



REPORT OF SURVEY

Kidder County, North Dakota LiDAR

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Prepared for

United States Geological Survey
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KIDDER COUNTY, NORTH DAKOTA

LIDAR

INTRODUCTION

Terrasurv, Inc of Pittsburgh, PA was tasked by Fugro Earthdata with performing a control survey in support of LiDAR data collection covering most of Kidder County in central North Dakota. The project consisted of two parts: ground control (GCP, 28 points) and quality control (HIGH/LOW, 40 points). The map below in figure 1 shows the layout of the GCP stations and the flight lines.

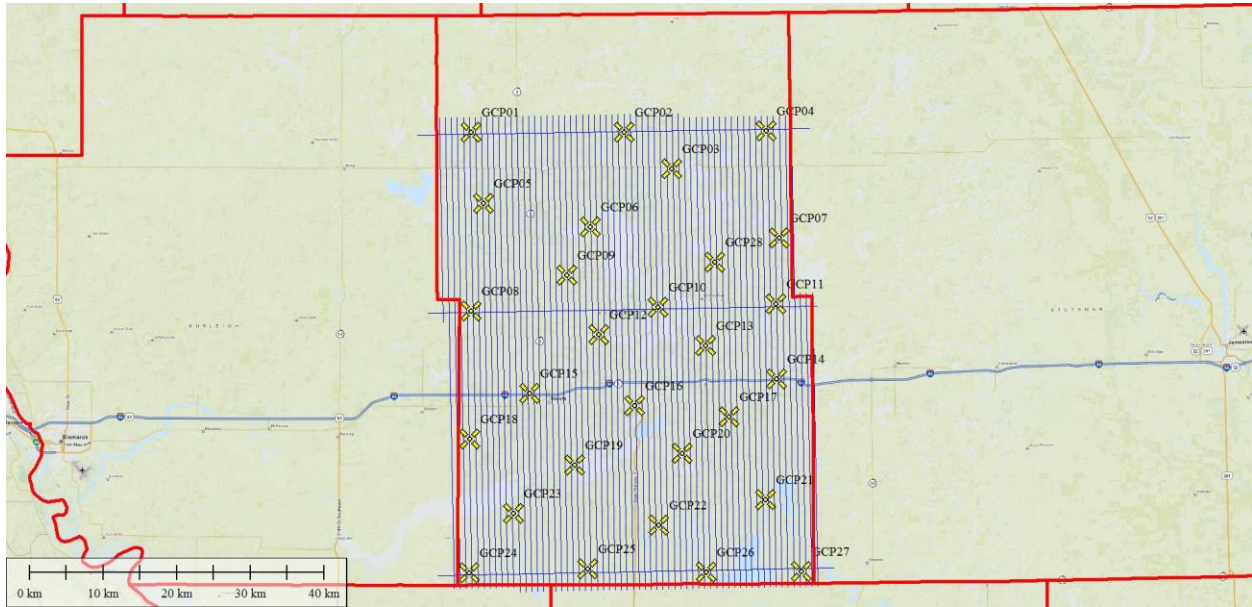


Figure 1 - GCP points

The next map in figure 2 shows the locations of the 40 QC points. The county is predominantly cultivated fields and pasture, therefore only two types of ground cover types were encountered: crops/agriculture/high weeds (20, red dots) and low grass/bare ground (20, green dots). The points were designated as follows:

Type	Designation	GPSID
GCP	GCP01 to GCP28	15009DA to 15009EB
AGRICULTURE/CROPS/HIGH WEEDS	HIGH01 to HIGH20	15009CA to 15009CT
BARE GROUND/LOW GRASS	LOW01 to LOW20	15009BA to 15009BT
BASE POINTS	N/A	15009A to 15009F

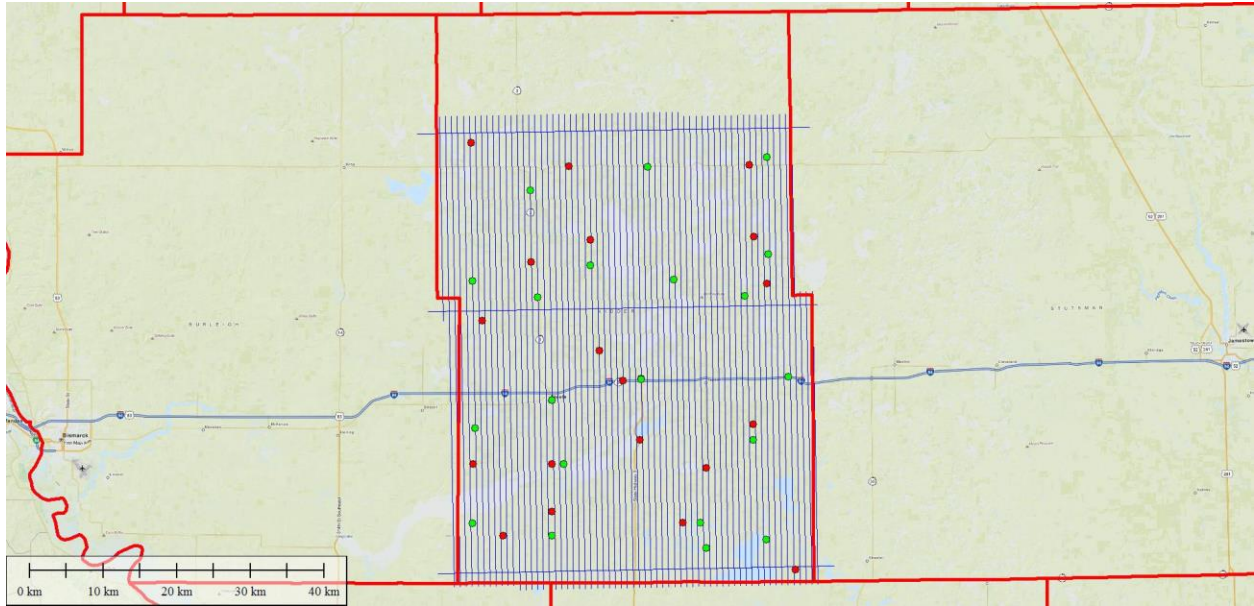


Figure 2 - QC stations (RED=HIGH, GREEN=LOW)

METHODOLOGY

Two Trimble dual frequency receivers were used in a real time static differential mode to determine the 3-D positions of each of the stations. A Trimble R10 was setup at several random locations, and functioned as an RTK base running an NTRIP server. The second unit, a Trimble R8 was used with a cellular connection to receive corrections from the base unit. These corrections are then applied at the remote GPS receiver to obtain real time positions, stored as vectors from the base station. Each surveyed point was occupied for 120 epochs (typically two minutes), then re-occupied a second time with a re-initialization in between.

The base data (5 stations) was processed against two Continuously Operating Reference Stations (CORS) located west of the project in Bismarck. In addition, three National Spatial Reference System (NSRS) benchmarks in Kidder County were included in the survey.

Station Name	PID	Comments
BISMARCK CORS ARP	AJ7216	CORS (BSMK)
MANDANDEBMND2012 CORS ARP	DO2366	CORS (P802)
E 486	RQ0487	Benchmark/FBN station
Y 125	SM0915	Benchmark
U 484	RQ0476	Benchmark

The horizontal datum was the North American Datum of 1983 – NAD83 (2011), epoch 2010.0. The vertical datum was the North American Vertical Datum of 1988 (NAVD88), realized with GEOID12A.

Figure 3 shows the configuration of the network. The large yellow dots are the locations of the three NSRS benchmarks and the two CORS near Bismarck. The large red X's are the temporary

base locations. The black lines are the RTK lines from the bases to the surveyed stations, and the green lines are static GPS lines from the CORS to the temporary bases.

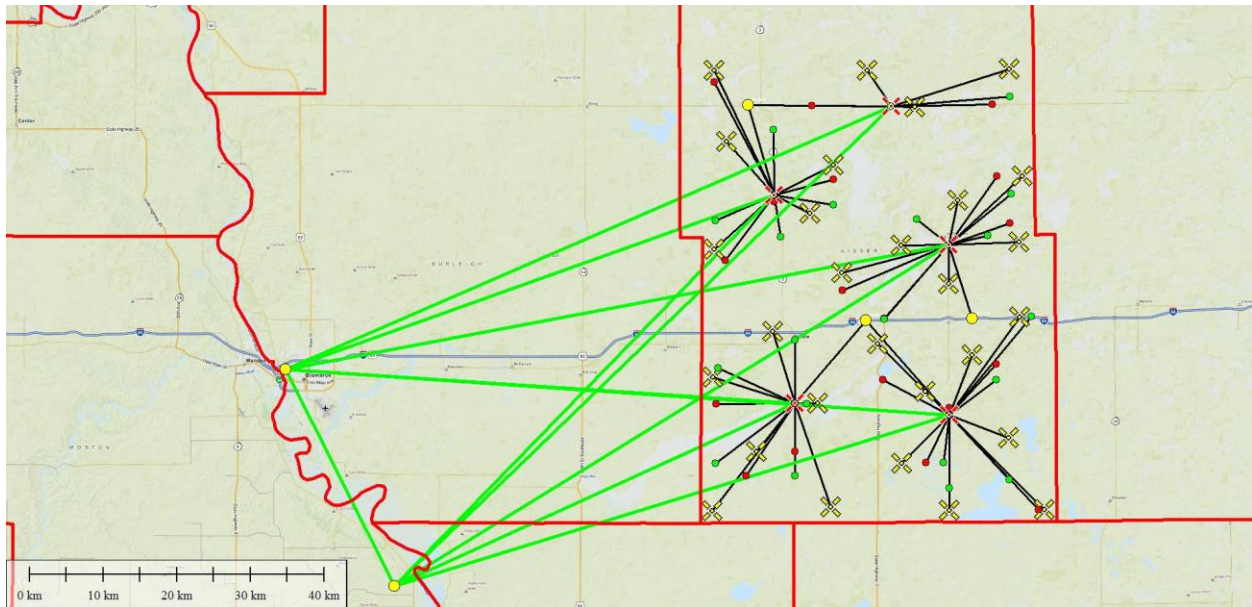


Figure 3 - Network Configuration

The table below summarizes the stations surveyed:

Station Name	GPSID	USGS Quadrangle	Description
BASE	15009A	STEELE	Temporary base
BASE	15009B	TAPPEN SOUTH	Temporary base
BASE	15009C	TAPPEN NORTH	Temporary base
BASE	15009D	TUTTLE SW	Temporary base
BASE	15009F	DES MOINES LAKE	Temporary base
BSMK ARP	BSMK	BISMARCK	CORS
E 486	RQ0487	STEELE NE	NSRS benchmark and FBN station
GCP01	15009DW	LAKE HELEN	bare ground in intersection of 21st Avenue SE and 16th Street SE
GCP02	15009EB	ROBINSON	bare ground in C/L of 34th Avenue SE at C/L extended of 16th Street SE
GCP03	15009DZ	DES MOINES LAKE	bare ground in C/L of 38th Avenue SE, about 600 feet south of SR 36
GCP04	15009EA	LAKE WILLIAMS	bare ground in center of southbound side of 46th Avenue SE
GCP05	15009DX	HARRIET LAKE SE	bare ground on east side of 22nd Avenue SE in center of 22nd Street SE extended
GCP06	15009DV	HORSEHEAD LAKE	bare ground in C/L of 24th Street SE just east of 31st Avenue SE
GCP07	15009DP	PETTIBONE	bare ground in middle of field entrance at south edge of 25th Street SE and C/L extended of 47th Avenue SE
GCP08	15009DY	STONY SLOUGH	bare ground in C/L of 31st Street SE just east of 19th Avenue SE
GCP09	15009DU	TUTTLE SW	bare ground in C/L of 28th Street SE just east of 29th Avenue SE to the south
GCP10	15009DR	TAPPEN NORTH	bare ground in middle of 35th Avenue SE at south end of road, north side of lake
GCP11	15009DO	TAPPEN NE	bare ground on east edge of 45th Avenue SE in C/L of farm field entrance
GCP12	15009DS	STEELE NE	bare ground in C/L of 33rd Street SE just west of 30th Avenue SE
GCP13	15009DT	TAPPEN NORTH	sparse grass in field entrance in SE quadrant of 39th Avenue SE and 34th Street SE

