

due Mon. 24 Mar

Satellite Photogr. Homework 3

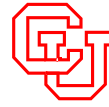
Image Resection (orientation refinement)

use 4 points to refine q_i, q_j, q_k for the Colorado 1 image from DS/WVL.

<u>point</u>	<u>l</u>	<u>s</u>
1004 (DSRC)	20385.5	18499.5
1005	16784.2	16190.0
1012	17065.0	18028.8
1015	20809.0	25389.2

use ϕ, λ, h from the accompanying control list.
careful of units!

This is a 3 parameter LS problem with 8 observations. Be sure to show the residuals after your adjustment.



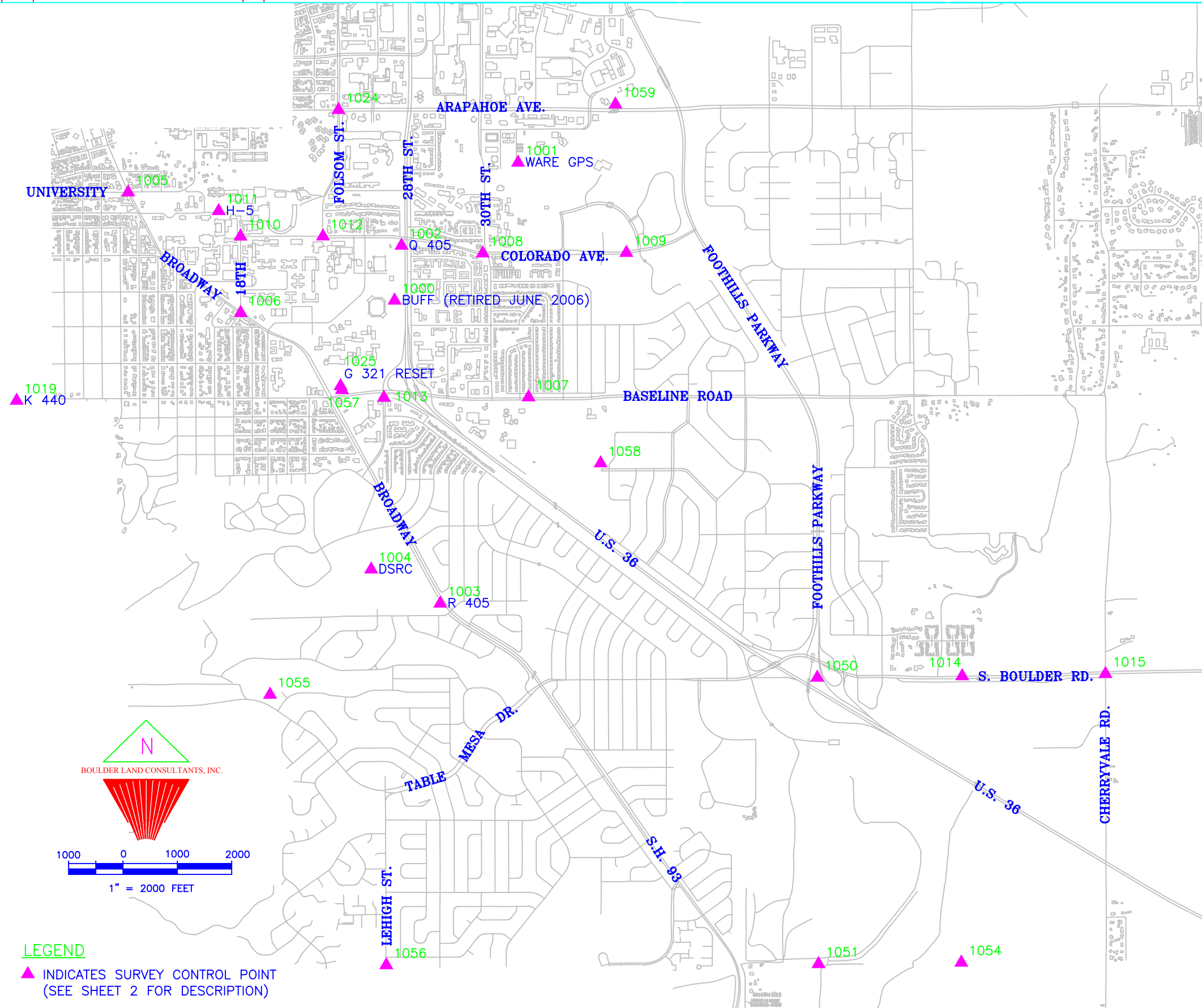
University of Colorado at Boulder

Survey Control Diagram

THIS MAP WAS PREPARED BY
 BOULDER LAND CONSULTANTS, INC.

