Lidar Mapping Report

Acquisition, Processing, and Delivery of Airborne Lidar Elevation Data and Orthoimagery for TX_Lower_CO_San_Bernard_2018_D18 Project

USGS CONTRACT: G16PC00029

CONTRACTOR: Merrick-Surdex JV

TASK ORDER NUMBER: 140G0218F0071

TASK NAME: TX_Lower_CO_San_Bernard_2018_D18

GOVERNMENT POINT-OF-CONTACT (POC):
Leslie Lansbery, MS 668
U.S. Geological Survey – NGTOC
1400 Independence Road
Rolla, MO 65401
(573) 308-3538
gdunn@usgs.gov

TOTAL AWARD: $3,250,958.00 (Fixed Price)

Contract Project Manager:
Doug Jacoby
Merrick-Surdex Joint Venture, LLP (JV)
5970 Greenwood Plaza Blvd.
Greenwood Village, CO 80111
(303) 353-3903 (o)
(303) 521-6522 (c)
doug.jacoby@merrick.com

Contractor Job Number: J65219783

Submitted to:

USGS science for a changing world

Submitted by:

MERRICK SURDEX JOINT VENTURE

Table of Contents

Project Summary

Merrick-Surdex Joint Venture, LLP (Merrick-Surdex JV) was awarded the TX_Lower_CO_San_Bernard_2018_D18 (USGS Task Order Number 140G0218F0071) project by the United States Geological Survey (USGS) to support the 3DEP mission, the Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment and Planning (MAP) program and the Natural Resources Conservation Service (NRCS) high resolution elevation enterprise program. The AOI covers approximately 15,007 square miles in total in the South Central Texas region. Additionally, one (1) option is included. The option AOI covers approximately 2,935 square miles resulting in a grand total of approximately 17,942 square miles.

The lidar mapping requirements and deliverables meet Quality Level Two (QL2) standards as outlined in the USGS-NGP Lidar Base Specifications, Techniques and Methods 11–B4, Version 1.2, November 2014 (TM11-B4). QL2 lidar specifications suggest a point density of greater than or equal to two points per square meter (≥2ppsm) Aggregate Nominal Pulse Density (ANPD), and point spacing of less than or equal to seven-tenths of a meter (≤0.71m) Aggregate Nominal Pulse Spacing (ANPS).

The vertical accuracy requirements of the lidar data meets or exceeds the following:

Absolute Vertical Accuracy

- ≤10cm RMSEz
- ≤19.6cm Non-vegetated Vertical Accuracy (NVA) at the 95% confidence level
- ≤29.4cm Vegetated Vertical Accuracy (VVA) at the 95% percentile

Relative Vertical Accuracy

- ≤6cm Smooth surface repeatability
- ≤8cm Swath overlap difference, RMSDz
- ±16cm Swath overlap difference, maximum

This data set was produced to meet ASPRS "Positional Accuracy Standards for Digital Geospatial Data" (2014) for a 17.5 cm RMSEx / RMSEy Horizontal Accuracy Class which equates to Positional Horizontal Accuracy = +/- 42.8 cm at a 95% confidence level.

Project Spatial Reference

- Projection – Universal Transverse Mercator (UTM), Zone 14 North (14N)
- Horizontal Datum - North American Datum of 1983 (NAD 83), National Adjustment of 2011 (NA2011) (epoch 2010.00)
- Vertical Datum – North American Vertical Datum of 1988 (NAVD 88); GEOID 12B
- Units – Meters
- EPSG Codes - UTM Zone 14N = EPSG 6343

CONTACT INFORMATION

Questions regarding this report should be addressed to:

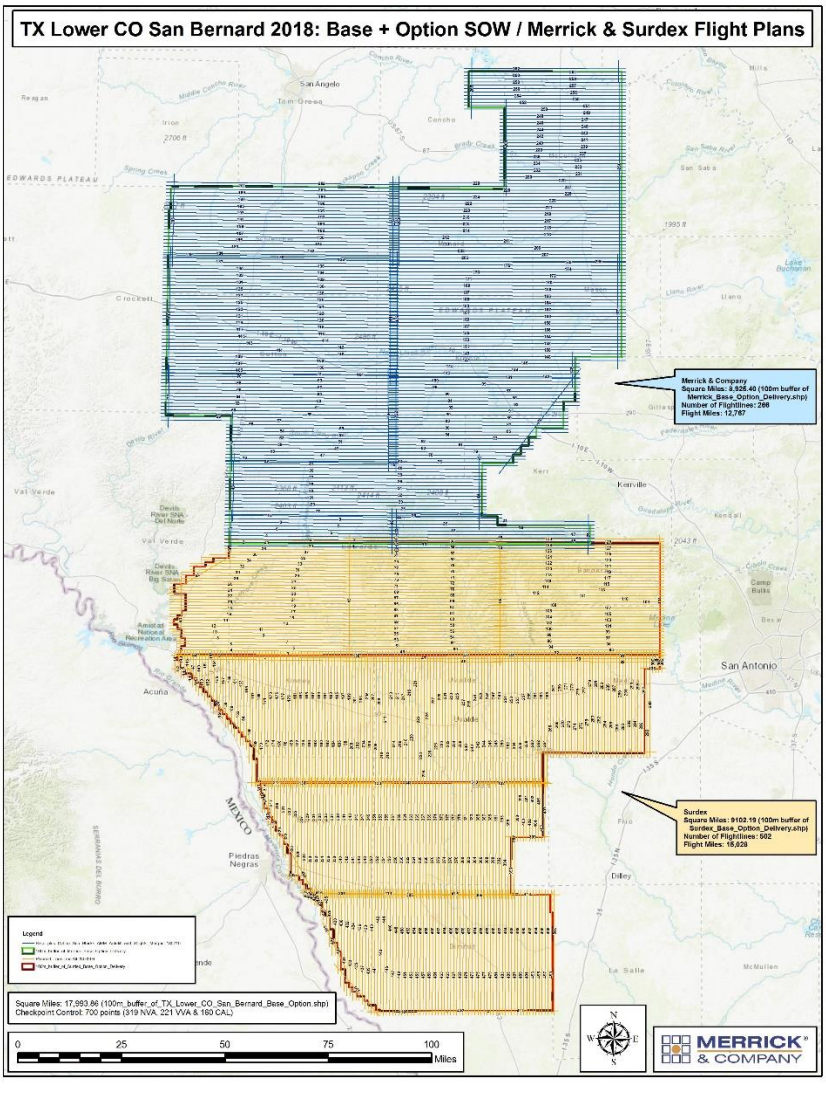
Doug Jacoby, CMS, GISP
Program Manager
Merrick-Surdex Joint Venture, LLP
5970 Greenwood Plaza Blvd.
Greenwood Village, CO 80111
T: +1 303-353-3903
Doug.jacoby@merrick.com

The contents of this report summarize the methods used to calibrate and classify the lidar data as well as the results of these methods for the project TX_Lower_CO_San_Bernard_2018_D18 (USGS TX Lower CO San Bernard).

Lidar Flight Information

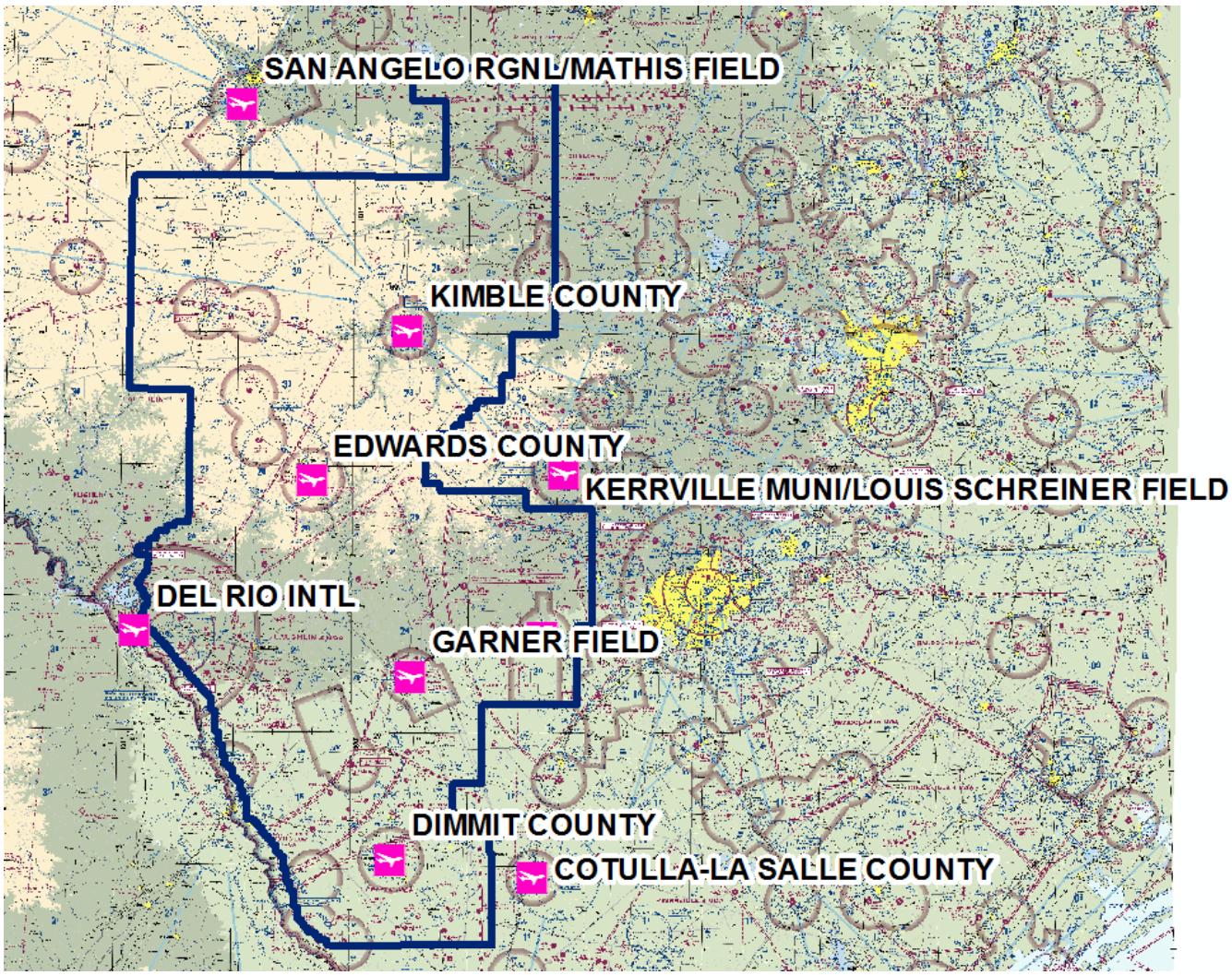
The acquisition area for the USGS TX Lower CO San Bernard project is delineated by the fully dissolved extent of the client-approved Esri shapefiles (*TX_Lower_CO_San_Bernard_Base_Option_dissolve, Merrick_Base_Option_Delivery, Surdex_Base_Option_Delivery*). The Merrick-Surdex JV acquired the QL2 lidar point cloud utilizing Optech Galaxy lidar sensors. The Galaxy is a high performance 550 kHz lidar sensor capable of collecting large areas efficiently.

Merrick-Surdex JV planned an acquisition area of approximately 17,942 square miles, to include a one hundred-meter (100m) buffer per TM11-B4. See below illustration of the proposed lidar flight plan.



Airports of Operation

Multiple airports were used for the collection of this project.



Aerial Mission(s) Duration / Time

Merrick's lidar acquisition was collected using a fixed wing aircraft and two different Optech Galaxy lidar sensors. Lidar data collection for the project was accomplished between February 12, 2018 and April 22, 2018. Each mission represents a lift of the aircraft and system from the ground, collects data, and lands again. Multiple lifts within a day are represented by Mission A, B, C, and D. The table below relates each mission to the date collected, the sensor and serial number used, and the actual average MSL in meters.

Mission(s)	Date	Sensor S/N	Actual Avg. MSL (m)
180212_A	February 12, 2018	5060380	2300
180214_A	February 14, 2018	5060380	2550
180215_A	February 15, 2018	5060380	2550
180216_A	February 16, 2018	5060380	2550

180217_A	February 17, 2018	5060380	2350
180225_A	February 25, 2018	5060382	2068
180225_A	February 25, 2018	5060380	2350
180225_B	February 25, 2018	5060380	2375
180226_A	February 26, 2018	5060380	2375
180302_A	March 2, 2018	5060380	2550
180304_A	March 4, 2018	5060380	2550
180305_A	March 5, 2018	5060380	2500
180306_A	March 6, 2018	5060380	2500
180306_B	March 6, 2018	5060380	2475
180307_A	March 7, 2018	5060380	2450
180308_A	March 8, 2018	5060380	2400
180308_A	March 8, 2018	5060382	1918
180310_A	March 10, 2018	5060380	2550
180312_B	March 12, 2018	5060380	2350
180312_C	March 12, 2018	5060380	2350
180313_A	March 13, 2018	5060380	2400
180314_A	March 14, 2018	5060380	2300
180315_A	March 15, 2018	5060380	2450
180316_A	March 16, 2018	5060380	2375
180316_A	March 16, 2018	5060407	2151
180318_A	March 18, 2018	5060407	2167
180319_A	March 19, 2018	5060407	2084
180320_A	March 20, 2018	5060407	2090
180321_A	March 21, 2018	5060382	2053
180321_A	March 21, 2018	5060407	2106
180322_A	March 22, 2018	5060382	2034
180322_A	March 22, 2018	5060407	2078
180323_A	March 23, 2018	5060407	2105
180324_A	March 24, 2018	5060407	2089
180325_A	March 25, 2018	5060407	2073
180326_A	March 26, 2018	5060385	2375
180326_A	March 26, 2018	5060407	2049
180329_A	March 29, 2018	5060382	2014
180329_A	March 29, 2018	5060407	2082
180330_A	March 30, 2018	5060407	2018
180330_A	March 30, 2018	5060382	2020
180330_A	March 30, 2018	5060406	2036
180330_B	March 30, 2018	5060385	2300
180330_C	March 30, 2018	5060385	2590
180330_D	March 30, 2018	5060385	2500
180330_E	March 30, 2018	5060385	2450

180331_A	March 31, 2018	5060382	1984
180331_A	March 31, 2018	5060407	2014
180331_A	March 31, 2018	5060406	2357
180401_A	April 1, 2018	5060407	1993
180401_A	April 1, 2018	5060406	2191
180402_A	April 2, 2018	5060407	1991
180403_A	April 3, 2018	5060385	2500
180403_A	April 3, 2018	5060406	2317
180404_A	April 4, 2018	5060385	2500
180404_A	April 4, 2018	5060406	2395
180406_A	April 6, 2018	5060385	2475
180406_A	April 6, 2018	5060407	2010
180407_A	April 7, 2018	5060406	1978
180408_A	April 8, 2018	5060385	2450
180408_A	April 8, 2018	5060382	1943
180408_A	April 8, 2018	5060406	2183
180410_A	April 10, 2018	5060382	1964
180411_A	April 11, 2018	5060382	1962
180412_A	April 12, 2018	5060382	2025
180415_A	April 15, 2018	5060407	1999
180415_A	April 15, 2018	5060382	1999
180415_A	April 15, 2018	5060406	2356
180416_A	April 16, 2018	5060407	2014
180416_A	April 16, 2018	5060406	2299
180417_A	April 17, 2018	5060407	1992
180417_A	April 17, 2018	5060406	2254
180419_A	April 19, 2018	5060407	2189
180422_A	April 22, 2018	5060407	2114

Lidar Acquisition Anomalies

Due to an active Military Operations Area (MOA) along the southwest perimeter of Block 4 (specifically Restricted Area R-6316 located northeast of Guerrero, Mexico), in which the acquisition team was not allowed access (due to a balloon tethered at 15,000' MSL), there is a small area of approximately 0.7 square miles that lacks data (see delivered shapefile TX_block4_removed_from_original_BPA_DPA_due_to_flight_restrictions.shp)

Due to high turbulence resulting in extreme aircraft pitch during the acquisition of mission 180403_A, four (4) minor data voids exist in the data and were deemed acceptable by the USGS for this project. These voids had no adverse effect on overall lidar swath point density.

GNSS / IMU Data

A five-minute INS initialization is conducted on the ground, with the aircraft engines running, prior to flight, to establish fine-alignment of the INS. GPS ambiguities are resolved by flying within ten kilometers of the base stations. During the data collection, the operator recorded information on log sheets which includes weather conditions, lidar operation parameters, and flight line statistics. Near the end of the mission, GPS ambiguities were again resolved by flying within ten kilometers of the base stations to aid in post-processing. Data is sent back to the main office for preliminary processing to check overall quality of GPS / INS data and to ensure sufficient overlap between flight lines. Any problematic data may be re-flown immediately as required.

The airborne GPS data was post-processed using Applanix POSPac Mobile Mapping Suite version 8.x. A fixed-bias carrier phase solution was computed in both the forward and reverse chronological directions. Whenever practical, lidar acquisition was limited to periods when the PDOP (Positional Dilution Of Precision) was less than 4.0. PDOP indicates satellite geometry relating to position. Generally, PDOP's of 4.0 or less result in a good quality solution, however PDOP's between 4.0 and 5.0 can still yield good results most of the time. PDOP's over 6.0 are of questionable results and PDOP's of over 7.0 usually result in a poor solution. Usually as the number of satellites increase the PDOP decreases. Other quality control checks used for the GPS include analyzing the combined separation of the forward and reverse GPS processing from one base station and the results of the combined separation when processed from two different base stations. An analysis of the number of satellites, present during the flight and data collection times, is also performed.

The GPS trajectory was combined with the raw IMU data and post-processed using POSPac Mobile Mapping Suite version 8.x. The Smoothed Best Estimated Trajectory (SBET) and refined attitude data are then utilized in the LMS Post Processor to compute the laser point-positions – the trajectory is combined with the attitude data and laser range measurements to produce the 3-dimensional coordinates of the mass points. Up to four return values are produced within the Optech lidar Mapping Suite (LMS) processor software for each pulse which ensures the greatest chance of ground returns in a heavily forested area.

GPS Controls

Ground GNSS Base Stations were set up to control the lidar airborne flight lines. In addition, CORS are at times used to further enhance the airborne solution. The ground GNSS Base Stations coordinates were obtained from NGS OPUS solutions. CORS coordinates were obtained from NGS datasheets.

Lidar Calibration – see appendix 1 for a more detailed workflow description

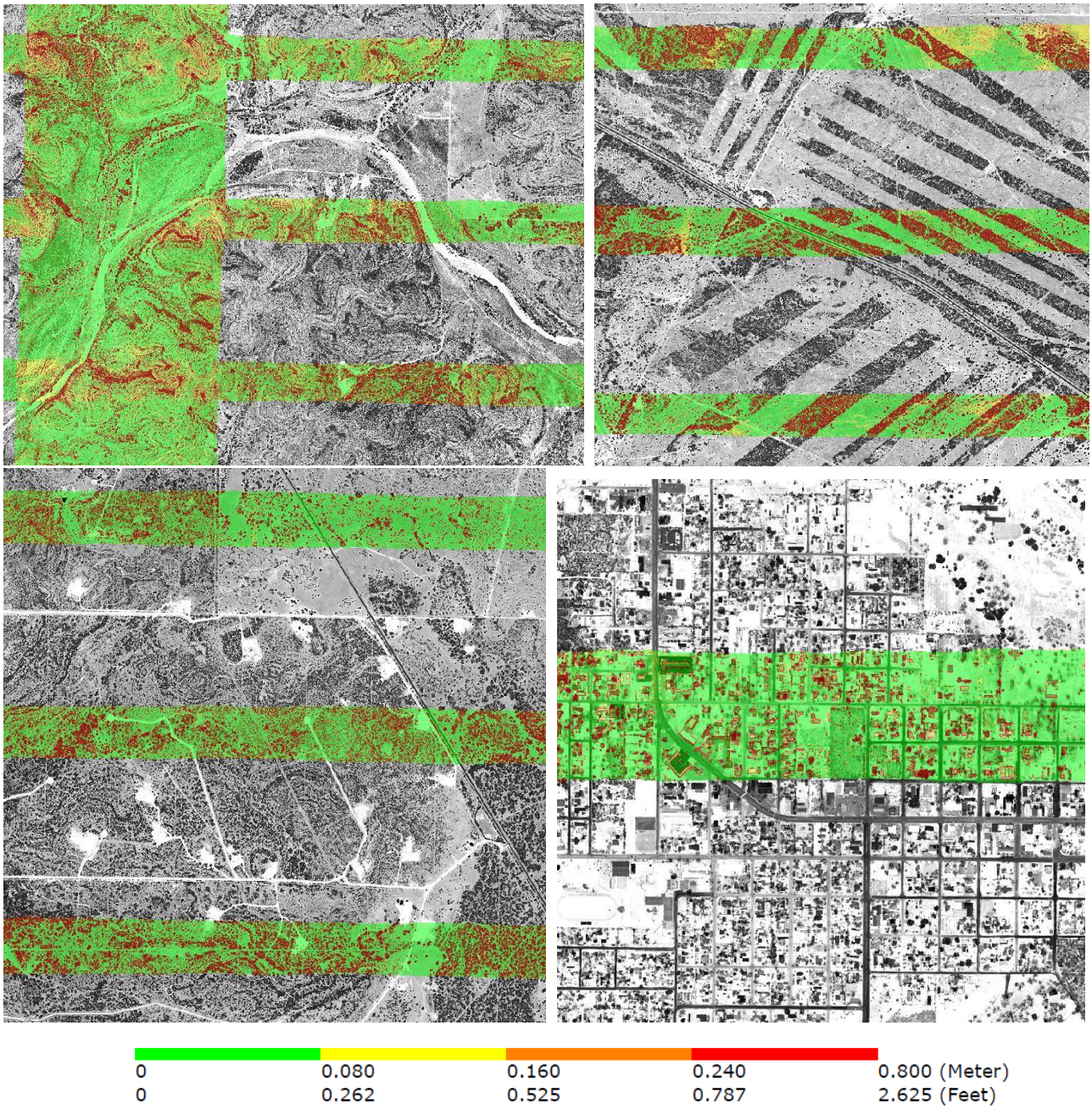
Merrick-Surdex JV takes great care to ensure all lidar acquisition missions are carried out in a manner conducive to post-processing an accurate data set. This begins in the flight-planning stage with attention to GPS baseline distances and GPS satellite constellation geometry and outages. Proper AGPS surveying techniques are always followed including pre- and post-mission static initializations. In-air IMU alignments (figure-eights) are performed both before and after on-site collection to ensure proper calibration of the IMU accelerometers and gyros.

A minimum of one cross-flight is planned throughout the project area across all flightlines and over roadways where possible. The cross-flight provides a common control surface used to remove any vertical discrepancies in the lidar data between flightlines. The cross-flight is critical to ensure flightline ties across the project area. The areas of overlap between flightlines are used to boresight (calibrate) the lidar point cloud to achieve proper flightline to flightline alignment in all three axes. This includes adjustment of both IMU and scanner-related variables such as roll, pitch, heading, timing interval (range), and torsion. Each lidar mission flown is accompanied by a hands-on boresight in the office.

After boresighting is complete a detailed statistical report is generated to check relative and absolute accuracies before filtering of lidar begins.

Relative Accuracy – flight line to flight line

The project representative flight line separation raster examples (below) depict the vertical separation of flight lines by thematically coloring the separation magnitude on a color ramp based on relative distance. This color thematic rendering is modulated by intensity to show land cover features.



Unfiltered Lidar Control Point Report

The following tables illustrate the results of the lidar data compared to the lidar control points post-calibration. The listing is sorted by the Z Error column showing, in ascending order, the vertical difference between the lidar points and the 156 surveyed ground points used for lidar calibration.

Project Data Unit: Meter
Vertical Accuracy Class tested: 10.0-cm
Elevation Calculation Method: Interpolated from TIN
LiDAR Classifications Included: 0-255

Check Points in Report: 156
Check Points with LiDAR Coverage: 156
Check Points (NVA): 156
Check Points (VVA): 0
Average Vertical Error Reported: -0.002 Meter
Maximum (highest) Vertical Error Reported: 0.122 Meter
Median Vertical Error Reported: 0.001 Meter
Minimum (lowest) Vertical Error Reported: -0.172 Meter
Standard deviation of Vertical Error: 0.045 Meter
Skewness of Vertical Error: -0.348
Kurtosis of Vertical Error: 0.991
Non-vegetated Vertical Accuracy (NVA) RMSE(z): 4.535cm PASS
Non-vegetated Vertical Accuracy (NVA) at the 95% Confidence Level +/-: 8.888cm PASS
FGDC/NSSDA Vertical Accuracy at the 95% Confidence Level +/-: 8.888cm
Non-vegetated Vertical Accuracy (NVA) RMSE(z) (DEM): 4.764cm PASS
Non-vegetated Vertical Accuracy (NVA) at the 95% Confidence Level +/- (DEM): 9.338cm PASS

This data set was tested to meet ASPRS Positional Accuracy Standard for Digital Geospatial Data (2014) for a 10.0-cm RMSEz Vertical Accuracy Class. Actual NVA accuracy was found to be RMSEz = 4.535cm, equating to +/- 8.888cm at the 95% confidence level.

Check Point Id	Check Point X	Check Point Y	Coverage	Check Point Z	Z from lidar	Z Error
3002	365142.036	3417026.766	Yes	708.099	708.071	-0.028
3012	452747.651	3415195.223	Yes	565.212	565.198	-0.014
3017	373802.128	3433910.057	Yes	730.532	730.493	-0.039
3022	345746.88	3421449.698	Yes	708.262	708.292	0.03
3024	380781.401	3428873.846	Yes	697.79	697.767	-0.023
3059	336186.799	3434543.259	Yes	767.234	767.246	0.012
3073	467538.73	3463759.543	Yes	482.889	482.937	0.048
3074	477224.774	3456356.86	Yes	549.228	549.273	0.045
3077	483334.177	3467859.11	Yes	477.066	477.188	0.122
3079	394830.519	3422900.219	Yes	660.604	660.59	-0.014
3086	448324.304	3463183.953	Yes	523.094	523.101	0.007
3093	468111.324	3445802.587	Yes	523.789	523.813	0.024
3099	447636.984	3440423.585	Yes	575.485	575.388	-0.097
3102	413084.756	3422323.044	Yes	634.634	634.6	-0.034
3109	314681.136	3422651.902	Yes	766.933	766.919	-0.014
3115	355736.352	3438750.175	Yes	649.343	649.371	0.028
3117	444878.739	3415294.144	Yes	570.243	570.259	0.016
3118	464398.373	3478506.045	Yes	420.929	420.945	0.016
3122	406719.145	3433241.016	Yes	670.207	670.197	-0.01

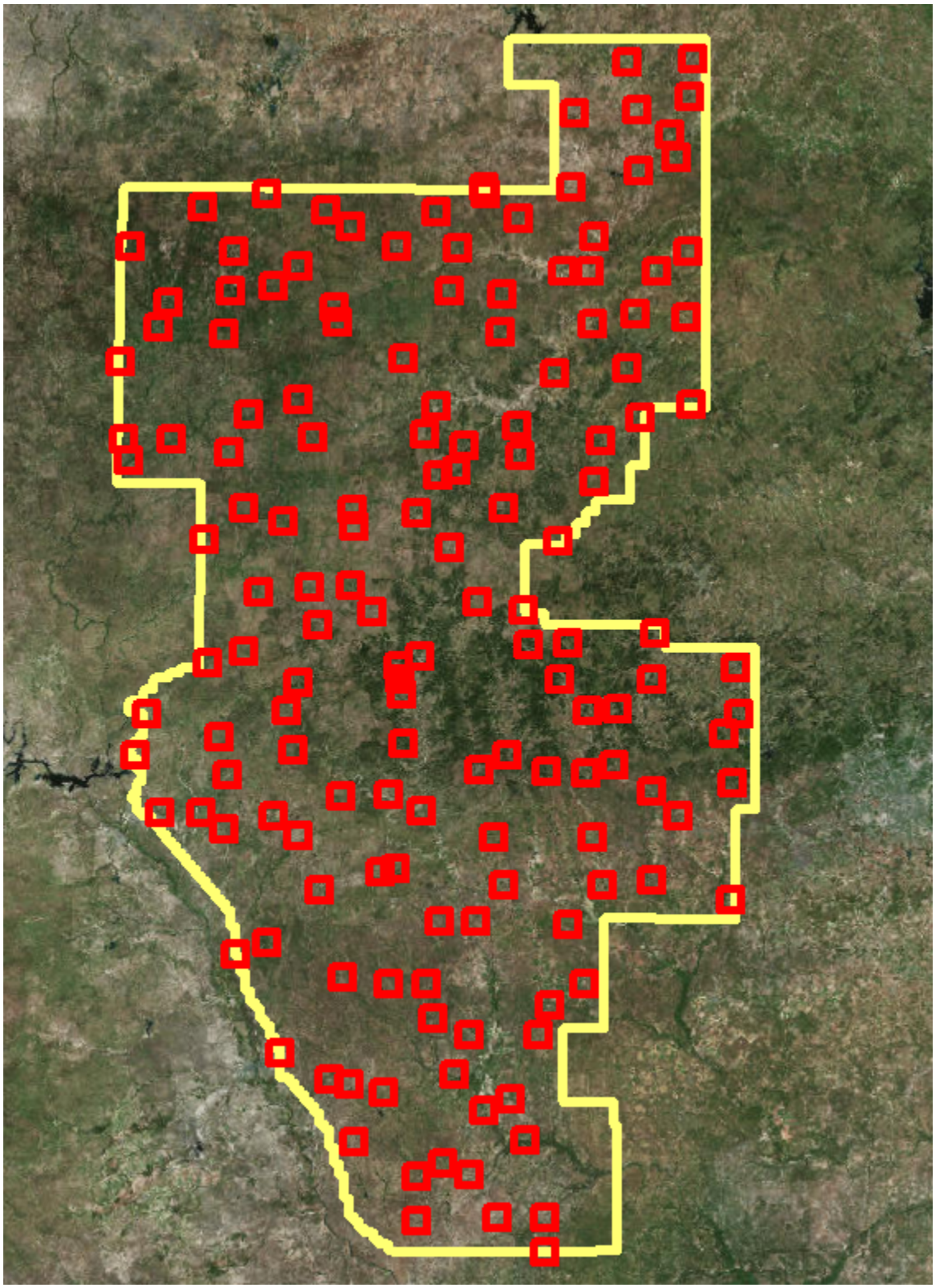
3124	482756.486	3421515.601	Yes	511.466	511.467	0.001
3127	431691.709	3431221.34	Yes	630.615	630.598	-0.017
3136	421207.551	3440689.712	Yes	662.93	662.881	-0.049
3142	484287.036	3479412.553	Yes	420.697	420.783	0.086
3151	473153.423	3415535.328	Yes	539.857	539.839	-0.018
3152	454534.058	3425666.96	Yes	549.321	549.353	0.032
3155	479316.518	3449665.257	Yes	524.907	524.907	0
3136A	421646.626	3438842.027	Yes	660.501	660.401	-0.1
3007	336100.868	3252033.795	Yes	331.089	331.091	0.002
3013	480016.31	3251081.65	Yes	301.649	301.595	-0.054
3014	402537.005	3252763.819	Yes	342.072	342.094	0.022
3028	454205.418	3244827.433	Yes	291.771	291.751	-0.02
3034	323427.735	3251958.34	Yes	327.486	327.488	0.002
3043	378203.826	3256923.067	Yes	425.133	425.131	-0.002
3046	471845.888	3231514.116	Yes	276.275	276.218	-0.057
3049	418832.541	3219285.621	Yes	260.562	260.495	-0.067
3050	371583.403	3228472.371	Yes	292.753	292.734	-0.019
3056	456756.633	3230204.471	Yes	246.607	246.64	0.033
3058	365235.385	3245170.266	Yes	375.102	375.1	-0.002
3060	424163.549	3244760.946	Yes	324.539	324.561	0.022
3082	355682.448	3212783.714	Yes	284.238	284.217	-0.021
3094	346521.004	3209429.135	Yes	261.963	261.989	0.026
3095	495885.179	3225537.912	Yes	220.292	220.236	-0.056
3098	390079.78	3234326.764	Yes	317.481	317.493	0.012
3100	408000.84	3219484.24	Yes	268.378	268.361	-0.017
3111	446320.518	3218149.723	Yes	264.776	264.832	0.056
3113	342768.706	3247107.656	Yes	331.027	331.027	0
3125	427020.398	3230053.292	Yes	277.699	277.694	-0.005
3143	357503.731	3251121.429	Yes	360.09	360.121	0.031
3148	394501.488	3235371.371	Yes	303.61	303.632	0.022
3160	392323.335	3257359.097	Yes	377.227	377.189	-0.038
1296	344866.547	3409202.63	Yes	739.815	739.826	0.011
3015	342708.911	3396517.011	Yes	713.069	713.064	-0.005
3016	442601.849	3384357.664	Yes	481.41	481.48	0.07
3019	410847.715	3409525.094	Yes	705.998	705.991	-0.007
3033	466868.946	3402421.132	Yes	521.21	521.161	-0.049
3035	426763.39	3408606.938	Yes	641.656	641.727	0.071
3037	454138.7	3399403.597	Yes	531.73	531.742	0.012
3041	376255.406	3404438.782	Yes	687.595	687.578	-0.017
3067	357861.068	3410764.764	Yes	731.001	730.984	-0.017
3069	365226.705	3376781.44	Yes	686.832	686.833	0.001
3070	397026.49	3389092.438	Yes	717.126	717.1	-0.026