Station Name	GPSID	USGS Quadrangle	Description
GCP14	15009DL	TAPPEN NE	bare ground at north edge of 37th Street SE and C/L of 45th Avenue SE
GCP15	15009DE	STEELE	bare ground on west side of 24th Avenue SE in dirt trail to silos
GCP16	15009DM	DAWSON	bare ground in C/L of 33rd Avenue SE just north of 39th Avenue SE
GCP17	15009DK	TAPPEN SE	bare ground on south side of 40th Street SE, just west of west edge of 40th Street SE extended
GCP18	15009DF	LAKE GENEVA	mowed grass on east side of 19th Avenue SE
GCP19	15009DA	DAWSON	mowed grass on north side of 44th Street SE in island between tracks to 28th Avenue SE going north
GCP20	15009DN	TAPPEN SOUTH	bare ground in C/L of 37th Avenue SE on curve
GCP21	15009DJ	ALKALINE LAKE	bare ground in C/L of 44th Avenue SE extended, just north of 47th Street SE
GCP22	15009DG	ALKALINE LAKE NW	bare ground in C/L of 35th Avenue SE just south of 49th Street SE
GCP23	15009DB	PURSIAN LAKE	sparse mowed grass on south side of 48th Street SE on east side of driveway south
GCP24	15009DC	BRADDOCK NE	mowed grass in NE quadrant of 53rd Street SE and 19th Avenue SE
GCP25	15009DD	KINTYRE NE	bare ground on west side of 29th Avenue SE at dirt drive into old homestead
GCP26	15009DH	ALKALINE LAKE NW	sparse grass in NW quadrant of 53rd Street SE and 39th Avenue SE in field entrance
GCP27	15009DI	STREETER NW	bare ground in C/L of 53rd Street SE just west of 47th Avenue SE
GCP28	15009DQ	PETTIBONE	bare ground in C/L of 41st Avenue SE just north of 27th Street SE
HIGH01	15009CA	STEELE	high grass in NW corner of field in SE quadrant of 44th Street SE and 26th Avenue SE
HIGH02	15009CB	PURSIAN LAKE	high grass in NE quadrant of 26th Avenue SE and 48th Street SE
HIGH03	15009CC	PURSIAN LAKE	high grass on south side of 50th Street SE
HIGH04	15009CD	STEELE NE	high grass on north side of north right of way fence for I-94, east side of 32nd Avenue SE extended
HIGH05	15009CE	LAKE GENEVA	high weeds between fences on south side of 44th Street SE
HIGH06	15009CF	ALKALINE LAKE NW	high weeds in NE quadrant of 37th Avenue SE and 49th Street SE
HIGH07	15009CG	STREETER NW	high weeds on south side of 53rd Street SE, west side of field road
HIGH08	15009CH	TAPPEN SE	high weeds in low area on east side of 43rd Avenue SE
HIGH09	15009CI	DAWSON	high weeds on east side of SR 3, north side of 42nd Street SE
HIGH10	15009CJ	TAPPEN SOUTH	high weeds on east side of SR 71 (39th Avenue SE)
HIGH11	15009CK	TAPPEN NE	high weeds on north side of 29th Street SE
HIGH12	15009CL	PETTIBONE	high weeds on south side of 25th Street SE
HIGH13	15009CM	STEELE NE	high weeds on east side of 30th Avenue SE
HIGH14	15009CN	STEELE NE	high weeds on east side of trail in abandoned parcel on north side of 37th Street SE at SR 3 extended on north side of I-94
HIGH15	15009CO	TUTTLE SW	high weeds in SW quadrant of SR 3 and 27th Street SE, at NE corner of field
HIGH16	15009CP	HORSEHEAD LAKE	high weeds on east side of 31st Avenue SE, between field and road, north side of field entrance
HIGH17	15009CQ	LAKE HELEN	high weeds on west side of 21st Avenue SE at 17th Street SE extended, between fences
HIGH18	15009CR	STONY SLOUGH	high weeds on west side of 20th Avenue SE
HIGH19	15009CS	LAKE WILLIAMS	high weeds on north side of SR 36
HIGH20	15009CT	TUTTLE	high weeds on north side of SR 36, just east of stockpile area
LOW01	15009BA	STEELE	bare ground on south side of 44th Street SE at 27th Avenue SE
LOW02	15009BB	BRADDOCK NE	sparse grass on field entrance on south side of 49th Street SE

Station Name	GPSID	USGS Quadrangle	Description
LOW03	15009BC	PURSIAN LAKE	bare ground in SE quadrant of intersection of 26th Avenue SE and 50th Street SE, NW corner of field
LOW04	15009BD	STEELE	bare ground on east side of 26th Avenue SE, south of RR tracks
LOW05	15009BE	LAKE GENEVA	short grass in low spot on north side of 41st Street SE
LOW06	15009BF	ALKALINE LAKE NW	bare ground at north edge of field, south side of 49th Street SE
LOW07	15009BG	ALKALINE LAKE NW	mowed grass on north side of faint trail to windmill on west side of 39th Avenue SE
LOW08	15009BH	ALKALINE LAKE	bare ground on access road between fields on east side of 44th Avenue SE
LOW09	15009BI	TAPPEN SE	bare ground in center of drive on west side of 43rd Avenue SE
LOW10	15009BJ	CRYSTAL SPRINGS	bare ground in center of 46th Avenue SE on north side of 37th Street SE
LOW11	15009BK	TAPPEN NE	short sparse grass on south side of 30th Street SE at 44th Avenue SE extended
LOW12	15009BL	PETTIBONE	center of unnamed dirt road about 100 feet east of 46th Avenue SE
LOW13	15009BM	KUNKEL LAKE	center of 38th Avenue SE (dirt)
LOW14	15009BN	STEELE NE	bare ground in center of entrance to abandoned parcel on north side of 37th Street SE at SR 3 extended on north side of I-94
LOW15	15009BO	STEELE NW	bare ground on SW side of SR 3 at field entrance opposite 30th Street SE
LOW16	15009BP	HORSEHEAD LAKE	bare ground in middle of field entrance on east side of 31st Avenue SE
LOW17	15009BQ	TUTTLE SW	bare ground in middle of field entrance on east side of 26th Avenue SE, at 21st Street SE extended
LOW18	15009BR	HARRIET LAKE SE	bare ground in middle of southbound lane of 21st Avenue SE (dirt/gravel)
LOW19	15009BS	LAKE WILLIAMS	bare ground in middle of field access on east side of 46th Avenue SE
LOW20	15009BT	DES MOINES LAKE	bare ground in middle of gated entrance on west side of cemetery located on south side of SR 36 (19th Street SE) and west side of 36th Avenue SE
P802 ARP	P802	FORT RICE	CORS
U 484	RQ0476	TAPPEN NE	Benchmark
Y 125	SM0915	TUTTLE	Benchmark

GPS OBSERVATIONS

The first table below summarizes the static GPS observations (at the temporary base stations).

GPSID	UTC Start	Duration Minutes	HI meters	Filename
15009A	04/20/2015 18:56	293	2.050	54321100.dat
15009B	04/21/2015 13:56	335	2.050	54321111.dat
15009C	04/21/2015 19:50	209	2.050	54321112.dat
15009D	04/22/2015 13:46	234	2.050	54321121.dat
15009F	04/22/2015 18:11	134	2.050	54321123.dat
BSMK	04/20/2015 18:55	294	0.000	bsmk110.15o
BSMK	04/21/2015 13:55	564	0.000	bsmk111.15o
BSMK	04/22/2015 13:45	400	0.000	bsmk112.15o
P802	04/20/2015 18:55	294	0.008	p802110.15o
P802	04/21/2015 13:55	564	0.008	p802111.15o
P802	04/22/2015 13:45	400	0.008	p802112.15o

The next table summarizes the RTK occupations (precisions in meters):

GPS BASE	GPSID	UTC Start	UTC End	Horiz Prec	Vert Prec	# of SV's	PDOP
15009A	15009CA	04/20/2015 19:14:28	19:14:56	0.004	0.004	15	0.8

GPS BASE	GPSID	UTC Start	UTC End	Horiz Prec	Vert Prec	# of SV's	PDOP
15009A	15009CA	04/20/2015 19:15:43	19:17:43	0.004	0.005	15	1.0
15009A	15009DA	04/20/2015 19:39:22	19:42:38	0.005	0.007	6	2.9
15009A	15009DA	04/20/2015 19:43:06	19:45:06	0.005	0.006	14	1.2
15009A	15009BA	04/20/2015 19:57:08	19:59:09	0.004	0.006	15	1.0
15009A	15009BA	04/20/2015 19:59:34	20:01:34	0.004	0.006	16	1.2
15009A	15009CB	04/20/2015 20:11:21	20:13:21	0.006	0.010	16	1.4
15009A	15009CB	04/20/2015 20:13:41	20:15:41	0.006	0.010	16	1.4
15009A	15009DB	04/20/2015 20:23:59	20:25:59	0.007	0.011	16	1.5
15009A	15009DB	04/20/2015 20:26:22	20:28:22	0.007	0.011	17	1.4
15009A	15009BB	04/20/2015 20:36:54	20:38:55	0.009	0.015	17	1.4
15009A	15009BB	04/20/2015 20:39:11	20:41:26	0.008	0.014	17	1.4
15009A	15009DC	04/20/2015 20:50:24	20:53:22	0.008	0.015	17	1.3
15009A	15009DC	04/20/2015 20:53:42	20:55:48	0.008	0.015	17	1.3
15009A	15009CC	04/20/2015 21:06:04	21:08:04	0.009	0.014	20	1.2
15009A	15009CC	04/20/2015 21:08:25	21:10:25	0.007	0.013	19	1.3
15009A	15009BC	04/20/2015 21:18:09	21:20:09	0.007	0.012	17	1.3
15009A	15009BC	04/20/2015 21:20:25	21:22:26	0.007	0.012	16	1.4
15009A	15009DD	04/20/2015 21:32:03	21:34:04	0.008	0.013	16	1.4
15009A	15009DD	04/20/2015 21:34:22	21:36:22	0.007	0.013	16	1.4
15009A	15009BD	04/20/2015 21:58:16	22:00:16	0.007	0.010	16	1.3
15009A	15009BD	04/20/2015 22:00:38	22:01:56	0.007	0.011	18	1.1
15009A	15009DE	04/20/2015 22:12:46	22:14:47	0.007	0.011	17	1.2
15009A	15009DE	04/20/2015 22:15:07	22:17:11	0.008	0.013	17	1.2
15009A	RQ0487	04/20/2015 22:34:08	22:36:09	0.009	0.012	17	1.2
15009A	RQ0487	04/20/2015 22:36:36	22:38:36	0.009	0.012	18	1.1
15009A	15009CD	04/20/2015 22:40:06	22:41:55	0.009	0.013	17	1.2
15009A	15009CD	04/20/2015 22:42:18	22:44:18	0.008	0.011	16	1.2
15009A	15009CD	04/20/2015 22:44:39	22:46:39	0.009	0.012	17	1.2
15009A	15009BE	04/20/2015 23:04:38	23:06:38	0.009	0.013	14	1.5
15009A	15009BE	04/20/2015 23:06:56	23:08:57	0.008	0.011	14	1.5
15009A	15009DF	04/20/2015 23:12:32	23:14:32	0.008	0.012	15	1.4
15009A	15009DF	04/20/2015 23:21:59	23:23:59	0.006	0.010	17	1.2
15009A	15009CE	04/20/2015 23:31:05	23:33:05	0.007	0.011	17	1.3
15009A	15009CE	04/20/2015 23:33:23	23:35:23	0.007	0.011	16	1.3
15009B	15009BF	04/21/2015 14:10:35	14:12:35	0.006	0.010	18	1.3
15009B	15009BF	04/21/2015 14:13:00	14:15:01	0.006	0.010	17	1.4
15009B	15009DG	04/21/2015 14:22:59	14:25:00	0.006	0.011	18	1.3
15009B	15009DG	04/21/2015 14:25:26	14:27:27	0.006	0.011	18	1.3
15009B	15009CF	04/21/2015 14:58:32	15:00:33	0.007	0.010	11	1.8
15009B	15009CF	04/21/2015 15:01:56	15:03:56	0.007	0.010	16	1.5
15009B	15009BG	04/21/2015 15:12:02	15:14:02	0.007	0.011	15	1.5
15009B	15009BG	04/21/2015 15:14:27	15:16:28	0.007	0.011	16	1.4
15009B	15009DH	04/21/2015 15:22:02	15:24:03	0.007	0.011	16	1.4
15009B	15009DH	04/21/2015 15:24:28	15:26:49	0.008	0.012	16	1.3
15009B	15009DI	04/21/2015 15:48:09	15:50:09	0.007	0.011	15	1.4
15009B	15009DI	04/21/2015 15:50:31	15:52:56	0.010	0.016	15	1.8
15009B	15009DI	04/21/2015 15:53:16	15:55:16	0.011	0.017	15	1.4
15009B	15009CG	04/21/2015 16:05:50	16:07:51	0.007	0.011	15	1.3
15009B	15009CG	04/21/2015 16:08:08	16:10:09	0.008	0.013	15	1.3
15009B	15009BH	04/21/2015 16:21:54	16:23:56	0.010	0.015	15	1.6
15009B	15009BH	04/21/2015 16:24:13	16:26:14	0.009	0.014	14	1.3
15009B	15009DJ	04/21/2015 16:33:12	16:35:13	0.009	0.013	15	1.2
15009B	15009DJ	04/21/2015 16:35:31	16:37:17	0.007	0.011	15	1.2
15009B	15009BI	04/21/2015 16:55:20	16:57:21	0.011	0.016	13	1.5
15009B	15009BI	04/21/2015 16:57:42	16:59:42	0.011	0.019	12	1.9
15009B	15009CH	04/21/2015 17:07:00	17:09:42	0.011	0.015	13	1.4
15009B	15009CH	04/21/2015 17:10:05	17:12:06	0.013	0.019	13	1.4
15009B	15009DK	04/21/2015 17:17:44	17:19:44	0.010	0.016	12	1.8
15009B	15009DK	04/21/2015 17:21:22	17:23:24	0.009	0.015	13	1.7
15009B	15009DL	04/21/2015 17:36:43	17:38:52	0.009	0.016	13	1.7
15009B	15009DL	04/21/2015 17:39:14	17:41:32	0.008	0.015	13	1.7
15009B	15009BJ	04/21/2015 17:45:26	17:47:48	0.010	0.017	14	1.5
15009B	15009BJ	04/21/2015 17:48:11	17:48:33	0.012	0.019	14	1.5
15009B	15009BJ	04/21/2015 17:49:31	17:51:36	0.009	0.015	14	1.4

