

EASTERN ARAPAHOE COUNTY VERTICAL CONTROL

2006 VERTICAL CONTROL RESETS

SURVEY NOTES

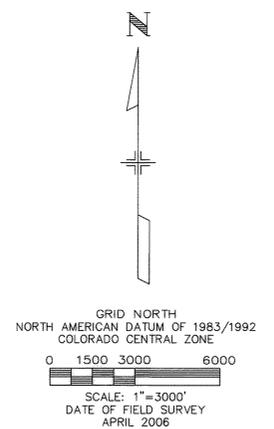
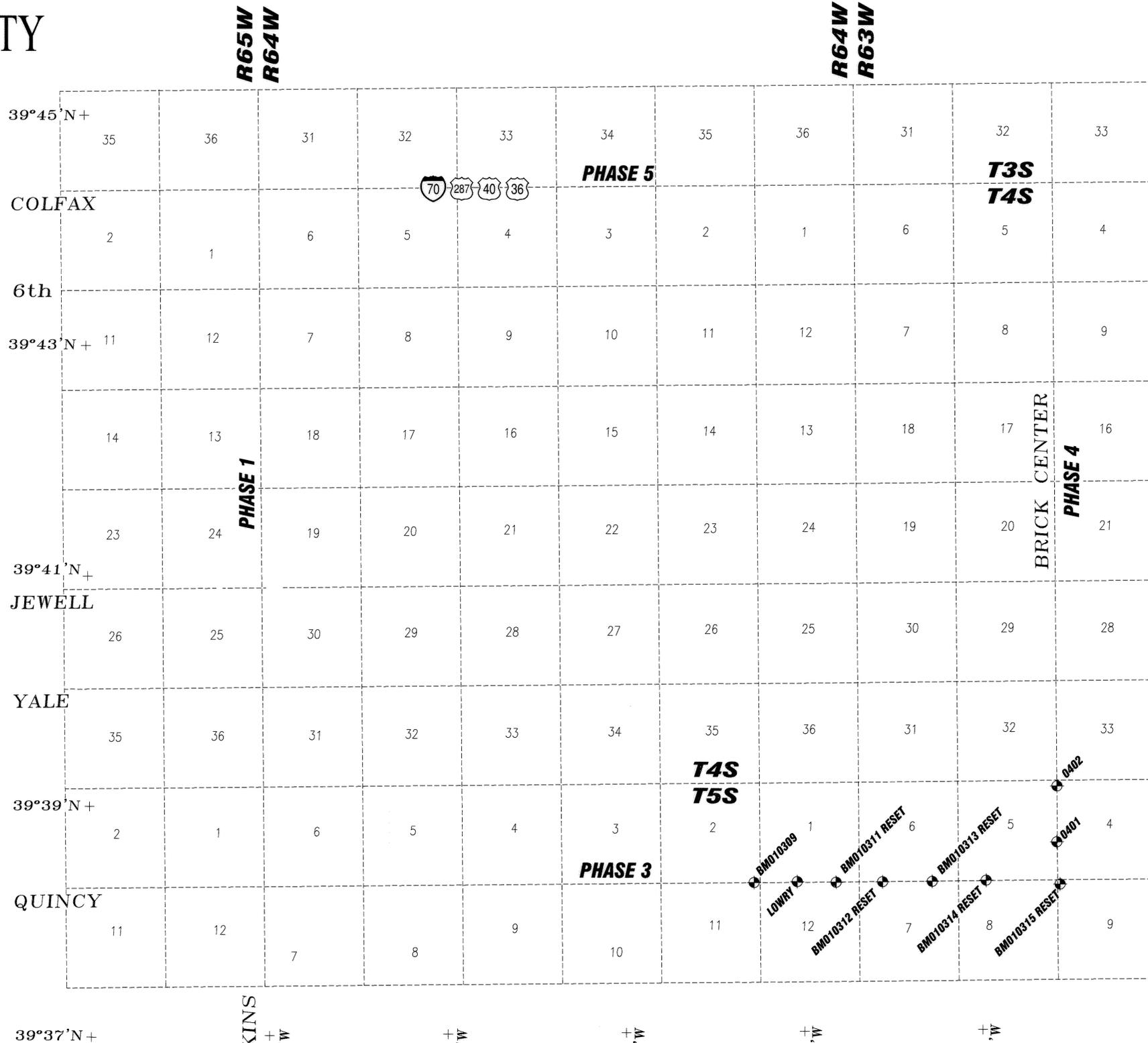
- THE ELEVATIONS REPORTED HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). OBSERVATIONS COLLECTED DURING THIS SURVEY MEET THE SPECIFICATIONS FOR A FIRST ORDER, CLASS II VERTICAL CONTROL SURVEY REFERENCING EXISTING ARAPAHOE VERTICAL CONTROL STATIONS.
- ALL MONUMENTS SET BY ZYLSTRA BAKER SURVEYING, INC ARE COLORADO DEPARTMENT OF TRANSPORTATION TYPE 2 CONTROL MONUMENTS, WHICH CONSIST OF BERNSTEIN TOP SECURITY ROD MONUMENTS BEING 3 FOOT SMOOTH ALUMINUM ROD SECTIONS WITH A 3 FOOT FINNED ROD AT THE TOP SECTION CONNECTED BY FLOATING THREADS AND SELF LOCKING WASHERS, A SPIRAL DRIVE POINT ATTACHED TO THE BOTTOM AND A 3 1/4 INCH ALUMINUM CAP AFFIXED TO THE TOP. ADDITIONAL 3 FOOT SMOOTH ROD SECTIONS WERE ATTACHED TO THE BOTTOM SECTION UNTIL THE MONUMENT REACHED A STABLE DEPTH; MONUMENT DEPTHS RANGE FROM 6 TO 15 FEET.
- ALL GEODETIC POSITIONS LISTED HEREON ARE BASED UPON AUTONOMOUS GLOBAL POSITIONING SYSTEM (GPS) MEASUREMENTS AND HAVE A POSITIONAL TOLERANCE OF 50 FEET ±. POSITIONS ARE RELATIVE TO THE NORTH AMERICAN DATUM OF 1983, 1992 REALIZATION.
- THE EQUIPMENT USED IN THIS PROJECT CONSIST OF FIRST ORDER DIFFERENTIAL LEVELING EQUIPMENT AS OUTLINED BY NGS, A ZEISS DINI 11 AUTOMATIC PRECISE DIGITAL LEVEL (SERIAL No. 103281) WITH A SET OF (2) 3m PRECISE DIGITAL BAR CODE INVAR RODS (SERIAL No.s 13512, 13513), CALIBRATED IN MUNICH GERMANY, WERE USED. STEEL TURNING PINS OR STEEL "TURTLES" WERE USED AS TURNING POINTS.