3072	325704.932	3406032.418	Yes	702.042	702.095	0.053
3078	464407.42	3386026.939	Yes	528.332	528.299	-0.033
3080	483732.859	3375043.874	Yes	550.882	550.893	0.011
3085	431032.765	3368580.331	Yes	620.407	620.371	-0.036
3087	406711.627	3374714.344	Yes	578.132	578.15	0.018
3097	350174.819	3372071.767	Yes	700.187	700.219	0.032
3108	468560.793	3371242.109	Yes	644.659	644.634	-0.025
3120	376892.566	3399988.124	Yes	724.077	724.011	-0.066
3135	482055.25	3401613.136	Yes	470.835	470.774	-0.061
3140	426060.101	3397006.299	Yes	673.436	673.447	0.011
3149	311722.238	3388172.888	Yes	695.019	695.045	0.026
3156	322927.241	3398503.885	Yes	731.855	731.871	0.016
3158	403142.873	3366379.611	Yes	673.113	673.168	0.055
3005	437415.003	3184870.21	Yes	209.053	209.032	-0.021
3006	392593.829	3200630.579	Yes	213.536	213.581	0.045
3010	381988.288	3152884.985	Yes	256.719	256.718	-0.001
3018	401085.166	3129123.414	Yes	236.381	236.37	-0.011
3023	441292.912	3193987.319	Yes	204.99	204.964	-0.026
3025	439749.924	3130156.654	Yes	149.891	149.895	0.004
3026	439744.299	3119778.812	Yes	198.024	198.032	0.008
3027	425420.939	3129849.563	Yes	190.336	190.327	-0.009
3029	429296.681	3165613.083	Yes	171.871	171.882	0.011
3031	400843.843	3142136.995	Yes	261.83	261.886	0.056
3048	391120.743	3167511.049	Yes	207.655	207.603	-0.052
3051	433402.155	3153083.204	Yes	151.461	151.517	0.056
3052	403860.865	3200676.842	Yes	220.399	220.405	0.006
3055	451479.484	3200548.349	Yes	216.638	216.676	0.038
3063	416691.212	3142680.915	Yes	196.324	196.327	0.003
3075	359606.536	3179750.698	Yes	258.028	258.084	0.056
3081	378435.872	3202593.781	Yes	237.428	237.355	-0.073
3084	416883.735	3185246.26	Yes	197.668	197.658	-0.01
3119	374691.098	3171567.256	Yes	248.895	248.854	-0.041
3129	412314.257	3172980.919	Yes	167.895	167.955	0.06
3131	405767.151	3189846.405	Yes	203.509	203.536	0.027
3137	380345.477	3170182.674	Yes	242.958	242.959	0.001
3146	408859.545	3146175.254	Yes	221.445	221.451	0.006
3150	421290.186	3162165.942	Yes	166.242	166.196	-0.046
3004	314250.772	3358239.567	Yes	572.544	572.521	-0.023
3008	407241.474	3353869.739	Yes	623.383	623.346	-0.037
3009	473021.233	3305941.031	Yes	486.595	486.579	-0.016
3011	344523.23	3360906.248	Yes	640.057	640.07	0.013
3020	369661.759	3365275.706	Yes	651.403	651.326	-0.077

3030	353230.277	3318327.834	Yes	659.106	659.168	0.062
3038	336776.414	3334337.652	Yes	599.165	599.268	0.103
3040	446419.278	3303174.865	Yes	697.748	697.712	-0.036
3042	381230.677	3320539.756	Yes	729.41	729.343	-0.067
3044	443540.513	3333886.01	Yes	672.355	672.382	0.027
3053	434761.562	3302712.565	Yes	670.097	670.089	-0.008
3057	410869.232	3332122.929	Yes	705.413	705.451	0.038
3062	456533.34	3363994.581	Yes	634.89	634.899	0.009
3066	348782.962	3343628.121	Yes	651.431	651.524	0.093
3071	419298.043	3315318.905	Yes	712.821	712.817	-0.004
3088	432923.08	3313194.128	Yes	720.676	720.703	0.027
3090	327114.72	3364747.112	Yes	598.478	598.499	0.021
3092	427343.445	3344001.384	Yes	704.998	704.976	-0.022
3101	312656.398	3364553.313	Yes	590.992	590.997	0.005
3107	400675.343	3342186.226	Yes	656.792	656.8	0.008
3112	371000.159	3308432.756	Yes	695.523	695.485	-0.038
3128	432139.278	3359532.452	Yes	654.244	654.26	0.016
3130	415220.483	3362926.674	Yes	544.959	544.96	0.001
3133	382005.828	3338315.258	Yes	682.82	682.816	-0.004
3134	360490.362	3339857.87	Yes	706.323	706.223	-0.1
3139	454434.051	3351611.184	Yes	685.237	685.208	-0.029
3141	412821.536	3355489.479	Yes	566.935	566.95	0.015
3144	381616.656	3343376.674	Yes	647.127	647.144	0.017
3145	387255.541	3312785.399	Yes	717.516	717.434	-0.082
3154	368707.245	3320151.029	Yes	657.441	657.396	-0.045
3001	428348.224	3269623.03	Yes	438.87	438.75	-0.12
3003	395882.53	3292292.898	Yes	519.757	519.786	0.029
3021	315788.245	3269211.987	Yes	364.475	364.552	0.077
3032	395596.922	3296055.739	Yes	503.275	503.235	-0.04
3036	341531.57	3274887.165	Yes	436.732	436.755	0.023
3039	461648.362	3283103.437	Yes	519.403	519.432	0.029
3047	348784.961	3300628.936	Yes	697.082	697.098	0.016
3061	439933.41	3264598.307	Yes	426.2	426.227	0.027
3064	343633.057	3263335.542	Yes	378.439	378.424	-0.015
3065	338013.028	3297087.458	Yes	563.548	563.509	-0.039
3068	452531.565	3282843.396	Yes	522.664	522.701	0.037
3076	452038.04	3263935.569	Yes	368.527	368.445	-0.082
3083	496980.07	3295961.104	Yes	425.633	425.679	0.046
3089	396618.709	3287829.758	Yes	458.109	458.124	0.015
3103	497931.155	3282056.675	Yes	378.23	378.335	0.105
3104	402010.107	3299159.506	Yes	496.127	496.171	0.044
3106	493584.968	3275689.216	Yes	412.707	412.723	0.016

3110	471945.988	3258271.155	Yes	312.493	312.321	-0.172
3114	444259.834	3292335.258	Yes	521.834	521.8	-0.034
3116	363713.944	3270804.868	Yes	505.918	505.825	-0.093
3121	496071.211	3260952.142	Yes	333.671	333.702	0.031
3126	361830.337	3282948.56	Yes	538.775	538.71	-0.065
3138	319478.973	3281725.061	Yes	468.93	468.989	0.059
3147	365142.606	3291382.416	Yes	541.748	541.721	-0.027
3153	396990.112	3272982.994	Yes	515.869	515.863	-0.006
3157	419761.857	3265155.637	Yes	447.359	447.423	0.064
3076A	460650.425	3266487.409	Yes	382.429	382.338	-0.091
3102A	471983.148	3292115.516	Yes	504.475	504.472	-0.003

Lidar Control Point Layout



Lidar Filtering and Classification

The lidar filtering process encompasses a series of automated and manual steps to classify the boresighted point cloud data set. Each project represents unique characteristics in terms of cultural features (urbanized vs. rural areas), terrain type and vegetation coverage. These characteristics are thoroughly evaluated at the onset of the project to ensure that the appropriate automated filters are applied and that subsequent manual filtering yields correctly classified data. Data is most often classified by ground and "unclassified", but specific project applications can include a wide variety of classifications including but not limited to buildings, vegetation, power lines, etc. MARS® software is used for the auto-filtering, manual filtering and QC of the classified data.

Merrick-Surdex JV used the American Society for Photogrammetry and Remote Sensing's (ASPRS) LAS Specification Version 1.4 – R13, 15 July 2013, Point Data Record Format 6 for this project and classified the lidar point cloud in accordance with the following classification classes and bitflags.

- Class 1 = Unclassified
- Class 2 = Bare-earth Ground
- Class 7 = Low point (noise)
- Class 9 = Water
- Class 10 = Ignored ground (near a breakline)
- Class 17 = Bridge decks
- Class 18 = High noise
- Bitflags
    - Overlap: Any part of a swath that also is covered by any part of any other swath.
    - Withheld: Within the LAS file specification, a single bit flag indicating that the associated lidar point is geometrically anomalous or unreliable and should be ignored for all normal processes.

Merrick-Surdex JV has developed several customized automated filters that are applied to the lidar data set based on project specifications, terrain, and vegetation characteristics. A filtering macro, which may contain one or more filtering algorithms, is executed to derive LAS files separated into the different classification groups as defined in the ASPRS classification table. The macros are tested in several portions of the project area to verify the appropriateness of the filters. Often, there is a combination of several filter macros that optimize the filtering based on the unique characteristics of the project. Automatic filtering generally yields a ground surface that is 85-90% valid, so additional editing (hand-filtering) is required to produce a more robust ground surface.

Lidar data is next taken into a graphic environment using MARS® to manually re-classify (or hand-filter) "noise" and other features that may remain in the ground classification after auto filter. A cross-section of the post auto-filtered surface is viewed to assist in the reclassification of non-ground data artifacts. The following is an example of re-classification of the non-ground points (elevated features) that need to be excluded from the true ground surface. Certain features such as berms, hilltops, cliffs and other features may have been aggressively auto-filtered and points will need to be re-classified into the ground classification. Data in the profile view displays non-ground (Unclassified, class 1) in grey and ground in brown/tan (Class 2). In figure 1, a small building was not auto-filtered and needs to be manually re-classified. Note that figure 2 has the building points reclassified to unclassified from the true ground surface.

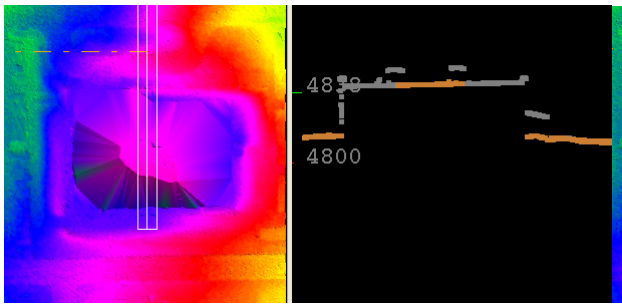


Figure 1

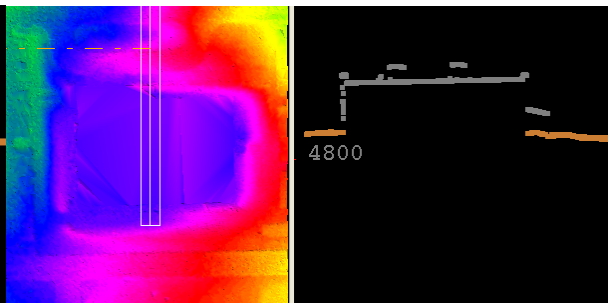


Figure 2

A combination of automated and semi-automated routines to classify buildings and vegetation. We expect that the classified buildings will meet a filtering criterion in the range of 90-95%.

At this point, individual lidar points from the original point cloud have now been parsed into separate classifications.

Filtered Lidar Check Point Report

After the hand-filtering has been completed and quality checked, a Check Point Report is generated to validate that the accuracy of the ground surface is within the defined accuracy specifications. Each surveyed ground check point is compared to the lidar surface by interpolating an elevation from a Triangulated Irregular Network (TIN) of the surface. The MARS® derived report provides an in-depth statistical report, including an RMSE of the vertical errors; a primary component in most accuracy standards and a statistically valid assessment of the overall accuracy of the ground surface.

The below lidar check point report provides statistics for 322 NVA and 228 VVA ground survey points used to validate the final filtered lidar surface.

Units: Meter (/Feet)

Vertical Accuracy Class tested: 10-cm

Check Points in defined project area (DPA):	550
Check Points with Lidar Coverage	550
Check Points with Lidar Coverage (NVA)	322
Check Points with Lidar Coverage (VVA)	228
Average Z Error (NVA)	0.000/0.000
Maximum Z Error (NVA)	0.140/0.460
Median Z Error (NVA)	-0.001/-0.003
Minimum Z Error (NVA)	-0.181/-0.594
Standard deviation of Vertical Error (NVA)	0.049/0.161
Skewness of Vertical Error (NVA)	0.105
Kurtosis of Vertical Error (NVA)	0.568
Non-vegetated Vertical Accuracy (NVA) RMSE(z) [1]	0.049/0.161 PASS
Non-vegetated Vertical Accuracy (NVA) at the 95% Confidence Level +/- [1]	0.096/0.315 PASS
FGDC/NSSDA Vertical Accuracy at the 95% Confidence Level +/-	0.096/0.315
Non-vegetated Vertical Accuracy (NVA) RMSE(z) (DEM) [2]	0.049/0.162 PASS
Non-vegetated Vertical Accuracy (NVA) at the 95% Confidence Level (DEM) +/- [2]	0.097/0.317 PASS
Vegetated Vertical Accuracy (VVA) at the 95th Percentile (DEM) +/- [2]	0.170/0.557 PASS

This data set was tested to meet ASPRS Positional Accuracy Standard for Digital Geospatial Data (2014) for a 10-cm RMSEz Vertical Accuracy Class. Actual NVA accuracy was found to be RMSEz = 4.898cm, equating to +/- 9.600cm at the 95% confidence level. Actual VVA accuracy was found to be +/- 16.972cm at the 95th percentile.

[1] This value is calculated from TIN-based testing of the raw swath lidar point cloud data.

[2] This value is calculated from RAM-based grid testing of the classified tiled lidar data. The grid cells are sized according to the Quality Level selected, and are defined in the USGS NGP Lidar Base Specification Version 1.2 (page 15, Table 7).

Check Point Id	Check Point X	Check Point Y	Coverage	Check Point Z	Z from Lidar	NVA or VVA	Z Error
1002	365124.289	3417052.450	Yes	708.078	708.055	NVA	-0.023
1012	453855.250	3415171.858	Yes	568.372	568.394	NVA	0.022
1017	373811.855	3433508.046	Yes	736.858	736.860	NVA	0.002
1022	345779.827	3421324.336	Yes	710.442	710.454	NVA	0.012
1024	380700.151	3429271.249	Yes	696.795	696.759	NVA	-0.036
1045	450213.571	3482923.410	Yes	450.442	450.489	NVA	0.047
1059	336074.423	3434598.838	Yes	767.727	767.702	NVA	-0.025
1073	467514.361	3463327.145	Yes	485.412	485.459	NVA	0.047
1074	477219.713	3456850.284	Yes	556.354	556.371	NVA	0.017
1077	483202.138	3467529.100	Yes	480.996	481.122	NVA	0.126
1079	394810.070	3422903.937	Yes	660.226	660.216	NVA	-0.010
1086	448760.166	3463147.722	Yes	515.937	515.897	NVA	-0.040
1093	468072.367	3445872.428	Yes	521.886	521.916	NVA	0.030
1099	447450.638	3440424.465	Yes	576.133	576.060	NVA	-0.073
1102	413104.070	3420923.828	Yes	619.074	619.062	NVA	-0.012
1109	314673.299	3422919.977	Yes	767.150	767.176	NVA	0.026
1115	355780.678	3438727.092	Yes	648.788	648.786	NVA	-0.002
1117	444936.809	3415228.413	Yes	569.074	569.082	NVA	0.008
1118	464360.090	3478629.215	Yes	420.401	420.478	NVA	0.077
1122	406725.786	3433207.558	Yes	670.126	670.122	NVA	-0.004
1124	482038.605	3421512.525	Yes	516.380	516.398	NVA	0.018
1127	431704.737	3431215.598	Yes	630.699	630.688	NVA	-0.011
1142	484255.695	3479217.787	Yes	422.861	422.975	NVA	0.114
1151	473159.106	3415587.495	Yes	539.878	539.865	NVA	-0.013
1152	454038.493	3424945.515	Yes	533.372	533.418	NVA	0.046
1155	479588.757	3449995.589	Yes	525.054	525.017	NVA	-0.037
1163	326666.288	3427379.019	Yes	767.262	767.221	NVA	-0.041
1170	428912.595	3420572.367	Yes	568.624	568.697	NVA	0.073
1177	442864.304	3451661.050	Yes	575.761	575.658	NVA	-0.103
1189	464217.559	3435451.534	Yes	587.912	587.964	NVA	0.052
1201	482353.651	3412375.070	Yes	524.984	524.989	NVA	0.005
1202	398420.681	3412793.853	Yes	633.869	633.801	NVA	-0.068
1211	446045.481	3443706.036	Yes	581.086	581.117	NVA	0.031
1222	435176.091	3473385.112	Yes	498.711	498.712	NVA	0.001
1223	317658.555	3439544.808	Yes	753.971	753.985	NVA	0.014
1224	349913.431	3429533.154	Yes	686.331	686.341	NVA	0.010
1235	360825.507	3428914.605	Yes	681.817	681.783	NVA	-0.034
1240	339462.939	3434545.358	Yes	766.209	766.203	NVA	-0.006
1247	379383.438	3423804.952	Yes	692.084	692.031	NVA	-0.053
1248	456339.978	3473823.912	Yes	452.093	452.100	NVA	0.007

1257	472187.524	3438969.623	Yes	513.413	513.476	NVA	0.063
1260	393464.197	3435791.452	Yes	724.369	724.304	NVA	-0.065
1261	336095.288	3414833.357	Yes	744.642	744.643	NVA	0.001
1265	460513.567	3483827.471	Yes	433.983	434.016	NVA	0.033
1272	486706.562	3432284.656	Yes	464.273	464.296	NVA	0.023
1276	325209.387	3416632.040	Yes	761.728	761.695	NVA	-0.033
1280	467688.467	3418523.129	Yes	603.071	603.021	NVA	-0.050
1284	457656.426	3448409.178	Yes	559.943	559.950	NVA	0.007
1297	313872.877	3421102.989	Yes	763.263	763.244	NVA	-0.019
1306	394734.537	3419600.155	Yes	708.259	708.134	NVA	-0.125
1311	440411.341	3425183.181	Yes	624.590	624.686	NVA	0.096
1017A	367389.273	3436156.738	Yes	736.761	736.732	NVA	-0.029
1122A	415082.169	3433104.737	Yes	673.184	673.135	NVA	-0.049
1222A	443034.984	3473339.284	Yes	464.636	464.589	NVA	-0.047
1311A	442713.721	3427805.364	Yes	593.959	593.957	NVA	-0.002
2002	365134.495	3417026.245	Yes	708.198	708.248	VVA	0.050
2012	453823.842	3415170.397	Yes	567.467	567.479	VVA	0.012
2017	373819.085	3433903.877	Yes	730.315	730.320	VVA	0.005
2022	345782.574	3421338.540	Yes	710.207	710.333	VVA	0.126
2024	380701.493	3429265.767	Yes	696.717	696.799	VVA	0.082
2045	450202.274	3482916.438	Yes	450.476	450.618	VVA	0.142
2059	336044.457	3434616.897	Yes	767.323	767.392	VVA	0.069
2073	467514.588	3463333.068	Yes	485.355	485.467	VVA	0.112
2074	477215.746	3456865.039	Yes	556.719	556.807	VVA	0.088
2077	483204.862	3467539.714	Yes	480.916	482.139	VVA	1.223
2079	394830.955	3422896.005	Yes	660.551	660.606	VVA	0.055
2086	448318.882	3463199.284	Yes	522.632	522.660	VVA	0.028
2093	468045.929	3445861.988	Yes	522.151	522.410	VVA	0.259
2099	447452.288	3440418.693	Yes	576.189	576.208	VVA	0.019
2102	413106.239	3420918.401	Yes	618.931	618.988	VVA	0.057
2109	314663.525	3422921.154	Yes	767.016	767.281	VVA	0.265
2115	355732.487	3438745.256	Yes	649.358	649.508	VVA	0.150
2117	444920.370	3415236.887	Yes	569.578	569.644	VVA	0.066
2118	464356.820	3478640.110	Yes	420.073	420.221	VVA	0.148
2122	406714.607	3433241.063	Yes	670.258	670.216	VVA	-0.042
2124	482077.027	3421507.057	Yes	515.545	515.632	VVA	0.087
2127	431726.644	3431223.913	Yes	631.031	631.035	VVA	0.004
2142	484253.729	3479227.118	Yes	422.322	422.479	VVA	0.157
2151	473152.933	3415550.332	Yes	539.579	539.623	VVA	0.044
2152	454031.424	3424950.206	Yes	533.441	533.467	VVA	0.026
2155	479328.458	3449670.956	Yes	525.014	525.030	VVA	0.016
2163	326668.650	3427388.739	Yes	767.186	767.387	VVA	0.201

2170	428950.696	3420563.729	Yes	567.863	568.050	VVA	0.187
2177	442788.569	3451671.430	Yes	575.048	575.019	VVA	-0.029
2189	464214.770	3435460.010	Yes	588.747	588.834	VVA	0.087
2201	482344.611	3412377.643	Yes	524.729	524.803	VVA	0.074
2202	398432.362	3412805.267	Yes	633.615	633.618	VVA	0.003
2211	446028.702	3443696.992	Yes	581.032	581.153	VVA	0.121
2257	472207.160	3438950.998	Yes	514.059	515.363	VVA	1.304
1007	335512.741	3252178.731	Yes	331.559	331.570	NVA	0.011
1013	479345.387	3251080.877	Yes	306.542	306.506	NVA	-0.036
1014	402468.131	3252909.513	Yes	342.929	342.979	NVA	0.050
1028	454422.719	3244877.621	Yes	292.069	292.083	NVA	0.014
1034	322870.521	3252664.522	Yes	336.285	336.277	NVA	-0.008
1043	378219.160	3257023.593	Yes	426.931	426.950	NVA	0.019
1046	471759.946	3231496.875	Yes	273.077	273.080	NVA	0.003
1049	418637.066	3217967.968	Yes	267.151	267.137	NVA	-0.014
1050	371685.908	3228503.076	Yes	292.361	292.318	NVA	-0.043
1056	455106.834	3230214.339	Yes	247.934	247.924	NVA	-0.010
1058	365459.905	3245401.405	Yes	370.726	370.724	NVA	-0.002
1060	423966.322	3244540.879	Yes	324.119	324.102	NVA	-0.017
1082	355718.256	3212937.574	Yes	284.773	284.755	NVA	-0.018
1095	495884.816	3225369.741	Yes	216.720	216.666	NVA	-0.054
1098	390166.948	3234271.194	Yes	318.069	318.109	NVA	0.040
1100	407851.985	3219410.816	Yes	266.977	266.953	NVA	-0.024
1110	471890.009	3257650.368	Yes	310.576	310.395	NVA	-0.181
1111	446417.307	3218086.377	Yes	265.364	265.383	NVA	0.019
1113	342853.273	3247125.799	Yes	330.559	330.586	NVA	0.027
1143	357759.059	3251470.063	Yes	361.387	361.382	NVA	-0.005
1148	394711.529	3235469.842	Yes	303.939	303.973	NVA	0.034
1160	392121.784	3257428.183	Yes	377.078	377.033	NVA	-0.045
1164	413307.055	3228571.589	Yes	279.216	279.226	NVA	0.010
1166	385982.407	3210298.455	Yes	236.984	236.987	NVA	0.003
1175	375569.151	3238871.226	Yes	344.946	344.969	NVA	0.023
1185	435272.405	3240127.815	Yes	298.916	299.011	NVA	0.095
1188	490369.924	3243616.189	Yes	255.536	255.482	NVA	-0.054
1192	412926.096	3239504.488	Yes	307.048	307.118	NVA	0.070
1193	350281.799	3223851.556	Yes	290.689	290.762	NVA	0.073
1194	355458.939	3234850.946	Yes	317.105	317.137	NVA	0.032
1197	364619.198	3226058.080	Yes	298.206	298.210	NVA	0.004
1210	400801.085	3232383.464	Yes	305.546	305.534	NVA	-0.012
1212	445583.101	3250612.242	Yes	312.055	312.069	NVA	0.014
1214	416654.191	3211440.066	Yes	240.578	240.646	NVA	0.068
1221	391463.482	3214126.219	Yes	237.647	237.660	NVA	0.013

1229	465061.158	3242846.733	Yes	306.327	306.321	NVA	-0.006
1232	477499.468	3220316.587	Yes	200.571	200.548	NVA	-0.023
1242	345616.096	3252594.626	Yes	349.679	349.785	NVA	0.106
1244	484981.417	3223462.021	Yes	203.264	203.249	NVA	-0.015
1245	426445.651	3256282.693	Yes	387.378	387.311	NVA	-0.067
1252	441854.339	3220429.727	Yes	271.514	271.574	NVA	0.060
1255	455426.866	3220640.801	Yes	223.459	223.515	NVA	0.056
1259	352582.854	3245614.392	Yes	340.262	340.353	NVA	0.091
1263	408138.280	3246809.048	Yes	323.888	323.912	NVA	0.024
1275	482683.638	3238441.635	Yes	278.440	278.370	NVA	-0.070
1277	373906.832	3230378.861	Yes	302.417	302.452	NVA	0.035
1290	383251.607	3254670.881	Yes	404.748	404.788	NVA	0.040
1292	356884.984	3218589.143	Yes	290.566	290.472	NVA	-0.094
1295	464544.895	3254364.324	Yes	334.764	334.710	NVA	-0.054
1305	444355.386	3237316.346	Yes	280.443	280.460	NVA	0.017
1316	455924.248	3210473.990	Yes	224.313	224.273	NVA	-0.040
1318	434311.066	3210387.653	Yes	241.682	241.725	NVA	0.043
1013A	474390.731	3251045.844	Yes	289.526	289.437	NVA	-0.089
1061A	439185.834	3257392.425	Yes	354.554	354.520	NVA	-0.034
1232A	470503.639	3223956.120	Yes	248.018	248.053	NVA	0.035
1252A	434885.148	3220953.407	Yes	254.592	254.705	NVA	0.113
1305A	439905.354	3237659.208	Yes	284.587	284.651	NVA	0.064
2007	335530.973	3252171.456	Yes	331.463	331.528	VVA	0.065
2013	479344.048	3251060.768	Yes	306.832	306.855	VVA	0.023
2014	402461.418	3252917.637	Yes	343.026	346.659	VVA	3.633
2028	454408.320	3244884.991	Yes	292.351	292.405	VVA	0.054
2034	322885.872	3252656.589	Yes	336.328	337.486	VVA	1.158
2043	378216.242	3257013.887	Yes	426.776	426.845	VVA	0.069
2046	471855.062	3231513.823	Yes	276.110	263.354	VVA	-12.756
2049	418839.588	3219274.101	Yes	260.596	261.783	VVA	1.187
2050	371772.646	3228548.472	Yes	291.628	291.687	VVA	0.059
2056	455114.054	3230238.483	Yes	248.079	248.183	VVA	0.104
2058	365470.260	3245400.811	Yes	370.592	370.649	VVA	0.057
2060	423974.578	3244555.400	Yes	324.469	324.481	VVA	0.012
2082	355718.415	3212946.418	Yes	284.757	284.799	VVA	0.042
2095	495889.796	3225521.436	Yes	220.150	220.046	VVA	-0.104
2098	390151.314	3234273.833	Yes	317.719	317.742	VVA	0.023
2100	407828.950	3219421.944	Yes	266.526	266.616	VVA	0.090
2110	471893.951	3257646.844	Yes	310.507	310.469	VVA	-0.038
2111	446407.078	3218086.781	Yes	265.419	265.548	VVA	0.129
2113	342840.822	3247130.619	Yes	330.590	330.691	VVA	0.101
2125	427064.548	3230083.111	Yes	277.927	277.921	VVA	-0.006