GPS BASE	GPSID	UTC Start	UTC End	Horiz Prec	Vert Prec	# of SV's	PDOP
15009B	RQ0487	04/21/2015 18:07:08	18:09:09	0.009	0.013	14	1.4
15009B	RQ0487	04/21/2015 18:09:27	18:11:27	0.009	0.013	13	1.5
15009B	15009DM	04/21/2015 18:44:26	18:46:26	0.009	0.012	10	1.5
15009B	15009DM	04/21/2015 18:46:46	18:48:46	0.008	0.011	16	1.2
15009B	15009CI	04/21/2015 18:57:34	18:59:35	0.008	0.011	17	1.1
15009B	15009CI	04/21/2015 18:59:55	19:01:56	0.008	0.011	16	1.2
15009B	15009DN	04/21/2015 19:11:36	19:13:37	0.005	0.007	16	1.2
15009B	15009DN	04/21/2015 19:14:01	19:16:02	0.005	0.007	15	1.2
15009B	15009CJ	04/21/2015 19:23:56	19:25:57	0.003	0.004	16	1.1
15009B	15009CJ	04/21/2015 19:27:23	19:29:23	0.003	0.004	16	0.8
15009C	15009BK	04/21/2015 20:03:43	20:05:44	0.005	0.009	16	1.5
15009C	15009BK	04/21/2015 20:06:02	20:08:02	0.005	0.009	16	1.5
15009C	15009CK	04/21/2015 20:13:24	20:15:11	0.007	0.012	17	1.4
15009C	15009CK	04/21/2015 20:15:42	20:16:00	0.008	0.014	18	1.4
15009C	15009DO	04/21/2015 20:21:53	20:25:28	0.006	0.011	18	1.4
15009C	15009DO	04/21/2015 20:26:47	20:31:17	0.006	0.011	17	1.4
15009C	15009BL	04/21/2015 20:39:11	20:41:11	0.007	0.013	17	1.4
15009C	15009BL	04/21/2015 20:43:29	20:45:30	0.007	0.014	18	1.3
15009C	15009DP	04/21/2015 20:50:57	20:52:57	0.007	0.013	17	1.3
15009C	15009DP	04/21/2015 20:53:23	20:55:24	0.008	0.013	17	1.3
15009C	15009CL	04/21/2015 21:00:09	21:02:10	0.007	0.012	19	1.2
15009C	15009CL	04/21/2015 21:02:29	21:04:29	0.007	0.011	19	1.2
15009C	15009DQ	04/21/2015 21:13:54	21:15:54	0.006	0.010	17	1.3
15009C	15009DQ	04/21/2015 21:16:15	21:18:15	0.006	0.010	17	1.3
15009C	15009BM	04/21/2015 21:27:16	21:29:16	0.006	0.010	15	1.5
15009C	15009BM	04/21/2015 21:29:36	21:31:36	0.006	0.010	15	1.5
15009C	15009DR	04/21/2015 21:38:34	21:40:34	0.007	0.011	16	1.3
15009C	15009DR	04/21/2015 21:40:50	21:42:50	0.007	0.011	15	1.4
15009C	15009DS	04/21/2015 21:55:48	21:59:13	0.008	0.013	17	1.2
15009C	15009DS	04/21/2015 21:59:34	22:01:43	0.008	0.013	18	1.2
15009C	15009CM	04/21/2015 22:05:59	22:07:59	0.009	0.014	17	1.2
15009C	15009CM	04/21/2015 22:10:11	22:12:11	0.008	0.013	17	1.2
15009C	15009CM	04/21/2015 22:12:27	22:14:28	0.007	0.012	17	1.2
15009C	15009BN	04/21/2015 22:29:19	22:31:20	0.008	0.012	17	1.2
15009C	15009BN	04/21/2015 22:31:38	22:33:38	0.008	0.012	18	1.1
15009C	15009CN	04/21/2015 22:35:43	22:37:44	0.008	0.011	17	1.2
15009C	15009CN	04/21/2015 22:37:59	22:39:59	0.008	0.011	17	1.2
15009C	RQ0476	04/21/2015 22:59:27	23:01:27	0.008	0.012	15	1.3
15009C	15009DT	04/21/2015 23:09:09	23:12:35	0.005	0.008	16	1.4
15009C	15009DT	04/21/2015 23:13:10	23:15:11	0.006	0.008	16	1.4
15009D	15009CO	04/22/2015 13:58:36	14:00:37	0.003	0.003	20	0.7
15009D	15009CO	04/22/2015 14:00:53	14:02:53	0.003	0.003	20	0.9
15009D	15009BO	04/22/2015 14:09:38	14:11:39	0.006	0.009	18	1.3
15009D	15009BO	04/22/2015 14:11:55	14:13:55	0.006	0.010	18	1.3
15009D	15009DU	04/22/2015 14:23:27	14:25:27	0.006	0.009	18	1.3
15009D	15009DU	04/22/2015 14:25:45	14:29:26	0.005	0.008	18	1.3
15009D	15009BP	04/22/2015 14:39:31	14:41:31	0.007	0.010	18	1.2
15009D	15009BP	04/22/2015 14:41:50	14:43:50	0.007	0.011	18	1.2
15009D	15009CP	04/22/2015 14:48:46	14:50:47	0.007	0.011	17	1.3
15009D	15009CP	04/22/2015 14:51:02	14:53:03	0.007	0.011	16	1.5
15009D	15009DV	04/22/2015 14:57:57	14:59:58	0.007	0.011	16	1.5
15009D	15009DV	04/22/2015 15:00:48	15:02:49	0.007	0.011	16	1.4
15009D	15009DV	04/22/2015 15:03:57	15:05:58	0.009	0.014	17	1.4
15009D	15009BQ	04/22/2015 15:19:44	15:21:45	0.007	0.010	16	1.3
15009D	15009BQ	04/22/2015 15:22:07	15:24:08	0.007	0.010	17	1.2
15009D	SM0915	04/22/2015 15:39:49	15:41:49	0.007	0.010	16	1.2
15009D	SM0915	04/22/2015 15:42:37	15:44:37	0.007	0.010	17	1.1
15009D	15009CQ	04/22/2015 15:56:48	15:58:49	0.009	0.014	15	1.3
15009D	15009CQ	04/22/2015 15:59:12	16:01:13	0.008	0.013	15	1.3
15009D	15009DW	04/22/2015 16:04:31	16:06:32	0.009	0.013	15	1.3
15009D	15009DW	04/22/2015 16:06:52	16:08:31	0.008	0.012	15	1.3
15009D	15009DX	04/22/2015 16:19:12	16:21:13	0.008	0.011	14	1.3
15009D	15009DX	04/22/2015 16:21:26	16:23:27	0.009	0.014	14	1.3
15009D	15009BR	04/22/2015 16:33:53	16:35:53	0.009	0.012	14	1.3

GPS BASE	GPSID	UTC Start	UTC End	Horiz Prec	Vert Prec	# of SV's	PDOP
15009D	15009BR	04/22/2015 16:36:15	16:38:15	0.010	0.014	14	1.3
15009D	15009DY	04/22/2015 16:45:51	16:47:52	0.009	0.014	13	1.5
15009D	15009DY	04/22/2015 16:48:10	16:50:11	0.011	0.015	13	1.5
15009D	15009DY	04/22/2015 16:50:29	16:52:29	0.010	0.013	14	1.3
15009D	15009CR	04/22/2015 16:57:01	16:59:13	0.010	0.014	14	1.2
15009D	15009CR	04/22/2015 16:59:35	17:01:36	0.013	0.016	14	1.2
15009F	15009DZ	04/22/2015 18:26:37	18:28:37	0.005	0.008	14	1.2
15009F	15009DZ	04/22/2015 18:34:32	18:36:33	0.004	0.006	16	1.2
15009F	15009CS	04/22/2015 18:45:17	18:47:59	0.008	0.011	16	1.2
15009F	15009CS	04/22/2015 18:48:22	18:50:23	0.009	0.013	16	1.2
15009F	15009EA	04/22/2015 18:57:50	18:59:50	0.008	0.011	16	1.2
15009F	15009EA	04/22/2015 19:00:06	19:02:06	0.008	0.012	15	1.3
15009F	15009BS	04/22/2015 19:06:26	19:08:26	0.008	0.012	16	1.2
15009F	15009BS	04/22/2015 19:08:41	19:10:41	0.008	0.012	16	1.3
15009F	15009EB	04/22/2015 19:30:25	19:32:26	0.006	0.010	16	1.3
15009F	15009EB	04/22/2015 19:32:43	19:34:43	0.006	0.011	17	1.3
15009F	SM0915	04/22/2015 19:50:50	19:53:52	0.007	0.012	16	1.4
15009F	SM0915	04/22/2015 19:54:15	19:57:17	0.008	0.012	16	1.4
15009F	15009CT	04/22/2015 20:05:52	20:07:59	0.007	0.012	17	1.4
15009F	15009CT	04/22/2015 20:08:21	20:10:21	0.007	0.012	17	1.4
15009F	15009BT	04/22/2015 20:19:09	20:21:10	0.002	0.004	18	0.9
15009F	15009BT	04/22/2015 20:21:55	20:23:56	0.002	0.004	18	1.4

PROCESSING

The RTK data collected and stored as vectors was downloaded to a PC and input to a database. The static data collected at the base stations was processed in Trimble Business Center (TBC) version 3.40. The precise ephemeris was used. The table below summarizes the processing (precisions and rms in meters):

From	To	UTC Start	Dur mins	Length meters	Horiz Prec	Vert Prec	RMS	L/T Ratio
BSMK	15009A	04/20/2015 18:56	293	69263	0.004	0.009	0.001	4.2
P802	15009A	04/20/2015 18:56	293	59743	0.004	0.009	0.001	4.9
BSMK	15009B	04/21/2015 13:56	335	90253	0.004	0.010	0.001	3.7
P802	15009B	04/21/2015 13:56	335	78812	0.004	0.011	0.000	4.3
BSMK	15009C	04/21/2015 19:50	209	91500	0.005	0.011	0.001	2.3
P802	15009C	04/21/2015 19:50	209	88288	0.005	0.011	0.001	2.4
BSMK	15009D	04/22/2015 13:46	233	70346	0.005	0.013	0.001	3.3
P802	15009D	04/22/2015 13:46	233	73882	0.005	0.013	0.000	3.2
BSMK	15009F	04/22/2015 18:11	134	89518	0.005	0.015	0.001	1.5
P802	15009F	04/22/2015 18:11	134	93602	0.005	0.015	0.001	1.4
BSMK	P802	04/20/2015 18:55	294	32819	0.003	0.009	0.000	9.0
BSMK	P802	04/21/2015 13:55	564	32819	0.003	0.007	0.000	17.2
BSMK	P802	04/22/2015 13:45	400	32819	0.003	0.008	0.000	12.2

All of the baselines had excellent statistics. As a check, the static data was submitted to the Trimble RTX Post Processing service. This service is a Precise Point Positioning (PPP) service and does not use local CORS. The positions are computed in the ITRF08 datum and transformed to the NAD83 (2011) datum realization. The results of the RTX processing are given below (in meters):

GPSID	Duration minutes	Latitude Accuracy	Longitude Accuracy	Height Accuracy
15009A	294	0.005	0.004	0.010
15009B	335	0.004	0.006	0.010
15009C	209	0.006	0.005	0.012

GPSID	Duration minutes	Latitude Accuracy	Longitude Accuracy	Height Accuracy
15009D	234	0.004	0.004	0.010
15009F	135	0.008	0.005	0.014

The next table shows the comparisons between the RTX solutions and the adjusted values as processed against the CORS in TBC:

GPSID	RTX Solutions			TBC Processed Solutions			Differences	
	UTM N	UTM E	Ellip H	UTM N	UTM E	Ellip H	H diff	V Diff
15009A	5180919.585	430413.904	506.740	5180919.578	430413.895	506.760	0.011	0.020
15009B	5178978.705	451307.067	543.518	5178978.700	451307.059	543.530	0.010	0.012
15009C	5202031.566	451638.751	552.033	5202031.560	451638.735	552.055	0.017	0.022
15009D	5209164.258	428133.384	537.197	5209164.253	428133.377	537.220	0.009	0.023
15009F	5220858.908	444221.994	520.851	5220858.897	444221.975	520.870	0.022	0.019

The RTK vectors were all repeated except for one, on benchmark **U 484**. As described above, the repeat occupations were done immediately after the initial observations, with a re-initialization in between. The Earth Centered earth Fixed (ECEF) vector differences were rotated into a local horizon system for analysis (all values in meters):

From	To	Delta N	Delta E	Horiz	Delta U	Length
15009A	15009BA	0.016	-0.006	0.017	-0.014	1587
15009A	15009BB	0.001	0.003	0.003	0.005	13499
15009A	15009BC	0.003	-0.005	0.005	-0.004	9734
15009A	15009BD	-0.002	0.000	0.002	0.002	8614
15009A	15009BE	-0.008	-0.004	0.009	0.007	11513
15009B	15009BF	0.000	-0.001	0.001	0.004	6509
15009B	15009BG	0.001	0.004	0.004	-0.007	9940
15009B	15009BH	-0.003	-0.003	0.004	-0.001	11938
15009B	15009BI	0.005	0.001	0.006	0.000	7931
15009B	15009BJ	0.000	0.004	0.004	-0.012	17366
15009B	15009BJ	0.010	0.000	0.010	-0.006	17366
15009B	15009BJ	0.010	-0.003	0.011	0.006	17366
15009C	15009BK	0.001	0.001	0.002	0.004	5461
15009C	15009BL	-0.001	-0.002	0.002	0.046	10931
15009C	15009BM	-0.003	-0.003	0.004	-0.011	5536
15009C	15009BN	0.001	0.006	0.006	0.001	13289
15009D	15009BO	0.004	0.002	0.005	0.000	5698
15009D	15009BP	-0.004	-0.002	0.004	-0.005	8152
15009D	15009BQ	0.004	0.001	0.004	0.005	8824
15009D	15009BR	-0.004	-0.001	0.004	-0.004	8710
15009F	15009BS	-0.009	0.000	0.009	0.001	16135
15009F	15009BT	-0.001	-0.002	0.002	-0.004	60