 5690 VALMONT RD. BOULDER, CO 80301
 (303) 443-3616

Project Number: 420cu04				
Project Location: University of Colorado Survey Control				
Project Location: City of Boulder				
Project Code:	Last Mod. Date	Subset Sheets	Sheet No.	Total No. of Sheets
	July 05, 2004	of	1	2



COORDINATE DATUM: Geodetic coordinates are based on NAD 83(1992) – Epoch 2000. State Plane coordinates are Colorado North Zone (501)–NAD 83(1992) – Epoch 2000. Units are in US Survey feet.
 Colorado High Accuracy Reference Network (CHARN) Stations and NGS CORS stations held fixed in the final horizontal least squares adjustment of the GPS data are as follows:

- BUFF – PID LL1403
- TT 23 J – PID KK0655
- X 438 – PID LL1137
- OVERLOOK – PID KK2060
- R 405 – PID LL1351
- TMGO – PID AB6369
- DSRC – PID AJ7970

BASIS OF ELEVATIONS: Orthometric Heights are shown in NAVD88. On site, elevations were established by GPS fast static observations based on a high-resolution Geoid model "GEOID03". National Geodetic Survey First Order, Class II Bench Marks observed as part of the GPS control network and held fixed during the final vertical least squares adjustment of the GPS data are listed as follows:

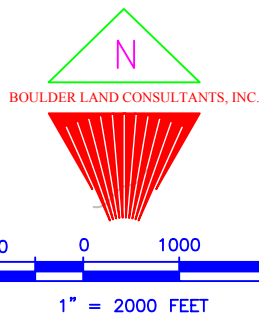
- G 321 RESET – PID LL0704 NAVD88 5387.00 (feet)
- K 440 – PID LL1143 NAVD88 5673.14 (feet)
- Q 405 – PID LL1094 NAVD88 5314.71 (feet)
- R 405 – PID KK1351 NAVD88 5398.70 (feet)
- TT 23 J – PID KK0655 NAVD88 5901.97 (feet)
- W 413 – PID KK1549 NAVD88 5459.59 (feet)
- WARE GPS – PID LL1093 NAVD88 5264.69 (feet)
- X 438 – PID LL1137 NAVD88 5289.64 (feet)

NOTE: This map does not represent a boundary survey, land survey plat or title search performed by Boulder Land Consultants, Inc. Coordinates on this project are for the exclusive use of the University of Colorado for mapping and survey control purposes only. Land Corners as shown hereon are GIS Land Positions only see C.R.S. 38–51–102(7.5).

NOTE: In accordance with C.R.S. 13–80–105:
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 statement shown.

SURVEYOR'S STATEMENT: I, Jason Emery, a Professional Land Surveyor in the State of Colorado, do hereby state to the University of Colorado that this Survey Control Diagram was prepared, and the field survey it depicts was performed, under my responsible charge; is based upon my knowledge information and belief; and was executed in accordance with applicable standards of practice. This statement is not a guaranty or warranty either expressed or implied (per Colorado State Board Rule 6.2.2).

