarks were occupied directly. The elevations were transferred by differential levels from six (6) NSRS stations that had published elevations to eccentric stations that were then occupied. One (1) benchmark had a First Order elevation. Seven (7) benchmarks has Second Order elevation. One (1) benchmark had been reset and had a recomputed elevation. Eight (8) stations were held in the final adjustment. The benchmark CRESTLINE (recomputed) was not held fixed. The NAVD88 datum was used.

PID	DESIGNATION	NAVD88 ELEV (M)	ORDER/ CLASS	STATUS	REMARKS
KZ1049	G 249	341.611	1/1	GPS DIRECT	
KZ1303	D 272	374.893	2/0		LEVEL TO 7
KZ0122	X 240	327.083	2/0		LEVEL TO 65
KZ0296	V 251	442.161	2/0		LEVEL TO HANLEY
KZ1206	Q 240	346.920	2/0		LEVEL TO 111
KZ1245	A 269	384.785	2/0		LEVEL TO 49A
KZ0377	N 265	402.171	2/0	GPS DIRECT	
KZ0117	T 240	360.207	2/0		LEVEL TO 71
KZ1936	CRESTLINE	373.78	?	GPS DIRECT	RECOMP ELEV

PID	DESIGNATION	NAVD88 ELEV (M)	ORDER/ CLASS	STATUS	REMARKS
	7	377.033		GPS DIRECT	ECC FROM D 272
	65	322.622		GPS DIRECT	ECC FROM X 240
KZ1782	HANLEY	442.591		GPS DIRECT	ECC FROM V 251
	111	348.329		GPS DIRECT	ECC FROM Q 240
	49A	384.900		GPS DIRECT	ECC FROM A 269
	71	359.899		GPS DIRECT	ECC FROM T 240