From	To	Delta N	Delta E	Horiz	Delta U	Length
15009A	15009CA	0.007	-0.003	0.008	-0.005	35
15009A	15009CB	0.001	0.001	0.001	-0.006	6478
15009A	15009CC	0.004	-0.001	0.004	-0.014	11774
15009A	15009CD	-0.008	-0.013	0.015	-0.025	14832
15009A	15009CD	0.001	-0.006	0.006	-0.024	14832
15009A	15009CD	0.009	0.008	0.012	0.001	14832
15009A	15009CE	0.004	0.001	0.004	0.008	10728
15009B	15009CF	-0.002	-0.003	0.004	-0.005	7201
15009B	15009CG	0.004	-0.002	0.004	-0.001	17637
15009B	15009CH	0.000	0.003	0.003	-0.001	9392
15009B	15009CI	0.006	0.001	0.006	-0.006	10241
15009B	15009CJ	0.000	-0.001	0.001	0.008	951
15009C	15009CK	0.002	0.000	0.002	0.008	8764
15009C	15009CL	-0.002	0.003	0.003	0.004	11319
15009C	15009CM	0.015	-0.007	0.017	-0.034	15685
15009C	15009CM	0.016	-0.010	0.019	-0.042	15685
15009C	15009CM	0.001	-0.003	0.003	-0.008	15685
15009C	15009CN	0.005	-0.002	0.005	0.003	13272
15009D	15009CO	0.001	0.001	0.001	-0.001	824
15009D	15009CP	0.003	0.001	0.003	-0.014	8280
15009D	15009CQ	-0.005	0.000	0.005	-0.007	17332
15009D	15009CR	0.004	0.002	0.004	-0.004	11054
15009F	15009CS	-0.001	0.005	0.005	-0.006	13675
15009F	15009CT	-0.006	-0.001	0.006	-0.002	10795
15009A	15009DA	0.005	-0.004	0.006	-0.014	3115
15009A	15009DB	-0.002	-0.005	0.005	-0.005	8336
15009A	15009DC	0.003	-0.002	0.004	0.000	18380
15009A	15009DD	0.001	0.002	0.003	-0.011	14859
15009A	15009DE	0.000	-0.002	0.002	-0.005	10220
15009A	15009DF	0.001	-0.002	0.002	0.004	11675
15009B	15009DG	0.000	0.002	0.002	-0.002	9150
15009B	15009DH	-0.004	0.004	0.006	0.012	12889
15009B	15009DI	-0.004	-0.008	0.009	0.014	18159
15009B	15009DI	-0.002	-0.011	0.011	0.021	18159
15009B	15009DI	0.001	-0.003	0.003	0.007	18159
15009B	15009DJ	0.002	0.002	0.003	-0.008	8653
15009B	15009DK	-0.002	0.004	0.005	-0.013	8667
15009B	15009DL	0.004	0.006	0.007	0.018	16317
15009B	15009DM	0.000	-0.001	0.001	0.009	13709
15009B	15009DN	-0.001	-0.001	0.001	0.001	4598
15009C	15009DO	0.008	0.004	0.008	-0.001	9587

From	To	Delta N	Delta E	Horiz	Delta U	Length
15009C	15009DP	0.000	0.000	0.000	-0.007	13674
15009C	15009DQ	0.004	0.001	0.004	0.001	6163
15009C	15009DR	-0.003	-0.002	0.003	0.003	6450
15009C	15009DS	0.004	-0.005	0.007	-0.021	14964
15009C	15009DT	-0.003	-0.002	0.004	-0.002	5325
15009D	15009DU	0.001	-0.002	0.003	-0.001	5423
15009D	15009DV	0.001	-0.002	0.002	-0.001	8966
15009D	15009DV	0.001	-0.003	0.003	-0.003	8966
15009D	15009DV	0.000	-0.001	0.001	-0.001	8966
15009D	15009DW	-0.001	0.001	0.001	-0.012	18749
15009D	15009DX	0.000	-0.003	0.003	-0.009	9697
15009D	15009DY	0.002	0.002	0.002	-0.022	10970
15009D	15009DY	0.004	0.006	0.007	0.010	10970
15009D	15009DY	0.002	0.004	0.005	0.033	10970
15009F	15009DZ	0.005	0.001	0.005	0.003	3225
15009F	15009EA	-0.001	0.003	0.003	0.013	16808
15009F	15009EB	0.000	0.001	0.001	-0.003	5898
15009A	RQ0487	-0.004	0.001	0.004	-0.001	14819
15009B	RQ0487	-0.001	0.002	0.002	-0.009	17130
15009D	SM0915	0.005	0.006	0.008	0.016	12730
15009F	SM0915	-0.004	0.000	0.004	0.005	19408

LEAST SQUARES ADJUSTMENTS

Geolab was used to adjust the GPS vectors. No scaling of the apriori GPS statistics was done. Station errors (centering, HI and HT) of 0.005 m were input. The GEOID12A model was used.

The two CORS were constrained horizontally (NAD83 (2011) epoch 2010.0 latitude and longitude), and the three NSRS benchmarks were constrained vertically (NAVD88 orthometric height). The adjustment had an estimated variance factor of 0.17. This adjustment provided the NAD83 (2011) epoch 2010.0 adjusted positions and NAVD88 GPS derived orthometric heights for the stations. The table below lists the station confidence regions (error ellipses) at the 95% level (in meters):

Station Name	Semi-Major Axis	Azimuth	Semi-Minor Axis	Vertical
15009A	0.005	23	0.005	0.006
15009B	0.005	26	0.005	0.006
15009BA	0.008	11	0.007	0.008
15009BB	0.009	16	0.008	0.013
15009BC	0.009	9	0.008	0.011
15009BD	0.009	6	0.008	0.011
15009BE	0.009	23	0.008	0.011
15009BF	0.009	27	0.007	0.010
15009BG	0.009	3	0.008	0.011
15009BH	0.009	2	0.008	0.011
15009BI	0.008	54	0.008	0.013

Station Name	Semi-Major Axis	Azimuth	Semi-Minor Axis	Vertical
15009BJ	0.008	23	0.007	0.012
15009BK	0.008	8	0.008	0.010
15009BL	0.009	11	0.008	0.013
15009BM	0.009	5	0.008	0.011
15009BN	0.010	20	0.008	0.012
15009BO	0.009	25	0.008	0.010
15009BP	0.008	13	0.008	0.011
15009BQ	0.009	176	0.008	0.010
15009BR	0.009	179	0.008	0.011
15009BS	0.009	3	0.008	0.011
15009BT	0.007	11	0.007	0.008
15009C	0.005	36	0.005	0.007
15009CA	0.008	22	0.007	0.008
15009CB	0.008	8	0.008	0.010
15009CC	0.009	2	0.008	0.013
15009CD	0.009	21	0.007	0.010
15009CE	0.009	19	0.008	0.011
15009CF	0.008	10	0.008	0.011
15009CG	0.010	178	0.008	0.011
15009CH	0.009	50	0.008	0.015
15009CI	0.009	178	0.008	0.011
15009CJ	0.007	8	0.007	0.008
15009CK	0.009	9	0.008	0.012
15009CL	0.009	10	0.008	0.012
15009CM	0.008	1	0.008	0.010
15009CN	0.010	24	0.008	0.011
15009CO	0.007	24	0.007	0.007
15009CP	0.008	6	0.008	0.011
15009CQ	0.009	174	0.008	0.010
15009CR	0.009	23	0.008	0.014
15009CS	0.009	180	0.008	0.011
15009CT	0.009	9	0.008	0.012
15009D	0.005	19	0.005	0.006
15009DA	0.008	8	0.007	0.009
15009DB	0.008	9	0.008	0.011
15009DC	0.008	11	0.008	0.012
15009DD	0.009	3	0.008	0.012
15009DE	0.009	9	0.008	0.010
15009DF	0.009	22	0.008	0.011
15009DG	0.009	26	0.008	0.011
15009DH	0.009	178	0.008	0.011
15009DI	0.009	174	0.008	0.010
15009DJ	0.008	4	0.008	0.011
15009DK	0.008	46	0.008	0.015
15009DL	0.009	30	0.008	0.014
15009DM	0.009	176	0.008	0.011
15009DN	0.008	180	0.008	0.009
15009DO	0.009	9	0.008	0.011
15009DP	0.009	10	0.008	0.013
15009DQ	0.008	8	0.008	0.011
15009DR	0.009	5	0.008	0.011
15009DS	0.009	178	0.008	0.012
15009DT	0.008	28	0.008	0.010
15009DU	0.008	21	0.007	0.010
15009DV	0.008	1	0.007	0.010
15009DW	0.009	176	0.008	0.011
15009DX	0.009	179	0.008	0.010
15009DY	0.008	18	0.007	0.011
15009DZ	0.008	176	0.007	0.009
15009EA	0.009	180	0.008	0.011
15009EB	0.009	2	0.008	0.011
15009F	0.005	11	0.005	0.006
BSMK	0.000	0	0.000	0.005
P802	0.000	0	0.000	0.005

Station Name	Semi-Major Axis	Azimuth	Semi-Minor Axis	Vertical
RQ0476	0.013	25	0.010	0.000
RQ0487	0.007	14	0.006	0.000
SM0915	0.006	3	0.006	0.000

SUMMARY

A LiDAR ground control network consisting of 28 ground control points (GCP) and 40 QC check points was established in Kidder County in central North Dakota. The estimated accuracy of the control network is ± 0.03 m with respect to the NAD83 (2011) epoch 2010.0 reference frame and the NAVD88 vertical datum.

Adjusted Coordinates – NAD83 (2011) epoch 2010.0/NAVD88

UTM Zone 14 meters

Station Name	GPSID	Latitude	Longitude	Ellip H meters	NAVD 1988 meters	UTM N meters	UTM E meters
BASE	15009A	46°46'41.50176" N	99°54'41.52798" W	506.760	529.130	5180919.578	430413.895
BASE	15009B	46°45'45.29642" N	99°38'15.58575" W	543.530	566.220	5178978.700	451307.059
BASE	15009C	46°58'12.16498" N	99°38'08.75046" W	552.055	574.758	5202031.560	451638.735
BASE	15009D	47°01'55.52400" N	99°56'45.11326" W	537.220	559.590	5209164.253	428133.377
BASE	15009F	47°08'19.93267" N	99°44'08.10255" W	520.870	543.491	5220858.897	444221.975
BSMK ARP	BSMK	46°49'16.02776" N	100°49'00.04151" W	551.984	573.494	5186888.267	361427.156
E 486	RQ0487	46°52'44.63919" N	99°47'04.51303" W	514.058	536.586	5192024.124	440216.990
GCP01	15009DW	47°11'03.90395" N	100°03'06.53546" W	576.746	598.987	5226194.700	420311.026
GCP02	15009EB	47°11'00.84092" N	99°46'38.89302" W	538.631	561.202	5225856.732	441095.256
GCP03	15009DZ	47°08'17.88394" N	99°41'35.10638" W	532.852	555.520	5220766.203	447444.021
GCP04	15009EA	47°10'58.60408" N	99°31'24.84457" W	567.787	590.622	5225627.465	460331.560
GCP05	15009DX	47°05'51.18907" N	100°01'48.73430" W	539.573	561.866	5216519.732	421821.122
GCP06	15009DV	47°04'04.62964" N	99°50'24.66221" W	518.407	540.905	5213057.962	436205.723
GCP07	15009DP	47°03'09.24103" N	99°30'08.76767" W	535.854	558.731	5211128.186	461839.569
GCP08	15009DY	46°57'59.92846" N	100°03'13.65368" W	562.080	584.334	5201996.592	419835.266
GCP09	15009DU	47°00'36.31599" N	99°52'55.92465" W	537.375	559.806	5206662.766	432942.945
GCP10	15009DR	46°58'10.50758" N	99°43'13.82179" W	507.228	529.837	5202036.173	445192.133
GCP11	15009DO	46°58'20.99183" N	99°30'35.45300" W	528.080	550.948	5202234.029	461218.657
GCP12	15009DS	46°56'12.38509" N	99°49'34.42520" W	512.991	535.472	5198469.327	437111.530
GCP13	15009DT	46°55'19.76204" N	99°38'10.66463" W	518.872	541.572	5196710.151	451555.101
GCP14	15009DL	46°52'50.03308" N	99°30'37.75947" W	524.718	547.587	5192018.325	461103.432
GCP15	15009DE	46°51'57.98119" N	99°57'02.38277" W	549.803	572.163	5190723.788	427545.239
GCP16	15009DM	46°51'01.52263" N	99°45'49.30536" W	516.056	538.607	5188825.471	441777.851
GCP17	15009DK	46°50'05.92688" N	99°35'44.01121" W	550.401	573.148	5186998.436	454583.143
GCP18	15009DF	46°48'39.16547" N	100°03'24.66370" W	543.260	565.502	5184690.375	419369.502
GCP19	15009DA	46°46'43.18531" N	99°52'14.71757" W	504.701	527.116	5180936.257	433527.628
GCP20	15009DN	46°47'29.37890" N	99°40'50.55148" W	530.773	553.408	5182218.976	448047.819
GCP21	15009DJ	46°44'00.98681" N	99°31'57.27807" W	548.686	571.535	5175699.273	459309.739
GCP22	15009DG	46°42'16.72300" N	99°43'21.64950" W	588.214	610.734	5172596.845	444755.857
GCP23	15009DB	46°43'12.16753" N	99°58'49.48063" W	510.457	532.699	5174521.363	425075.451
GCP24	15009DC	46°38'52.45795" N	100°03'34.14435" W	553.278	575.383	5166583.379	418924.725
GCP25	15009DD	46°39'05.44299" N	99°50'58.51869" W	579.675	601.990	5166789.586	434990.913
GCP26	15009DH	46°38'47.95336" N	99°38'22.24932" W	562.442	585.046	5166097.834	451061.060
GCP27	15009DI	46°38'46.30894" N	99°28'15.86688" W	558.201	581.127	5165956.237	463950.616
GCP28	15009DQ	47°01'27.14641" N	99°37'06.65962" W	530.702	553.439	5208039.807	452998.228
HIGH01	15009CA	46°46'40.35947" N	99°54'41.45237" W	507.047	529.416	5180884.300	430415.089
HIGH02	15009CB	46°43'11.75268" N	99°54'43.10367" W	519.745	542.056	5174445.673	430305.417
HIGH03	15009CC	46°41'27.53354" N	99°59'56.07403" W	522.462	544.656	5171309.449	423620.814
HIGH04	15009CD	46°52'44.68491" N	99°47'03.66135" W	514.388	536.917	5192025.355	440235.030
HIGH05	15009CE	46°46'41.29964" N	100°03'07.21369" W	533.267	555.487	5181047.247	419690.613
HIGH06	15009CF	46°42'17.47330" N	99°40'49.37032" W	596.412	618.994	5172591.187	447989.587
HIGH07	15009CG	46°38'45.94641" N	99°28'52.02194" W	559.174	582.081	5165949.690	463181.993