Jason Emery, P.L.S. 20134

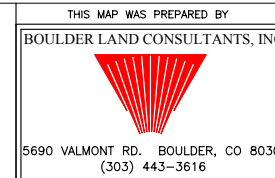


LEGEND
 ▲ INDICATES SURVEY CONTROL POINT
 (SEE SHEET 2 FOR DESCRIPTION)



University of Colorado at Boulder

Survey Control Diagram



Survey Control Diagram				
Coordinate Summary Table of Project Control				
Project Number: 420cu04				
Project Location: University of Colorado Survey Control				
Project Location: City of Boulder				
Project Code:	Last Mod. Date	Subset Sheets	Sheet No.	Total No. of Sheets
	July 05, 2004	of	2	2

GEODETIC COORDINATE SUMMARY TABLE (ADJUSTED FIELD DATA)

Points output in USFEET:

POINT NO.	GEODETIC COORDINATES ARE NAD-83(92) - EPOCH 2000		ELLIP. HEIGHT	ELEV. NAVD88	MAPPING ANGLE	SCALE	NAD-83(92) ZONE 501		DESCRIPTION
	LATITUDE	LONGITUDE					NORTHING	EASTING	
1000	40° 00' 17.99850" N	105° 15' 33.96976" W	5324.63	5376.24	0° 09' 19.57109"	0.99996599	1244759.46	3067389.83	NGS HARN STATION "BUFF" PID LL1403. JUNE 2006: BUFF POINT NO LONGER EXISTS
1001	40° 00' 42.99834" N	105° 15' 04.67907" W	5212.77	5264.69	0° 09' 38.49594"	0.99996548	1247295.40	3069661.98	NGS FIRST ORDER BENCH MARK & FIRST ORDER HORIZONTAL MARK "WARE GPS" PID LL1093.
1002	40° 00' 27.96545" N	105° 15' 32.29856" W	5263.06	5314.71	0° 09' 20.65093"	0.99996579	1245768.33	3067517.13	NGS FIRST ORDER BENCH MARK "Q 405" PID LL1094.
1003	39° 59' 22.90518" N	105° 15' 23.36291" W	5347.04	5398.70	0° 09' 26.42457"	0.99996717	1239187.00	3068230.51	NGS FIRST ORDER BENCH MARK & FIRST ORDER HORIZONTAL MARK "R 405" PID KK1351.
1004	39° 59' 29.12990" N	105° 15' 39.67584" W	5437.25	5488.82	0° 09' 15.88419"	0.99996703	1239813.40	3066959.14	BOULDER CORS L1 PHASE CENTER, CORS ID DSRC, PID AJ7970.
1005	40° 00' 37.78510" N	105° 16' 36.88577" W	5359.67	5410.69	0° 08' 38.91896"	0.99996559	1246748.80	3062489.02	FOUND 2" DIA. BRASS CAP FLUSH WITH CONC. AT THE C.L. INTER. OF BROADWAY & UNIVERSITY, CAP MARKED "CITY OF BOULDER 24959".
1006	40° 00' 15.81498" N	105° 16' 10.34429" W	5373.40	5424.67	0° 08' 56.06830"	0.99996604	1244531.00	3064559.94	FOUND 2" DIA. ALUM. CAP FLUSH WITH BRICK IN MEDIAN IN BROADWAY AT 18TH ST., CAP MARKED "CITY OF BOULDER LS 24959".
1007	40° 00' 00.34531" N	105° 15' 02.36090" W	5278.66	5330.58	0° 09' 39.99466"	0.99996636	1242979.98	3069854.48	FOUND 2.5" DIA. ALUM. CAP IN RANGE BOX IN BASELINE RD. WEST BOUND LANE BETWEEN 32ND ST. & 33RD ST., CAP MARKED "CITY OF BOULDER 1/4 SEC. 5"
1008	40° 00' 26.52815" N	105° 15' 13.09064" W	5235.90	5287.71	0° 09' 33.06180"	0.99996582	1245627.01	3069012.13	FOUND 2.5" DIA. ALUM. CAP IN RANGE BOX IN COLORADO AVE. WEST OF 30TH ST., CAP MARKED IN PART "LS 13842 1984".