2143	357767.233	3251464.763	Yes	361.446	361.483	VVA	0.037
2148	394719.872	3235467.221	Yes	303.638	303.732	VVA	0.094
2160	392121.231	3257414.954	Yes	376.772	376.768	VVA	-0.004
2164	413293.080	3228562.303	Yes	278.774	278.825	VVA	0.051
2166	385989.796	3210298.949	Yes	236.971	237.076	VVA	0.105
2175	375551.719	3238874.735	Yes	345.258	345.352	VVA	0.094
2185	435281.020	3240136.666	Yes	298.887	300.349	VVA	1.462
2188	490379.554	3243615.624	Yes	255.441	255.448	VVA	0.007
2192	412934.588	3239499.912	Yes	306.769	307.004	VVA	0.235
2193	350280.695	3223857.181	Yes	290.721	290.820	VVA	0.099
2194	355447.836	3234847.070	Yes	317.065	317.141	VVA	0.076
2197	364606.468	3226085.581	Yes	297.500	297.530	VVA	0.030
2210	400785.541	3232388.062	Yes	305.951	305.932	VVA	-0.019
2212	445572.538	3250606.416	Yes	311.994	312.070	VVA	0.076
2214	416618.601	3211431.626	Yes	240.142	240.251	VVA	0.109
2221	391459.248	3214113.982	Yes	237.468	237.626	VVA	0.158
2275	482689.422	3238457.706	Yes	278.237	278.278	VVA	0.041
2318	434308.109	3210390.607	Yes	241.631	241.740	VVA	0.109
2062A	439191.213	3257385.285	Yes	354.418	354.384	VVA	-0.034
2125A	427075.678	3230078.383	Yes	277.984	277.961	VVA	-0.023
2192A	415322.128	3235301.243	Yes	293.386	293.397	VVA	0.011
1015	342719.560	3396366.491	Yes	712.817	712.768	NVA	-0.049
1016	442625.258	3384413.853	Yes	482.232	482.254	NVA	0.022
1019	411067.344	3409320.520	Yes	712.227	712.181	NVA	-0.046
1033	466725.641	3402468.176	Yes	523.162	523.112	NVA	-0.050
1035	426738.786	3409136.738	Yes	639.019	639.132	NVA	0.113
1037	454092.135	3399845.146	Yes	539.799	539.826	NVA	0.027
1041	375652.866	3404010.956	Yes	690.462	690.460	NVA	-0.002
1067	357719.308	3410880.766	Yes	731.201	731.161	NVA	-0.040
1069	365575.769	3376579.494	Yes	689.933	689.888	NVA	-0.045
1070	397046.897	3388930.947	Yes	713.270	713.226	NVA	-0.044
1072	326356.897	3406515.295	Yes	729.991	730.057	NVA	0.066
1078	464980.011	3386964.027	Yes	497.265	497.239	NVA	-0.026
1080	483868.640	3375140.924	Yes	552.571	552.543	NVA	-0.028
1085	430161.289	3370248.474	Yes	621.311	621.236	NVA	-0.075
1087	406352.065	3374622.349	Yes	576.167	576.135	NVA	-0.032
1097	349777.169	3372948.819	Yes	677.170	677.201	NVA	0.031
1108	468656.802	3370845.755	Yes	648.102	648.059	NVA	-0.043
1120	376818.599	3400094.876	Yes	722.494	722.448	NVA	-0.046
1135	481985.052	3401601.572	Yes	469.578	469.523	NVA	-0.055
1140	426167.434	3397664.496	Yes	659.067	659.048	NVA	-0.019
1149	312128.958	3388501.879	Yes	730.654	730.675	NVA	0.021

1156	322938.989	3398490.842	Yes	731.856	731.918	NVA	0.062
1158	402819.704	3366215.312	Yes	673.377	673.392	NVA	0.015
1162	349708.743	3389653.006	Yes	711.441	711.427	NVA	-0.014
1171	461813.879	3378076.163	Yes	524.249	524.253	NVA	0.004
1179	321437.626	3393336.616	Yes	675.721	675.746	NVA	0.025
1183	486605.978	3387941.086	Yes	428.015	428.052	NVA	0.037
1184	424483.243	3386179.604	Yes	642.515	642.437	NVA	-0.078
1186	387671.629	3400286.729	Yes	696.489	696.386	NVA	-0.103
1196	442769.834	3394064.657	Yes	526.399	526.468	NVA	0.069
1199	324274.446	3382759.889	Yes	659.083	659.035	NVA	-0.048
1219	381463.791	3388759.875	Yes	748.802	748.803	NVA	0.001
1225	340237.612	3384907.197	Yes	665.336	665.364	NVA	0.028
1226	365165.846	3375145.385	Yes	698.633	698.575	NVA	-0.058
1230	388019.674	3379428.547	Yes	713.764	713.744	NVA	-0.020
1231	410307.180	3401977.981	Yes	684.766	684.718	NVA	-0.048
1234	362473.716	3396867.648	Yes	689.173	689.148	NVA	-0.025
1236	394844.308	3370660.502	Yes	670.459	670.449	NVA	-0.010
1266	333689.171	3374976.322	Yes	650.514	650.493	NVA	-0.021
1268	385111.310	3409634.295	Yes	657.050	657.045	NVA	-0.005
1269	316750.712	3374734.171	Yes	616.801	616.691	NVA	-0.110
1278	360110.039	3378424.341	Yes	713.593	713.540	NVA	-0.053
1279	413106.713	3388461.284	Yes	599.096	599.137	NVA	0.041
1281	422883.019	3376329.968	Yes	523.306	523.295	NVA	-0.011
1283	351099.612	3399825.148	Yes	728.479	728.477	NVA	-0.002
1294	365602.578	3405357.360	Yes	731.971	731.936	NVA	-0.035
1307	434692.385	3379190.877	Yes	513.373	513.370	NVA	-0.003
1310	454094.200	3385590.074	Yes	522.898	522.858	NVA	-0.040
1314	398609.150	3380811.978	Yes	635.750	635.700	NVA	-0.050
1317	476353.552	3392472.380	Yes	445.437	445.403	NVA	-0.034
1234A	367218.420	3399847.994	Yes	694.890	694.896	NVA	0.006
1281A	425387.972	3375382.486	Yes	519.714	519.658	NVA	-0.056
2015	342727.649	3396360.062	Yes	712.404	712.576	VVA	0.172
2016	442636.300	3384410.392	Yes	481.980	482.089	VVA	0.109
2019	411059.934	3409321.186	Yes	712.212	712.232	VVA	0.020
2033	466880.549	3402416.210	Yes	521.157	521.180	VVA	0.023
2035	426765.302	3409171.058	Yes	640.012	640.187	VVA	0.175
2037	454102.503	3399834.701	Yes	539.745	539.861	VVA	0.116
2041	376270.758	3404439.475	Yes	686.821	686.822	VVA	0.001
2067	357712.350	3410859.036	Yes	731.158	732.083	VVA	0.925
2069	365582.388	3376586.987	Yes	689.177	689.198	VVA	0.021
2070	397045.509	3388896.001	Yes	712.776	712.693	VVA	-0.083
2072	326344.249	3406515.770	Yes	729.737	729.894	VVA	0.157

2078	464993.911	3386969.843	Yes	497.546	497.577	VVA	0.031
2080	483716.608	3375046.796	Yes	550.972	550.972	VVA	0.000
2085	431029.608	3368605.263	Yes	620.672	620.585	VVA	-0.087
2087	406349.825	3374644.204	Yes	575.901	575.969	VVA	0.068
2097	349788.906	3372963.039	Yes	677.180	677.359	VVA	0.179
2108	468660.850	3370829.908	Yes	647.143	647.108	VVA	-0.035
2120	376900.657	3399987.160	Yes	724.202	724.173	VVA	-0.029
2135	481942.315	3401593.128	Yes	468.974	468.977	VVA	0.003
2140	426073.262	3396998.395	Yes	673.491	673.605	VVA	0.114
2149	312119.752	3388492.685	Yes	730.686	730.741	VVA	0.055
2156	322946.367	3398491.627	Yes	731.982	731.990	VVA	0.008
2158	402816.961	3366231.711	Yes	673.498	673.615	VVA	0.117
2162	349727.386	3389648.169	Yes	711.290	711.292	VVA	0.002
2171	461823.262	3378084.823	Yes	524.002	524.073	VVA	0.071
2179	321441.665	3393360.431	Yes	676.514	676.641	VVA	0.127
2183	486642.835	3387932.519	Yes	428.888	431.186	VVA	2.298
2184	424479.467	3386195.552	Yes	642.130	642.083	VVA	-0.047
2186	387651.217	3400277.779	Yes	696.037	695.958	VVA	-0.079
2196	442778.715	3394077.389	Yes	525.999	528.822	VVA	2.823
2199	324282.129	3382770.314	Yes	659.194	659.215	VVA	0.021
2219	381480.345	3388754.515	Yes	748.933	749.004	VVA	0.071
2230	388033.165	3379430.604	Yes	713.037	713.273	VVA	0.236
2279	413079.502	3388486.692	Yes	599.177	600.488	VVA	1.311
2281	422892.545	3376333.844	Yes	523.771	523.810	VVA	0.039
2283	351115.098	3399829.902	Yes	728.515	728.514	VVA	-0.001
2310	454088.266	3385591.411	Yes	522.686	522.681	VVA	-0.005
1005	437339.264	3184658.439	Yes	207.311	207.301	NVA	-0.010
1006	392583.492	3200675.269	Yes	213.637	213.722	NVA	0.085
1010	382191.068	3152867.619	Yes	256.841	256.909	NVA	0.068
1018	401090.257	3130740.649	Yes	232.464	232.492	NVA	0.028
1023	441254.780	3193959.070	Yes	205.390	205.381	NVA	-0.009
1025	439762.975	3129927.393	Yes	150.959	150.974	NVA	0.015
1026	439723.357	3119849.026	Yes	197.547	197.553	NVA	0.006
1027	424915.375	3129590.444	Yes	193.891	193.920	NVA	0.029
1029	428744.574	3166010.401	Yes	172.316	172.349	NVA	0.033
1031	400897.453	3142134.741	Yes	262.243	262.277	NVA	0.034
1048	391121.085	3167578.176	Yes	207.646	207.613	NVA	-0.033
1051	433486.713	3153221.745	Yes	151.729	151.745	NVA	0.016
1052	405930.092	3200658.469	Yes	212.648	212.689	NVA	0.041
1055	451420.111	3201101.342	Yes	215.129	215.124	NVA	-0.005
1063	416922.127	3142350.551	Yes	189.572	189.590	NVA	0.018
1081	378475.945	3202614.287	Yes	236.683	236.617	NVA	-0.066

1084	416971.457	3184879.971	Yes	201.437	201.389	NVA	-0.048
1119	374634.421	3171579.219	Yes	248.146	248.091	NVA	-0.055
1129	412095.538	3172844.338	Yes	168.365	168.439	NVA	0.074
1131	405778.624	3189744.049	Yes	203.949	203.977	NVA	0.028
1137	380256.275	3170189.379	Yes	243.114	243.129	NVA	0.015
1146	408887.691	3146155.160	Yes	220.605	220.628	NVA	0.023
1150	421467.562	3162235.553	Yes	167.140	167.207	NVA	0.067
1174	367164.869	3186835.802	Yes	256.139	256.170	NVA	0.031
1176	444377.257	3166543.794	Yes	171.577	171.583	NVA	0.006
1178	453774.849	3189756.050	Yes	190.410	190.449	NVA	0.039
1187	443299.954	3155969.994	Yes	146.137	146.178	NVA	0.041
1191	429164.436	3178384.979	Yes	189.628	189.666	NVA	0.038
1198	398068.337	3137541.547	Yes	240.743	240.761	NVA	0.018
1203	394835.948	3191517.174	Yes	197.554	197.553	NVA	-0.001
1207	386167.836	3168694.872	Yes	222.924	222.877	NVA	-0.047
1216	454352.619	3157507.798	Yes	159.755	159.795	NVA	0.040
1217	369200.170	3188673.834	Yes	239.402	239.408	NVA	0.006
1227	416944.024	3196500.737	Yes	213.148	213.146	NVA	-0.002
1237	402641.458	3152682.411	Yes	212.790	212.807	NVA	0.017
1241	426181.775	3200513.990	Yes	211.614	211.607	NVA	-0.007
1251	420980.608	3125955.771	Yes	183.503	183.461	NVA	-0.042
1262	439152.873	3206171.687	Yes	221.848	221.779	NVA	-0.069
1267	438729.047	3139256.025	Yes	174.650	174.667	NVA	0.017
1270	411125.064	3160323.112	Yes	190.675	190.634	NVA	-0.041
1273	380956.612	3196472.983	Yes	232.441	232.440	NVA	-0.001
1285	412488.446	3120460.325	Yes	246.893	246.886	NVA	-0.007
1300	455910.089	3164755.303	Yes	167.978	167.971	NVA	-0.007
1302	437577.317	3175587.847	Yes	190.825	190.825	NVA	0.000
1312	421343.861	3172530.735	Yes	172.058	172.139	NVA	0.081
1313	445895.492	3142494.164	Yes	158.826	158.817	NVA	-0.009
1018A	401176.540	3137419.085	Yes	255.554	255.576	NVA	0.022
1055A	440733.187	3200716.581	Yes	212.889	212.910	NVA	0.021
1203A	398484.283	3191296.345	Yes	196.302	196.272	NVA	-0.030
1251A	416539.379	3125229.479	Yes	193.346	193.323	NVA	-0.023
1302A	437969.433	3175560.196	Yes	187.354	187.319	NVA	-0.035
2005	437325.487	3184657.129	Yes	207.430	207.410	VVA	-0.020
2006	392602.448	3200625.586	Yes	213.553	213.697	VVA	0.144
2010	381997.337	3152898.066	Yes	256.351	256.421	VVA	0.070
2018	401027.100	3130753.188	Yes	232.604	234.546	VVA	1.942
2023	441274.967	3193948.800	Yes	205.394	205.453	VVA	0.059
2025	439761.647	3129914.612	Yes	150.485	150.660	VVA	0.175
2026	439739.306	3119837.533	Yes	197.374	197.491	VVA	0.117

2027	424872.621	3129582.668	Yes	194.449	194.491	VVA	0.042
2029	428738.361	3166010.584	Yes	172.130	172.507	VVA	0.377
2031	400854.630	3142123.038	Yes	261.785	261.848	VVA	0.063
2048	391110.450	3167517.413	Yes	207.850	207.998	VVA	0.148
2051	433502.532	3153189.848	Yes	150.549	150.760	VVA	0.211
2052	405946.504	3200678.020	Yes	212.790	212.879	VVA	0.089
2055	451474.075	3200559.114	Yes	216.719	216.763	VVA	0.044
2063	416703.194	3142672.786	Yes	196.290	196.315	VVA	0.025
2081	378470.554	3202609.595	Yes	236.658	236.659	VVA	0.001
2084	416982.167	3184862.300	Yes	200.971	200.956	VVA	-0.015
2119	374681.933	3171537.512	Yes	248.090	248.195	VVA	0.105
2129	412129.481	3172863.987	Yes	168.363	168.448	VVA	0.085
2131	405728.340	3189597.659	Yes	202.675	202.770	VVA	0.095
2137	380325.240	3170177.490	Yes	243.021	243.106	VVA	0.085
2146	408866.034	3146179.094	Yes	221.380	221.598	VVA	0.218
2150	421475.364	3162234.300	Yes	167.213	167.307	VVA	0.094
2174	367174.814	3186838.202	Yes	256.285	256.353	VVA	0.068
2176	444360.666	3166536.173	Yes	171.070	171.727	VVA	0.657
2178	453771.834	3189749.128	Yes	190.242	193.822	VVA	3.580
2187	443286.224	3155980.776	Yes	145.990	147.172	VVA	1.182
2191	429174.726	3178391.319	Yes	189.023	189.066	VVA	0.043
2198	398097.032	3137483.354	Yes	240.083	240.116	VVA	0.033
2203	394850.071	3191505.965	Yes	197.573	197.886	VVA	0.313
2207	386182.847	3168689.424	Yes	222.541	224.592	VVA	2.051
2216	454355.516	3157533.848	Yes	159.116	159.218	VVA	0.102
2217	369197.610	3188666.619	Yes	239.239	239.256	VVA	0.017
2227	416938.251	3196502.964	Yes	213.216	214.370	VVA	1.154
1004	314444.297	3358535.615	Yes	573.248	573.263	NVA	0.015
1008	407141.993	3353934.542	Yes	624.414	624.432	NVA	0.018
1009	473097.146	3306000.663	Yes	486.870	486.875	NVA	0.005
1011	344642.296	3360830.224	Yes	640.982	640.956	NVA	-0.026
1020	369365.694	3365455.992	Yes	653.565	653.495	NVA	-0.070
1030	353452.868	3318420.649	Yes	653.993	654.128	NVA	0.135
1038	336771.892	3334003.422	Yes	590.902	591.042	NVA	0.140
1040	446433.332	3303169.377	Yes	697.422	697.380	NVA	-0.042
1042	380307.777	3320419.236	Yes	727.352	727.291	NVA	-0.061
1044	443323.209	3333709.701	Yes	669.757	669.814	NVA	0.057
1053	434334.879	3302582.474	Yes	672.290	672.259	NVA	-0.031
1057	410899.304	3330520.159	Yes	708.833	708.903	NVA	0.070
1062	456408.219	3363837.839	Yes	638.435	638.426	NVA	-0.009
1066	348726.951	3343852.553	Yes	653.073	653.000	NVA	-0.073
1071	419571.321	3315919.811	Yes	722.181	722.172	NVA	-0.009

1088	432971.811	3313162.499	Yes	720.732	720.754	NVA	0.022
1090	327183.000	3364790.701	Yes	598.534	598.580	NVA	0.046
1092	427312.629	3344302.276	Yes	706.004	706.001	NVA	-0.003
1101	312906.684	3364296.834	Yes	589.551	589.531	NVA	-0.020
1107	400726.193	3341824.206	Yes	653.215	653.219	NVA	0.004
1112	371115.929	3308505.144	Yes	695.269	695.213	NVA	-0.056
1128	432146.417	3359492.771	Yes	654.809	654.814	NVA	0.005
1130	415290.360	3362730.122	Yes	540.534	540.574	NVA	0.040
1132	376463.464	3329074.406	Yes	711.584	711.431	NVA	-0.153
1133	381642.368	3339294.018	Yes	673.473	673.493	NVA	0.020
1134	360506.934	3339879.531	Yes	706.684	706.659	NVA	-0.025
1139	452506.111	3351539.474	Yes	661.154	661.075	NVA	-0.079
1141	412833.538	3355392.803	Yes	566.432	566.434	NVA	0.002
1144	381830.898	3343314.770	Yes	647.771	647.780	NVA	0.009
1145	387528.274	3312459.402	Yes	710.719	710.643	NVA	-0.076
1154	368842.819	3320212.389	Yes	657.940	657.893	NVA	-0.047
1165	368034.109	3350948.929	Yes	704.829	704.849	NVA	0.020
1168	398859.924	3324185.009	Yes	708.798	708.823	NVA	0.025
1180	449402.555	3351027.190	Yes	666.913	666.894	NVA	-0.019
1182	384018.225	3361404.201	Yes	704.794	704.750	NVA	-0.044
1195	361550.399	3338429.286	Yes	703.951	703.965	NVA	0.014
1204	344944.687	3350449.561	Yes	698.189	698.166	NVA	-0.023
1205	428318.956	3326395.536	Yes	668.384	668.437	NVA	0.053
1206	431387.969	3349521.980	Yes	659.999	659.983	NVA	-0.016
1215	422224.882	3311311.570	Yes	633.489	633.444	NVA	-0.045
1228	312626.794	3352219.635	Yes	558.938	558.922	NVA	-0.016
1238	364837.484	3355645.056	Yes	690.744	690.698	NVA	-0.046
1243	411690.346	3350461.978	Yes	603.032	603.171	NVA	0.139
1246	468484.604	3358421.487	Yes	640.409	640.363	NVA	-0.046
1254	341741.120	3351395.209	Yes	689.583	689.649	NVA	0.066
1258	393123.714	3330368.964	Yes	712.908	712.851	NVA	-0.057
1264	418629.920	3324158.266	Yes	700.623	700.624	NVA	0.001
1274	462116.415	3301643.312	Yes	551.491	551.578	NVA	0.087
1286	447614.832	3365287.375	Yes	640.719	640.666	NVA	-0.053
1288	392519.696	3301851.060	Yes	564.722	564.651	NVA	-0.071
1298	373744.880	3332591.995	Yes	674.328	674.292	NVA	-0.036
1301	386456.264	3314377.360	Yes	723.404	723.335	NVA	-0.069
1303	461895.626	3347538.422	Yes	665.561	665.560	NVA	-0.001
1304	351646.562	3313648.350	Yes	671.498	671.558	NVA	0.060
1315	389377.027	3327133.405	Yes	716.819	716.813	NVA	-0.006
1144A	380290.638	3351226.728	Yes	703.730	703.718	NVA	-0.012
1215A	424353.931	3302998.592	Yes	683.348	683.308	NVA	-0.040

1258A	396163.375	3335075.345	Yes	659.839	659.942	NVA	0.103
2004	314440.316	3358542.901	Yes	573.281	573.363	VVA	0.082
2008	407135.622	3353924.068	Yes	624.432	624.522	VVA	0.090
2009	473051.010	3305946.326	Yes	487.092	487.127	VVA	0.035
2011	344625.485	3360847.658	Yes	640.517	641.267	VVA	0.750
2020	369355.075	3365460.905	Yes	653.592	653.557	VVA	-0.035
2030	353461.159	3318416.509	Yes	654.544	654.653	VVA	0.109
2038	336769.663	3334022.193	Yes	591.069	591.211	VVA	0.142
2040	446452.508	3303170.127	Yes	696.878	696.840	VVA	-0.038
2042	380290.000	3320408.550	Yes	727.149	727.149	VVA	0.000
2044	443311.768	3333717.073	Yes	668.996	672.269	VVA	3.273
2053	434336.427	3302573.815	Yes	672.969	673.060	VVA	0.091
2057	410833.474	3332122.985	Yes	705.730	705.901	VVA	0.171
2062	456536.973	3364012.700	Yes	634.707	634.729	VVA	0.022
2066	348737.541	3343855.623	Yes	652.759	652.993	VVA	0.234
2071	419277.518	3315293.553	Yes	712.651	712.735	VVA	0.084
2088	432932.633	3313169.965	Yes	720.068	720.400	VVA	0.332
2090	327197.121	3364774.073	Yes	598.442	598.434	VVA	-0.008
2092	427351.587	3344017.458	Yes	705.119	705.174	VVA	0.055
2101	312683.441	3364544.221	Yes	591.766	591.986	VVA	0.220
2107	400729.873	3341831.945	Yes	653.327	653.614	VVA	0.287
2112	371112.420	3308508.131	Yes	695.198	695.159	VVA	-0.039
2128	432149.339	3359518.482	Yes	654.472	655.136	VVA	0.664
2130	415271.732	3362781.619	Yes	542.825	542.859	VVA	0.034
2132	376438.608	3329098.672	Yes	711.293	711.336	VVA	0.043
2133	381661.340	3339310.259	Yes	673.976	674.253	VVA	0.277
2134	360468.130	3339877.085	Yes	706.505	706.487	VVA	-0.018
2139	452513.831	3351544.951	Yes	661.456	661.486	VVA	0.030
2141	412821.332	3355405.061	Yes	567.022	566.990	VVA	-0.032
2144	381841.277	3343307.770	Yes	647.557	647.794	VVA	0.237
2145	387520.307	3312465.773	Yes	710.709	710.699	VVA	-0.010
2154	368820.207	3320208.395	Yes	658.029	658.030	VVA	0.001
2165	368035.308	3350941.051	Yes	704.714	704.951	VVA	0.237
2180	449398.598	3351014.140	Yes	665.392	671.224	VVA	5.832
2182	384037.347	3361410.798	Yes	704.751	705.316	VVA	0.565
2195	361558.357	3338408.251	Yes	703.628	703.911	VVA	0.283
2204	344923.379	3350455.092	Yes	697.716	697.723	VVA	0.007
2205	428313.026	3326394.749	Yes	668.464	671.662	VVA	3.198
2206	431382.704	3349509.584	Yes	659.053	659.302	VVA	0.249
2215	422243.480	3311310.990	Yes	632.497	632.556	VVA	0.059
2268	398902.762	3324232.147	Yes	708.583	708.647	VVA	0.064
2286	447617.254	3365295.406	Yes	640.557	640.492	VVA	-0.065

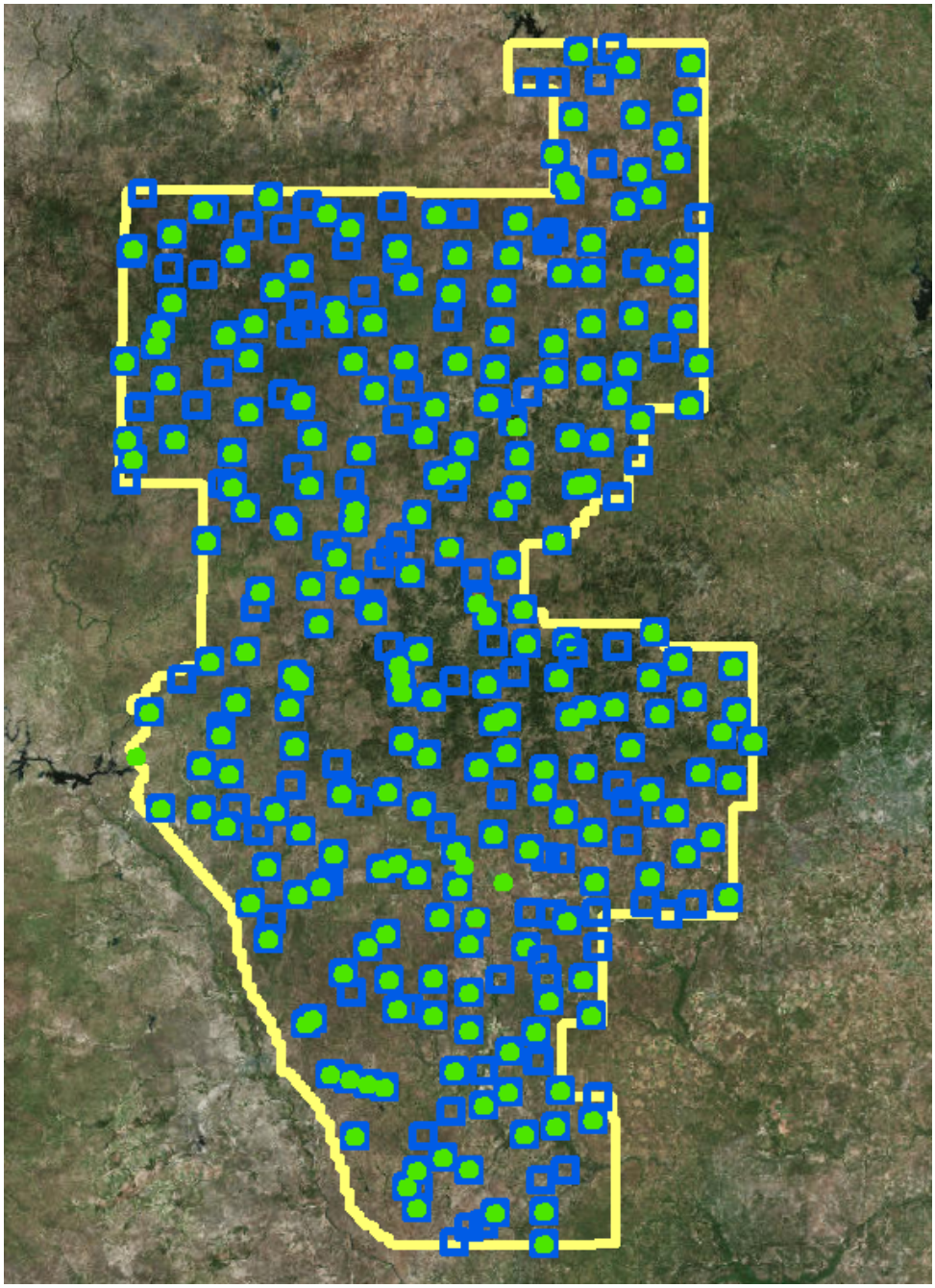
1001	428374.486	3269602.767	Yes	438.001	437.911	NVA	-0.090
1003	395776.952	3292373.540	Yes	519.473	519.458	NVA	-0.015
1032	395643.847	3296320.394	Yes	510.302	510.310	NVA	0.008
1036	341484.482	3274926.058	Yes	436.862	436.894	NVA	0.032
1039	460919.051	3283081.963	Yes	506.016	506.072	NVA	0.056
1047	348618.945	3299999.324	Yes	680.313	680.321	NVA	0.008
1061	439790.672	3264578.729	Yes	422.434	422.501	NVA	0.067
1064	343762.290	3263101.882	Yes	378.925	378.926	NVA	0.001
1065	338046.975	3297125.132	Yes	563.551	563.577	NVA	0.026
1068	452129.627	3282504.029	Yes	505.608	505.616	NVA	0.008
1076	451357.569	3264642.143	Yes	367.261	367.236	NVA	-0.025
1083	497161.675	3295639.657	Yes	431.327	431.393	NVA	0.066
1089	396329.160	3287815.854	Yes	460.416	460.403	NVA	-0.013
1091	422134.486	3290030.067	Yes	534.324	534.267	NVA	-0.057
1103	497965.580	3282003.454	Yes	374.350	374.424	NVA	0.074
1104	401468.741	3299992.152	Yes	497.792	497.839	NVA	0.047
1105	472264.215	3292222.287	Yes	490.207	490.163	NVA	-0.044
1106	493624.658	3274758.569	Yes	407.229	407.265	NVA	0.036
1114	444240.083	3292322.838	Yes	521.337	521.315	NVA	-0.022
1116	363637.086	3271238.335	Yes	514.386	514.321	NVA	-0.065
1121	496655.059	3260966.906	Yes	328.492	328.428	NVA	-0.064
1126	362024.285	3283509.974	Yes	521.069	521.046	NVA	-0.023
1138	319494.081	3281724.358	Yes	469.138	469.231	NVA	0.093
1147	365154.581	3291329.560	Yes	540.034	540.013	NVA	-0.021
1153	396954.570	3272871.794	Yes	498.338	498.343	NVA	0.005
1157	419767.257	3265164.345	Yes	447.497	447.543	NVA	0.046
1161	466129.385	3270884.340	Yes	465.940	465.908	NVA	-0.032
1169	484552.852	3286281.123	Yes	462.372	462.376	NVA	0.004
1172	363321.815	3293385.559	Yes	559.987	559.994	NVA	0.007
1181	424353.499	3278763.541	Yes	473.938	473.965	NVA	0.027
1200	447608.578	3280119.282	Yes	434.550	434.569	NVA	0.019
1208	428383.906	3280381.205	Yes	454.701	454.810	NVA	0.109
1209	335534.273	3265283.106	Yes	406.995	407.072	NVA	0.077
1213	405278.861	3286162.551	Yes	475.177	475.212	NVA	0.035
1218	345658.647	3284703.503	Yes	501.501	501.566	NVA	0.065
1220	474678.396	3281399.656	Yes	422.275	422.322	NVA	0.047
1239	480470.234	3297003.189	Yes	448.997	448.985	NVA	-0.012
1249	487362.401	3263387.611	Yes	312.344	312.322	NVA	-0.022
1256	404021.042	3268671.168	Yes	398.324	398.323	NVA	-0.001
1271	362559.512	3259362.410	Yes	404.522	404.511	NVA	-0.011
1287	376430.747	3266114.494	Yes	430.395	430.351	NVA	-0.044
1293	329306.017	3291673.009	Yes	581.807	581.888	NVA	0.081

1299	430579.704	3293683.070	Yes	511.770	511.755	NVA	-0.015
1309	502892.393	3272651.015	Yes	341.080	341.083	NVA	0.003
1319	341365.861	3277107.404	Yes	465.746	465.827	NVA	0.081
1040A	448434.562	3299772.611	Yes	705.727	705.667	NVA	-0.060
1047A	348657.458	3299975.763	Yes	680.292	680.270	NVA	-0.022
1091A	412094.841	3291180.915	Yes	681.506	681.514	NVA	0.008
1295A	462132.337	3259354.676	Yes	346.900	346.824	NVA	-0.076
2001	428320.960	3269622.012	Yes	441.420	441.356	VVA	-0.064
2003	395788.274	3292378.546	Yes	520.028	520.228	VVA	0.200
2021	315404.596	3268563.796	Yes	354.386	354.454	VVA	0.068
2032	395649.209	3296314.832	Yes	510.217	510.235	VVA	0.018
2036	341497.948	3274946.441	Yes	437.035	437.042	VVA	0.007
2039	460922.761	3283073.031	Yes	505.667	505.752	VVA	0.085
2047	348622.915	3299980.987	Yes	679.561	679.674	VVA	0.113
2061	439799.464	3264575.499	Yes	422.732	422.800	VVA	0.068
2064	343766.202	3263093.753	Yes	378.860	378.922	VVA	0.062
2065	338048.305	3297149.117	Yes	563.764	563.812	VVA	0.048
2068	452533.690	3282829.781	Yes	522.464	424.471	VVA	-97.993
2076	452051.332	3263928.280	Yes	369.169	369.112	VVA	-0.057
2083	497175.228	3295626.119	Yes	431.114	342.449	VVA	-88.665
2089	396313.772	3287819.296	Yes	460.798	460.966	VVA	0.168
2091	422136.076	3290040.399	Yes	535.135	535.206	VVA	0.071
2103	497957.411	3281999.578	Yes	374.367	368.669	VVA	-5.698
2104	401459.173	3300005.128	Yes	497.530	497.566	VVA	0.036
2105	471976.253	3292123.478	Yes	505.128	463.458	VVA	-41.670
2106	493581.980	3275678.378	Yes	412.350	412.400	VVA	0.050
2114	444232.780	3292303.392	Yes	520.215	520.160	VVA	-0.055
2116	363633.248	3271263.845	Yes	514.752	514.682	VVA	-0.070
2121	496664.839	3260966.289	Yes	328.235	329.336	VVA	1.101
2126	362014.398	3283510.412	Yes	520.752	520.829	VVA	0.077
2138	319489.319	3281749.863	Yes	469.514	469.636	VVA	0.122
2147	365153.431	3291337.699	Yes	540.111	540.212	VVA	0.101
2153	396952.022	3272925.634	Yes	506.114	506.291	VVA	0.177
2157	419773.528	3265154.598	Yes	447.239	451.559	VVA	4.320
2161	466125.887	3270889.826	Yes	465.646	465.712	VVA	0.066
2169	484547.804	3286277.142	Yes	462.538	465.577	VVA	3.039
2172	363312.313	3293396.929	Yes	559.481	559.462	VVA	-0.019
2181	424359.378	3278784.127	Yes	474.503	474.523	VVA	0.020
2200	447632.596	3280139.629	Yes	434.379	434.386	VVA	0.007
2208	428389.069	3280362.185	Yes	454.799	454.866	VVA	0.067
2209	335565.580	3265295.568	Yes	407.300	407.418	VVA	0.118
2213	405271.624	3286146.370	Yes	474.773	474.805	VVA	0.032

2218	345664.709	3284718.402	Yes	501.556	501.675	VVA	0.119
2220	474673.386	3281411.641	Yes	421.699	421.779	VVA	0.080
2239	480481.040	3296999.321	Yes	449.316	449.392	VVA	0.076
2249	487371.975	3263375.609	Yes	312.378	312.483	VVA	0.105
2309	502879.392	3272646.239	Yes	340.838	340.882	VVA	0.044
2153A	404003.799	3268664.634	Yes	398.151	400.716	VVA	2.565

Checkpoint Layout

NVA
VVA



Hydro-flattening Breakline Collection

Hydro- flattening breaklines are captured per the USGS National Geospatial Program Lidar Base Specification Version 1.2. Final hydro-flattened breaklines features are appropriately turned into polygons (flat elevations) and polylines (decreasing by elevation) and are used to reclassify ground points in water to Water (Class 9). The lidar points around the breaklines are reclassified to Ignored Ground (Class 10) based on predetermined buffer.