Station Name	GPSID	Latitude	Longitude	Ellip H meters	NAVD 1988 meters	UTM N meters	UTM E meters
HIGH08	15009CH	46°49'25.97308" N	99°33'10.89990" W	582.976	605.783	5185741.452	457817.831
HIGH09	15009CI	46°48'23.96852" N	99°45'19.48740" W	513.047	535.602	5183956.087	442362.539
HIGH10	15009CJ	46°46'16.06703" N	99°38'16.55103" W	528.082	550.775	5179928.664	451294.289
HIGH11	15009CK	46°59'42.06092" N	99°31'35.43974" W	527.458	550.304	5204744.871	459968.012
HIGH12	15009CL	47°03'09.06486" N	99°32'54.59292" W	535.100	557.923	5211146.234	458341.044
HIGH13	15009CM	46°54'54.96236" N	99°49'32.15377" W	522.803	545.283	5196078.949	437134.398
HIGH14	15009CN	46°52'50.43302" N	99°45'04.61363" W	509.841	532.405	5192178.137	442756.456
HIGH15	15009CO	47°01'28.88662" N	99°56'47.23296" W	531.320	553.687	5208342.543	428078.701
HIGH16	15009CP	47°03'02.10162" N	99°50'25.20908" W	518.550	541.043	5211127.938	436173.464
HIGH17	15009CQ	47°10'11.89173" N	100°03'08.60599" W	577.343	599.592	5224589.721	420245.819
HIGH18	15009CR	46°57'10.24578" N	100°02'01.00887" W	548.600	570.875	5200442.550	421350.109
HIGH19	15009CS	47°08'24.52650" N	99°33'19.19112" W	533.908	556.722	5220887.833	457891.223
HIGH20	15009CT	47°08'26.62976" N	99°52'40.28937" W	530.934	553.394	5221176.979	433435.962
LOW01	15009BA	46°46'39.77799" N	99°53'26.75727" W	510.930	533.322	5180848.196	431998.827
LOW02	15009BB	46°42'20.55940" N	100°03'11.64013" W	513.089	535.241	5173000.306	419488.992
LOW03	15009BC	46°41'26.31714" N	99°54'44.00578" W	542.141	564.422	5171191.457	430248.551
LOW04	15009BD	46°51'20.41152" N	99°54'39.74992" W	545.299	567.694	5189528.305	430551.425
LOW05	15009BE	46°49'18.54173" N	100°02'53.87426" W	538.656	560.915	5185897.066	420038.220
LOW06	15009BF	46°42'16.28485" N	99°38'55.19390" W	591.163	613.797	5172534.036	450413.723
LOW07	15009BG	46°40'23.46132" N	99°38'21.17687" W	579.819	602.445	5169045.644	451107.778
LOW08	15009BH	46°40'58.05802" N	99°31'59.36524" W	557.319	580.145	5170053.150	459227.198
LOW09	15009BI	46°48'16.06298" N	99°33'12.93240" W	603.441	626.251	5183583.816	457759.564
LOW10	15009BJ	46°52'51.76769" N	99°29'21.64018" W	526.171	549.070	5192061.608	462714.845
LOW11	15009BK	46°58'49.54581" N	99°33'56.24426" W	544.428	567.219	5203144.547	456982.503
LOW12	15009BL	47°01'51.86855" N	99°31'23.11568" W	527.305	550.158	5208750.083	460255.058
LOW13	15009BM	47°00'04.86233" N	99°41'32.45339" W	517.404	540.051	5205546.793	447365.246
LOW14	15009BN	46°52'49.82602" N	99°45'04.85120" W	510.878	533.442	5192159.449	442751.248
LOW15	15009BO	46°58'52.91198" N	99°56'06.69307" W	534.140	556.507	5203517.609	428876.947
LOW16	15009BP	47°01'10.18907" N	99°50'24.83352" W	516.957	539.441	5207673.292	436144.313
LOW17	15009BQ	47°06'41.22585" N	99°56'47.79387" W	534.438	556.821	5217984.132	428183.499
LOW18	15009BR	47°00'05.55816" N	100°03'04.82952" W	586.976	609.225	5205872.025	420073.764
LOW19	15009BS	47°08'59.55721" N	99°31'24.56199" W	543.084	565.930	5221952.538	460312.884
LOW20	15009BT	47°08'21.16237" N	99°44'10.28473" W	522.242	544.862	5220897.289	444176.369
P802 ARP	P802	46°33'27.16148" N	100°37'24.23115" W	573.145	594.733	5157277.684	375566.003
U 484	RQ0476	46°52'46.27128" N	99°35'42.63911" W	521.731	544.479	5191947.655	454649.724
Y 125	SM0915	47°08'32.25613" N	99°59'28.89585" W	544.732	567.058	5221453.574	424831.893

Adjusted Coordinates – NAD83 (2011) epoch 2010.0/NAVD88

North Dakota South Zone State Plane Coordinates

Units: meters & International FT

Station Name	GPSID	Northing meters	Easting meters	NAVD 1988 meters	Northing I FT	Easting I FT	NAVD 1988 US FT
BASE	15009A	123721.969	644937.851	529.130	405911.973	2115937.832	1735.987
BASE	15009B	122179.719	665870.385	566.220	400852.096	2184614.124	1857.673
BASE	15009C	145241.803	665761.695	574.758	476515.102	2184257.528	1885.685
BASE	15009D	151925.694	642117.264	559.590	498443.877	2106683.938	1835.922
BASE	15009F	163929.642	657983.790	543.491	537826.908	2158739.469	1783.103
BSMK ARP	BSMK	128373.768	575836.071	573.494	421173.778	1889225.956	1881.538
E 486	RQ0487	135014.876	654529.868	536.586	442962.191	2147407.702	1760.449
GCP01	15009DW	168807.881	633967.929	598.987	553831.631	2079947.275	1965.177
GCP02	15009EB	168868.237	654760.953	561.202	554029.648	2148165.856	1841.210
GCP03	15009DZ	163898.622	661208.032	555.520	537725.139	2169317.690	1822.569
GCP04	15009EA	169007.265	674004.358	590.622	554485.776	2211300.386	1937.732
GCP05	15009DX	159160.984	635663.594	561.866	522181.705	2085510.478	1843.389
GCP06	15009DV	155974.309	650115.919	540.905	511726.736	2132926.243	1774.619
GCP07	15009DP	154534.706	675789.969	558.731	507003.630	2217158.692	1833.103
GCP08	15009DY	144598.641	633955.585	584.334	474404.989	2079906.773	1917.102
GCP09	15009DU	149515.993	646975.175	559.806	490538.034	2122621.965	1836.630
GCP10	15009DR	145123.163	659314.210	529.837	476125.863	2163104.364	1738.307
GCP11	15009DO	145627.433	675339.018	550.948	477780.293	2215679.192	1807.569
GCP12	15009DS	141401.422	651300.890	535.472	463915.426	2136813.944	1756.794
GCP13	15009DT	139918.123	665779.769	541.572	459048.959	2184316.826	1776.807
GCP14	15009DL	135408.136	675418.999	547.587	444252.413	2215941.598	1796.542
GCP15	15009DE	133472.296	641881.697	572.163	437901.232	2105911.080	1877.171
GCP16	15009DM	131845.688	656152.011	538.607	432564.593	2152729.695	1767.080
GCP17	15009DK	130263.029	668993.744	573.148	427372.143	2194861.365	1880.403
GCP18	15009DF	127282.231	633820.534	565.502	417592.621	2079463.695	1855.318
GCP19	15009DA	123798.089	648051.570	527.116	406161.710	2126153.444	1729.380
GCP20	15009DN	125358.168	662548.880	553.408	411280.079	2173716.798	1815.639
GCP21	15009DJ	119052.632	673936.711	571.535	390592.626	2211078.448	1875.111
GCP22	15009DG	115672.050	659440.184	610.734	379501.476	2163517.665	2003.716
GCP23	15009DB	117221.301	639721.019	532.699	384584.320	2098822.239	1747.697
GCP24	15009DC	109165.380	633721.141	575.383	358154.134	2079137.601	1887.736
GCP25	15009DD	109677.875	649784.902	601.990	359835.548	2131840.230	1975.029
GCP26	15009DH	109292.518	665870.158	585.046	358571.253	2184613.378	1919.438
GCP27	15009DI	109396.814	678764.181	581.127	358913.430	2226916.604	1906.581
GCP28	15009DQ	151276.823	667006.478	553.439	496315.034	2188341.463	1815.741
HIGH01	15009CA	123686.711	644939.719	529.416	405796.297	2115943.961	1736.926
HIGH02	15009CB	117245.377	644952.908	542.056	384663.309	2115987.232	1778.395
HIGH03	15009CC	113981.365	638327.517	544.656	373954.611	2094250.384	1786.926
HIGH04	15009CD	135016.452	654547.887	536.917	442967.362	2147466.819	1761.535
HIGH05	15009CE	123644.962	634211.220	555.487	405659.325	2080745.471	1822.460

Station Name	GPSID	Northing meters	Easting meters	NAVD 1988 meters	Northing I FT	Easting I FT	NAVD 1988 US FT
HIGH06	15009CF	115728.094	662674.413	618.994	379685.348	2174128.652	2030.816
HIGH07	15009CG	109375.600	677995.573	582.081	358843.831	2224394.925	1909.711
HIGH08	15009CH	129067.663	672252.860	605.783	423450.338	2205554.002	1987.473
HIGH09	15009CI	126986.924	656829.765	535.602	416623.765	2154953.298	1757.221
HIGH10	15009CJ	123129.558	665839.478	550.775	403968.367	2184512.722	1807.001
HIGH11	15009CK	148114.713	674040.202	550.304	485940.658	2211417.987	1805.456
HIGH12	15009CL	154485.851	672290.607	557.923	506843.343	2205677.843	1830.452
HIGH13	15009CM	139011.229	651369.454	545.283	456073.585	2137038.891	1788.983
HIGH14	15009CN	135217.428	657066.675	532.405	443626.734	2155730.559	1746.732
HIGH15	15009CO	151102.859	642078.309	553.687	495744.288	2106556.131	1816.555
HIGH16	15009CP	154043.455	650120.595	541.043	505391.911	2132941.585	1775.072
HIGH17	15009CQ	167201.505	633933.492	599.592	548561.367	2079834.290	1967.161
HIGH18	15009CR	143073.453	635500.270	570.875	469401.092	2084974.639	1872.946
HIGH19	15009CS	164220.228	671654.361	556.722	538780.274	2203590.424	1826.512
HIGH20	15009CT	164041.196	647190.384	553.394	538192.899	2123328.030	1815.593
LOW01	15009BA	123680.836	646524.298	533.322	405777.022	2121142.710	1749.741
LOW02	15009BB	115593.563	634163.114	535.241	379243.974	2080587.644	1756.037
LOW03	15009BC	113989.761	644958.111	564.422	373982.155	2116004.302	1851.775
LOW04	15009BD	132334.135	644910.998	567.694	434167.111	2115849.732	1862.509
LOW05	15009BE	128501.781	634466.260	560.915	421593.771	2081582.219	1840.269
LOW06	15009BF	115717.194	665099.942	613.797	379649.587	2182086.425	2013.766
LOW07	15009BG	112241.600	665860.647	602.445	368246.720	2184582.175	1976.522
LOW08	15009BH	113404.167	673961.922	580.145	372060.915	2211161.160	1903.359
LOW09	15009BI	126908.630	672235.792	626.251	416366.897	2205498.004	2054.625
LOW10	15009BJ	135482.210	677029.803	549.070	444495.440	2221226.389	1801.407
LOW11	15009BK	146457.097	671084.883	567.219	480502.286	2201722.055	1860.951
LOW12	15009BL	152125.969	674250.710	550.158	499100.947	2212108.629	1804.977
LOW13	15009BM	148675.764	661420.456	540.051	487781.376	2170014.618	1771.817
LOW14	15009BN	135198.638	657061.823	533.442	443565.086	2155714.644	1750.134
LOW15	15009BO	146292.743	642968.944	556.507	479963.067	2109478.164	1825.807
LOW16	15009BP	150587.875	650157.546	539.441	494054.706	2133062.814	1769.816
LOW17	15009BQ	160747.396	641998.520	556.821	527386.469	2106294.357	1826.837
LOW18	15009BR	148478.938	634119.955	609.225	487135.622	2080446.045	1998.766
LOW19	15009BS	165331.428	674056.005	565.930	542425.946	2211469.831	1856.722
LOW20	15009BT	163967.166	657937.443	544.862	537950.018	2158587.411	1787.601
P802 ARP	P802	99034.111	590538.184	594.733	324915.061	1937461.232	1951.220
U 484	RQ0476	135214.156	668965.789	544.479	443615.997	2194769.649	1786.345
Y 125	SM0915	164152.969	638580.112	567.058	538559.610	2095079.108	1860.423



REPORT OF SURVEY

Kidder County, ND LiDAR

GCP Stations

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP01 GPSID: 15009DW USGS Quad: LAKE HELEN

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°11'03.90395" N Longitude: 100°03'06.53546" W Ellip H: 576.746 meters

North Dakota South Zone State Plane Coordinates

Northing: 168,807.881 Easting: 633,967.929 Ortho H: 598.987 meters
Northing: 553,831.631 Easting: 2,079,947.275 Ortho H: 1,965.177 International FT

UTM Zone 14 meters

Northing: 5,226,194.700 Easting: 420,311.026

Description: bare ground in intersection of 21st Avenue SE and 16th Street SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP02 GPSID: 15009EB USGS Quad: ROBINSON