- THE ELEVATION DIFFERENCE DATA WAS CORRECTED FOR SYSTEMATIC ERRORS BY APPLYING CORRECTIONS THAT ACCOUNTED FOR ROD SCALE ERRORS, ROD INVAR TEMPERATURE, REFRACTION AND COLLIMATION ERROR. DUE TO THE SMALL EXTENTS OF THIS PROJECT IT WAS NOT NECESSARY TO APPLY CORRECTIONS THAT ACCOUNTED FOR EARTH TIDES AND CRUSTAL MOTION. THE MAGNETIC FIELD CORRECTION WAS NOT NECESSARY BECAUSE THE INSTRUMENTATION USED DURING OBSERVATIONS IS NOT SUSCEPTIBLE TO MAGNETIC EFFECTS. GRAVITY EFFECTS WERE ACCOUNTED FOR USING NAVD88 MODELED GRAVITY AS PROVIDED BY NGS; AVAILABLE FOR DOWNLOAD AT WWW.NGS.NOAA.GOV. THE MODELED GRAVITY VALUES WERE USED TO COMPUTE NAVD88 GEOPOTENTIAL NUMBERS AT EACH BENCHMARK. THE HELMERT ORTHOMETRIC REDUCTION EQUATION WAS USED TO REDUCE THE GEOPOTENTIAL VALUES TO NAVD88 HELMERT ORTHOMETRIC HEIGHTS. THIS IS THE CURRENT METHOD IN USE BY NGS TO DATE. REFERENCE THE REPORT FOR PHASES 4 AND 5 OF THE ESTABLISHMENT OF VERTICAL CONTROL FOR DETAILED CALCULATION METHODS.
- NOTICE: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT, IN NO EVENT, MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.
- THE SURVEY POSITIONS SHOWN HEREON FOR THE RESET BENCHMARKS WERE ESTABLISHED TO REPLACE SURVEY MONUMENTS THAT WERE DESTROYED DUE TO CONSTRUCTION, AN ARAPAHOE COUNTY ROADWAY PROJECT, EAST QUINCY AVENUE PHASE 2 PETERSON TO BRICK CENTER ROAD.
- NO GUARANTEE AS TO THE ACCURACY OF THE INFORMATION CONTAINED ON THE ATTACHED DRAWING IS EITHER STATED OR IMPLIED UNLESS THIS COPY BEARS AN ORIGINAL SIGNATURE OF THE PROFESSIONAL LAND SURVEYOR NAMED HEREON.