1009	40° 00' 26.54665" N	105° 14' 39.14232" W	5213.64	5265.76	0° 09' 54.99695"	0.99996582	1245636.36	3071653.70	FOUND 3 1/4" DIA. ALUM. CAP IN RANGE BOX IN COLORADO AVE. JUST WEST OF DISCOVERY DRIVE, CAP ILLEGIBLE.
1010	40° 00' 29.70828" N	105° 16' 10.34611" W	5342.44	5393.70	0° 08' 56.06712"	0.99996575	1245936.81	3064556.15	FOUND 1.5" DIA ALUM. CAP FLUSH WITH ASPH. AT THE C.L. INTER. OF 18TH & COLORADO AVE., CAP MARKED "BLC LS 20134".
1011	40° 00' 34.35209" N	105° 16' 15.50422" W	5345.26	5396.47	0° 08' 52.73430"	0.99996566	1246405.67	3064153.58	FOUND 3 3/4" DIA. BRASS CAP SET FLUSH IN TOP OF 8" X 8" RED SAND STONE, NORTH OF NORLIN LIBRARY, CAP MARKED "U.S. GEOLOGICAL SURVEY B.M.". (ALSO KNOWN AS CITY OF BOULDER BENCH MARK H-5).
1012	40° 00' 29.69696" N	105° 15' 50.85247" W	5315.38	5366.83	0° 09' 08.66262"	0.99996575	1245939.66	3066072.96	FOUND 1/2" DIA. SMOOTH STEEL ROD IN RANGE BOX AT THE C.L. INTER. OF FOLSOM ST. & COLORADO AVE.
1013	40° 00' 00.32829" N	105° 15' 36.55796" W	5313.81	5365.39	0° 09' 17.89879"	0.99996636	1242970.92	3067193.27	FOUND 2.5" DIA. BRASS CAP IN RANGE BOX IN THE MEDIAN OF 27TH WAY JUST SOUTH OF BASELINE RD., CAP MARKED "CITY OF BOULDER".
1014	39° 59' 09.41783" N	105° 13' 20.06037" W	5288.65	5341.35	0° 10' 46.09446"	0.99996747	1237850.47	3077831.65	FOUND 3.25" DIA. BRASS CAP IN RANGE BOX IN WEST BOUND LANE OF S. BOULDER RD. EAST OF 55TH ST., CAP MARKED IN PART "T1S R70W S3 S10".
1015	39° 59' 09.73819" N	105° 12' 46.19022" W	5300.37	5353.33	0° 11' 07.97910"	0.99996746	1237891.28	3080467.87	FOUND 3.25" DIA. BRASS CAP IN RANGE BOX IN THE INTER. OF S. BOULDER RD. & CHERRYVALE, CAP MARKED "T1S R70W 1/4 S3 S10 1986 LS 23047".
1018	39° 58' 01.27002" N	105° 11' 18.68937" W	5625.83	5679.30	0° 12' 04.51632"	0.99996904	1230986.22	3087302.91	NGS HARN STATION "OVERLOOK" PID KK2060.
1019	39° 59' 59.96560" N	105° 17' 03.37110" W	5622.36	5673.14	0° 08' 21.80629"	0.99996637	1242916.86	3060437.55	NGS FIRST ORDER BENCH MARK & FIRST ORDER HORIZONTAL MARK "K 440" PID L1143.
1020	40° 07' 51.34512" N	105° 13' 57.71720" W	5492.10	5544.28	0° 10' 21.76311"	0.99995902	1290653.91	3074741.39	TABLE MOUNTAIN CORS L1 PHASE CENTER, CORS ID TMGO, PID AB6369.
1021	40° 02' 11.39028" N	105° 14' 05.37373" W	5237.23	5289.64	0° 10' 16.81597"	0.99996380	1256252.88	3074249.57	NGS FIRST ORDER BENCH MARK & FIRST ORDER HORIZONTAL MARK "X 438" PID LL1137.
1022	39° 55' 40.61368" N	105° 13' 59.89777" W	5849.91	5901.97	0° 10' 20.35413"	0.99997263	1216712.82	3074794.40	NGS FIRST ORDER BENCH MARK & FIRST ORDER HORIZONTAL MARK "TT 23 J" PID KK0655.