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°11'00.84092" N Longitude: 99°46'38.89302" W Ellip H: 538.631 meters

North Dakota South Zone State Plane Coordinates

Northing: 168,868.237 Easting: 654,760.953 Ortho H: 561.202 meters

Northing: 554,029.648 Easting: 2,148,165.856 Ortho H: 1,841.210 International FT

UTM Zone 14 meters

Northing: 5,225,856.732 Easting: 441,095.256

Description: bare ground in C/L of 34th Avenue SE at C/L extended of 16th Street SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP03 GPSID: 15009DZ USGS Quad: DES MOINES LAKE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°08'17.88394" N Longitude: 99°41'35.10638" W Ellip H: 532.852 meters

North Dakota South Zone State Plane Coordinates

Northing: 163,898.622 Easting: 661,208.032 Ortho H: 555.520 meters

Northing: 537,725.139 Easting: 2,169,317.690 Ortho H: 1,822.569 International FT

UTM Zone 14 meters

Northing: 5,220,766.203 Easting: 447,444.021

Description: bare ground in C/L of 38th Avenue SE, about 600 feet south of SR 36

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP04 GPSID: 15009EA USGS Quad: LAKE WILLIAMS

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°10'58.60408" N Longitude: 99°31'24.84457" W Ellip H: 567.787 meters

North Dakota South Zone State Plane Coordinates

Northing: 169,007.265 Easting: 674,004.358 Ortho H: 590.622 meters

Northing: 554,485.776 Easting: 2,211,300.386 Ortho H: 1,937.732 International FT

UTM Zone 14 meters

Northing: 5,225,627.465 Easting: 460,331.560

Description: bare ground in center of southbound side of 46th Avenue SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP05 GPSID: 15009DX USGS Quad: HARRIET LAKE SE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°05'51.18907" N Longitude: 100°01'48.73430" W Ellip H: 539.573 meters

North Dakota South Zone State Plane Coordinates

Northing: 159,160.984 Easting: 635,663.594 Ortho H: 561.866 meters

Northing: 522,181.705 Easting: 2,085,510.478 Ortho H: 1,843.389 International FT

UTM Zone 14 meters

Northing: 5,216,519.732 Easting: 421,821.122

Description: bare ground on east side of 22nd Avenue SE in center of 22nd Street SE extended

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP06 GPSID: 15009DV USGS Quad: HORSEHEAD LAKE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°04'04.62964" N Longitude: 99°50'24.66221" W Ellip H: 518.407 meters

North Dakota South Zone State Plane Coordinates

Northing: 155,974.309 Easting: 650,115.919 Ortho H: 540.905 meters

Northing: 511,726.736 Easting: 2,132,926.243 Ortho H: 1,774.619 International FT

UTM Zone 14 meters

Northing: 5,213,057.962 Easting: 436,205.723

Description: bare ground in C/L of 24th Street SE just east of 31st Avenue SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP07 GPSID: 15009DP USGS Quad: PETTIBONE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°03'09.24103" N Longitude: 99°30'08.76767" W Ellip H: 535.854 meters

North Dakota South Zone State Plane Coordinates

Northing: 154,534.706 Easting: 675,789.969 Ortho H: 558.731 meters

Northing: 507,003.630 Easting: 2,217,158.692 Ortho H: 1,833.103 International FT

UTM Zone 14 meters

Northing: 5,211,128.186 Easting: 461,839.569

Description: bare ground in middle of field entrance at south edge of 25th Street SE and C/L extended of 47th Avenue SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP08 GPSID: 15009DY USGS Quad: STONY SLOUGH

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°57'59.92846" N Longitude: 100°03'13.65368" W Ellip H: 562.080 meters

North Dakota South Zone State Plane Coordinates

Northing: 144,598.641 Easting: 633,955.585 Ortho H: 584.334 meters
Northing: 474,404.989 Easting: 2,079,906.773 Ortho H: 1,917.102 International FT

UTM Zone 14 meters

Northing: 5,201,996.592 Easting: 419,835.266

Description: bare ground in C/L of 31st Street SE just east of 19th Avenue SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP09 GPSID: 15009DU USGS Quad: TUTTLE SW

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°00'36.31599" N Longitude: 99°52'55.92465" W Ellip H: 537.375 meters

North Dakota South Zone State Plane Coordinates

Northing: 149,515.993 Easting: 646,975.175 Ortho H: 559.806 meters

Northing: 490,538.034 Easting: 2,122,621.965 Ortho H: 1,836.630 International FT

UTM Zone 14 meters

Northing: 5,206,662.766 Easting: 432,942.945

Description: bare ground in C/L of 28th Street SE just east of 29th Avenue SE to the south

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP10 GPSID: 15009DR USGS Quad: TAPPEN NORTH

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°58'10.50758" N Longitude: 99°43'13.82179" W Ellip H: 507.228 meters

North Dakota South Zone State Plane Coordinates

Northing: 145,123.163 Easting: 659,314.210 Ortho H: 529.837 meters

Northing: 476,125.863 Easting: 2,163,104.364 Ortho H: 1,738.307 International FT

UTM Zone 14 meters

Northing: 5,202,036.173 Easting: 445,192.133

Description: bare ground in middle of 35th Avenue SE at south end of road, north side of lake

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP11 GPSID: 15009DO USGS Quad: TAPPEN NE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°58'20.99183" N Longitude: 99°30'35.45300" W Ellip H: 528.080 meters

North Dakota South Zone State Plane Coordinates

Northing: 145,627.433 Easting: 675,339.018 Ortho H: 550.948 meters

Northing: 477,780.293 Easting: 2,215,679.192 Ortho H: 1,807.569 International FT

UTM Zone 14 meters

Northing: 5,202,234.029 Easting: 461,218.657

Description: bare ground on east edge of 45th Avenue SE in C/L of farm field entrance

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP12 GPSID: 15009DS USGS Quad: STEELE NE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°56'12.38509" N Longitude: 99°49'34.42520" W Ellip H: 512.991 meters

North Dakota South Zone State Plane Coordinates

Northing: 141,401.422 Easting: 651,300.890 Ortho H: 535.472 meters

Northing: 463,915.426 Easting: 2,136,813.944 Ortho H: 1,756.794 International FT

UTM Zone 14 meters

Northing: 5,198,469.327 Easting: 437,111.530

Description: bare ground in C/L of 33rd Street SE just west of 30th Avenue SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP13 GPSID: 15009DT USGS Quad: TAPPEN NORTH

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°55'19.76204" N Longitude: 99°38'10.66463" W Ellip H: 518.872 meters

North Dakota South Zone State Plane Coordinates

Northing: 139,918.123 Easting: 665,779.769 Ortho H: 541.572 meters

Northing: 459,048.959 Easting: 2,184,316.826 Ortho H: 1,776.807 International FT

UTM Zone 14 meters

Northing: 5,196,710.151 Easting: 451,555.101

Description: sparse grass in field entrance in SE quadrant of 39th Avenue SE and 34th Street SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP14 GPSID: 15009DL USGS Quad: TAPPEN NE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°52'50.03308" N Longitude: 99°30'37.75947" W Ellip H: 524.718 meters

North Dakota South Zone State Plane Coordinates

Northing: 135,408.136 Easting: 675,418.999 Ortho H: 547.587 meters

Northing: 444,252.413 Easting: 2,215,941.598 Ortho H: 1,796.542 International FT

UTM Zone 14 meters

Northing: 5,192,018.325 Easting: 461,103.432

Description: bare ground at north edge of 37th Street SE and C/L of 45th Avenue SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP15 GPSID: 15009DE USGS Quad: STEELE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°51'57.98119" N Longitude: 99°57'02.38277" W Ellip H: 549.803 meters

North Dakota South Zone State Plane Coordinates

Northing: 133,472.296 Easting: 641,881.697 Ortho H: 572.163 meters

Northing: 437,901.232 Easting: 2,105,911.080 Ortho H: 1,877.171 International FT

UTM Zone 14 meters

Northing: 5,190,723.788 Easting: 427,545.239

Description: bare ground on west side of 24th Avenue SE in dirt trail to silos

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP16 GPSID: 15009DM USGS Quad: DAWSON

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°51'01.52263" N Longitude: 99°45'49.30536" W Ellip H: 516.056 meters

North Dakota South Zone State Plane Coordinates

Northing: 131,845.688 Easting: 656,152.011 Ortho H: 538.607 meters

Northing: 432,564.593 Easting: 2,152,729.695 Ortho H: 1,767.080 International FT

UTM Zone 14 meters

Northing: 5,188,825.471 Easting: 441,777.851

Description: bare ground in C/L of 33rd Avenue SE just north of 39th Avenue SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP17 GPSID: 15009DK USGS Quad: TAPPEN SE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°50'05.92688" N Longitude: 99°35'44.01121" W Ellip H: 550.401 meters

North Dakota South Zone State Plane Coordinates

Northing: 130,263.029 Easting: 668,993.744 Ortho H: 573.148 meters

Northing: 427,372.143 Easting: 2,194,861.365 Ortho H: 1,880.403 International FT

UTM Zone 14 meters

Northing: 5,186,998.436 Easting: 454,583.143

Description: bare ground on south side of 40th Street SE, just west of west edge of 40th Street SE extended

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP18 GPSID: 15009DF USGS Quad: LAKE GENEVA

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°48'39.16547" N Longitude: 100°03'24.66370" W Ellip H: 543.260 meters

North Dakota South Zone State Plane Coordinates

Northing: 127,282.231 Easting: 633,820.534 Ortho H: 565.502 meters
Northing: 417,592.621 Easting: 2,079,463.695 Ortho H: 1,855.318 International FT

UTM Zone 14 meters

Northing: 5,184,690.375 Easting: 419,369.502

Description: mowed grass on east side of 19th Avenue SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP19 GPSID: 15009DA USGS Quad: DAWSON

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°46'43.18531" N Longitude: 99°52'14.71757" W Ellip H: 504.701 meters

North Dakota South Zone State Plane Coordinates

Northing: 123,798.089 Easting: 648,051.570 Ortho H: 527.116 meters
Northing: 406,161.710 Easting: 2,126,153.444 Ortho H: 1,729.380 International FT

UTM Zone 14 meters

Northing: 5,180,936.257 Easting: 433,527.628

Description: mowed grass on north side of 44th Street SE in island between tracks to 28th Avenue SE going north

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP20 GPSID: 15009DN USGS Quad: TAPPEN SOUTH

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°47'29.37890" N Longitude: 99°40'50.55148" W Ellip H: 530.773 meters

North Dakota South Zone State Plane Coordinates

Northing: 125,358.168 Easting: 662,548.880 Ortho H: 553.408 meters

Northing: 411,280.079 Easting: 2,173,716.798 Ortho H: 1,815.639 International FT

UTM Zone 14 meters

Northing: 5,182,218.976 Easting: 448,047.819

Description: bare ground in C/L of 37th Avenue SE on curve

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP21 GPSID: 15009DJ USGS Quad: ALKALINE LAKE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°44'00.98681" N Longitude: 99°31'57.27807" W Ellip H: 548.686 meters

North Dakota South Zone State Plane Coordinates

Northing: 119,052.632 Easting: 673,936.711 Ortho H: 571.535 meters

Northing: 390,592.626 Easting: 2,211,078.448 Ortho H: 1,875.111 International FT

UTM Zone 14 meters

Northing: 5,175,699.273 Easting: 459,309.739

Description: bare ground in C/L of 44th Avenue SE extended, just north of 47th Street SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP22 GPSID: 15009DG USGS Quad: ALKALINE LAKE NW

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°42'16.72300" N Longitude: 99°43'21.64950" W Ellip H: 588.214 meters

North Dakota South Zone State Plane Coordinates

Northing: 115,672.050 Easting: 659,440.184 Ortho H: 610.734 meters

Northing: 379,501.476 Easting: 2,163,517.665 Ortho H: 2,003.716 International FT

UTM Zone 14 meters

Northing: 5,172,596.845 Easting: 444,755.857

Description: bare ground in C/L of 35th Avenue SE just south of 49th Street SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP23 GPSID: 15009DB USGS Quad: PURSIAN LAKE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°43'12.16753" N Longitude: 99°58'49.48063" W Ellip H: 510.457 meters

North Dakota South Zone State Plane Coordinates

Northing: 117,221.301 Easting: 639,721.019 Ortho H: 532.699 meters

Northing: 384,584.320 Easting: 2,098,822.239 Ortho H: 1,747.697 International FT

UTM Zone 14 meters

Northing: 5,174,521.363 Easting: 425,075.451

Description: sparse mowed grass on south side of 48th Street SE on east side of driveway south

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP24 GPSID: 15009DC USGS Quad: BRADDOCK NE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°38'52.45795" N Longitude: 100°03'34.14435" W Ellip H: 553.278 meters

North Dakota South Zone State Plane Coordinates

Northing: 109,165.380 Easting: 633,721.141 Ortho H: 575.383 meters
Northing: 358,154.134 Easting: 2,079,137.601 Ortho H: 1,887.736 International FT

UTM Zone 14 meters

Northing: 5,166,583.379 Easting: 418,924.725

Description: mowed grass in NE quadrant of 53rd Street SE and 19th Avenue SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP25 GPSID: 15009DD USGS Quad: KINTYRE NE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°39'05.44299" N Longitude: 99°50'58.51869" W Ellip H: 579.675 meters

North Dakota South Zone State Plane Coordinates

Northing: 109,677.875 Easting: 649,784.902 Ortho H: 601.990 meters

Northing: 359,835.548 Easting: 2,131,840.230 Ortho H: 1,975.029 International FT

UTM Zone 14 meters

Northing: 5,166,789.586 Easting: 434,990.913

Description: bare ground on west side of 29th Avenue SE at dirt drive into old homestead

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP26 GPSID: 15009DH USGS Quad: ALKALINE LAKE NW

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°38'47.95336" N Longitude: 99°38'22.24932" W Ellip H: 562.442 meters