Linear hydrographic features

To collect hydrographic features, Merrick-Surdex JV uses a methodology that directly interacts with the lidar bare-earth data to collect drainage breaklines. To determine the alignment of a drainageway, the technician first views the area as a TIN of bare-earth points using a color ramp to depict varying elevations. In areas of extremely flat terrain, the technician may need to determine the direction of flow based on measuring lidar bare-earth points at each end of the drain. The operator will then use the color ramped TIN to digitize the drainage in 2D with the elevation being attributed directly from the bare-earth LAS data. MARS® software has the capability of "flipping" views between the elevation TIN, Intensity and imagery, as necessary, to further assist in the determination of the drainage. All drainage breaklines are collected in a downhill direction. For each point collected, the software uses a five-foot (5') search radius to identify the lowest point within that proximity. Within each radius, if a bare-earth point is not found that is lower than the previous point, the elevation for subsequent point remains the same as the previous point. This forces the drain to always flow in a downhill direction. Waterbodies that are embedded along a drainageway are validated to ensure consistency with the downhill direction of flow.

This methodology may differ from those of other vendors in that Merrick-Surdex JV relies on the bare-earth data to attribute breakline elevations. As a result of our methodology, there is no mismatch between lidar bare-earth data and breaklines that might otherwise be collected in stereo 3D as a separate process. This is particularly important in densely vegetated areas where breaklines collected in 3D from imagery will most likely not match (either horizontally or vertically), the more reliable lidar bare-earth data.

Merrick-Surdex JV has the capability of "draping" 2D breaklines to a bare-earth elevation model to attribute the "z" as opposed to the forced downhill attribution methodology described above. However, the problem with this process is the "pooling "effect or depressions along the drainageway caused by a lack of consistent penetration in densely vegetated areas.

Criteria of linear hydrographic breaklines are as follows:

- Linear hydrographic features (e.g., visible streams, rivers, shorelines, canals, etc.) greater than one hundred feet (100') wide will be captured as a double-lined polygon
    - linear hydrographic features must be flat and level bank-to-bank (perpendicular to the apparent flow centerline) with gradient following the immediately surrounding terrain
    - water surface edge must be at or just below the immediately surrounding terrain
    - streams should break at road crossings (e.g., culverts), and streams and rivers should not break at bridges

Waterbodies

Waterbodies are digitized from the color ramped TIN, similar to the process described above. The elevation attribute is determined as the technician collects the hydro feature by using the lowest bare-earth point within the polygon.

Criteria of waterbody breaklines are as follows:

- Waterbodies (e.g., lakes, ponds, reservoirs) greater than two (2) acres in size are surrounded by a water breakline (i.e., closed polygon)
    - waterbodies must be flat and level with a single elevation for every bank vertex
    - water surface edge must be at or just below the immediately surrounding terrain
    - long impoundments, such as reservoirs or inlets, whose water surface elevations drop when moving downstream should be treated as rivers

Color cycles provide a clear indication of where breaklines are to be collected, especially hydrographic breaklines. Figure 3 demonstrates no breaklines, where Figure 4 is breakline enforced displayed using color cycles within the MARS® software environment.

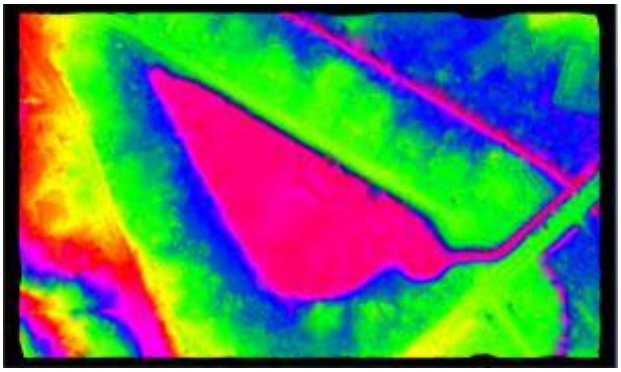


Figure 3

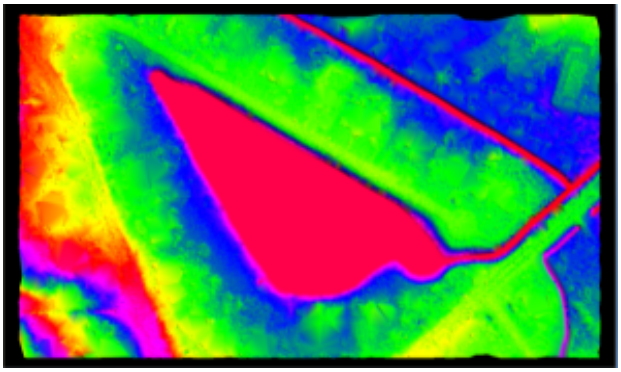


Figure 4

Bare-Earth Surface (DEM)

Merrick-Surdex JV exports the hydro-flattening breakline enforced Class 2 (ground) lidar points to a one-meter (1m) cell size, 32-bit format using MARS®, the DEMs are exported to the project tiling scheme. Projection information is applied that reflects the project requirements.

Intensity Images

Merrick-Surdex JV exports all lidar points to a one-meter (1m) cell size 16-bit client desired format using MARS®, the intensity images are exported to the project tiling scheme and / or project-wide boundary. Projection information is applied that reflects the project requirements.

List of Deliverables

- Classified lidar point cloud
    - Fully compliant ASPRS LAS 1.4, point record format 6
    - By tile
    - Intensity values normalized (rescaled) to 16-bit
    - FGDC-compliant metadata
- Bare-earth DEM
    - 1m cell size 32-bit floating point raster in GeoTIFF format
    - Bare-earth (hydro-flattened)
        - Culverts will not be removed from the DEMs
        - Bridges will be removed from the DEMs
    - By tile

    - FGDC-compliant metadata
- Hydro-flattened breaklines
    - Project-wide Esri feature class(es) for insertion into file geodatabase
        - PolylineZ
        - PolygonZ
    - FGDC-compliant metadata
- Intensity Images
    - 1m cell size 8-bit, 256 color gray scale in GeoTIFF format
    - By tile
    - FGDC-compliant metadata
- Control
    - Survey report
    - Esri shapefile format
    - FGDC-compliant metadata
- FGDC-compliant metadata (project level)
- Detailed Lidar Mapping / Project Report

Appendix 1

Following is a more detailed lidar calibration workflow description.

LIDAR CALIBRATION AND BLOCK LAS OUTPUT

Note: All figures represented on the following pages are for general illustration purposes, and are not examples derived from the project.

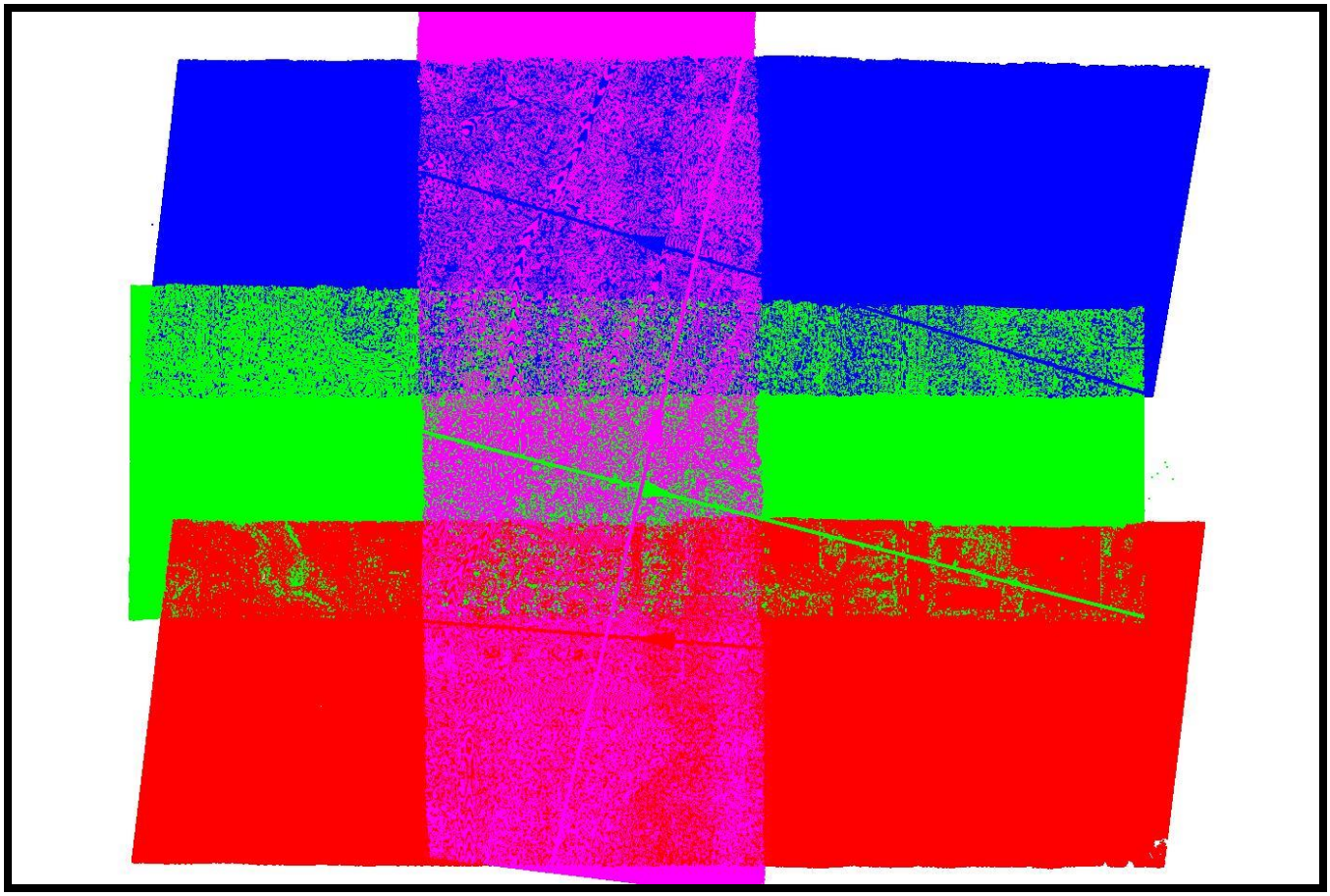
Initial Processing

Lidar data is output as LAS point data using Optech's Lidar Mapping Suite (LMS). LMS matches ground and roof planes plus roof lines to self-calibrate and correct system biases. These biases occur within the hardware of the laser scanning systems, within the Inertial Measurement Unit (IMU) and because of environmental conditions which affect the refraction of light. The systemic biases that are corrected for include scale, roll, pitch, and heading.

In addition to the self-calibration mode LMS runs a "production" mode which applies the self-calibration parameters and then analyzes each individual flight line and applies small adjustments to each line to tie overlapping lidar points even more tightly together.

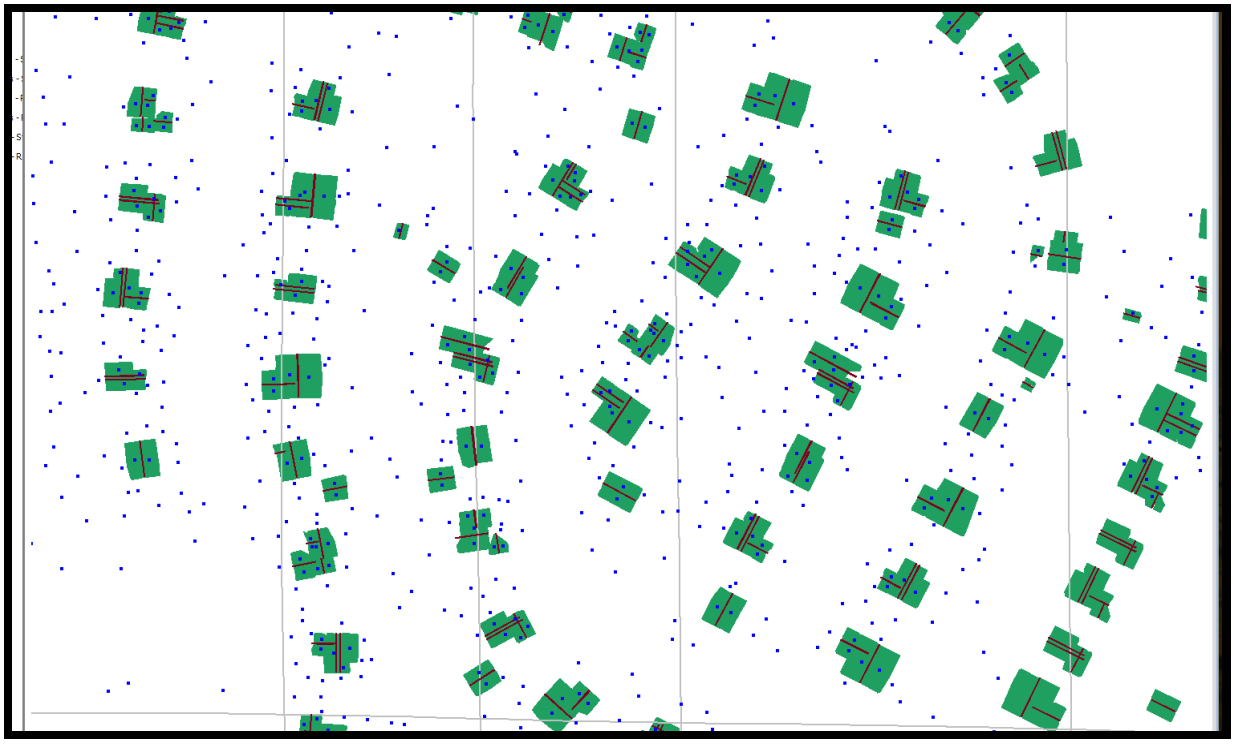
Boresight Self-Calibration Processing Procedures

An LMS boresight calibration is performed on an as-needed basis to correct scale, roll, pitch and heading biases. A minimum of three overlapping flights are flown in opposing directions with one cross flight.



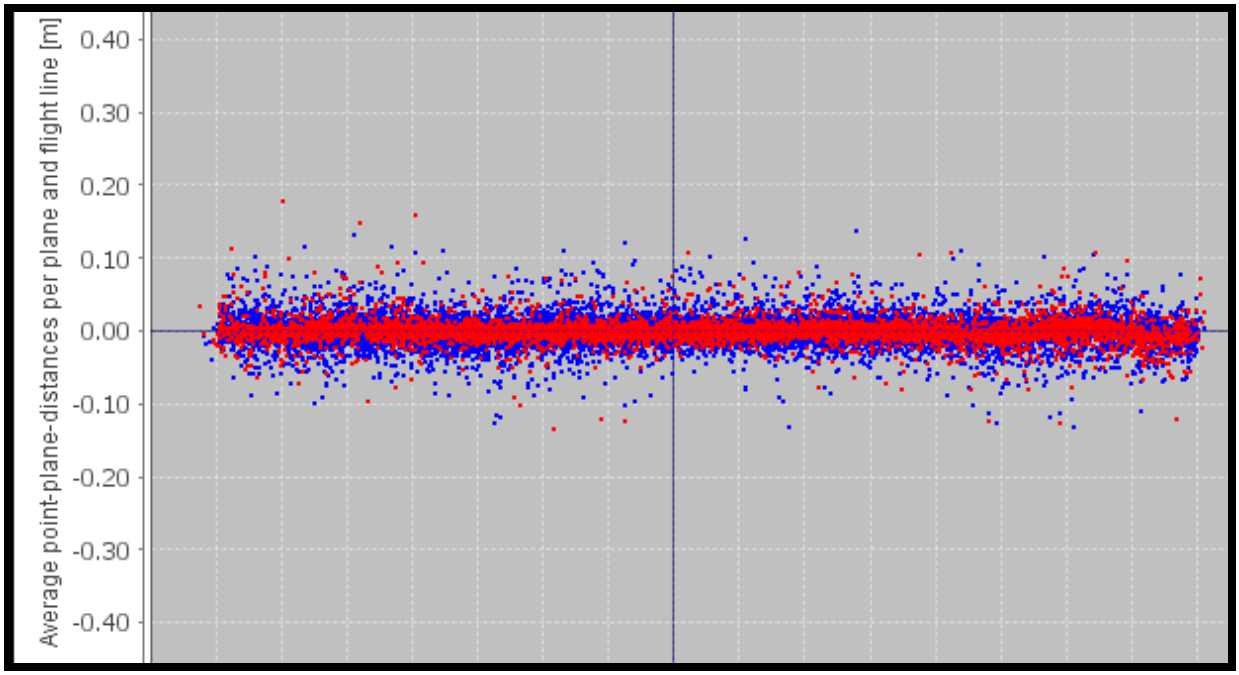
The Boresighting module frees scan angle scale, scan angle lag, XYZ boresight corrections and elevation position corrections while locking scan angle offset and XY position corrections.

The picked calibration site will have a good distribution of buildings for the self-calibration software to match ground planes, roof planes and roof lines.

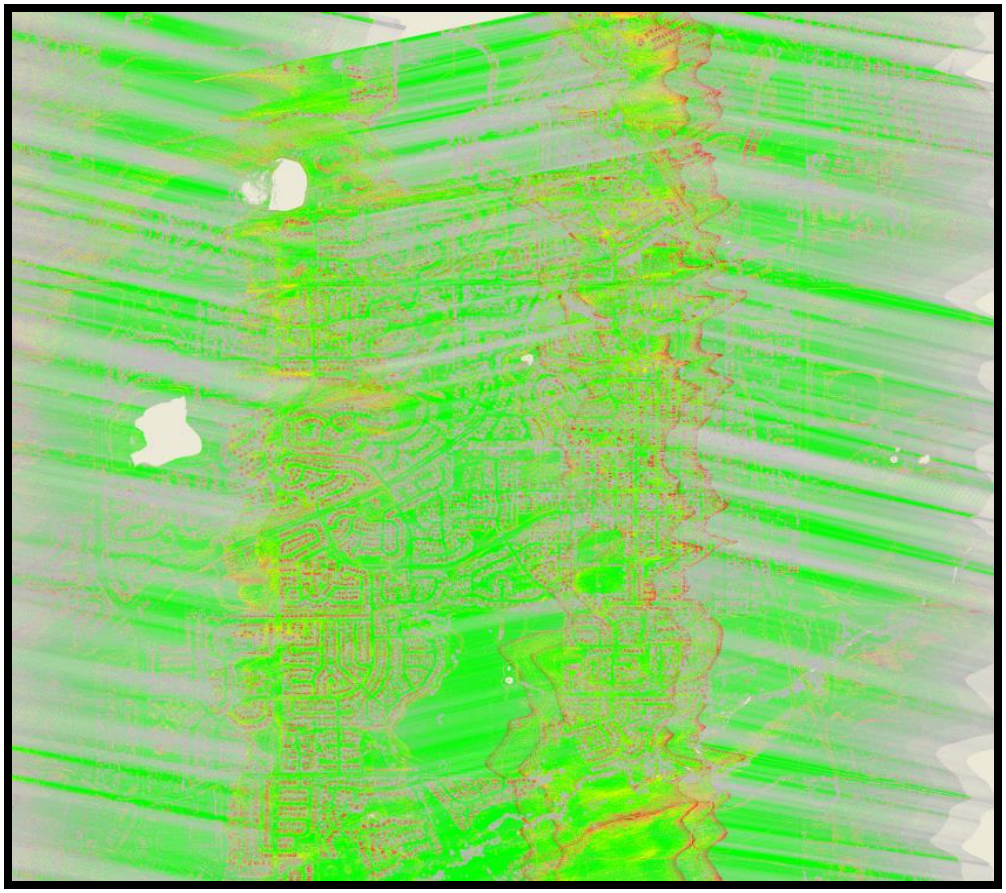


At the conclusion of the self-calibration run the data is quality checked with LMS plots

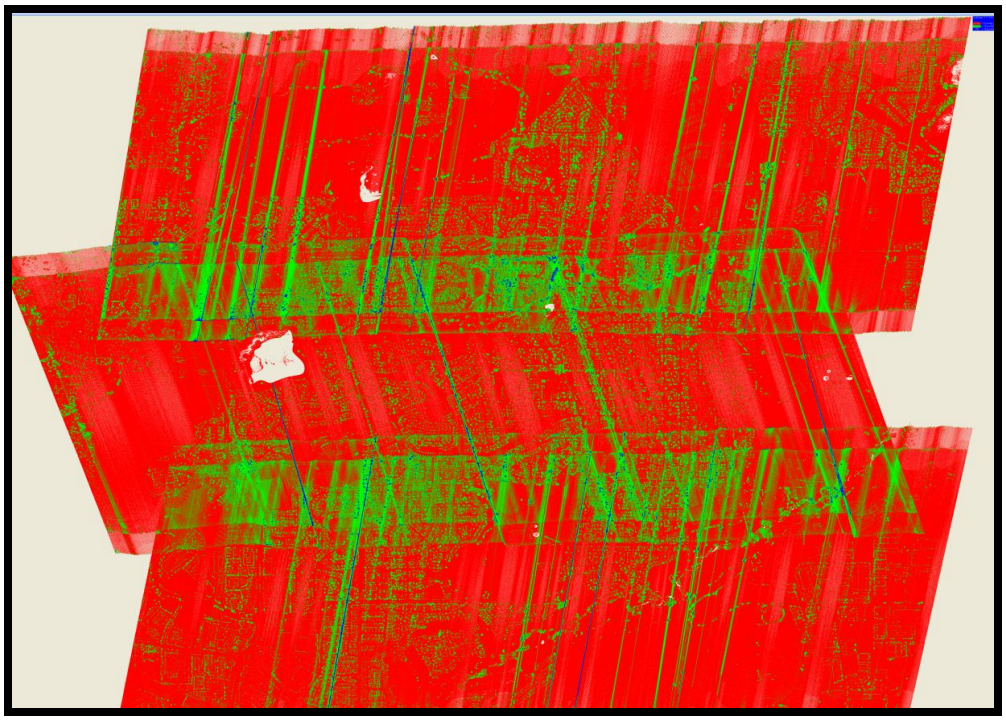
Plot of plane vertical distances from datum plane.



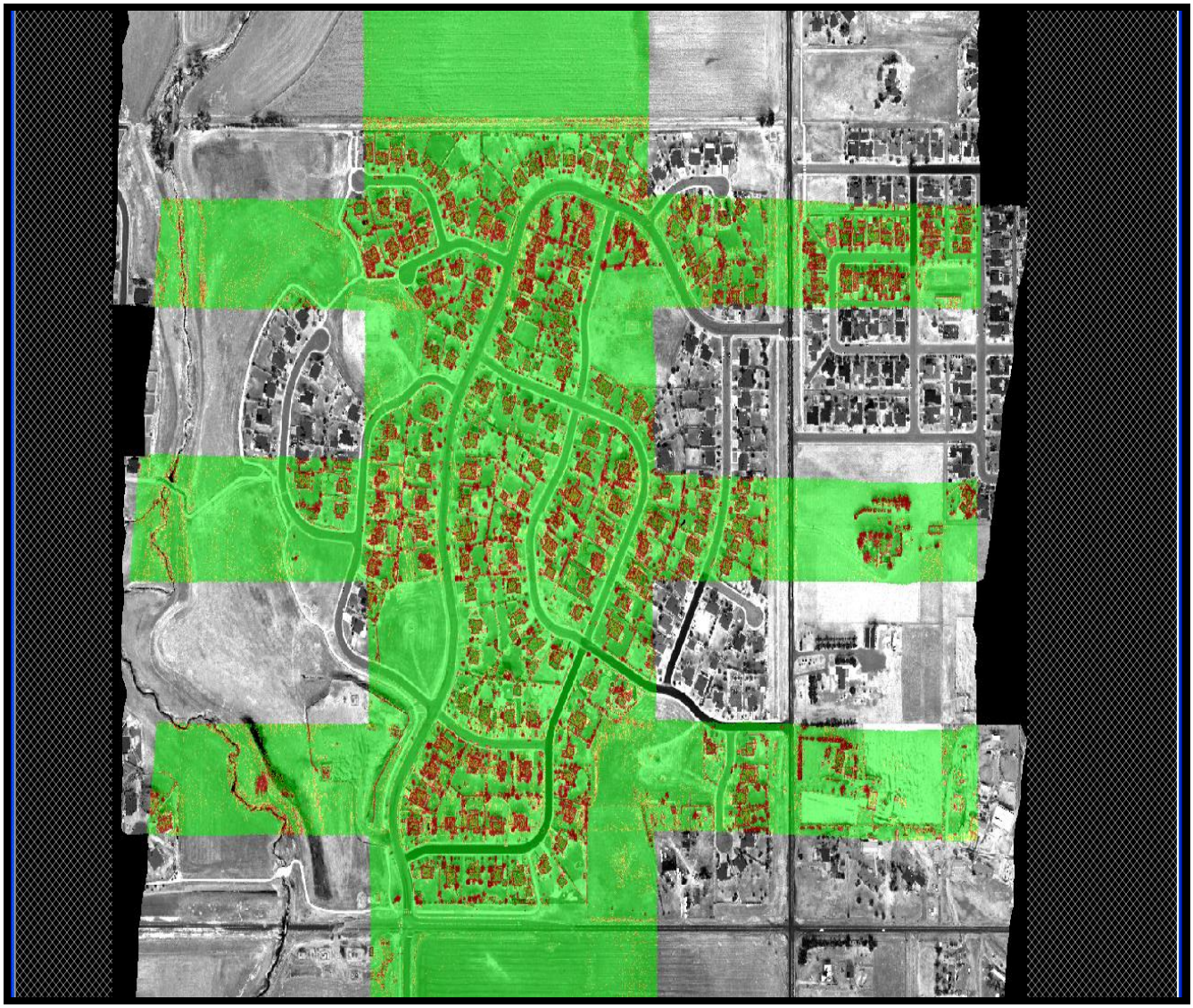
Plot of height differenced between flight lines. (Green=less than 5cm).



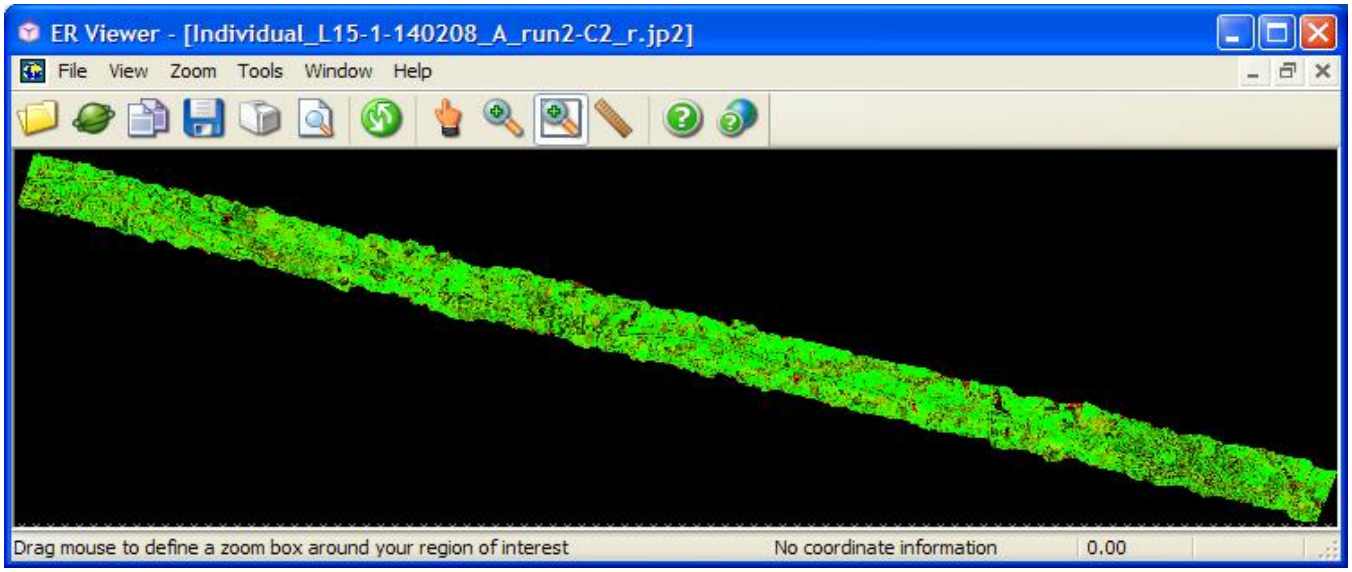
Plot of point densities. (Red=5-9 points per cell, green 10+ points per cell).