1023	39° 59' 14.88261" N	105° 10' 30.97171" W	5405.79	5459.59	0° 12' 35.34830"	0.99996735	1238448.14	3090990.81	NGS FIRST ORDER BENCH MARK "W 413" PID KK1549.
1024	40° 00' 52.66176" N	105° 15' 47.10110" W	-----	-----	0° 09' 11.08650"	0.99996529	1248264.17	3066358.65	FOUND 2.5" DIA. ALUM. CAP IN RANGE BOX AT THE C.L. INTER. OF FOLSOM ST. & ARAPAHOE AVE., CAP MARKED "CITY OF BOULDER SEC. COR."
1025	40° 00' 02.46702" N	105° 15' 46.79259" W	5335.51	5387.00	0° 09' 11.28585"	0.99996632	1243185.19	3066396.23	NGS FIRST ORDER BENCH MARK "G 321 RESET" PID LL0704.
1050	39° 59' 09.22872" N	105° 13' 54.30334" W	5308.71	5361.11	0° 10' 23.96893"	0.99996747	1237823.12	3075166.37	FOUND 2" DIA BRASS CAP SET FLUSH IN CONC. IN 12" DIA CMP, W. OF FOOTHILLS OFF RAMP, N. OF US 36, CAP MARKED IN PART "LS 11372 1/4 4 9 1975 T1S R70W".
1051	39° 58' 17.17292" N	105° 13' 54.21487" W	5353.40	5405.74	0° 10' 24.02611"	0.99996866	1232555.80	3075189.19	FOUND 2.5" DIA. ALUM. CAP MARKED "FRANK R. DREXEL 1/4 COR. S9 S16 1976 T1S R70W 2149".
1052	39° 57' 25.52355" N	105° 13' 53.55066" W	5445.79	5498.06	0° 10' 24.45528"	0.99996991	1227329.74	3075256.73	FOUND 2" DIA. ALUM. CAP MARKED "MERRICK COMPANY DENVER, COLORADO 94".
1053	39° 57' 24.78083" N	105° 13' 19.88814" W	5510.60	5563.14	0° 10' 46.20577"	0.99996992	1227262.66	3077878.23	FOUND 2.5" DIA. ALUM. CAP 0.8' OUT OF THE GROUND, CAP MARKED "T1S R70W S15 S16 S21 S22" MERRICK POINT 95.
1054	39° 58' 17.35954" N	105° 13' 20.46907" W	5381.90	5434.51	0° 10' 45.83040"	0.99996866	1232582.77	3077816.33	FOUND 2" DIA. ALUM. CAP MARKED "CITY OF BOULDER GPS 85".
1055	39° 59' 06.41359" N	105° 16' 03.65507" W	5637.75	5689.05	0° 09' 00.39045"	0.99996753	1237509.85	3065098.87	FOUND 2" DIA. ALUM. CAP MARKED "CITY OF BOULDER 78".
1056	39° 58' 17.19506" N	105° 15' 36.35373" W	5588.82	5640.28	0° 09' 18.03077"	0.99996866	1232535.25	3067237.40	FOUND 1.5" DIA ALUM. CAP IN RANGE BOX, IN LEHIGH ST. S. OF HEIDELBURG, CAP MARKED "SECTION CORNER 7 8 18 17 RLS 5255" MERRICK POINT 146.
1057	40° 00' 01.76843" N	105° 15' 46.45084" W	5335.65	5387.15	0° 09' 11.50667"	0.99996633	1243114.57	3066423.02	FOUND REMAINDER OF 2.5" DIA BRASS CAP SET FLUSH IN 6" DIA. CONC. SET CUT "X" IN CENTER OF REMAINING BRASS.
1058	39° 59' 48.30793" N	105° 14' 45.36796" W	5281.40	5333.44	0° 09' 50.97436"	0.99996662	1241765.71	3071180.36	FOUND 2.5" DIA BRASS CAP MARKED IN PART "SEC NW NE 4 SE T1S".
1059	40° 00' 53.51990" N	105° 14' 41.62587" W	5200.52	5252.65	0° 09' 53.39224"	0.99996527	1248365.14	3071452.60	FOUND 2" DIA ALUM CAP NORTH OF ARAPAHOE AVE., WEST OF BOULDER CREEK, CAP STAMPED "CITY OF BOULDER 64".