North Dakota South Zone State Plane Coordinates

Northing: 109,292.518 Easting: 665,870.158 Ortho H: 585.046 meters

Northing: 358,571.253 Easting: 2,184,613.378 Ortho H: 1,919.438 International FT

UTM Zone 14 meters

Northing: 5,166,097.834 Easting: 451,061.060

Description: sparse grass in NW quadrant of 53rd Street SE and 39th Avenue SE in field entrance

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP27 GPSID: 15009DI USGS Quad: STREETER NW

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°38'46.30894" N Longitude: 99°28'15.86688" W Ellip H: 558.201 meters

North Dakota South Zone State Plane Coordinates

Northing: 109,396.814 Easting: 678,764.181 Ortho H: 581.127 meters

Northing: 358,913.430 Easting: 2,226,916.604 Ortho H: 1,906.581 International FT

UTM Zone 14 meters

Northing: 5,165,956.237 Easting: 463,950.616

Description: bare ground in C/L of 53rd Street SE just west of 47th Avenue SE

Kidder County, ND USGS LiDAR – GCP stations



Station Name: GCP28 GPSID: 15009DQ USGS Quad: PETTIBONE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°01'27.14641" N Longitude: 99°37'06.65962" W Ellip H: 530.702 meters

North Dakota South Zone State Plane Coordinates

Northing: 151,276.823 Easting: 667,006.478 Ortho H: 553.439 meters

Northing: 496,315.034 Easting: 2,188,341.463 Ortho H: 1,815.741 International FT

UTM Zone 14 meters

Northing: 5,208,039.807 Easting: 452,998.228

Description: bare ground in C/L of 41st Avenue SE just north of 27th Street SE



REPORT OF SURVEY

Kidder County, ND LiDAR

QC Stations

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH01 GPSID: 15009CA USGS Quad: STEELE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°46'40.35947" N Longitude: 99°54'41.45237" W Ellip H: 507.047 meters

North Dakota South Zone State Plane Coordinates

Northing: 123,686.711 Easting: 644,939.719 Ortho H: 529.416 meters
Northing: 405,796.297 Easting: 2,115,943.961 Ortho H: 1,736.926 International FT

UTM Zone 14 meters

Northing: 5,180,884.300 Easting: 430,415.089

Description: high grass in NW corner of field in SE quadrant of 44th Street SE and 26th Avenue SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH02 GPSID: 15009CB USGS Quad: PURSIAN LAKE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°43'11.75268" N Longitude: 99°54'43.10367" W Ellip H: 519.745 meters

North Dakota South Zone State Plane Coordinates

Northing: 117,245.377 Easting: 644,952.908 Ortho H: 542.056 meters

Northing: 384,663.309 Easting: 2,115,987.232 Ortho H: 1,778.395 International FT

UTM Zone 14 meters

Northing: 5,174,445.673 Easting: 430,305.417

Description: high grass in NE quadrant of 26th Avenue SE and 48th Street SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH03 GPSID: 15009CC USGS Quad: PURSIAN LAKE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°41'27.53354" N Longitude: 99°59'56.07403" W Ellip H: 522.462 meters

North Dakota South Zone State Plane Coordinates

Northing: 113,981.365 Easting: 638,327.517 Ortho H: 544.656 meters

Northing: 373,954.611 Easting: 2,094,250.384 Ortho H: 1,786.926 International FT

UTM Zone 14 meters

Northing: 5,171,309.449 Easting: 423,620.814

Description: high grass on south side of 50th Street SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH04 GPSID: 15009CD USGS Quad: STEELE NE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°52'44.68491" N Longitude: 99°47'03.66135" W Ellip H: 514.388 meters

North Dakota South Zone State Plane Coordinates

Northing: 135,016.452 Easting: 654,547.887 Ortho H: 536.917 meters
Northing: 442,967.362 Easting: 2,147,466.819 Ortho H: 1,761.535 International FT

UTM Zone 14 meters

Northing: 5,192,025.355 Easting: 440,235.030

Description: high grass on north side of north right of way fence for I-94, east side of 32nd Avenue SE extended

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH05 GPSID: 15009CE USGS Quad: LAKE GENEVA

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°46'41.29964" N Longitude: 100°03'07.21369" W Ellip H: 533.267 meters

North Dakota South Zone State Plane Coordinates

Northing: 123,644.962 Easting: 634,211.220 Ortho H: 555.487 meters
Northing: 405,659.325 Easting: 2,080,745.471 Ortho H: 1,822.460 International FT

UTM Zone 14 meters

Northing: 5,181,047.247 Easting: 419,690.613

Description: high weeds between fences on south side of 44th Street SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH06 GPSID: 15009CF USGS Quad: ALKALINE LAKE NW

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°42'17.47330" N Longitude: 99°40'49.37032" W Ellip H: 596.412 meters

North Dakota South Zone State Plane Coordinates

Northing: 115,728.094 Easting: 662,674.413 Ortho H: 618.994 meters

Northing: 379,685.348 Easting: 2,174,128.652 Ortho H: 2,030.816 International FT

UTM Zone 14 meters

Northing: 5,172,591.187 Easting: 447,989.587

Description: high weeds in NE quadrant of 37th Avenue SE and 49th Street SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH07 GPSID: 15009CG USGS Quad: STREETER NW

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°38'45.94641" N Longitude: 99°28'52.02194" W Ellip H: 559.174 meters

North Dakota South Zone State Plane Coordinates

Northing: 109,375.600 Easting: 677,995.573 Ortho H: 582.081 meters

Northing: 358,843.831 Easting: 2,224,394.925 Ortho H: 1,909.711 International FT

UTM Zone 14 meters

Northing: 5,165,949.690 Easting: 463,181.993

Description: high weeds on south side of 53rd Street SE, west side of field road

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH08 GPSID: 15009CH USGS Quad: TAPPEN SE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°49'25.97308" N Longitude: 99°33'10.89990" W Ellip H: 582.976 meters

North Dakota South Zone State Plane Coordinates

Northing: 129,067.663 Easting: 672,252.860 Ortho H: 605.783 meters

Northing: 423,450.338 Easting: 2,205,554.002 Ortho H: 1,987.473 International FT

UTM Zone 14 meters

Northing: 5,185,741.452 Easting: 457,817.831

Description: high weeds in low area on east side of 43rd Avenue SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH09 GPSID: 15009CI USGS Quad: DAWSON

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°48'23.96852" N Longitude: 99°45'19.48740" W Ellip H: 513.047 meters

North Dakota South Zone State Plane Coordinates

Northing: 126,986.924 Easting: 656,829.765 Ortho H: 535.602 meters

Northing: 416,623.765 Easting: 2,154,953.298 Ortho H: 1,757.221 International FT

UTM Zone 14 meters

Northing: 5,183,956.087 Easting: 442,362.539

Description: high weeds on east side of SR 3, north side of 42nd Street SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH10 GPSID: 15009CJ USGS Quad: TAPPEN SOUTH

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°46'16.06703" N Longitude: 99°38'16.55103" W Ellip H: 528.082 meters

North Dakota South Zone State Plane Coordinates

Northing: 123,129.558 Easting: 665,839.478 Ortho H: 550.775 meters

Northing: 403,968.367 Easting: 2,184,512.722 Ortho H: 1,807.001 International FT

UTM Zone 14 meters

Northing: 5,179,928.664 Easting: 451,294.289

Description: high weeds on east side of SR 71 (39th Avenue SE)

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH11 GPSID: 15009CK USGS Quad: TAPPEN NE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°59'42.06092" N Longitude: 99°31'35.43974" W Ellip H: 527.458 meters

North Dakota South Zone State Plane Coordinates

Northing: 148,114.713 Easting: 674,040.202 Ortho H: 550.304 meters

Northing: 485,940.658 Easting: 2,211,417.987 Ortho H: 1,805.456 International FT

UTM Zone 14 meters

Northing: 5,204,744.871 Easting: 459,968.012

Description: high weeds on north side of 29th Street SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH12 GPSID: 15009CL USGS Quad: PETTIBONE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°03'09.06486" N Longitude: 99°32'54.59292" W Ellip H: 535.100 meters

North Dakota South Zone State Plane Coordinates

Northing: 154,485.851 Easting: 672,290.607 Ortho H: 557.923 meters

Northing: 506,843.343 Easting: 2,205,677.843 Ortho H: 1,830.452 International FT

UTM Zone 14 meters

Northing: 5,211,146.234 Easting: 458,341.044

Description: high weeds on south side of 25th Street SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH13 GPSID: 15009CM USGS Quad: STEELE NE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°54'54.96236" N Longitude: 99°49'32.15377" W Ellip H: 522.803 meters

North Dakota South Zone State Plane Coordinates

Northing: 139,011.229 Easting: 651,369.454 Ortho H: 545.283 meters

Northing: 456,073.585 Easting: 2,137,038.891 Ortho H: 1,788.983 International FT

UTM Zone 14 meters

Northing: 5,196,078.949 Easting: 437,134.398

Description: high weeds on east side of 30th Avenue SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH14 GPSID: 15009CN USGS Quad: STEELE NE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°52'50.43302" N Longitude: 99°45'04.61363" W Ellip H: 509.841 meters

North Dakota South Zone State Plane Coordinates

Northing: 135,217.428 Easting: 657,066.675 Ortho H: 532.405 meters
Northing: 443,626.734 Easting: 2,155,730.559 Ortho H: 1,746.732 International FT

UTM Zone 14 meters

Northing: 5,192,178.137 Easting: 442,756.456

Description: high weeds on east side of trail in abandoned parcel on north side of 37th Street SE at SR 3 extended on north side of I-94

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH15 GPSID: 15009CO USGS Quad: TUTTLE SW

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°01'28.88662" N Longitude: 99°56'47.23296" W Ellip H: 531.320 meters

North Dakota South Zone State Plane Coordinates

Northing: 151,102.859 Easting: 642,078.309 Ortho H: 553.687 meters

Northing: 495,744.288 Easting: 2,106,556.131 Ortho H: 1,816.555 International FT

UTM Zone 14 meters

Northing: 5,208,342.543 Easting: 428,078.701

Description: high weeds in SW quadrant of SR 3 and 27th Street SE, at NE corner of field

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH16 GPSID: 15009CP USGS Quad: HORSEHEAD LAKE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°03'02.10162" N Longitude: 99°50'25.20908" W Ellip H: 518.550 meters

North Dakota South Zone State Plane Coordinates

Northing: 154,043.455 Easting: 650,120.595 Ortho H: 541.043 meters
Northing: 505,391.911 Easting: 2,132,941.585 Ortho H: 1,775.072 International FT

UTM Zone 14 meters

Northing: 5,211,127.938 Easting: 436,173.464

Description: high weeds on east side of 31st Avenue SE, between field and road, north side of field entrance

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH17 GPSID: 15009CQ USGS Quad: LAKE HELEN

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°10'11.89173" N Longitude: 100°03'08.60599" W Ellip H: 577.343 meters

North Dakota South Zone State Plane Coordinates

Northing: 167,201.505 Easting: 633,933.492 Ortho H: 599.592 meters

Northing: 548,561.367 Easting: 2,079,834.290 Ortho H: 1,967.161 International FT

UTM Zone 14 meters

Northing: 5,224,589.721 Easting: 420,245.819

Description: high weeds on west side of 21st Avenue SE at 17th Street SE extended, between fences

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH18 GPSID: 15009CR USGS Quad: STONY SLOUGH

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°57'10.24578" N Longitude: 100°02'01.00887" W Ellip H: 548.600 meters

North Dakota South Zone State Plane Coordinates

Northing: 143,073.453 Easting: 635,500.270 Ortho H: 570.875 meters
Northing: 469,401.092 Easting: 2,084,974.639 Ortho H: 1,872.946 International FT

UTM Zone 14 meters

Northing: 5,200,442.550 Easting: 421,350.109

Description: high weeds on west side of 20th Avenue SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH19 GPSID: 15009CS USGS Quad: LAKE WILLIAMS

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°08'24.52650" N Longitude: 99°33'19.19112" W Ellip H: 533.908 meters

North Dakota South Zone State Plane Coordinates

Northing: 164,220.228 Easting: 671,654.361 Ortho H: 556.722 meters

Northing: 538,780.274 Easting: 2,203,590.424 Ortho H: 1,826.512 International FT

UTM Zone 14 meters

Northing: 5,220,887.833 Easting: 457,891.223

Description: high weeds on north side of SR 36

Kidder County, ND USGS LiDAR – QC stations



Station Name: HIGH20 GPSID: 15009CT USGS Quad: TUTTLE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°08'26.62976" N Longitude: 99°52'40.28937" W Ellip H: 530.934 meters

North Dakota South Zone State Plane Coordinates

Northing: 164,041.196 Easting: 647,190.384 Ortho H: 553.394 meters

Northing: 538,192.899 Easting: 2,123,328.030 Ortho H: 1,815.593 International FT

UTM Zone 14 meters

Northing: 5,221,176.979 Easting: 433,435.962

Description: high weeds on north side of SR 36, just east of stockpile area

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW01 GPSID: 15009BA USGS Quad: STEELE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°46'39.77799" N Longitude: 99°53'26.75727" W Ellip H: 510.930 meters

North Dakota South Zone State Plane Coordinates

Northing: 123,680.836 Easting: 646,524.298 Ortho H: 533.322 meters

Northing: 405,777.022 Easting: 2,121,142.710 Ortho H: 1,749.741 International FT

UTM Zone 14 meters

Northing: 5,180,848.196 Easting: 431,998.827

Description: bare ground on south side of 44th Street SE at 27th Avenue SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW02 GPSID: 15009BB USGS Quad: BRADDOCK NE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°42'20.55940" N Longitude: 100°03'11.64013" W Ellip H: 513.089 meters

North Dakota South Zone State Plane Coordinates

Northing: 115,593.563 Easting: 634,163.114 Ortho H: 535.241 meters
Northing: 379,243.974 Easting: 2,080,587.644 Ortho H: 1,756.037 International FT