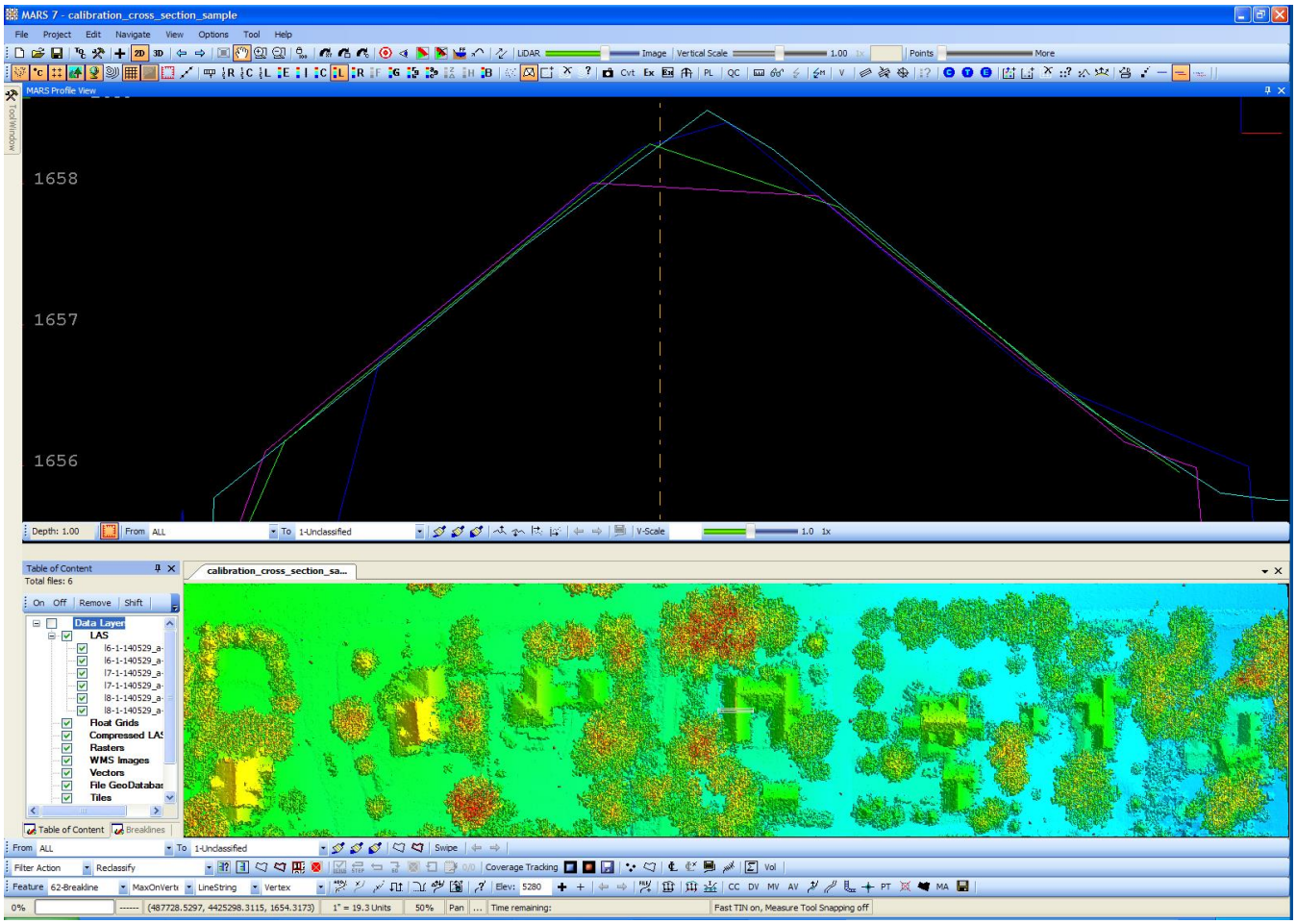
A Flight Line Separation Raster image is generated in Merrick Advanced Remote Sensing Software (MARS®), in this example ground returns from multiple flight lines that are fitting within 3 centimeters are colored green.



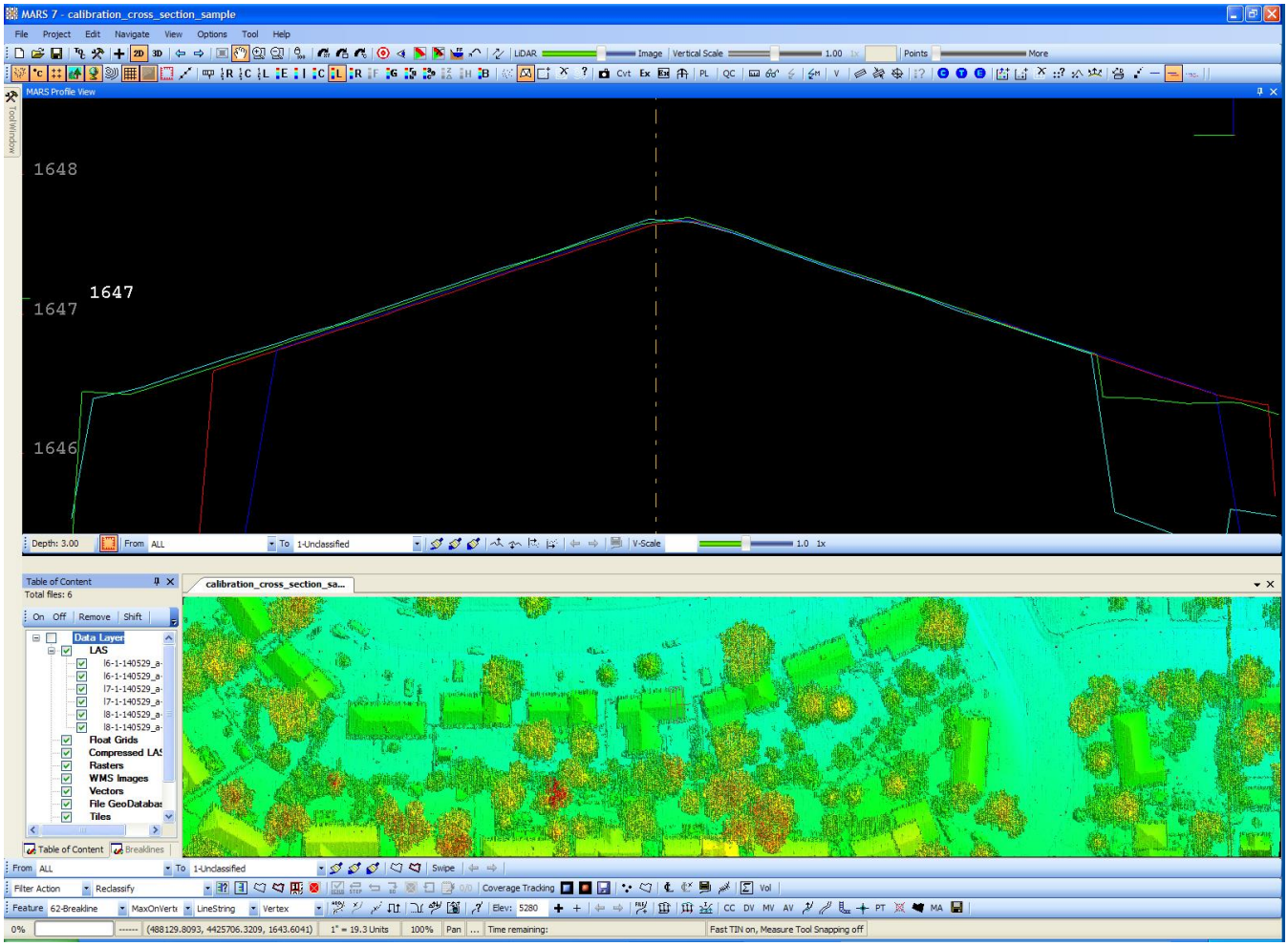
MARS® tests for internal relative vertical accuracy using inbound and outbound scan values. Again, Green is showing inbound and outbound scan data fitting to 3 centimeters.



Building cross sections are checked for good alignment. Pitch and heading are checked on roof planes parallel to the flight direction.



Roll and scale are checked on roof planes perpendicular to the flight direction.

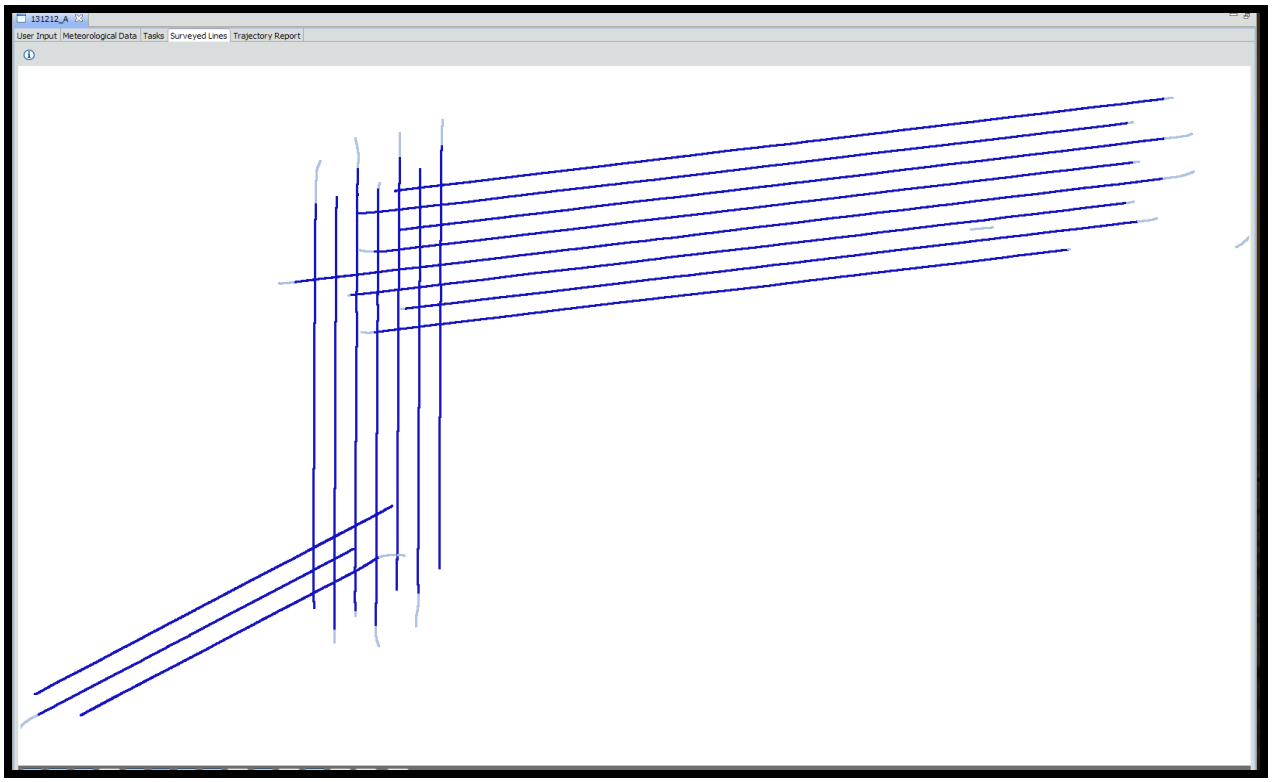


The LMS program outputs a "LCP" file with all the correction parameters. The calibration process may be run several times until the boresight adjustments are acceptable. When the boresight solution is acceptable the LCP file adjustments are saved and also applied to subsequent projects. Each new project is again analyzed and when the adjustment biases show too much drift a new boresight calibration is run. The LCP file may hold calibration tolerances for several projects.

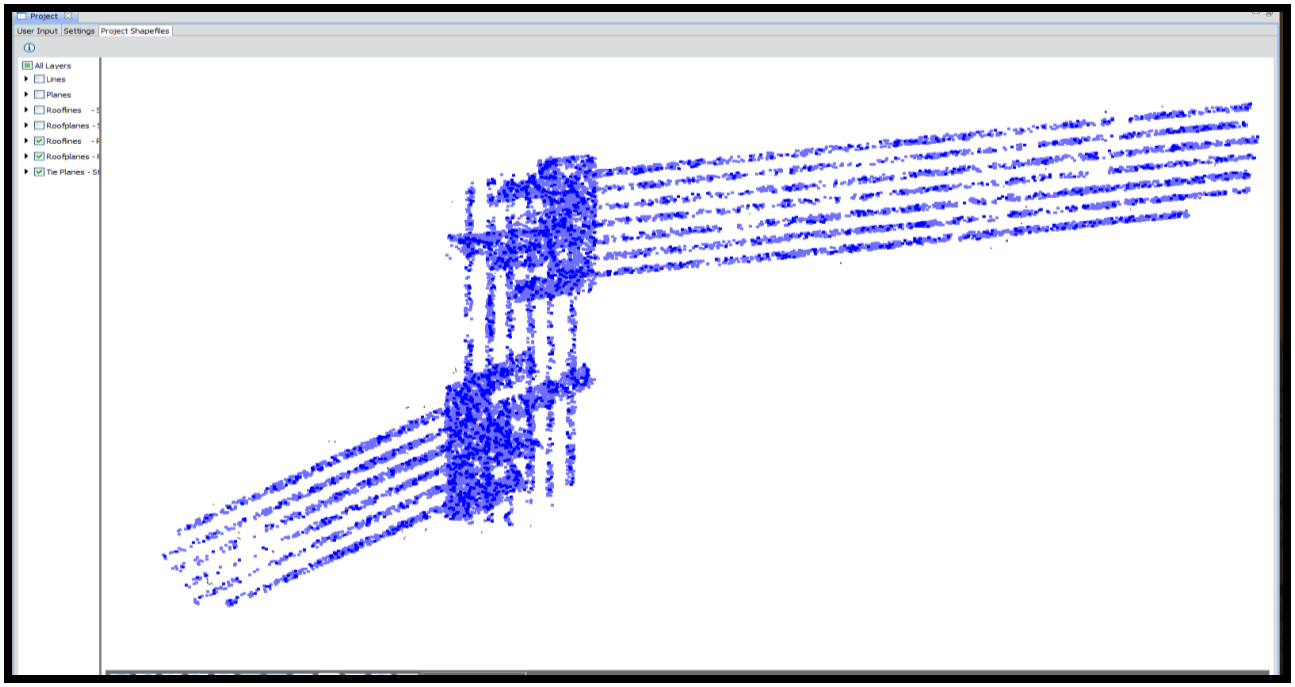
Block LAS Production Processing Procedures

The LMS production mode is run on each flight line to further tie the final lidar LAS flight line files tightly together. Production settings allow scan angle scale, scan angle lag to float and allows elevation to move slightly during flight line to flight line comparison thus further tying flight lines together. A cross flight with locked elevation data is used for controlling flight line elevations.

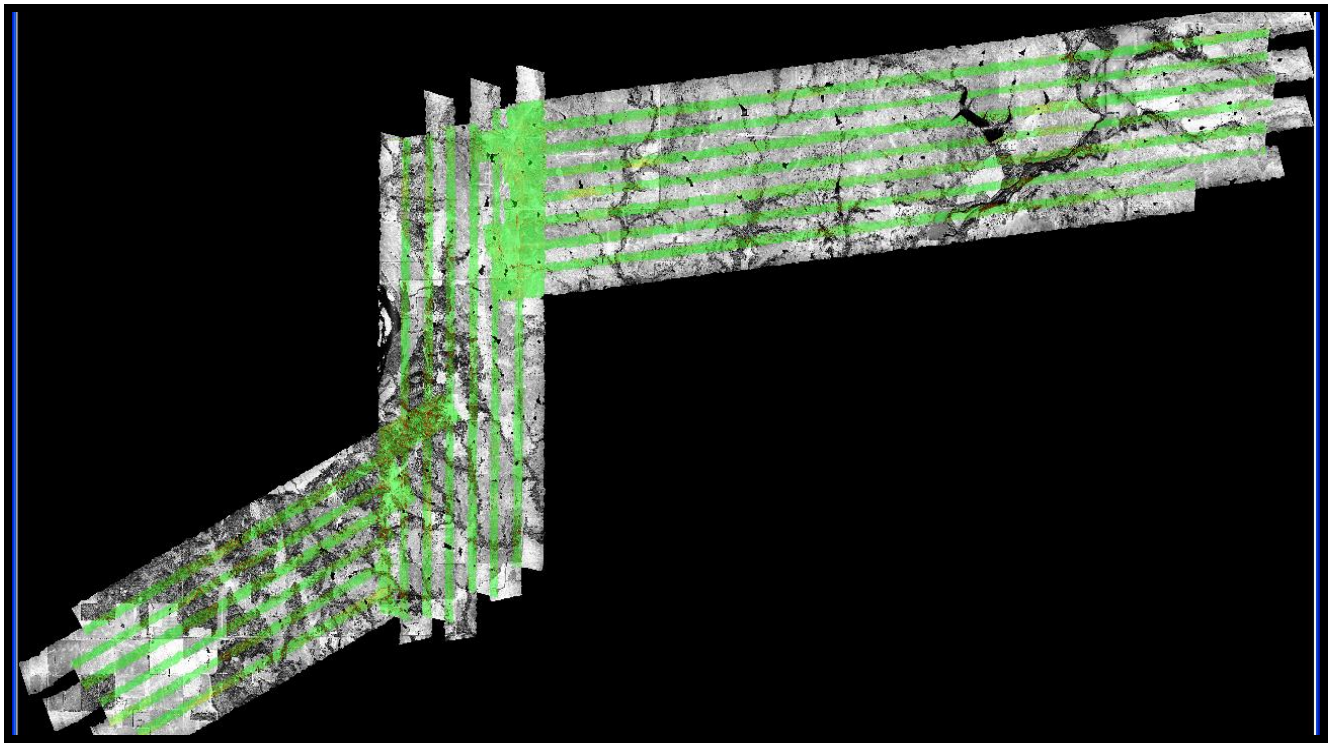
A block of data is selected to process with LMS production settings. Data collected during turns at the ends of flight lines is deselected (light blue lines).



As in self-calibration the LMS production program analyses ground, roof planes and rooflines. One cross flight is locked in elevation and all other lines are adjusted to it. Unlike the calibration site the distribution of roof planes is usually much less dense. Here matched ground tie planes are blue.

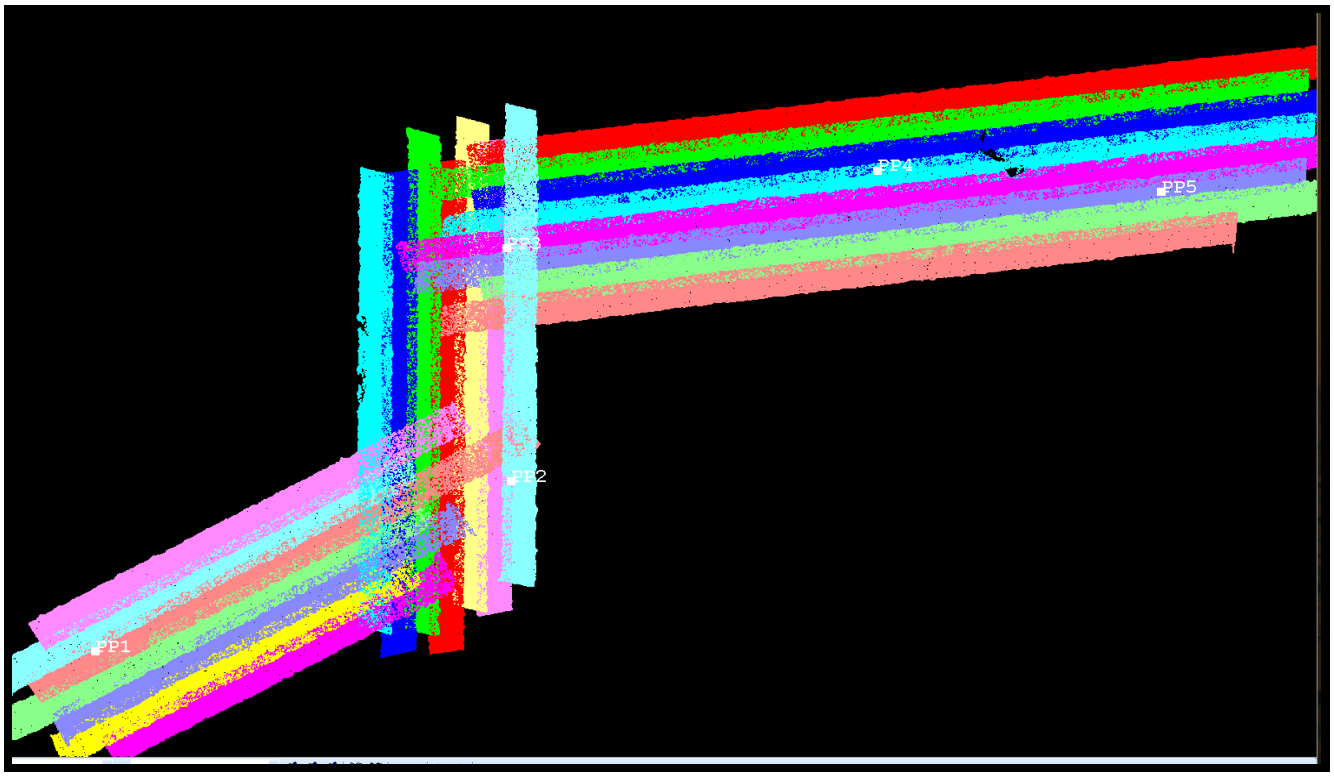


The same quality control outputs used to check self-calibrations are available to analyze the production run. Output plots are again available in LMS and cross sections plus a Flight Line Separation Raster are generated in MARS® to check coverage and quality.



Correcting the Final Elevation

After all the lines are tied together a ground control network is imported into MARS®. The ground control network may be pre-existing or collected by a licensed surveyor.



The next step is to match the ground control elevations to the lidar data set. A control report is run and the data set is shifted slightly to zero out the average elevation error and points checked for quality.

The final step before boresighted, leveled LAS files are ready for filtering is to run the MARS® QC Module on the block data. The Boresighted lidar QC Report outputs individual reports on Point Density, Nominal Pulse Spacing, Data Voids, Spatial Distribution, Scan Angles, Control Report, Flight Line Separation, Flight Line Overlap, Buffered Boundary, LAS Formats, Datums and Coordinates.
These reports are checked with the required specifications in the Project Management Plan.

Appendix 2

Following is a more detailed Survey Report

TEXAS LOWER CO SAN BERNARD
GROUND CONTROL SURVEY REPORT

JOB NO. 65219783
DATE MARCH 2018

Contractor Project Manager:

PM Name:	Doug Jacoby
Subcontractor Firm:	Merrick-Surdex Joint Venture, LLP (JV)
Address:	5970 Greenwood Plaza Blvd. Greenwood Village, CO 80111
Office Phone/Fax:	(303) 353-3903
Cell Phone:	(303) 521-6522
E-mail:	doug.jacoby@merrick.com

Prepared by:

Merrick & Company
303-751-0741 / Fax: 303-751-2581
www.merrick.com

SOUTH CENTRAL TEXAS
LIDAR MAPPING PROJECT
GROUND CONTROL SURVEY REPORT

I. INTRODUCTION

This report summarizes the results of a ground control survey requested by USGS. The survey was conducted in South Central Texas for LIDAR (Light Detection and Ranging) mapping. The ground control field observations were performed by Merrick & Company commencing on February 20, 2018 through the completion date of March 8, 2018. Merrick also surveyed approximately 710 checkpoints to verify confidence levels of the LIDAR datasets.

II. PROJECT AREA

The project area for this report includes all or parts of 19 counties in South Central Texas being 17,942 square miles in area

METHODOLOGY

Merrick used Trimble RTX (A satellite-based service using worldwide continuously operating reference stations) verified with NGS (National Geodetic Survey) ground stations to establish horizontal and vertical control constraints for the LIDAR acquisition RTX coordinates are observed in WGS84(G1762). WGS stands for World Geodetic System and the G1762 is a reference to the GPS week. Coordinate values are converted into NAD83(2011) and NAVD88 values using the HTDP (Horizontal Time Dependent Positioning) program version 3.2.5 published by the National Geodetic Survey.

III. HORIZONTAL AND VERTICAL CONTROL

The project coordinate system is UTM ZONE 14 NORTH based on NAD-83, adjustment of 2011. The geodetic network was tied to CORS (Continuously Operating Reference Stations) via RTX and NGS ground stations. The following existing NGS control points were used as horizontal checks to control this survey.

NGS Primary Horizontal Control Checkpoints		
	RECORD POSITION NAD-83 (2011)	
PT# (NGS NAME)	**LATITUDE**	**LONGITUDE**
E 1454	30°26'20.85973"N	99°49'55.94799"W
G 1091	29°13'06.45321"N	99°44'36.05581"W
G 1432	29°09'22.28226"N	100°23'30.20098"W
K 1086 RESET	28°37'10.80324"N	99°56'37.72763"W
M 1085	28°31'23.32714"N	99°49'37.59832"W

NINE 2	31°03'06.37530"N	99°22'32.37074"W
P 1094	29°20'44.85129"N	98°50'56.04726"W
S 1449	30°35'13.79079"N	99°47'02.33910"W
U 120	30°44'29.70712"N	99°10'30.59590"W
X 1419	31°10'34.45609"N	99°19'08.79230"W

NGS Primary Control
Horizontal NAD-83 (2011)
Comparisons: Record Versus Measured

PT# (NGS NAME)	NORTH (meters)	EAST (meters)
E 1454	-0.059	-0.004
G 1091	-0.031	-0.002
G 1432	-0.057	-0.030
K 1086 RESET	-0.061	-0.016
M 1085	-0.042	+0.009
NINE 2	-0.056	+0.003
P 1094	-0.118	-0.045
S 1449	-0.033	-0.014
U 120	-0.034	-0.030
X 1419	-0.054	+0.013

NGS Primary Vertical Control checks
Comparisons: Record Versus Measured

PT# (NGS NAME)	RECORD	MEASURED
	NAVD 88 elevation in meters	Difference in meters
E 1454	539.842	+0.031
G 1432	297.171	-0.027
K 1086 RESET	187.501	-0.054
M 1085	181.243	-0.039
NINE 2	589.568	+0.042
P 1094	232.384	-0.033

S 1449	622.116	+0.037
U 120	472.821	+0.009
X 1419	553.598	+0.042
U 1447	566.981	+0.080
Q 1387	295.414	-0.044
R 33	299.002	+0.024
S 1387	293.444	+0.147
S 1455	418.802	+0.076
T 1444	677.353	-0.053
W 1444	677.025	-0.061
X 1444	653.013	-0.046

IV. JOB SUMMARY

The coordinate system is the UTM Zone 14 North and the units are in meters. The projection parameters are as follows:

PROJECTION: TRANSVERSE MERCATOR
LATITUDE OF ORIGIN = N 0° 00’ 00.000000”
LONGITUDE OF ORIGIN = W 99° 00’ 00.000000”
FALSE NORTHING =0.000m
FALSE EASTING =500000.000m
SCALE FACTOR =0.9996000000

V. ACCURACY

The data collected was converted and checked with published ground station coordinates. The specifications for accuracy with RTX are 4 centimeters horizontally and 4 centimeters vertically.

VI. EQUIPMENT/SOFTWARE

Satellite data was collected using two Trimble R10 receivers. The coordinates were processed using Trimble Business Center (Version 3.9).

VII. QUALITY ASSURANCE

Existing NGS published control stations were surveyed to assure that there were no discrepancies in the field observation data. Close examinations of the residuals showed no distortions in orientation or scale.