LEGEND

- ▲ DENOTES THAT THIS POINT WAS USED AS PROJECT CONTROL
- ⊕ DENOTES LOCATION OF BENCHMARK
- KGAL DENOTES THE "KILO GAL" UNIT OF GRAVITATIONAL ACCELERATION
- GPU DENOTES THE "GEOPOTENTIAL UNIT" UNIT OF GRAVITY POTENTIAL
- SE DENOTES SOUTHEAST
- SW DENOTES SOUTHWEST
- UPRR DENOTES THE UNION PACIFIC RAILROAD
- NGS DENOTES NATIONAL GEODETIC SURVEY
- m DENOTES THE "METER" LINEAR UNIT OF MEASURE
- ft DENOTES THE "US SURVEY FOOT" LINEAR UNIT OF MEASURE; BEING DEFINED AS (3937/1200)(VALUE IN METERS)
- INT DENOTES INTERSECTION
- N DENOTES NORTH
- W DENOTES WEST
- NE DENOTES NORTHEAST
- NW DENOTES NORTHWEST

ELEVATION TABULATION

MARK ID	LATITUDE	LONGITUDE	ELEV (m)	ELEV (ft)	GRAVITY (kgal)	GEOPOTENTIAL (gpu)	LOCATION
▲ BM010309	39°38'14" N	104°30'33" W	1816.511	5959.67	0.9796004 kgal	1779.59502 gpu	5.0 MILES EAST OF INT WATKINS & QUINCY, NORTH SIDE OF ROAD
▲ LOWRY	39°38'13" N	104°30'04" W	1839.271	6034.34	0.9796013 kgal	1801.89570 gpu	5.6 MILES EAST OF INT WATKINS & QUINCY, NORTH SIDE OF ROAD
▲ BM010311 RESET	39°38'12" N	104°29'38" W	1806.841	5927.95	0.9796018 kgal	1770.12345 gpu	6.0 MILES EAST OF INT WATKINS & QUINCY, SOUTH SIDE OF ROAD
▲ BM010312 RESET	39°38'12" N	104°29'07" W	1790.326	5873.76	0.9796029 kgal	1753.94450 gpu	6.5 MILES EAST OF INT WATKINS & QUINCY, SOUTH SIDE OF ROAD
▲ BM010313 RESET	39°38'11" N	104°28'33" W	1778.767	5835.84	0.9796041 kgal	1742.62151 gpu	6.9 MILES EAST OF INT WATKINS & QUINCY, SOUTH SIDE OF ROAD
▲ BM010314 RESET	39°38'12" N	104°27'57" W	1770.301	5808.06	0.9796055 kgal	1734.32993 gpu	7.5 MILES EAST OF INT WATKINS & QUINCY, NORTH SIDE OF ROAD
▲ BM010315 RESET	39°38'11" N	104°27'14" W	1755.775	5760.40	0.9796070 kgal	1720.09975 gpu	SE CORNER OF INTERSECTION BRICK CENTER & QUINCY
▲ 0401	39°38'37" N	104°27'14" W	1759.992	5774.24	0.9796086 kgal	1724.23457 gpu	0.5 MI N. OF INT OF BRICK CENTER & QUINCY, WEST SIDE OF ROAD
▲ 0402	39°39'06" N	104°27'13" W	1731.755	5681.60	0.9796104 kgal	1696.57277 gpu	1.0 MI N. OF INT, TOP N. SIDE OF BOX CULVERT ON E. SIDE OF RD
▲ BM010311	39°38'12" N	104°29'38" W	1806.889	5928.10	0.9796018 kgal	1770.17051 gpu	TO BE DESTROYED
▲ BM010314	39°38'12" N	104°27'57" W	1770.278	5807.99	0.9796055 kgal	1734.30743 gpu	TO BE DESTROYED
▲ BM010315	39°38'11" N	104°27'14" W	1756.008	5761.17	0.9796070 kgal	1720.32882 gpu	TO BE DESTROYED



SURVEYOR'S CERTIFICATION

I, STEVEN CARSTENS, A PROFESSIONAL LAND SURVEYOR PRACTICING IN THE STATE OF COLORADO, BASED UPON MY PROFESSIONAL OPINION, DO HEREBY CERTIFY THAT THIS SURVEY WAS MADE TO THE STANDARD CARE OF PROFESSIONAL LAND SURVEYORS PRACTICING IN THE STATE OF COLORADO, I FIND THAT THE INFORMATION CONTAINED HEREON IS ACCURATE AND A REPRESENTATION OF SAID SURVEY.



STEVEN CARSTENS, PROFESSIONAL LAND SURVEYOR
COLORADO LICENSE NO. 29028

7-13-06
DATE ISSUED