UTM Zone 14 meters

Northing: 5,173,000.306 Easting: 419,488.992

Description: sparse grass on field entrance on south side of 49th Street SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW03 GPSID: 15009BC USGS Quad: PURSIAN LAKE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°41'26.31714" N Longitude: 99°54'44.00578" W Ellip H: 542.141 meters

North Dakota South Zone State Plane Coordinates

Northing: 113,989.761 Easting: 644,958.111 Ortho H: 564.422 meters

Northing: 373,982.155 Easting: 2,116,004.302 Ortho H: 1,851.775 International FT

UTM Zone 14 meters

Northing: 5,171,191.457 Easting: 430,248.551

Description: bare ground in SE quadrant of intersection of 26th Avenue SE and 50th Street SE, NW corner of field

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW04 GPSID: 15009BD USGS Quad: STEELE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°51'20.41152" N Longitude: 99°54'39.74992" W Ellip H: 545.299 meters

North Dakota South Zone State Plane Coordinates

Northing: 132,334.135 Easting: 644,910.998 Ortho H: 567.694 meters

Northing: 434,167.111 Easting: 2,115,849.732 Ortho H: 1,862.509 International FT

UTM Zone 14 meters

Northing: 5,189,528.305 Easting: 430,551.425

Description: bare ground on east side of 26th Avenue SE, south of RR tracks

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW05 GPSID: 15009BE USGS Quad: LAKE GENEVA

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°49'18.54173" N Longitude: 100°02'53.87426" W Ellip H: 538.656 meters

North Dakota South Zone State Plane Coordinates

Northing: 128,501.781 Easting: 634,466.260 Ortho H: 560.915 meters
Northing: 421,593.771 Easting: 2,081,582.219 Ortho H: 1,840.269 International FT

UTM Zone 14 meters

Northing: 5,185,897.066 Easting: 420,038.220

Description: short grass in low spot on north side of 41st Street SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW06 GPSID: 15009BF USGS Quad: ALKALINE LAKE NW

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°42'16.28485" N Longitude: 99°38'55.19390" W Ellip H: 591.163 meters

North Dakota South Zone State Plane Coordinates

Northing: 115,717.194 Easting: 665,099.942 Ortho H: 613.797 meters

Northing: 379,649.587 Easting: 2,182,086.425 Ortho H: 2,013.766 International FT

UTM Zone 14 meters

Northing: 5,172,534.036 Easting: 450,413.723

Description: bare ground at north edge of field, south side of 49th Street SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW07 GPSID: 15009BG USGS Quad: ALKALINE LAKE NW

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°40'23.46132" N Longitude: 99°38'21.17687" W Ellip H: 579.819 meters

North Dakota South Zone State Plane Coordinates

Northing: 112,241.600 Easting: 665,860.647 Ortho H: 602.445 meters

Northing: 368,246.720 Easting: 2,184,582.175 Ortho H: 1,976.522 International FT

UTM Zone 14 meters

Northing: 5,169,045.644 Easting: 451,107.778

Description: mowed grass on north side of faint trail to windmill on west side of 39th Avenue SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW08 GPSID: 15009BH USGS Quad: ALKALINE LAKE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°40'58.05802" N Longitude: 99°31'59.36524" W Ellip H: 557.319 meters

North Dakota South Zone State Plane Coordinates

Northing: 113,404.167 Easting: 673,961.922 Ortho H: 580.145 meters

Northing: 372,060.915 Easting: 2,211,161.160 Ortho H: 1,903.359 International FT

UTM Zone 14 meters

Northing: 5,170,053.150 Easting: 459,227.198

Description: bare ground on access road between fields on east side of 44th Avenue SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW09 GPSID: 15009BI USGS Quad: TAPPEN SE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°48'16.06298" N Longitude: 99°33'12.93240" W Ellip H: 603.441 meters

North Dakota South Zone State Plane Coordinates

Northing: 126,908.630 Easting: 672,235.792 Ortho H: 626.251 meters

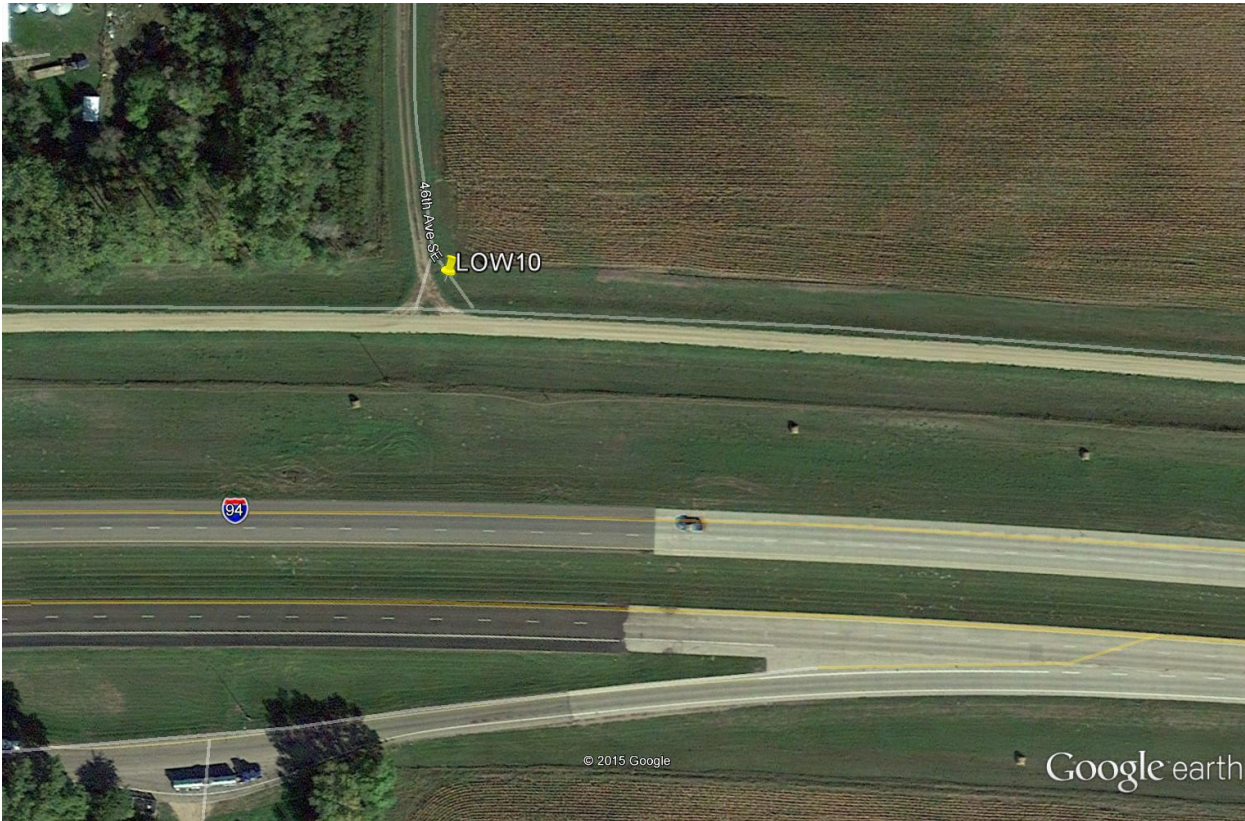
Northing: 416,366.897 Easting: 2,205,498.004 Ortho H: 2,054.625 International FT

UTM Zone 14 meters

Northing: 5,183,583.816 Easting: 457,759.564

Description: bare ground in center of drive on west side of 43rd Avenue SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW10 GPSID: 15009BJ USGS Quad: CRYSTAL SPRINGS

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°52'51.76769" N Longitude: 99°29'21.64018" W Ellip H: 526.171 meters

North Dakota South Zone State Plane Coordinates

Northing: 135,482.210 Easting: 677,029.803 Ortho H: 549.070 meters

Northing: 444,495.440 Easting: 2,221,226.389 Ortho H: 1,801.407 International FT

UTM Zone 14 meters

Northing: 5,192,061.608 Easting: 462,714.845

Description: bare ground in center of 46th Avenue SE on north side of 37th Street SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW11 GPSID: 15009BK USGS Quad: TAPPEN NE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°58'49.54581" N Longitude: 99°33'56.24426" W Ellip H: 544.428 meters

North Dakota South Zone State Plane Coordinates

Northing: 146,457.097 Easting: 671,084.883 Ortho H: 567.219 meters

Northing: 480,502.286 Easting: 2,201,722.055 Ortho H: 1,860.951 International FT

UTM Zone 14 meters

Northing: 5,203,144.547 Easting: 456,982.503

Description: short sparse grass on south side of 30th Street SE at 44th Avenue SE extended

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW12 GPSID: 15009BL USGS Quad: PETTIBONE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°01'51.86855" N Longitude: 99°31'23.11568" W Ellip H: 527.305 meters

North Dakota South Zone State Plane Coordinates

Northing: 152,125.969 Easting: 674,250.710 Ortho H: 550.158 meters

Northing: 499,100.947 Easting: 2,212,108.629 Ortho H: 1,804.977 International FT

UTM Zone 14 meters

Northing: 5,208,750.083 Easting: 460,255.058

Description: center of unnamed dirt road about 100 feet east of 46th Avenue SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW13 GPSID: 15009BM USGS Quad: KUNKEL LAKE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°00'04.86233" N Longitude: 99°41'32.45339" W Ellip H: 517.404 meters

North Dakota South Zone State Plane Coordinates

Northing: 148,675.764 Easting: 661,420.456 Ortho H: 540.051 meters

Northing: 487,781.376 Easting: 2,170,014.618 Ortho H: 1,771.817 International FT

UTM Zone 14 meters

Northing: 5,205,546.793 Easting: 447,365.246

Description: center of 38th Avenue SE (dirt)

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW14 GPSID: 15009BN USGS Quad: STEELE NE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°52'49.82602" N Longitude: 99°45'04.85120" W Ellip H: 510.878 meters

North Dakota South Zone State Plane Coordinates

Northing: 135,198.638 Easting: 657,061.823 Ortho H: 533.442 meters

Northing: 443,565.086 Easting: 2,155,714.644 Ortho H: 1,750.134 International FT

UTM Zone 14 meters

Northing: 5,192,159.449 Easting: 442,751.248

Description: bare ground in center of entrance to abandoned parcel on north side of 37th Street SE at SR 3 extended on north side of I-94

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW15 GPSID: 15009B0 USGS Quad: STEELE NW

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 46°58'52.91198" N Longitude: 99°56'06.69307" W Ellip H: 534.140 meters

North Dakota South Zone State Plane Coordinates

Northing: 146,292.743 Easting: 642,968.944 Ortho H: 556.507 meters

Northing: 479,963.067 Easting: 2,109,478.164 Ortho H: 1,825.807 International FT

UTM Zone 14 meters

Northing: 5,203,517.609 Easting: 428,876.947

Description: bare ground on SW side of SR 3 at field entrance opposite 30th Street SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW16 GPSID: 15009BP USGS Quad: HORSEHEAD LAKE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°01'10.18907" N Longitude: 99°50'24.83352" W Ellip H: 516.957 meters

North Dakota South Zone State Plane Coordinates

Northing: 150,587.875 Easting: 650,157.546 Ortho H: 539.441 meters

Northing: 494,054.706 Easting: 2,133,062.814 Ortho H: 1,769.816 International FT

UTM Zone 14 meters

Northing: 5,207,673.292 Easting: 436,144.313

Description: bare ground in middle of field entrance on east side of 31st Avenue SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW17 GPSID: 15009BQ USGS Quad: TUTTLE SW

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°06'41.22585" N Longitude: 99°56'47.79387" W Ellip H: 534.438 meters

North Dakota South Zone State Plane Coordinates

Northing: 160,747.396 Easting: 641,998.520 Ortho H: 556.821 meters

Northing: 527,386.469 Easting: 2,106,294.357 Ortho H: 1,826.837 International FT

UTM Zone 14 meters

Northing: 5,217,984.132 Easting: 428,183.499

Description: bare ground in middle of field entrance on east side of 26th Avenue SE, at 21st Street SE extended

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW18 GPSID: 15009BR USGS Quad: HARRIET LAKE SE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°00'05.55816" N Longitude: 100°03'04.82952" W Ellip H: 586.976 meters

North Dakota South Zone State Plane Coordinates

Northing: 148,478.938 Easting: 634,119.955 Ortho H: 609.225 meters
Northing: 487,135.622 Easting: 2,080,446.045 Ortho H: 1,998.766 International FT

UTM Zone 14 meters

Northing: 5,205,872.025 Easting: 420,073.764

Description: bare ground in middle of southbound lane of 21st Avenue SE (dirt/gravel)

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW19 GPSID: 15009BS USGS Quad: LAKE WILLIAMS

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°08'59.55721" N Longitude: 99°31'24.56199" W Ellip H: 543.084 meters

North Dakota South Zone State Plane Coordinates

Northing: 165,331.428 Easting: 674,056.005 Ortho H: 565.930 meters

Northing: 542,425.946 Easting: 2,211,469.831 Ortho H: 1,856.722 International FT

UTM Zone 14 meters

Northing: 5,221,952.538 Easting: 460,312.884

Description: bare ground in middle of field access on east side of 46th Avenue SE

Kidder County, ND USGS LiDAR – QC stations



Station Name: LOW20 GPSID: 15009BT USGS Quad: DES MOINES LAKE

NAD 1983 (2011)/ NAVD 1988 Ortho Heights

Latitude: 47°08'21.16237" N Longitude: 99°44'10.28473" W Ellip H: 522.242 meters

North Dakota South Zone State Plane Coordinates

Northing: 163,967.166 Easting: 657,937.443 Ortho H: 544.862 meters

Northing: 537,950.018 Easting: 2,158,587.411 Ortho H: 1,787.601 International FT

UTM Zone 14 meters

Northing: 5,220,897.289 Easting: 444,176.369

Description: bare ground in middle of gated entrance on west side of cemetery located on south side of SR 36 (19th Street SE) and west side of 36th Avenue SE