USGS TEXAS MAPPING
LIDAR CHECKPOINTS AND CONTROL
65219783
MARCH 2018

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1001	29°33'14.66669"N	99°44'21.63185"W	415.035	3269602.767	428374.486	438.001	NVA
1002	30°52'44.65308"N	100°24'39.48372"W	685.423	3417052.450	365124.289	708.078	NVA
1003	29°45'26.09050"N	100°04'40.69524"W	496.916	3292373.540	395776.952	519.473	NVA
1004	30°20'40.07981"N	100°55'49.52018"W	549.812	3358535.615	314444.297	573.248	NVA
1005	28°47'16.51301"N	99°38'31.27592"W	183.747	3184658.439	437339.264	207.311	NVA
1006	28°55'46.22102"N	100°06'07.40268"W	190.667	3200675.269	392583.492	213.637	NVA
1007	29°23'17.14466"N	100°41'42.08568"W	308.787	3252178.731	335512.741	331.559	NVA
1008	30°18'49.08649"N	99°57'56.91596"W	602.309	3353934.542	407141.993	624.414	NVA
1009	29°53'03.58084"N	99°16'43.01098"W	464.522	3306000.663	473097.146	486.870	NVA
1010	28°29'49.76948"N	100°12'13.35600"W	233.608	3152867.619	382191.068	256.841	NVA
1011	30°22'09.93337"N	100°37'00.17045"W	618.255	3360830.224	344642.296	640.982	NVA
1012	30°52'08.01458"N	99°28'57.72364"W	545.600	3415171.858	453855.250	568.372	NVA
1013	29°23'19.66294"N	99°12'46.29967"W	282.705	3251080.877	479345.387	306.542	NVA
1014	29°24'06.04156"N	100°00'18.85968"W	320.123	3252909.513	402468.131	342.929	NVA
1015	30°41'22.99269"N	100°38'31.55804"W	689.781	3396366.491	342719.560	712.817	NVA
1016	30°35'27.12793"N	99°35'54.42418"W	459.780	3384413.853	442625.258	482.232	NVA
1017	31°01'42.50309"N	100°19'19.73712"W	714.067	3433508.046	373811.855	736.858	NVA
1018	28°17'56.49727"N	100°00'31.47084"W	208.960	3130740.649	401090.257	232.464	NVA
1019	30°48'49.16966"N	99°55'47.06580"W	689.715	3409320.520	411067.344	712.227	NVA
1020	30°24'50.71244"N	100°21'36.27788"W	631.197	3365455.992	369365.694	653.565	NVA
1021	29°32'00.72511"N	100°54'17.20389"W	332.882	3268611.815	315417.801	355.570	NVA
1022	30°54'54.85619"N	100°36'50.10347"W	687.613	3421324.336	345779.827	710.442	NVA
1023	28°52'19.37892"N	99°36'08.59597"W	181.901	3193959.070	441254.780	205.390	NVA
1024	30°59'27.49841"N	100°14'58.17336"W	674.137	3429271.249	380700.151	696.795	NVA
1025	28°17'38.50948"N	99°36'51.53872"W	126.693	3129927.393	439762.975	150.959	NVA
1026	28°12'11.00419"N	99°36'51.11586"W	173.329	3119849.026	439723.357	197.547	NVA
1027	28°17'24.80644"N	99°45'56.53836"W	169.916	3129590.444	424915.375	193.891	NVA
1028	29°19'55.74817"N	99°28'10.00369"W	268.630	3244877.621	454422.719	292.069	NVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1029	28°37'08.98550"N	99°43'44.07330"W	148.591	3166010.401	428744.574	172.316	NVA
1030	29°59'16.59838"N	100°31'09.02461"W	631.611	3318420.649	353452.868	653.993	NVA
1031	28°24'06.65636"N	100°00'42.05628"W	238.772	3142134.741	400897.453	262.243	NVA
1032	29°47'34.25935"N	100°04'47.02584"W	487.798	3296320.394	395643.847	510.302	NVA
1033	30°45'16.90391"N	99°20'51.57128"W	500.551	3402468.176	466725.641	523.162	NVA
1034	29°23'26.72956"N	100°49'31.17324"W	313.542	3252664.522	322870.521	336.285	NVA
1035	30°48'47.05884"N	99°45'57.25793"W	616.322	3409136.738	426738.786	639.019	NVA
1036	29°35'38.69353"N	100°38'12.49177"W	414.135	3274926.058	341484.482	436.862	NVA
1037	30°43'50.18290"N	99°28'46.32978"W	517.222	3399845.146	454092.135	539.799	NVA
1038	30°07'35.04515"N	100°41'39.94303"W	568.197	3334003.422	336771.892	590.902	NVA
1039	29°40'37.80264"N	99°24'14.04353"W	483.045	3283081.963	460919.051	506.016	NVA
1040	29°51'28.45994"N	99°33'16.57184"W	675.194	3303169.377	446433.332	697.422	NVA
1041	30°45'45.26964"N	100°17'57.35616"W	668.037	3404010.956	375652.866	690.462	NVA
1042	30°00'32.01718"N	100°14'27.84660"W	705.148	3320419.236	380307.777	727.352	NVA
1043	29°26'12.05282"N	100°15'20.08440"W	404.275	3257023.593	378219.160	426.931	NVA
1044	30°08'00.11951"N	99°35'18.33382"W	647.855	3333709.701	443323.209	669.757	NVA
1045	31°28'48.14663"N	99°31'26.93968"W	425.626	3482923.410	450213.571	450.442	NVA
1046	29°12'42.81530"N	99°17'25.91884"W	249.563	3231496.875	471759.946	273.077	NVA
1047	29°49'16.21625"N	100°33'59.99618"W	657.891	3299999.324	348618.945	680.313	NVA
1048	28°37'50.50542"N	100°06'49.96656"W	184.436	3167578.176	391121.085	207.646	NVA
1049	29°05'14.98200"N	99°50'09.73774"W	244.147	3217967.968	418637.066	267.151	NVA
1050	29°10'43.26438"N	100°19'10.59024"W	269.738	3228503.076	371685.908	292.361	NVA
1051	28°30'14.34762"N	99°40'46.77737"W	127.722	3153221.745	433486.713	151.729	NVA
1052	28°55'49.45955"N	99°57'54.50602"W	189.575	3200658.469	405930.092	212.648	NVA
1053	29°51'07.28514"N	99°40'47.36003"W	650.060	3302582.474	434334.879	672.290	NVA
1054	28°16'06.46792"N	99°23'21.52554"W	137.539	3127003.447	461816.921	162.114	NVA
1055	28°56'12.98249"N	99°29'54.46162"W	191.625	3201101.342	451420.111	215.129	NVA
1056	29°11'59.41000"N	99°27'42.49508"W	224.645	3230214.339	455106.834	247.934	NVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1057	30°06'09.52729"N	99°55'29.12588"W	686.640	3330520.159	410899.304	708.833	NVA
1058	29°19'49.84183"N	100°23'08.43576"W	348.069	3245401.405	365459.905	370.726	NVA
1059	31°02'01.16217"N	100°43'03.32605"W	744.674	3434598.838	336074.423	767.727	NVA
1060	29°19'39.50911"N	99°46'59.17210"W	301.080	3244540.879	423966.322	324.119	NVA
1061	29°30'33.61349"N	99°37'16.42688"W	399.312	3264578.729	439790.672	422.434	NVA
1062	30°24'20.80818"N	99°27'13.78332"W	616.635	3363837.839	456408.219	638.435	NVA
1063	28°24'17.68853"N	99°50'53.25727"W	165.813	3142350.551	416922.127	189.572	NVA
1064	29°29'15.70513"N	100°36'41.75172"W	356.175	3263101.882	343762.290	378.925	NVA
1065	29°47'38.04232"N	100°40'32.18302"W	540.983	3297125.132	338046.975	563.551	NVA
1066	30°13'00.45383"N	100°34'18.39519"W	630.524	3343852.553	348726.951	653.073	NVA
1067	30°49'21.11444"N	100°29'15.18720"W	708.477	3410880.766	357719.308	731.201	NVA
1068	29°40'17.91739"N	99°29'40.96118"W	482.685	3282504.029	452129.627	505.608	NVA
1069	30°30'50.46466"N	100°24'03.46032"W	667.481	3376579.494	365575.769	689.933	NVA
1070	30°37'42.84725"N	100°04'27.31584"W	690.966	3388930.947	397046.897	713.270	NVA
1071	29°58'17.40522"N	99°50'01.16502"W	700.039	3315919.811	419571.321	722.181	NVA
1072	30°46'44.33222"N	100°48'52.49251"W	706.852	3406515.295	326356.897	729.991	NVA
1073	31°18'13.85748"N	99°20'28.93546"W	461.186	3463327.145	467514.361	485.412	NVA
1074	31°14'44.30659"N	99°14'21.25306"W	532.351	3456850.284	477219.713	556.354	NVA
1075	28°44'16.74985"N	100°26'17.74500"W	234.746	3179804.947	359553.528	257.731	NVA
1076	29°30'37.48810"N	99°30'06.80933"W	343.962	3264642.143	451357.569	367.261	NVA
1077	31°20'31.54121"N	99°10'35.72324"W	456.507	3467529.100	483202.138	480.996	NVA
1078	30°36'53.07833"N	99°21'55.33200"W	474.964	3386964.027	464980.011	497.265	NVA
1079	30°56'05.54442"N	100°06'03.87720"W	637.705	3422903.937	394810.070	660.226	NVA
1080	30°30'30.45226"N	99°10'05.22678"W	530.491	3375140.924	483868.640	552.571	NVA
1081	28°56'44.66724"N	100°14'49.11972"W	213.871	3202614.287	378475.945	236.683	NVA
1082	29°02'11.47762"N	100°28'54.35868"W	262.106	3212937.574	355718.256	284.773	NVA
1083	29°47'28.00511"N	99°01'45.72242"W	408.159	3295639.657	497161.675	431.327	NVA
1084	28°47'19.55915"N	99°51'02.55233"W	178.122	3184879.971	416971.457	201.437	NVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1085	30°27'44.60299"N	99°43'38.98740"W	599.120	3370248.474	430161.289	621.311	NVA
1086	31°18'05.59962"N	99°32'18.35394"W	491.823	3463147.722	448760.166	515.937	NVA
1087	30°30'00.84571"N	99°58'33.16757"W	554.000	3374622.349	406352.065	576.167	NVA
1088	29°56'50.73101"N	99°41'40.54182"W	698.634	3313162.499	432971.811	720.732	NVA
1089	29°42'58.20484"N	100°04'18.56244"W	437.807	3287815.854	396329.160	460.416	NVA
1090	30°24'09.98812"N	100°47'56.34784"W	575.340	3364790.701	327183.000	598.534	NVA
1091	29°44'16.94440"N	99°48'18.77108"W	511.774	3290030.067	422134.486	534.324	NVA
1092	30°13'41.15759"N	99°45'19.32541"W	683.911	3344302.276	427312.629	706.004	NVA
1093	31°08'46.95043"N	99°20'05.82522"W	498.402	3445872.428	468072.367	521.886	NVA
1094	28°59'57.88943"N	100°34'39.81144"W	239.236	3208946.631	346318.417	261.929	NVA
1095	29°09'24.84018"N	99°02'32.33198"W	192.827	3225369.741	495884.816	216.720	NVA
1096	29°17'22.71012"N	100°46'41.12508"W	279.184	3241387.511	327284.578	301.939	NVA
1097	30°28'45.81692"N	100°33'54.14331"W	654.362	3372948.819	349777.169	677.170	NVA
1098	29°13'56.90528"N	100°07'48.53892"W	295.359	3234271.194	390166.948	318.069	NVA
1099	31°05'47.31299"N	99°33'03.60806"W	552.928	3440424.465	447450.638	576.133	NVA
1100	29°05'59.20757"N	99°56'49.08066"W	244.071	3219410.816	407851.985	266.977	NVA
1101	30°23'46.28112"N	100°56'50.78736"W	566.052	3364296.834	312906.684	589.551	NVA
1102	30°55'06.59086"N	99°54'33.97597"W	596.306	3420923.828	413104.070	619.074	NVA
1103	29°40'04.97154"N	99°01'15.68600"W	350.736	3282003.454	497965.580	374.350	NVA
1104	29°49'35.25658"N	100°01'11.30160"W	475.319	3299992.152	401468.741	497.792	NVA
1105	29°45'35.86770"N	99°17'12.78546"W	467.373	3292222.287	472264.215	490.207	NVA
1106	29°36'09.52960"N	99°03'57.02699"W	383.516	3274758.569	493624.658	407.229	NVA
1107	30°12'13.88372"N	100°01'53.00040"W	631.038	3341824.206	400726.193	653.215	NVA
1108	30°28'09.83773"N	99°19'35.48248"W	626.261	3370845.755	468656.802	648.102	NVA
1109	30°55'30.56525"N	100°56'22.53912"W	743.871	3422919.977	314673.299	767.150	NVA
1110	29°26'52.59116"N	99°17'23.50216"W	286.857	3257650.368	471890.009	310.576	NVA
1111	29°05'24.13939"N	99°33'02.17454"W	242.169	3218086.377	446417.307	265.364	NVA
1112	29°54'01.68887"N	100°20'05.70948"W	672.975	3308505.144	371115.929	695.269	NVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1113	29°20'36.41690"N	100°37'07.26492"W	307.807	3247125.799	342853.273	330.559	NVA
1114	29°45'35.72838"N	99°34'36.29366"W	498.745	3292322.838	444240.083	521.337	NVA
1115	31°04'24.51245"N	100°30'42.35292"W	625.734	3438727.092	355780.678	648.788	NVA
1116	29°33'48.35761"N	100°24'27.57492"W	491.788	3271238.335	363637.086	514.386	NVA
1117	30°52'08.47837"N	99°34'33.57300"W	546.225	3415228.413	444936.809	569.074	NVA
1118	31°26'30.55189"N	99°22'30.23260"W	395.612	3478629.215	464360.090	420.401	NVA
1119	28°39'55.11949"N	100°16'58.62864"W	225.066	3171579.219	374634.421	248.146	NVA
1120	30°43'38.52552"N	100°17'11.82516"W	700.081	3400094.876	376818.599	722.494	NVA
1121	29°28'41.46931"N	99°02'04.20839"W	304.404	3260966.906	496655.059	328.492	NVA
1122	31°01'43.80251"N	99°58'38.32457"W	647.226	3433207.558	406725.786	670.126	NVA
1123	29°58'44.56780"N	100°45'18.45431"W	508.392	3317759.721	330673.233	531.089	NVA
1124	30°55'36.73333"N	99°11'16.80295"W	493.344	3421512.525	482038.605	516.380	NVA
1126	29°40'26.30633"N	100°25'33.10392"W	498.550	3283509.974	362024.285	521.069	NVA
1127	31°00'45.28073"N	99°42'55.70287"W	607.581	3431215.598	431704.737	630.699	NVA
1128	30°21'55.62320"N	99°42'22.03247"W	632.781	3359492.771	432146.417	654.809	NVA
1129	28°40'47.34638"N	99°53'59.03408"W	144.966	3172844.338	412095.538	168.365	NVA
1130	30°23'36.94656"N	99°52'54.40671"W	518.437	3362730.122	415290.360	540.534	NVA
1131	28°49'54.81620"N	99°57'56.81790"W	180.776	3189744.049	405778.624	203.949	NVA
1132	30°05'11.76426"N	100°16'54.93612"W	689.370	3329074.406	376463.464	711.584	NVA
1133	30°10'45.54923"N	100°13'45.61860"W	651.285	3339294.018	381642.368	673.473	NVA
1134	30°10'56.49881"N	100°26'55.99564"W	684.318	3339879.531	360506.934	706.684	NVA
1135	30°44'49.93793"N	99°11'17.55755"W	446.954	3401601.572	481985.052	469.578	NVA
1136	31°05'25.96852"N	99°49'25.06807"W	653.300	3439928.443	421444.407	676.616	NVA
1137	28°39'11.88493"N	100°13'31.02708"W	220.004	3170189.379	380256.275	243.114	NVA
1138	29°39'08.67931"N	100°51'53.66738"W	446.489	3281724.358	319494.081	469.138	NVA
1139	30°17'40.75688"N	99°29'38.01905"W	639.377	3351539.474	452506.111	661.154	NVA
1140	30°42'34.29155"N	99°46'15.78788"W	636.556	3397664.496	426167.434	659.067	NVA
1141	30°19'37.97998"N	99°54'24.26476"W	544.320	3355392.803	412833.538	566.432	NVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1142	31°26'51.26021"N	99°09'56.51748"W	397.898	3479217.787	484255.695	422.861	NVA
1143	29°23'03.90973"N	100°27'56.71188"W	338.694	3251470.063	357759.059	361.387	NVA
1144	30°12'56.20982"N	100°13'40.19088"W	625.584	3343314.770	381830.898	647.771	NVA
1145	29°56'15.93053"N	100°09'55.35036"W	688.480	3312459.402	387528.274	710.719	NVA
1146	28°26'19.38048"N	99°55'49.58710"W	197.028	3146155.160	408887.691	220.605	NVA
1147	29°44'41.52811"N	100°23'40.18560"W	517.589	3291329.560	365154.581	540.034	NVA
1148	29°14'37.23806"N	100°05'00.62988"W	281.180	3235469.842	394711.529	303.939	NVA
1149	30°36'51.71240"N	100°57'35.66400"W	707.123	3388501.879	312128.958	730.654	NVA
1150	28°35'04.81790"N	99°48'11.10524"W	143.482	3162235.553	421467.562	167.140	NVA
1151	30°52'23.65964"N	99°16'50.82647"W	517.002	3415587.495	473159.106	539.878	NVA
1152	30°57'25.51698"N	99°28'52.41137"W	510.482	3424945.515	454038.493	533.372	NVA
1153	29°34'52.93942"N	100°03'50.17932"W	475.677	3272871.794	396954.570	498.338	NVA
1154	30°00'21.07094"N	100°21'35.62020"W	635.667	3320212.389	368842.819	657.940	NVA
1155	31°11'01.80834"N	99°12'51.18516"W	501.283	3449995.589	479588.757	525.054	NVA
1156	30°42'21.97814"N	100°50'56.03974"W	708.592	3398490.842	322938.989	731.856	NVA
1157	29°30'48.58668"N	99°49'40.27883"W	424.609	3265164.345	419767.257	447.497	NVA
1158	30°25'26.76428"N	100°00'42.84195"W	651.292	3366215.312	402819.704	673.377	NVA
1160	29°26'29.78304"N	100°06'44.29620"W	354.364	3257428.183	392121.784	377.078	NVA
1161	29°34'02.05518"N	99°20'58.82240"W	442.565	3270884.340	466129.385	465.940	NVA
1162	30°37'48.23205"N	100°34'05.42518"W	688.549	3389653.006	349708.743	711.441	NVA
1163	30°58'01.89679"N	100°48'53.61478"W	744.132	3427379.019	326666.288	767.262	NVA
1164	29°10'58.21313"N	99°53'29.85558"W	256.286	3228571.589	413307.055	279.216	NVA
1165	30°16'59.03673"N	100°22'19.59597"W	682.565	3350948.929	368034.109	704.829	NVA
1166	29°00'56.79079"N	100°10'14.68920"W	214.179	3210298.455	385982.407	236.984	NVA
1167	28°17'40.80476"N	99°23'41.34235"W	151.249	3129908.181	461286.506	175.830	NVA
1168	30°02'40.36412"N	100°02'56.72976"W	686.572	3324185.009	398859.924	708.798	NVA
1169	29°42'23.61301"N	99°09'34.89505"W	439.176	3286281.123	484552.852	462.372	NVA
1170	30°54'58.98208"N	99°44'38.31734"W	545.674	3420572.367	428912.595	568.624	NVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1171	30°32'04.00733"N	99°23'53.06816"W	502.164	3378076.163	461813.879	524.249	NVA
1172	29°45'47.58286"N	100°24'49.33800"W	537.547	3293385.559	363321.815	559.987	NVA
1173	28°12'19.32124"N	100°10'28.64604"W	173.982	3120510.804	384723.212	197.254	NVA
1174	28°48'08.05392"N	100°21'40.17348"W	233.225	3186835.802	367164.869	256.139	NVA
1175	29°16'21.46120"N	100°16'51.04020"W	322.298	3238871.226	375569.151	344.946	NVA
1176	28°37'29.07332"N	99°34'08.49958"W	147.596	3166543.794	444377.257	171.577	NVA
1177	31°11'51.51725"N	99°35'59.01943"W	552.158	3451661.050	442864.304	575.761	NVA
1178	28°50'04.65508"N	99°28'25.80978"W	166.649	3189756.050	453774.849	190.410	NVA
1179	30°39'33.82408"N	100°51'49.23792"W	652.363	3393336.616	321437.626	675.721	NVA
1180	30°17'23.66218"N	99°31'34.11343"W	645.098	3351027.190	449402.555	666.913	NVA
1181	29°38'11.42304"N	99°46'53.33509"W	451.132	3278763.541	424353.499	473.938	NVA
1182	30°22'44.51196"N	100°12'25.57937"W	682.614	3361404.201	384018.225	704.794	NVA
1183	30°37'26.39557"N	99°08'23.12156"W	405.596	3387941.086	486605.978	428.015	NVA
1184	30°36'20.85620"N	99°47'16.07402"W	620.147	3386179.604	424483.243	642.515	NVA
1185	29°17'18.40603"N	99°39'59.05980"W	275.764	3240127.815	435272.405	298.916	NVA
1186	30°43'48.62338"N	100°10'23.88432"W	674.052	3400286.729	387671.629	696.489	NVA
1187	28°31'45.32164"N	99°34'46.28924"W	121.971	3155969.994	443299.954	146.137	NVA
1188	29°19'17.60120"N	99°05'57.04793"W	231.567	3243616.189	490369.924	255.536	NVA
1189	31°03'08.05320"N	99°22'30.07837"W	564.787	3435451.534	464217.559	587.912	NVA
1190	28°17'46.29120"N	100°12'55.65960"W	208.778	3130613.097	380816.215	232.031	NVA
1191	28°43'51.14867"N	99°43'31.38071"W	166.093	3178384.979	429164.436	189.628	NVA
1192	29°16'53.31112"N	99°53'47.05210"W	284.129	3239504.488	412926.096	307.048	NVA
1193	29°08'03.71929"N	100°32'20.56416"W	268.015	3223851.556	350281.799	290.689	NVA
1194	29°14'03.15892"N	100°29'14.18208"W	294.429	3234850.946	355458.939	317.105	NVA
1195	30°10'09.82786"N	100°26'16.30416"W	681.600	3338429.286	361550.399	703.951	NVA
1196	30°40'40.64642"N	99°35'50.92120"W	503.818	3394064.657	442769.834	526.399	NVA
1197	29°09'21.19446"N	100°23'31.08804"W	275.573	3226058.080	364619.198	298.206	NVA
1198	28°21'36.63540"N	100°02'24.55692"W	217.291	3137541.547	398068.337	240.743	NVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1199	30°33'51.92586"N	100°49'56.22353"W	635.688	3382759.889	324274.446	659.083	NVA
1200	29°38'59.78231"N	99°32'28.74073"W	411.591	3280119.282	447608.578	434.550	NVA
1201	30°50'39.92921"N	99°11'04.36250"W	502.152	3412375.070	482353.651	524.984	NVA
1202	30°50'38.32220"N	100°03'44.21232"W	611.379	3412793.853	398420.681	633.869	NVA
1203	28°50'49.36438"N	100°04'41.14632"W	174.494	3191517.174	394835.948	197.554	NVA
1204	30°16'32.97085"N	100°36'43.32203"W	675.581	3350449.561	344944.687	698.189	NVA
1205	30°03'59.67050"N	99°44'37.31312"W	646.241	3326395.536	428318.956	668.384	NVA
1206	30°16'31.57288"N	99°42'48.09690"W	637.970	3349521.980	431387.969	659.999	NVA
1207	28°38'25.25183"N	100°09'52.76304"W	199.764	3168694.872	386167.836	222.924	NVA
1208	29°39'04.83674"N	99°44'23.83703"W	431.879	3280381.205	428383.906	454.701	NVA
1209	29°30'22.74599"N	100°41'48.36444"W	384.230	3265283.106	335534.273	406.995	NVA
1210	29°12'58.74530"N	100°01'14.06568"W	282.736	3232383.464	400801.085	305.546	NVA
1211	31°07'33.67348"N	99°33'57.27924"W	557.776	3443706.036	446045.481	581.086	NVA
1212	29°23'00.80254"N	99°33'38.78471"W	288.700	3250612.242	445583.101	312.055	NVA
1213	29°42'07.07674"N	99°58'44.98154"W	452.543	3286162.551	405278.861	475.177	NVA
1214	29°01'42.43069"N	99°51'21.32852"W	217.537	3211440.066	416654.191	240.578	NVA
1215	29°55'48.31997"N	99°48'20.94934"W	611.345	3311311.570	422224.882	633.489	NVA
1216	28°32'36.85798"N	99°27'59.83686"W	135.413	3157507.798	454352.619	159.755	NVA
1217	28°49'08.51437"N	100°20'25.87452"W	216.502	3188673.834	369200.170	239.402	NVA
1218	29°40'58.13090"N	100°35'42.37995"W	478.883	3284703.503	345658.647	501.501	NVA
1219	30°37'32.09020"N	100°14'12.49944"W	726.429	3388759.875	381463.791	748.802	NVA
1220	29°39'44.43030"N	99°15'41.97827"W	399.044	3281399.656	474678.396	422.275	NVA
1221	29°03'02.86661"N	100°06'53.44848"W	214.842	3214126.219	391463.482	237.647	NVA
1222	31°23'35.66569"N	99°40'54.59635"W	474.218	3473385.112	435176.091	498.711	NVA
1223	31°04'31.97188"N	100°54'40.87820"W	730.550	3439544.808	317658.555	753.971	NVA
1224	30°59'23.32655"N	100°34'18.78744"W	663.463	3429533.154	349913.431	686.331	NVA
1225	30°35'09.70226"N	100°39'58.42907"W	642.205	3384907.197	340237.612	665.336	NVA
1226	30°30'03.72456"N	100°24'18.16652"W	676.180	3375145.385	365165.846	698.633	NVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1227	28°53'37.11905"N	99°51'06.63818"W	189.948	3196500.737	416944.024	213.148	NVA
1228	30°17'14.00173"N	100°56'53.49770"W	535.524	3352219.635	312626.794	558.938	NVA
1229	29°18'50.98748"N	99°21'35.30664"W	282.788	3242846.733	465061.158	306.327	NVA
1230	30°32'31.29576"N	100°10'02.65584"W	691.433	3379428.547	388019.674	713.764	NVA
1231	30°44'50.47526"N	99°56'13.35930"W	662.353	3401977.981	410307.180	684.766	NVA
1232	29°06'39.95510"N	99°13'52.53301"W	177.017	3220316.587	477499.468	200.571	NVA
1233	28°38'51.38218"N	99°59'53.18333"W	162.887	3169351.781	402453.920	186.206	NVA
1234	30°41'48.06456"N	100°26'09.52800"W	666.569	3396867.648	362473.716	689.173	NVA
1235	30°59'08.06496"N	100°27'27.17568"W	658.995	3428914.605	360825.507	681.817	NVA
1236	30°27'48.73391"N	100°05'43.37275"W	648.247	3370660.502	394844.308	670.459	NVA
1237	28°29'49.83482"N	99°59'41.17747"W	189.344	3152682.411	402641.458	212.790	NVA
1238	30°19'30.28497"N	100°24'21.39488"W	668.416	3355645.056	364837.484	690.744	NVA
1239	29°48'11.76127"N	99°12'07.53527"W	426.219	3297003.189	480470.234	448.997	NVA
1240	31°02'01.10901"N	100°40'55.52672"W	743.204	3434545.358	339462.939	766.209	NVA
1241	28°55'49.55030"N	99°45'26.52998"W	188.371	3200513.990	426181.775	211.614	NVA
1242	29°23'35.27138"N	100°35'27.60936"W	326.935	3252594.626	345616.096	349.679	NVA
1243	30°16'57.51378"N	99°55'05.57794"W	580.886	3350461.978	411690.346	603.032	NVA
1244	29°08'22.55698"N	99°09'15.85015"W	179.582	3223462.021	484981.417	203.264	NVA
1245	29°26'01.51688"N	99°45'30.07750"W	364.328	3256282.693	426445.651	387.378	NVA
1246	30°21'26.20656"N	99°19'40.59034"W	618.784	3358421.487	468484.604	640.409	NVA
1247	30°56'29.49281"N	100°15'45.47268"W	669.514	3423804.952	379383.438	692.084	NVA
1248	31°23'53.48393"N	99°27'33.30961"W	427.513	3473823.912	456339.978	452.093	NVA
1249	29°29'59.90676"N	99°07'49.37480"W	288.458	3263387.611	487362.401	312.344	NVA
1250	28°22'08.80039"N	100°15'40.14144"W	196.088	3138738.118	376420.091	219.301	NVA
1251	28°15'25.87122"N	99°48'20.09311"W	159.605	3125955.771	420980.608	183.503	NVA
1252	29°06'39.55550"N	99°35'51.40403"W	248.366	3220429.727	441854.339	271.514	NVA
1253	30°00'43.05302"N	100°44'29.76766"W	517.027	3321387.642	332033.629	539.721	NVA
1254	30°17'02.18827"N	100°38'43.69477"W	666.899	3351395.209	341741.120	689.583	NVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1255	29°06'48.39037"N	99°27'29.26278"W	200.179	3220640.801	455426.866	223.459	NVA
1256	29°32'38.51084"N	99°59'26.22188"W	375.566	3268671.168	404021.042	398.324	NVA
1257	31°05'03.10747"N	99°17'29.72245"W	490.092	3438969.623	472187.524	513.413	NVA
1258	30°05'59.47544"N	100°06'33.13620"W	690.720	3330368.964	393123.714	712.908	NVA
1259	29°19'51.56659"N	100°31'05.85660"W	317.554	3245614.392	352582.854	340.262	NVA
1260	31°03'03.66361"N	100°06'59.45868"W	701.616	3435791.452	393464.197	724.369	NVA
1261	30°51'19.40183"N	100°42'51.07039"W	721.699	3414833.357	336095.288	744.642	NVA
1262	28°58'55.83716"N	99°37'28.56191"W	198.573	3206171.687	439152.873	221.848	NVA
1263	29°20'49.39505"N	99°56'46.66315"W	301.023	3246809.048	408138.280	323.888	NVA
1264	30°02'44.80800"N	99°50'38.55473"W	678.431	3324158.266	418629.920	700.623	NVA
1265	31°29'18.94369"N	99°24'56.70252"W	409.072	3483827.471	460513.567	433.983	NVA
1266	30°29'44.02507"N	100°43'58.47353"W	627.360	3374976.322	333689.171	650.514	NVA
1267	28°22'41.46866"N	99°37'31.27069"W	150.429	3139256.025	438729.047	174.650	NVA
1268	30°48'51.32970"N	100°12'03.91212"W	634.591	3409634.295	385111.310	657.050	NVA
1269	30°29'27.28904"N	100°54'33.41435"W	593.285	3374734.171	316750.712	616.801	NVA
1270	28°34'00.27782"N	99°54'31.28443"W	167.167	3160323.112	411125.064	190.675	NVA
1271	29°27'22.18943"N	100°25'02.23284"W	381.844	3259362.410	362559.512	404.522	NVA
1272	31°01'26.87383"N	99°08'21.41812"W	440.957	3432284.656	486706.562	464.273	NVA
1273	28°53'25.99829"N	100°13'15.16332"W	209.557	3196472.983	380956.612	232.441	NVA
1274	29°50'40.97627"N	99°23'31.84170"W	529.084	3301643.312	462116.415	551.491	NVA
1275	29°16'29.17398"N	99°10'41.73424"W	254.641	3238441.635	482683.638	278.440	NVA
1276	30°52'12.19581"N	100°49'41.86610"W	738.634	3416632.040	325209.387	761.728	NVA
1277	29°11'45.00103"N	100°17'49.14888"W	279.796	3230378.861	373906.832	302.417	NVA
1278	30°31'48.12791"N	100°27'29.36876"W	691.038	3378424.341	360110.039	713.593	NVA
1279	30°37'32.18664"N	99°54'23.97445"W	576.787	3388461.284	413106.713	599.096	NVA
1280	30°53'58.52724"N	99°20'17.18254"W	580.196	3418523.129	467688.467	603.071	NVA
1281	30°31'00.54667"N	99°48'13.52797"W	501.025	3376329.968	422883.019	523.306	NVA
1282	28°35'06.67198"N	100°21'21.95712"W	222.986	3162780.254	367385.382	246.128	NVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1283	30°43'19.18153"N	100°33'18.48672"W	705.639	3399825.148	351099.612	728.479	NVA
1284	31°10'08.15884"N	99°26'39.58433"W	536.436	3448409.178	457656.426	559.943	NVA
1285	28°12'25.37089"N	99°53'30.24992"W	223.200	3120460.325	412488.446	246.893	NVA
1286	30°25'06.63578"N	99°32'43.60240"W	618.797	3365287.375	447614.832	640.719	NVA
1287	29°31'06.72308"N	100°16'30.14544"W	407.758	3266114.494	376430.747	430.395	NVA
1288	29°50'32.94938"N	100°06'45.36432"W	542.330	3301851.060	392519.696	564.722	NVA
1289	31°29'55.66438"N	99°39'41.65610"W	427.267	3485072.684	437172.902	452.131	NVA
1290	29°24'57.35131"N	100°12'12.43116"W	382.075	3254670.881	383251.607	404.748	NVA
1291	28°52'26.48813"N	100°31'21.94392"W	247.210	3194981.826	351494.190	270.029	NVA
1292	29°05'15.52830"N	100°28'13.83924"W	267.912	3218589.143	356884.984	290.566	NVA
1293	29°44'36.75131"N	100°45'54.52160"W	559.187	3291673.009	329306.017	581.807	NVA
1294	30°46'25.05479"N	100°24'15.94368"W	709.408	3405357.360	365602.578	731.971	NVA
1295	29°25'05.15413"N	99°21'55.78178"W	311.143	3254364.324	464544.895	334.764	NVA
1296	30°48'20.81881"N	100°37'17.86935"W	716.944	3409202.630	344866.547	739.815	CAL
1297	30°54'31.12317"N	100°56'51.48633"W	739.980	3421102.989	313872.877	763.263	NVA
1298	30°07'05.01258"N	100°18'37.97928"W	652.091	3332591.995	373744.880	674.328	NVA
1299	29°46'17.42941"N	99°43'05.24093"W	489.276	3293683.070	430579.704	511.770	NVA
1300	28°36'32.55574"N	99°27'03.52714"W	143.750	3164755.303	455910.089	167.978	NVA
1301	29°57'17.87443"N	100°10'36.06420"W	701.176	3314377.360	386456.264	723.404	NVA
1302	28°42'21.82684"N	99°38'20.70089"W	167.125	3175587.847	437577.317	190.825	NVA
1303	30°15'31.97221"N	99°23'45.99150"W	643.858	3347538.422	461895.626	665.561	NVA
1304	29°56'40.82590"N	100°32'14.02779"W	649.118	3313648.350	351646.562	671.498	NVA
1305	29°15'48.62135"N	99°34'21.91444"W	257.203	3237316.346	444355.386	280.443	NVA
1306	30°54'18.22000"N	100°06'05.49324"W	685.759	3419600.155	394734.537	708.259	NVA
1307	30°32'36.00301"N	99°40'51.10212"W	491.008	3379190.877	434692.385	513.373	NVA
1308	29°54'23.49778"N	99°35'49.50676"W	667.718	3308577.630	442358.093	689.820	NVA
1309	29°35'01.10062"N	98°58'12.48470"W	317.089	3272651.015	502892.393	341.080	NVA
1310	30°36'07.11936"N	99°28'43.96703"W	500.570	3385590.074	454094.200	522.898	NVA

USGS TEXAS MAPPING
LIDAR CHECKPOINTS AND CONTROL
65219783
MARCH 2018

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1311	30°57'31.04089"N	99°37'26.08234"W	601.634	3425183.181	440411.341	624.590	NVA
1312	28°40'39.30247"N	99°48'18.21056"W	148.537	3172530.735	421343.861	172.058	NVA
1313	28°24'27.82904"N	99°33'08.51105"W	134.474	3142494.164	445895.492	158.826	NVA
1314	30°33'19.62335"N	100°03'25.77636"W	613.502	3380811.978	398609.150	635.750	NVA
1315	30°04'13.17677"N	100°08'51.88380"W	694.626	3327133.405	389377.027	716.819	NVA
1316	29°01'18.11143"N	99°27'09.41573"W	200.942	3210473.990	455924.248	224.313	NVA
1317	30°39'53.02285"N	99°14'48.60629"W	422.960	3392472.380	476353.552	445.437	NVA
1318	29°01'11.95500"N	99°40'28.36682"W	218.517	3210387.653	434311.066	241.682	NVA
1319	29°36'49.48320"N	100°38'18.04510"W	443.035	3277107.404	341365.861	465.746	NVA
2001	29°33'15.28085"N	99°44'23.62531"W	418.455	3269622.012	428320.960	441.420	VVA
2002	30°52'43.80629"N	100°24'39.08700"W	685.543	3417026.245	365134.495	708.198	VVA
2003	29°45'26.25653"N	100°04'40.27548"W	497.471	3292378.546	395788.274	520.028	VVA
2004	30°20'40.31419"N	100°55'49.67385"W	549.845	3358542.901	314440.316	573.281	VVA
2005	28°47'16.46801"N	99°38'31.78381"W	183.866	3184657.129	437325.487	207.430	VVA
2006	28°55'44.61265"N	100°06'06.68556"W	190.583	3200625.586	392602.448	213.553	VVA
2007	29°23'16.91700"N	100°41'41.40564"W	308.691	3252171.456	335530.973	331.463	VVA
2008	30°18'48.74454"N	99°57'57.15117"W	602.327	3353924.068	407135.622	624.432	VVA
2009	29°53'01.81187"N	99°16'44.72612"W	464.742	3305946.326	473051.010	487.092	VVA
2010	28°29'50.69551"N	100°12'20.49192"W	233.120	3152898.066	381997.337	256.351	VVA
2011	30°22'10.49172"N	100°37'00.80935"W	617.789	3360847.658	344625.485	640.517	VVA
2012	30°52'07.96271"N	99°28'58.90613"W	544.695	3415170.397	453823.842	567.467	VVA
2013	29°23'19.00946"N	99°12'46.34798"W	282.995	3251060.768	479344.048	306.832	VVA
2014	29°24'06.30360"N	100°00'19.11132"W	320.220	3252917.637	402461.418	343.026	VVA
2015	30°41'22.78778"N	100°38'31.25057"W	689.368	3396360.062	342727.649	712.404	VVA
2016	30°35'27.01741"N	99°35'54.00888"W	459.528	3384410.392	442636.300	481.980	VVA
2017	31°01'55.36042"N	100°19'19.64208"W	707.515	3433903.877	373819.085	730.315	VVA
2018	28°17'56.88755"N	100°00'33.79320"W	209.101	3130753.188	401027.100	232.604	VVA
2019	30°48'49.18928"N	99°55'47.34484"W	689.700	3409321.186	411059.934	712.212	VVA

USGS TEXAS MAPPING
LIDAR CHECKPOINTS AND CONTROL
65219783
MARCH 2018

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
2020	30°24'50.86785"N	100°21'36.67802"W	631.224	3365460.905	369355.075	653.592	VVA
2021	29°31'59.15875"N	100°54'17.66500"W	331.697	3268563.796	315404.596	354.386	VVA
2022	30°54'55.31872"N	100°36'50.00779"W	687.378	3421338.540	345782.574	710.207	VVA
2023	28°52'19.04855"N	99°36'07.84890"W	181.904	3193948.800	441274.967	205.394	VVA
2024	30°59'27.32086"N	100°14'58.12044"W	674.059	3429265.767	380701.493	696.717	VVA
2025	28°17'38.09393"N	99°36'51.58508"W	126.219	3129914.612	439761.647	150.485	VVA
2026	28°12'10.63336"N	99°36'50.52870"W	173.156	3119837.533	439739.306	197.374	VVA
2027	28°17'24.54497"N	99°45'58.10605"W	170.475	3129582.668	424872.621	194.449	VVA
2028	29°19'55.98574"N	99°28'10.53869"W	268.912	3244884.991	454408.320	292.351	VVA
2029	28°37'08.99022"N	99°43'44.30212"W	148.405	3166010.584	428738.361	172.130	VVA
2030	29°59'16.46748"N	100°31'08.71325"W	632.163	3318416.509	353461.159	654.544	VVA
2031	28°24'06.26443"N	100°00'43.62624"W	238.315	3142123.038	400854.630	261.785	VVA
2032	29°47'34.08032"N	100°04'46.82424"W	487.713	3296314.832	395649.209	510.217	VVA
2033	30°45'15.23138"N	99°20'45.73867"W	498.547	3402416.210	466880.549	521.157	VVA
2034	29°23'26.47972"N	100°49'30.59940"W	313.585	3252656.589	322885.872	336.328	VVA
2035	30°48'48.17948"N	99°45'56.26886"W	617.314	3409171.058	426765.302	640.012	VVA
2036	29°35'39.36170"N	100°38'12.00205"W	414.307	3274946.441	341497.948	437.035	VVA
2037	30°43'49.84504"N	99°28'45.93824"W	517.168	3399834.701	454102.503	539.745	VVA
2038	30°07'35.65363"N	100°41'40.03669"W	568.363	3334022.193	336769.663	591.069	VVA
2039	29°40'37.51288"N	99°24'13.90432"W	482.696	3283073.031	460922.761	505.667	VVA
2040	29°51'28.48730"N	99°33'15.85724"W	674.650	3303170.127	446452.508	696.878	VVA
2041	30°45'59.41865"N	100°17'34.30500"W	664.398	3404439.475	376270.758	686.821	VVA
2042	30°00'31.66380"N	100°14'28.50576"W	704.945	3320408.550	380290.000	727.149	VVA
2043	29°26'11.73653"N	100°15'20.18880"W	404.120	3257013.887	378216.242	426.776	VVA
2044	30°08'00.35707"N	99°35'18.76286"W	647.094	3333717.073	443311.768	668.996	VVA
2045	31°28'47.91842"N	99°31'27.36656"W	425.660	3482916.438	450202.274	450.476	VVA
2046	29°12'43.37363"N	99°17'22.39764"W	252.593	3231513.823	471855.062	276.110	VVA
2047	29°49'15.62249"N	100°33'59.83903"W	657.139	3299980.987	348622.915	679.561	VVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
2048	28°37'48.52805"N	100°06'50.33736"W	184.640	3167517.413	391110.450	207.850	VVA
2049	29°05'57.46434"N	99°50'02.58875"W	237.598	3219274.101	418839.588	260.596	VVA
2050	29°10'44.77066"N	100°19'07.39848"W	269.006	3228548.472	371772.646	291.628	VVA
2051	28°30'13.31406"N	99°40'46.18884"W	126.541	3153189.848	433502.532	150.549	VVA
2052	28°55'50.09909"N	99°57'53.90575"W	189.717	3200678.020	405946.504	212.790	VVA
2053	29°51'07.00416"N	99°40'47.30041"W	650.739	3302573.815	434336.427	672.969	VVA
2054	28°16'07.23792"N	99°23'21.04602"W	137.680	3127027.100	461830.061	162.256	VVA
2055	28°55'55.37150"N	99°29'52.38413"W	193.202	3200559.114	451474.075	216.719	VVA
2056	29°12'00.19541"N	99°27'42.23124"W	224.790	3230238.483	455114.054	248.079	VVA
2057	30°07'01.57584"N	99°55'32.07061"W	683.541	3332122.985	410833.474	705.730	VVA
2058	29°19'49.82653"N	100°23'08.05164"W	347.935	3245400.811	365470.260	370.592	VVA
2059	31°02'01.73347"N	100°43'04.46647"W	744.269	3434616.897	336044.457	767.323	VVA
2060	29°19'39.98269"N	99°46'58.86962"W	301.430	3244555.400	423974.578	324.469	VVA
2061	29°30'33.51006"N	99°37'16.09972"W	399.609	3264575.499	439799.464	422.732	VVA
2062	30°24'26.50540"N	99°27'08.98405"W	612.906	3364012.700	456536.973	634.707	VVA
2063	28°24'28.10866"N	99°51'01.38636"W	172.537	3142672.786	416703.194	196.290	VVA
2064	29°29'15.44287"N	100°36'41.60232"W	356.110	3263093.753	343766.202	378.860	VVA
2065	29°47'38.82189"N	100°40'32.14647"W	541.197	3297149.117	338048.305	563.764	VVA
2066	30°13'00.55829"N	100°34'18.00079"W	630.211	3343855.623	348737.541	652.759	VVA
2067	30°49'20.40578"N	100°29'15.43812"W	708.434	3410859.036	357712.350	731.158	VVA
2068	29°40'28.55662"N	99°29'25.98032"W	499.547	3282829.781	452533.690	522.464	VVA
2069	30°30'50.71064"N	100°24'03.21552"W	666.725	3376586.987	365582.388	689.177	VVA
2070	30°37'41.71177"N	100°04'27.35544"W	690.472	3388896.001	397045.509	712.776	VVA
2071	29°57'56.99156"N	99°50'11.95674"W	690.510	3315293.553	419277.518	712.651	VVA
2072	30°46'44.34099"N	100°48'52.96841"W	706.598	3406515.770	326344.249	729.737	VVA
2073	31°18'14.04990"N	99°20'28.92757"W	461.128	3463333.068	467514.588	485.355	VVA
2074	31°14'44.78561"N	99°14'21.40426"W	532.716	3456865.039	477215.746	556.719	VVA
2075	28°44'15.40219"N	100°26'17.06028"W	232.402	3179763.243	359571.602	255.387	VVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
2076	29°30'14.39140"N	99°29'40.92774"W	345.847	3263928.280	452051.332	369.169	VVA
2077	31°20'31.88612"N	99°10'35.62082"W	456.426	3467539.714	483204.862	480.916	VVA
2078	30°36'53.26873"N	99°21'54.81065"W	475.245	3386969.843	464993.911	497.546	VVA
2079	30°56'05.29350"N	100°06'03.08736"W	638.030	3422896.005	394830.955	660.551	VVA
2080	30°30'27.38700"N	99°10'10.92547"W	528.896	3375046.796	483716.608	550.972	VVA
2081	28°56'44.51298"N	100°14'49.31700"W	213.846	3202609.595	378470.554	236.658	VVA
2082	29°02'11.76493"N	100°28'54.35688"W	262.090	3212946.418	355718.415	284.757	VVA
2083	29°47'27.56537"N	99°01'45.21745"W	407.946	3295626.119	497175.228	431.114	VVA
2084	28°47'18.98750"N	99°51'02.15269"W	177.655	3184862.300	416982.167	200.971	VVA
2085	30°26'51.40572"N	99°43'06.03559"W	598.517	3368605.263	431029.608	620.672	VVA
2086	31°18'07.20410"N	99°32'35.05628"W	498.518	3463199.284	448318.882	522.632	VVA
2087	30°30'01.55495"N	99°58'33.25868"W	553.734	3374644.204	406349.825	575.901	VVA
2088	29°56'50.96584"N	99°41'42.00497"W	697.970	3313169.965	432932.633	720.068	VVA
2089	29°42'58.31201"N	100°04'19.13628"W	438.189	3287819.296	396313.772	460.798	VVA
2090	30°24'09.45548"N	100°47'55.80897"W	575.249	3364774.073	327197.121	598.442	VVA
2091	29°44'17.28042"N	99°48'18.71460"W	512.586	3290040.399	422136.076	535.135	VVA
2092	30°13'31.91380"N	99°45'17.79736"W	683.025	3344017.458	427351.587	705.119	VVA
2093	31°08'46.60872"N	99°20'06.82249"W	498.667	3445861.988	468045.929	522.151	VVA
2094	28°59'57.79198"N	100°34'39.48816"W	238.663	3208943.514	346327.125	261.356	VVA
2095	29°09'29.76923"N	99°02'32.14964"W	196.257	3225521.436	495889.796	220.150	VVA
2096	29°17'22.89883"N	100°46'41.08188"W	279.186	3241393.302	327285.832	301.941	VVA
2097	30°28'46.28399"N	100°33'53.71067"W	654.372	3372963.039	349788.906	677.180	VVA
2098	29°13'56.98614"N	100°07'49.11888"W	295.010	3234273.833	390151.314	317.719	VVA
2099	31°05'47.12579"N	99°33'03.54470"W	552.984	3440418.693	447452.288	576.189	VVA
2100	29°05'59.56310"N	99°56'49.93606"W	243.620	3219421.944	407828.950	266.526	VVA
2101	30°23'54.18844"N	100°56'59.30831"W	568.262	3364544.221	312683.441	591.766	VVA
2102	30°55'06.41514"N	99°54'33.89260"W	596.163	3420918.401	413106.239	618.931	VVA
2103	29°40'04.84558"N	99°01'15.98988"W	350.753	3281999.578	497957.411	374.367	VVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
2104	29°49'35.67536"N	100°01'11.66232"W	475.057	3300005.128	401459.173	497.530	VVA
2105	29°45'32.63407"N	99°17'23.49881"W	482.295	3292123.478	471976.253	505.128	VVA
2106	29°36'39.41388"N	99°03'58.63327"W	388.666	3275678.378	493581.980	412.350	VVA
2107	30°12'14.13619"N	100°01'52.86540"W	631.150	3341831.945	400729.873	653.327	VVA
2108	30°28'09.32329"N	99°19'35.32897"W	625.302	3370829.908	468660.850	647.143	VVA
2109	30°55'30.59794"N	100°56'22.90796"W	743.737	3422921.154	314663.525	767.016	VVA
2110	29°26'52.47701"N	99°17'23.35549"W	286.787	3257646.844	471893.951	310.507	VVA
2111	29°05'24.15095"N	99°33'02.55301"W	242.224	3218086.781	446407.078	265.419	VVA
2112	29°54'01.78456"N	100°20'05.84160"W	672.904	3308508.131	371112.420	695.198	VVA
2113	29°20'36.56785"N	100°37'07.72896"W	307.837	3247130.619	342840.822	330.590	VVA
2114	29°45'35.09543"N	99°34'36.56197"W	497.623	3292303.392	444232.780	520.215	VVA
2115	31°04'25.08096"N	100°30'44.18028"W	626.304	3438745.256	355732.487	649.358	VVA
2116	29°33'49.18468"N	100°24'27.72900"W	492.154	3271263.845	363633.248	514.752	VVA
2117	30°52'08.75089"N	99°34'34.19368"W	546.728	3415236.887	444920.370	569.578	VVA
2118	31°26'30.90541"N	99°22'30.35791"W	395.284	3478640.110	464356.820	420.073	VVA
2119	28°39'53.78116"N	100°16'56.86212"W	225.010	3171537.512	374681.933	248.090	VVA
2120	30°43'35.05782"N	100°17'08.69388"W	701.790	3399987.160	376900.657	724.202	VVA
2121	29°28'41.44937"N	99°02'03.84522"W	304.146	3260966.289	496664.839	328.235	VVA
2122	31°01'44.88751"N	99°58'38.75732"W	647.357	3433241.063	406714.607	670.258	VVA
2123	29°58'44.29257"N	100°45'17.63380"W	508.124	3317750.911	330695.096	530.821	VVA
2124	30°55'36.55783"N	99°11'15.35485"W	492.509	3421507.057	482077.027	515.545	VVA
2125	29°11'50.44488"N	99°45'00.87350"W	254.910	3230083.111	427064.548	277.927	VVA
2126	29°40'26.31659"N	100°25'33.47184"W	498.233	3283510.412	362014.398	520.752	VVA
2127	31°00'45.55537"N	99°42'54.87872"W	607.913	3431223.913	431726.644	631.031	VVA
2128	30°21'56.45902"N	99°42'21.92900"W	632.444	3359518.482	432149.339	654.472	VVA
2129	28°40'47.99309"N	99°53'57.78895"W	144.964	3172863.987	412129.481	168.363	VVA
2130	30°23'38.61460"N	99°52'55.11974"W	520.728	3362781.619	415271.732	542.825	VVA
2131	28°49'50.04674"N	99°57'58.62928"W	179.502	3189597.659	405728.340	202.675	VVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
2132	30°05'12.54334"N	100°16'55.87464"W	689.079	3329098.672	376438.608	711.293	VVA
2133	30°10'46.08340"N	100°13'44.91588"W	651.788	3339310.259	381661.340	673.976	VVA
2134	30°10'56.40334"N	100°26'57.44508"W	684.139	3339877.085	360468.130	706.505	VVA
2135	30°44'49.66130"N	99°11'19.16441"W	446.351	3401593.128	481942.315	468.974	VVA
2136	31°05'26.04124"N	99°49'26.23908"W	654.391	3439930.912	421413.399	677.707	VVA
2137	28°39'11.52166"N	100°13'28.48260"W	219.911	3170177.490	380325.240	243.021	VVA
2138	29°39'09.50503"N	100°51'53.85970"W	446.865	3281749.863	319489.319	469.514	VVA
2139	30°17'40.93588"N	99°29'37.73094"W	639.679	3351544.951	452513.831	661.456	VVA
2140	30°42'12.63413"N	99°46'19.15576"W	650.989	3396998.395	426073.262	673.491	VVA
2141	30°19'38.37500"N	99°54'24.72545"W	544.910	3355405.061	412821.332	567.022	VVA
2142	31°26'51.56318"N	99°09'56.59247"W	397.359	3479227.118	484253.729	422.322	VVA
2143	29°23'03.74093"N	100°27'56.40624"W	338.753	3251464.763	357767.233	361.446	VVA
2144	30°12'55.98608"N	100°13'39.79992"W	625.370	3343307.770	381841.277	647.557	VVA
2145	29°56'16.13483"N	100°09'55.64988"W	688.470	3312465.773	387520.307	710.709	VVA
2146	28°26'20.15268"N	99°55'50.38997"W	197.803	3146179.094	408866.034	221.380	VVA
2147	29°44'41.79199"N	100°23'40.23204"W	517.666	3291337.699	365153.431	540.111	VVA
2148	29°14'37.15544"N	100°05'00.31992"W	280.879	3235467.221	394719.872	303.638	VVA
2149	30°36'51.40869"N	100°57'36.00355"W	707.154	3388492.685	312119.752	730.686	VVA
2150	28°35'04.77892"N	99°48'10.81775"W	143.555	3162234.300	421475.364	167.213	VVA
2151	30°52'22.45195"N	99°16'51.05543"W	516.704	3415550.332	473152.933	539.579	VVA
2152	30°57'25.66836"N	99°28'52.67856"W	510.551	3424950.206	454031.424	533.441	VVA
2153	29°34'54.68765"N	100°03'50.29236"W	483.453	3272925.634	396952.022	506.114	VVA
2154	30°00'20.93249"N	100°21'36.46224"W	635.756	3320208.395	368820.207	658.029	VVA
2155	31°10'51.24698"N	99°13'00.99577"W	501.257	3449670.956	479328.458	525.014	VVA
2156	30°42'22.00758"N	100°50'55.76303"W	708.718	3398491.627	322946.367	731.982	VVA
2157	29°30'48.27146"N	99°49'40.04335"W	424.351	3265154.598	419773.528	447.239	VVA
2158	30°25'27.29613"N	100°00'42.95025"W	651.412	3366231.711	402816.961	673.498	VVA
2160	29°26'29.35313"N	100°06'44.31204"W	354.058	3257414.954	392121.231	376.772	VVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
2161	29°34'02.23306"N	99°20'58.95301"W	442.272	3270889.826	466125.887	465.646	VVA
2162	30°37'48.08343"N	100°34'04.72258"W	688.400	3389648.169	349727.386	711.290	VVA
2163	30°58'02.21364"N	100°48'53.53174"W	744.056	3427388.739	326668.650	767.186	VVA
2164	29°10'57.90799"N	99°53'30.37034"W	255.843	3228562.303	413293.080	278.774	VVA
2165	30°16'58.78132"N	100°22'19.54751"W	682.451	3350941.051	368035.308	704.714	VVA
2166	29°00'56.80922"N	100°10'14.41632"W	214.166	3210298.949	385989.796	236.971	VVA
2167	28°17'40.25767"N	99°23'41.77244"W	152.102	3129891.384	461274.736	176.682	VVA
2169	29°42'23.48345"N	99°09'35.08272"W	439.342	3286277.142	484547.804	462.538	VVA
2170	30°54'58.70977"N	99°44'36.87976"W	544.913	3420563.729	428950.696	567.863	VVA
2171	30°32'04.28971"N	99°23'52.71720"W	501.917	3378084.823	461823.262	524.002	VVA
2172	29°45'47.94836"N	100°24'49.69692"W	537.041	3293396.929	363312.313	559.481	VVA
2173	28°12'19.90030"N	100°10'30.47880"W	173.170	3120529.109	384673.418	196.442	VVA
2174	28°48'08.13560"N	100°21'39.80772"W	233.371	3186838.202	367174.814	256.285	VVA
2175	29°16'21.56902"N	100°16'51.68748"W	322.610	3238874.735	375551.719	345.258	VVA
2176	28°37'28.82312"N	99°34'09.10924"W	147.089	3166536.173	444360.666	171.070	VVA
2177	31°11'51.84103"N	99°36'01.88327"W	551.445	3451671.430	442788.569	575.048	VVA
2178	28°50'04.42975"N	99°28'25.92005"W	166.481	3189749.128	453771.834	190.242	VVA
2179	30°39'34.59946"N	100°51'49.10105"W	653.156	3393360.431	321441.665	676.514	VVA
2180	30°17'23.23766"N	99°31'34.25927"W	643.577	3351014.140	449398.598	665.392	VVA
2181	29°38'12.09311"N	99°46'53.12161"W	451.697	3278784.127	424359.378	474.503	VVA
2182	30°22'44.73284"N	100°12'24.86569"W	682.571	3361410.798	384037.347	704.751	VVA
2183	30°37'26.11873"N	99°08'21.73668"W	406.469	3387932.519	486642.835	428.888	VVA
2184	30°36'21.37338"N	99°47'16.22000"W	619.762	3386195.552	424479.467	642.130	VVA
2185	29°17'18.69518"N	99°39'58.74239"W	275.734	3240136.666	435281.020	298.887	VVA
2186	30°43'48.32576"N	100°10'24.64824"W	673.600	3400277.779	387651.217	696.037	VVA
2187	28°31'45.66983"N	99°34'46.79634"W	121.824	3155980.776	443286.224	145.990	VVA
2188	29°19'17.58310"N	99°05'56.69084"W	231.472	3243615.624	490379.554	255.441	VVA
2189	31°03'08.32820"N	99°22'30.18468"W	565.622	3435460.010	464214.770	588.747	VVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
2190	28°17'46.12081"N	100°12'56.19240"W	208.831	3130607.999	380801.648	232.084	VVA
2191	28°43'51.35668"N	99°43'31.00282"W	165.488	3178391.319	429174.726	189.023	VVA
2192	29°16'53.16456"N	99°53'46.73609"W	283.850	3239499.912	412934.588	306.769	VVA
2193	29°08'03.90152"N	100°32'20.60772"W	268.047	3223857.181	350280.695	290.721	VVA
2194	29°14'03.02845"N	100°29'14.59140"W	294.389	3234847.070	355447.836	317.065	VVA
2195	30°10'09.14794"N	100°26'15.99679"W	681.277	3338408.251	361558.357	703.628	VVA
2196	30°40'41.06154"N	99°35'50.58996"W	503.418	3394077.389	442778.715	525.999	VVA
2197	29°09'22.08290"N	100°23'31.57116"W	274.867	3226085.581	364606.468	297.500	VVA
2198	28°21'34.75267"N	100°02'23.48448"W	216.630	3137483.354	398097.032	240.083	VVA
2199	30°33'52.26841"N	100°49'55.94161"W	635.798	3382770.314	324282.129	659.194	VVA
2200	29°39'00.44701"N	99°32'27.85092"W	411.420	3280139.629	447632.596	434.379	VVA
2201	30°50'40.01230"N	99°11'04.70299"W	501.897	3412377.643	482344.611	524.729	VVA
2202	30°50'38.69653"N	100°03'43.77672"W	611.125	3412805.267	398432.362	633.615	VVA
2203	28°50'49.00438"N	100°04'40.62144"W	174.512	3191505.965	394850.071	197.573	VVA
2204	30°16'33.14064"N	100°36'44.12222"W	675.107	3350455.092	344923.379	697.716	VVA
2205	30°03'59.64368"N	99°44'37.53442"W	646.321	3326394.749	428313.026	668.464	VVA
2206	30°16'31.16914"N	99°42'48.29105"W	637.024	3349509.584	431382.704	659.053	VVA
2207	28°38'25.07960"N	100°09'52.20828"W	199.381	3168689.424	386182.847	222.541	VVA
2208	29°39'04.21992"N	99°44'23.64047"W	431.976	3280362.185	428389.069	454.799	VVA
2209	29°30'23.16557"N	100°41'47.20884"W	384.535	3265295.568	335565.580	407.300	VVA
2210	29°12'58.89031"N	100°01'14.64276"W	283.141	3232388.062	400785.541	305.951	VVA
2211	31°07'33.37694"N	99°33'57.91104"W	557.722	3443696.992	446028.702	581.032	VVA
2212	29°23'00.61159"N	99°33'39.17556"W	288.639	3250606.416	445572.538	311.994	VVA
2213	29°42'06.54912"N	99°58'45.24575"W	452.139	3286146.370	405271.624	474.773	VVA
2214	29°01'42.14809"N	99°51'22.64191"W	217.101	3211431.626	416618.601	240.142	VVA
2215	29°55'48.30539"N	99°48'20.25554"W	610.353	3311310.990	422243.480	632.497	VVA
2216	28°32'37.70480"N	99°27'59.73397"W	134.774	3157533.848	454355.516	159.116	VVA
2217	28°49'08.27908"N	100°20'25.96596"W	216.339	3188666.619	369197.610	239.239	VVA

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
2218	29°40'58.61750"N	100°35'42.16211"W	478.938	3284718.402	345664.709	501.556	VVA
2219	30°37'31.92200"N	100°14'11.87556"W	726.560	3388754.515	381480.345	748.933	VVA
2220	29°39'44.81935"N	99°15'42.16568"W	398.468	3281411.641	474673.386	421.699	VVA
2221	29°03'02.46776"N	100°06'53.60076"W	214.663	3214113.982	391459.248	237.468	VVA
2227	28°53'37.19008"N	99°51'06.85192"W	190.016	3196502.964	416938.251	213.216	VVA
2230	30°32'31.36711"N	100°10'02.15040"W	690.706	3379430.604	388033.165	713.037	VVA
2239	29°48'11.63621"N	99°12'07.13246"W	426.538	3296999.321	480481.040	449.316	VVA
2249	29°29'59.51713"N	99°07'49.01869"W	288.492	3263375.609	487371.975	312.378	VVA
2257	31°05'02.50415"N	99°17'28.97948"W	490.738	3438950.998	472207.160	514.059	VVA
2268	30°02'41.90806"N	100°02'55.14648"W	686.358	3324232.147	398902.762	708.583	VVA
2275	29°16'29.69645"N	99°10'41.52079"W	254.438	3238457.706	482689.422	278.237	VVA
2279	30°37'33.00478"N	99°54'25.00416"W	576.868	3388486.692	413079.502	599.177	VVA
2281	30°31'00.67476"N	99°48'13.17161"W	501.490	3376333.844	422892.545	523.771	VVA
2283	30°43'19.34288"N	100°33'17.90712"W	705.675	3399829.902	351115.098	728.515	VVA
2286	30°25'06.89707"N	99°32'43.51304"W	618.635	3365295.406	447617.254	640.557	VVA
2309	29°35'00.94553"N	98°58'12.96800"W	316.847	3272646.239	502879.392	340.838	VVA
2310	30°36'07.16195"N	99°28'44.19008"W	500.358	3385591.411	454088.266	522.686	VVA
2318	29°01'12.05044"N	99°40'28.47677"W	218.466	3210390.607	434308.109	241.631	VVA
3001	29°33'15.31955"N	99°44'22.61249"W	415.904	3269623.030	428348.224	438.870	CAL
3002	30°52'43.82630"N	100°24'38.80332"W	685.444	3417026.766	365142.036	708.099	CAL
3003	29°45'23.50292"N	100°04'36.73668"W	497.199	3292292.898	395882.530	519.757	CAL
3004	30°20'30.36057"N	100°55'56.57581"W	549.108	3358239.567	314250.772	572.544	CAL
3005	28°47'23.40722"N	99°38'28.52452"W	185.491	3184870.210	437415.003	209.053	CAL
3006	28°55'44.77228"N	100°06'07.00560"W	190.566	3200630.579	392593.829	213.536	CAL
3007	29°23'12.71440"N	100°41'20.19768"W	308.318	3252033.795	336100.868	331.089	CAL
3008	30°18'47.00904"N	99°57'53.17088"W	601.277	3353869.739	407241.474	623.383	CAL
3009	29°53'01.63748"N	99°16'45.83579"W	464.245	3305941.031	473021.233	486.595	CAL
3010	28°29'50.26758"N	100°12'20.81988"W	233.488	3152884.985	381988.288	256.719	CAL

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
3011	30°22'12.34695"N	100°37'04.67017"W	617.327	3360906.248	344523.230	640.057	CAL
3012	30°52'08.61614"N	99°29'39.43633"W	542.432	3415195.223	452747.651	565.212	CAL
3013	29°23'19.72712"N	99°12'21.40816"W	277.801	3251081.650	480016.310	301.649	CAL
3014	29°24'01.32772"N	100°00'16.25796"W	319.265	3252763.819	402537.005	342.072	CAL
3015	30°41'27.87527"N	100°38'32.04090"W	690.034	3396517.011	342708.911	713.069	CAL
3016	30°35'25.29863"N	99°35'55.29192"W	458.959	3384357.664	442601.849	481.410	CAL
3017	31°01'55.55456"N	100°19'20.28432"W	707.731	3433910.057	373802.128	730.532	CAL
3018	28°17'03.94897"N	100°00'31.16232"W	212.874	3129123.414	401085.166	236.381	CAL
3019	30°48'55.75489"N	99°55'55.39498"W	683.485	3409525.094	410847.715	705.998	CAL
3020	30°24'44.97264"N	100°21'25.10273"W	629.040	3365275.706	369661.759	651.403	CAL
3021	29°32'20.41146"N	100°54'03.81293"W	341.789	3269211.987	315788.245	364.475	CAL
3022	30°54'58.91136"N	100°36'51.41268"W	685.432	3421449.698	345746.880	708.262	CAL
3023	28°52'20.30308"N	99°36'07.19370"W	181.501	3193987.319	441292.912	204.990	CAL
3024	30°59'14.62200"N	100°14'54.94236"W	675.140	3428873.846	380781.401	697.790	CAL
3025	28°17'45.95716"N	99°36'52.06064"W	125.625	3130156.654	439749.924	149.891	CAL
3026	28°12'08.72600"N	99°36'50.33462"W	173.806	3119778.812	439744.299	198.024	CAL
3027	28°17'33.32998"N	99°45'38.03908"W	166.351	3129849.563	425420.939	190.336	CAL
3028	29°19'54.08911"N	99°28'18.05347"W	268.335	3244827.433	454205.418	291.771	CAL
3029	28°36'56.18444"N	99°43'23.65410"W	148.131	3165613.083	429296.681	171.871	CAL
3030	29°59'13.48810"N	100°31'17.28314"W	636.722	3318327.834	353230.277	659.106	CAL
3031	28°24'06.71497"N	100°00'44.02692"W	238.360	3142136.995	400843.843	261.830	CAL
3032	29°47'25.64808"N	100°04'48.68112"W	480.769	3296055.739	395596.922	503.275	CAL
3033	30°45'15.39011"N	99°20'46.17568"W	498.600	3402421.132	466868.946	521.210	CAL
3034	29°23'04.07875"N	100°49'10.10208"W	304.742	3251958.340	323427.735	327.486	CAL
3035	30°48'29.85552"N	99°45'56.19550"W	618.967	3408606.938	426763.390	641.656	CAL
3036	29°35'37.45198"N	100°38'10.72154"W	414.005	3274887.165	341531.570	436.732	CAL
3037	30°43'35.84615"N	99°28'44.50786"W	509.159	3399403.597	454138.700	531.730	CAL
3038	30°07'45.90104"N	100°41'39.95947"W	576.456	3334337.652	336776.414	599.165	CAL

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
3039	29°40'38.58226"N	99°23'46.91209"W	496.426	3283103.437	461648.362	519.403	CAL
3040	29°51'28.63602"N	99°33'17.09662"W	675.521	3303174.865	446419.278	697.748	CAL
3041	30°45'59.39039"N	100°17'34.88208"W	665.172	3404438.782	376255.406	687.595	CAL
3042	30°00'36.25531"N	100°13'53.45184"W	707.208	3320539.756	381230.677	729.410	CAL
3043	29°26'08.78201"N	100°15'20.61324"W	402.477	3256923.067	378203.826	425.133	CAL
3044	30°08'05.88343"N	99°35'10.24616"W	650.456	3333886.010	443540.513	672.355	CAL
3045	31°28'48.70218"N	99°31'13.03086"W	424.277	3482938.768	450580.637	449.095	CAL
3046	29°12'43.38241"N	99°17'22.73744"W	252.759	3231514.116	471845.888	276.275	CAL
3047	29°49'36.73765"N	100°33'54.13150"W	674.666	3300628.936	348784.961	697.082	CAL
3048	28°37'48.32440"N	100°06'49.95612"W	184.445	3167511.049	391120.743	207.655	CAL
3049	29°05'57.83698"N	99°50'02.85245"W	237.564	3219285.621	418832.541	260.562	CAL
3050	29°10'42.22956"N	100°19'14.37168"W	270.130	3228472.371	371583.403	292.753	CAL
3051	28°30'09.83034"N	99°40'49.85890"W	127.454	3153083.204	433402.155	151.461	CAL
3052	28°55'49.50257"N	99°59'10.93006"W	197.343	3200676.842	403860.865	220.399	CAL
3053	29°51'11.59304"N	99°40'31.48676"W	647.870	3302712.565	434761.562	670.097	CAL
3054	28°16'09.25860"N	99°23'21.63228"W	137.824	3127089.332	461814.289	162.400	CAL
3055	28°55'55.02245"N	99°29'52.18267"W	193.121	3200548.349	451479.484	216.638	CAL
3056	29°11'59.29631"N	99°26'41.39948"W	223.305	3230204.471	456756.633	246.607	CAL
3057	30°07'01.58344"N	99°55'30.73447"W	683.224	3332122.929	410869.232	705.413	CAL
3058	29°19'42.24742"N	100°23'16.65672"W	352.445	3245170.266	365235.385	375.102	CAL
3059	31°01'59.41397"N	100°42'59.05642"W	744.184	3434543.259	336186.799	767.234	CAL
3060	29°19'46.70170"N	99°46'51.91439"W	301.497	3244760.946	424163.549	324.539	CAL
3061	29°30'34.27430"N	99°37'11.12912"W	403.076	3264598.307	439933.410	426.200	CAL
3062	30°24'25.91633"N	99°27'09.11750"W	613.089	3363994.581	456533.340	634.890	CAL
3063	28°24'28.37005"N	99°51'01.82880"W	172.572	3142680.915	416691.212	196.324	CAL
3064	29°29'23.23583"N	100°36'46.66932"W	355.688	3263335.542	343633.057	378.439	CAL
3065	29°47'36.80280"N	100°40'33.42656"W	540.980	3297087.458	338013.028	563.548	CAL
3066	30°12'53.19045"N	100°34'16.18489"W	628.882	3343628.121	348782.962	651.431	CAL

USGS TEXAS MAPPING
LIDAR CHECKPOINTS AND CONTROL
65219783
MARCH 2018

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
3067	30°49'17.40868"N	100°29'09.79512"W	708.279	3410764.764	357861.068	731.001	CAL
3068	29°40'28.99866"N	99°29'26.06154"W	499.747	3282843.396	452531.565	522.664	CAL
3069	30°30'56.88212"N	100°24'16.64784"W	664.375	3376781.440	365226.705	686.832	CAL
3070	30°37'48.08608"N	100°04'28.14024"W	694.821	3389092.438	397026.490	717.126	CAL
3071	29°57'57.82000"N	99°50'11.19786"W	690.680	3315318.905	419298.043	712.821	CAL
3072	30°46'28.31022"N	100°49'16.71369"W	678.891	3406032.418	325704.932	702.042	CAL
3073	31°18'27.90486"N	99°20'28.06422"W	458.642	3463759.543	467538.730	482.889	CAL
3074	31°14'28.27950"N	99°14'21.02132"W	525.244	3456356.860	477224.774	549.228	CAL
3075	28°44'15.00839"N	100°26'15.76716"W	235.043	3179750.698	359606.536	258.028	CAL
3076	29°30'14.62637"N	99°29'41.42256"W	345.205	3263935.569	452038.040	368.527	CAL
3077	31°20'42.26737"N	99°10'30.74606"W	452.562	3467859.110	483334.177	477.066	CAL
3078	30°36'22.57625"N	99°22'16.72169"W	506.058	3386026.939	464407.420	528.332	CAL
3079	30°56'05.43023"N	100°06'03.10536"W	638.083	3422900.219	394830.519	660.604	CAL
3080	30°30'27.29290"N	99°10'10.31560"W	528.806	3375043.874	483732.859	550.882	CAL
3081	28°56'43.98738"N	100°14'50.59176"W	214.616	3202593.781	378435.872	237.428	CAL
3082	29°02'06.46526"N	100°28'55.61076"W	261.571	3212783.714	355682.448	284.238	CAL
3083	29°47'38.44723"N	99°01'52.49010"W	402.479	3295961.104	496980.070	425.633	CAL
3084	28°47'31.43983"N	99°51'05.88445"W	174.357	3185246.260	416883.735	197.668	CAL
3085	30°26'50.59648"N	99°43'05.91128"W	598.252	3368580.331	431032.765	620.407	CAL
3086	31°18'06.70702"N	99°32'34.84831"W	498.980	3463183.953	448324.304	523.094	CAL
3087	30°30'03.93462"N	99°58'19.71008"W	555.965	3374714.344	406711.627	578.132	CAL
3088	29°56'51.74891"N	99°41'42.36680"W	698.578	3313194.128	432923.080	720.676	CAL
3089	29°42'58.74361"N	100°04'07.79196"W	435.497	3287829.758	396618.709	458.109	CAL
3090	30°24'08.53748"N	100°47'58.87961"W	575.283	3364747.112	327114.720	598.478	CAL
3091	29°44'13.69489"N	99°48'14.54454"W	506.702	3289929.255	422247.325	529.255	CAL
3092	30°13'31.38989"N	99°45'18.09796"W	682.904	3344001.384	427343.445	704.998	CAL
3093	31°08'44.68567"N	99°20'04.34598"W	500.307	3445802.587	468111.324	523.789	CAL
3094	29°00'13.64951"N	100°34'32.56428"W	239.273	3209429.135	346521.004	261.963	CAL

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
3095	29°09'30.30451"N	99°02'32.32079"W	196.398	3225537.912	495885.179	220.292	CAL
3096	29°18'34.49646"N	100°47'43.06164"W	287.961	3243622.940	325647.016	310.710	CAL
3097	30°28'17.51414"N	100°33'38.77961"W	677.401	3372071.767	350174.819	700.187	CAL
3098	29°13'58.68325"N	100°07'51.78720"W	294.772	3234326.764	390079.780	317.481	CAL
3099	31°05'47.31443"N	99°32'56.57406"W	552.280	3440423.585	447636.984	575.485	CAL
3100	29°06'01.63184"N	99°56'43.59606"W	245.471	3219484.240	408000.840	268.378	CAL
3101	30°23'54.46850"N	100°57'00.32705"W	567.488	3364553.313	312656.398	590.992	CAL
3102	30°55'52.03211"N	99°54'35.13377"W	611.838	3422323.044	413084.756	634.634	CAL
3103	29°40'06.70051"N	99°01'16.96706"W	354.619	3282056.675	497931.155	378.230	CAL
3104	29°49'08.36389"N	100°00'50.85972"W	473.642	3299159.506	402010.107	496.127	CAL
3106	29°36'39.76607"N	99°03'58.52239"W	389.023	3275689.216	493584.968	412.707	CAL
3107	30°12'25.62800"N	100°01'55.02468"W	634.614	3342186.226	400675.343	656.792	CAL
3108	30°28'22.70453"N	99°19'39.12622"W	622.806	3371242.109	468560.793	644.659	CAL
3109	30°55'21.86654"N	100°56'22.06829"W	743.656	3422651.902	314681.136	766.933	CAL
3110	29°27'12.76560"N	99°17'21.48133"W	288.777	3258271.155	471945.988	312.493	CAL
3111	29°05'26.18290"N	99°33'05.76587"W	241.582	3218149.723	446320.518	264.776	CAL
3112	29°53'59.29400"N	100°20'09.99384"W	673.228	3308432.756	371000.159	695.523	CAL
3113	29°20'35.78960"N	100°37'10.39044"W	308.274	3247107.656	342768.706	331.027	CAL
3114	29°45'36.13511"N	99°34'35.56056"W	499.243	3292335.258	444259.834	521.834	CAL
3115	31°04'25.24238"N	100°30'44.03700"W	626.289	3438750.175	355736.352	649.343	CAL
3116	29°33'34.30847"N	100°24'24.52428"W	483.317	3270804.868	363713.944	505.918	CAL
3117	30°52'10.60374"N	99°34'35.77249"W	547.392	3415294.144	444878.739	570.243	CAL
3118	31°26'26.55550"N	99°22'28.76635"W	396.143	3478506.045	464398.373	420.929	CAL
3119	28°39'54.75064"N	100°16'56.53632"W	225.815	3171567.256	374691.098	248.895	CAL
3120	30°43'35.08612"N	100°17'08.99844"W	701.665	3399988.124	376892.566	724.077	CAL
3121	29°28'40.98349"N	99°02'25.88834"W	309.594	3260952.142	496071.211	333.671	CAL
3122	31°01'44.88726"N	99°58'38.58614"W	647.306	3433241.016	406719.145	670.207	CAL
3123	29°58'44.45512"N	100°45'17.41270"W	508.147	3317755.825	330701.099	530.843	CAL

USGS TEXAS MAPPING
LIDAR CHECKPOINTS AND CONTROL
65219783
MARCH 2018

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
3124	30°55'36.87179"N	99°10'49.75280"W	488.428	3421515.601	482756.486	511.466	CAL
3125	29°11'49.46690"N	99°45'02.50128"W	254.682	3230053.292	427020.398	277.699	CAL
3126	29°40'07.99385"N	100°25'40.05984"W	516.251	3282948.560	361830.337	538.775	CAL
3127	31°00'45.46451"N	99°42'56.19557"W	607.497	3431221.340	431691.709	630.615	CAL
3128	30°21'56.91078"N	99°42'22.30916"W	632.215	3359532.452	432139.278	654.244	CAL
3129	28°40'51.83753"N	99°53'51.01354"W	144.495	3172980.919	412314.257	167.895	CAL
3130	30°23'43.31342"N	99°52'57.08240"W	522.862	3362926.674	415220.483	544.959	CAL
3131	28°49'58.13868"N	99°57'57.27193"W	180.337	3189846.405	405767.151	203.509	CAL
3132	30°05'21.18097"N	100°17'06.35833"W	686.405	3329367.728	376160.939	708.622	CAL
3133	30°10'13.88600"N	100°13'31.63728"W	660.635	3338315.258	382005.828	682.820	CAL
3134	30°10'55.78847"N	100°26'56.60484"W	683.957	3339857.870	360490.362	706.323	CAL
3135	30°44'50.31740"N	99°11'14.91810"W	448.211	3401613.136	482055.250	470.835	CAL
3136	31°05'50.63716"N	99°49'34.22136"W	639.597	3440689.712	421207.551	662.930	CAL
3137	28°39'11.69683"N	100°13'27.73920"W	219.848	3170182.674	380345.477	242.958	CAL
3138	29°39'08.69422"N	100°51'54.22950"W	446.281	3281725.061	319478.973	468.930	CAL
3139	30°17'43.35328"N	99°28'25.85647"W	663.480	3351611.184	454434.051	685.237	CAL
3140	30°42'12.88793"N	99°46'19.65252"W	650.934	3397006.299	426060.101	673.436	CAL
3141	30°19'41.11720"N	99°54'24.74309"W	544.823	3355489.479	412821.536	566.935	CAL
3142	31°26'57.58796"N	99°09'55.34114"W	395.727	3479412.553	484287.036	420.697	CAL
3143	29°22'52.48157"N	100°28'06.01860"W	337.397	3251121.429	357503.731	360.090	CAL
3144	30°12'58.14533"N	100°13'48.22824"W	624.940	3343376.674	381616.656	647.127	CAL
3145	29°56'26.42953"N	100°10'05.64564"W	695.280	3312785.399	387255.541	717.516	CAL
3146	28°26'20.02628"N	99°55'50.62742"W	197.868	3146175.254	408859.545	221.445	CAL
3147	29°44'43.24016"N	100°23'40.65504"W	519.303	3291382.416	365142.606	541.748	CAL
3148	29°14'33.97600"N	100°05'08.37636"W	280.853	3235371.371	394501.488	303.610	CAL
3149	30°36'40.80090"N	100°57'50.71550"W	671.478	3388172.888	311722.238	695.019	CAL
3150	28°35'02.51740"N	99°48'17.61746"W	142.586	3162165.942	421290.186	166.242	CAL
3151	30°52'21.96462"N	99°16'51.03556"W	516.982	3415535.328	473153.423	539.857	CAL

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
3152	30°57'49.02062"N	99°28'33.84898"W	526.423	3425666.960	454534.058	549.321	CAL
3153	29°34'56.56235"N	100°03'48.89628"W	493.208	3272982.994	396990.112	515.869	CAL
3154	30°00'19.02571"N	100°21'40.65228"W	635.167	3320151.029	368707.245	657.441	CAL
3155	31°10'51.06112"N	99°13'01.44646"W	501.151	3449665.257	479316.518	524.907	CAL
3156	30°42'22.39533"N	100°50'56.48929"W	708.591	3398503.885	322927.241	731.855	CAL
3157	29°30'48.30253"N	99°49'40.47712"W	424.471	3265155.637	419761.857	447.359	CAL
3158	30°25'32.19466"N	100°00'30.78429"W	651.029	3366379.611	403142.873	673.113	CAL
3160	29°26'27.60119"N	100°06'36.79164"W	354.512	3257359.097	392323.335	377.227	CAL
1013A	29°23'18.19597"N	99°15'50.11625"W	265.762	3251045.844	474390.731	289.526	NVA
1017A	31°03'05.97179"N	100°23'23.18352"W	713.852	3436156.738	367389.273	736.761	NVA
1018A	28°21'33.51413"N	100°00'30.35124"W	232.065	3137419.085	401176.540	255.554	NVA
1040A	29°49'38.41342"N	99°32'01.39657"W	683.389	3299772.611	448434.562	705.727	NVA
1047A	29°49'15.46806"N	100°33'58.54982"W	657.870	3299975.763	348657.458	680.292	NVA
1055A	28°55'58.85839"N	99°36'29.12944"W	189.504	3200716.581	440733.187	212.889	NVA
1061A	29°26'40.03062"N	99°37'37.45448"W	331.327	3257392.425	439185.834	354.554	NVA
1091A	29°44'51.91022"N	99°54'32.82646"W	659.029	3291180.915	412094.841	681.506	NVA
1122A	31°01'42.74263"N	99°53'23.12261"W	650.101	3433104.737	415082.169	673.184	NVA
1144A	30°17'12.64445"N	100°14'41.03298"W	681.558	3351226.728	380290.638	703.730	NVA
1173A	28°11'58.59658"N	100°07'26.51988"W	184.483	3119825.919	389682.588	207.824	NVA
1203A	28°50'43.24740"N	100°02'26.44944"W	173.206	3191296.345	398484.283	196.302	NVA
1215A	29°51'18.74264"N	99°46'59.43158"W	661.093	3302998.592	424353.931	683.348	NVA
1222A	31°23'35.66368"N	99°35'57.01999"W	440.140	3473339.284	443034.984	464.636	NVA
1232A	29°08'37.69656"N	99°18'11.72714"W	224.592	3223956.120	470503.639	248.018	NVA
1234A	30°43'26.79067"N	100°23'12.60708"W	672.368	3399847.994	367218.420	694.890	NVA
1251A	28°15'01.28380"N	99°51'02.88907"W	169.546	3125229.479	416539.379	193.346	NVA
1252A	29°06'55.35234"N	99°40'09.36217"W	231.505	3220953.407	434885.148	254.592	NVA
1258A	30°08'33.29428"N	100°04'41.24518"W	637.653	3335075.345	396163.375	659.839	NVA
1281A	30°30'30.33979"N	99°46'39.30136"W	497.427	3375382.486	425387.972	519.714	NVA

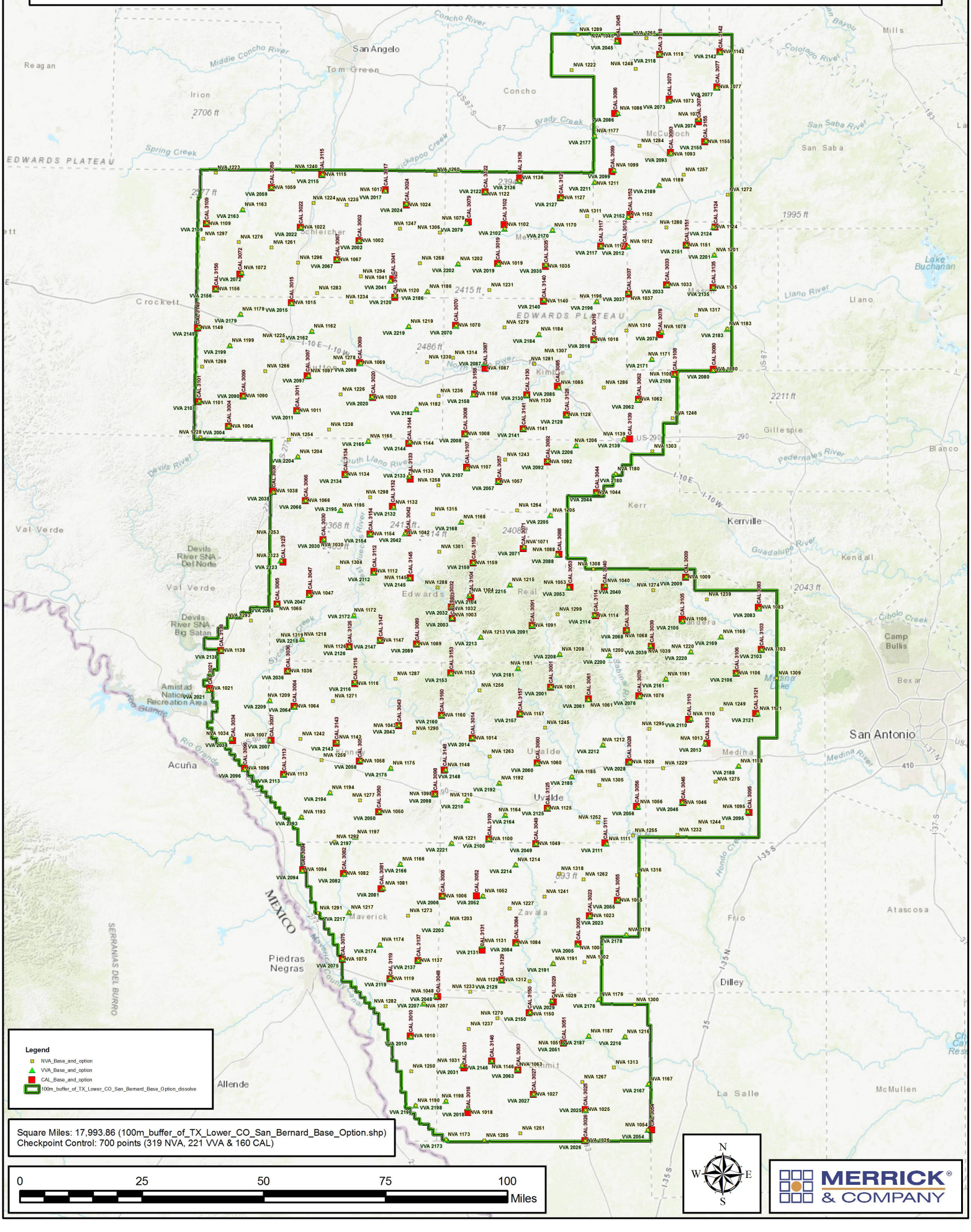
USGS TEXAS MAPPING
LIDAR CHECKPOINTS AND CONTROL
65219783
MARCH 2018

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
1291A	28°52'18.70792"N	100°31'25.11156"W	247.438	3194743.448	351405.292	270.260	NVA
1295A	29°27'47.03965"N	99°23'25.93352"W	323.341	3259354.676	462132.337	346.900	NVA
1302A	28°42'20.99642"N	99°38'06.24404"W	163.646	3175560.196	437969.433	187.354	NVA
1305A	29°15'59.02625"N	99°37'06.87000"W	261.398	3237659.208	439905.354	284.587	NVA
1311A	30°58'56.62542"N	99°35'59.83512"W	570.991	3427805.364	442713.721	593.959	NVA
2062A	29°26'39.79961"N	99°37'37.25339"W	331.191	3257385.285	439191.213	354.418	VVA
2125A	29°11'50.29357"N	99°45'00.46026"W	254.967	3230078.383	427075.678	277.984	VVA
2153A	29°32'38.29380"N	99°59'26.86042"W	375.393	3268664.634	404003.799	398.151	VVA
2192A	29°14'37.34174"N	99°52'17.10311"W	270.446	3235301.243	415322.128	293.386	VVA
3076A	29°31'38.61941"N	99°24'21.87623"W	359.017	3266487.409	460650.425	382.429	CAL
3102A	29°45'32.37595"N	99°17'23.24134"W	481.642	3292115.516	471983.148	504.475	CAL
3136A	31°04'50.73060"N	99°49'17.13248"W	637.209	3438842.027	421646.626	660.501	CAL
E1454	30°26'20.86163"N	99°49'55.94786"W	517.664	3367739.973	420089.846	539.811	NGS POINT
G1091	29°13'06.45420"N	99°44'36.05575"W	263.408	3232418.243	427749.568	286.435	NGS POINT
G1432	29°09'22.28414"N	100°23'30.19992"W	274.565	3226091.337	364643.591	297.198	NGS POINT
K1086 RESET	28°37'10.80523"N	99°56'37.72709"W	164.149	3166213.309	407735.908	187.555	NGS POINT
M1085	28°31'23.32852"N	99°49'37.59866"W	157.585	3155435.184	419070.977	181.282	NGS POINT
U 1447	31°00'22.50796"N	99°31'35.07758"W	543.934	3430413.753	449748.614	566.901	NGS POINT
NINE2	31°03'06.37711"N	99°22'32.37089"W	566.403	3435400.141	464156.624	589.526	NGS POINT
P1084	29°20'44.85512"N	98°50'56.04558"W	207.949	3246306.994	514667.739	232.417	NGS POINT
Q1387	29°18'59.76058"N	99°32'17.39562"W	272.118	3243183.197	447742.846	295.458	NGS POINT
R33	29°17'32.04740"N	99°38'57.67346"W	275.802	3240538.363	436930.999	298.978	NGS POINT
S1387	29°14'37.31402"N	99°52'17.18544"W	270.357	3235300.406	415319.899	293.297	NGS POINT
S1449	30°35'13.79184"N	99°47'02.33858"W	599.726	3384112.525	424834.611	622.079	NGS POINT
S1455	31°27'12.65429"N	99°09'48.04445"W	393.738	3479876.111	484480.309	418.726	NGS POINT
T1444	29°59'34.62294"N	100°29'28.28292"W	655.051	3318940.082	356159.857	677.406	NGS POINT
U120	30°44'29.70823"N	99°10'30.59476"W	450.192	3400976.804	483232.731	472.812	NGS POINT
W1444	30°00'32.60228"N	100°24'12.28320"W	654.783	3320618.007	364649.638	677.086	NGS POINT

USGS TEXAS MAPPING
LIDAR CHECKPOINTS AND CONTROL
65219783
MARCH 2018

PT#	NAD 83(2011)	NAD 83(2011)	ELLIPSOID	UTM 14 NORTH		ELEVATION	CODE
	LATITUDE	LONGITUDE	HEIGHT	NORTHING	EASTING	METERS	
			METERS			GEOID 12B	
X1419	31°10'34.45784"N	99°19'08.79276"W	529.940	3449177.666	469592.008	553.556	NGS POINT
X1444	30°00'18.81245"N	100°21'56.66724"W	630.781	3320149.572	368278.071	653.059	NGS POINT

TX Lower CO San Bernard 2018: Base + Option SOW / Checkpoint Control Layout



The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1         National Geodetic Survey,   Retrieval Date = MARCH 15, 2018
 BN0435 ***********************************************************************
 BN0435  CBN         -  This is a Cooperative Base Network Control Station.
 BN0435  DESIGNATION -  E 1454
 BN0435  PID         -  BN0435
 BN0435  STATE/COUNTY-  TX/KIMBLE
 BN0435  COUNTRY     -  US
 BN0435  USGS QUAD   -  JUNCTION (1974)
 BN0435
 BN0435                        *CURRENT SURVEY CONTROL
 BN0435  ______________________________________________________________________
 BN0435* NAD 83(2011) POSITION- 30 26 20.85973(N) 099 49 55.94799(W)   ADJUSTED
 BN0435* NAD 83(2011) ELLIP HT-   517.721 (meters)        (06/27/12)   ADJUSTED
 BN0435* NAD 83(2011) EPOCH   -  2010.00
 BN0435* NAVD 88 ORTHO HEIGHT -   539.842 (meters)     1771.13  (feet) ADJUSTED
 BN0435  ______________________________________________________________________
 BN0435  GEOID HEIGHT    -        -22.147 (meters)                     GEOID12B
 BN0435  NAD 83(2011) X  -   -939,916.200 (meters)                     COMP
 BN0435  NAD 83(2011) Y  - -5,423,356.311 (meters)                     COMP
 BN0435  NAD 83(2011) Z  -  3,212,700.461 (meters)                     COMP
 BN0435  LAPLACE CORR    -         -0.55  (seconds)                    DEFLEC12B
 BN0435  DYNAMIC HEIGHT  -        539.076 (meters)     1768.62  (feet) COMP
 BN0435  MODELED GRAVITY -    979,206.4   (mgal)                       NAVD 88
 BN0435
 BN0435  VERT ORDER      -  FIRST     CLASS II
 BN0435
 BN0435  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 BN0435  Standards:
 BN0435         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 BN0435            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 BN0435  ------------------------------------------------------------------
 BN0435  NETWORK    1.97   4.25           0.80   0.80   2.17      0.20862211
 BN0435  ------------------------------------------------------------------
 BN0435  Click here for local accuracies and other accuracy information.
 BN0435
 BN0435
 BN0435.The horizontal coordinates were established by GPS observations
 BN0435.and adjusted by the National Geodetic Survey in June 2012.
 BN0435
 BN0435.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 BN0435.been affixed to the stable North American tectonic plate. See
 BN0435.NA2011 for more information.
 BN0435
 BN0435.The horizontal coordinates are valid at the epoch date displayed above
 BN0435.which is a decimal equivalence of Year/Month/Day.
 BN0435
 BN0435.The orthometric height was determined by differential leveling and
 BN0435.adjusted by the NATIONAL GEODETIC SURVEY
 BN0435.in June 1991.
 BN0435
```

```
BN0435.Significant digits in the geoid height do not necessarily reflect accuracy.
BN0435.GEOID12B height accuracy estimate available here.
BN0435
BN0435.The X, Y, and Z were computed from the position and the ellipsoidal ht.
BN0435
BN0435.The Laplace correction was computed from DEFLEC12B derived deflections.
BN0435
BN0435.The ellipsoidal height was determined by GPS observations
BN0435.and is referenced to NAD 83.
BN0435
BN0435.The dynamic height is computed by dividing the NAVD 88
BN0435.geopotential number by the normal gravity value computed on the
BN0435.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
BN0435.degrees latitude (g = 980.6199 gals.).
BN0435
BN0435.The modeled gravity was interpolated from observed gravity values.
BN0435
BN0435. The following values were computed from the NAD 83(2011) position.
BN0435
BN0435;                    North         East     Units Scale Factor Converg.
BN0435;SPC TX C     - 3,085,740.455   748,133.892   MT  0.99992956   +0 15 29.2
BN0435;SPC TX C     -10,123,800.14  2,454,502.61   sFT  0.99992956   +0 15 29.2
BN0435;UTM  14      - 3,367,739.914   420,089.842   MT  0.99967878   -0 25 17.9
BN0435
BN0435!             -  Elev Factor  x  Scale Factor =   Combined Factor
BN0435!SPC TX C     -   0.99991870  x   0.99992956  =   0.99984827
BN0435!UTM  14      -   0.99991870  x   0.99967878  =   0.99959751
BN0435
BN0435_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RMU2008967739(NAD 83)
BN0435
BN0435                           SUPERSEDED SURVEY CONTROL
BN0435
BN0435  NAD 83(2007)-  30 26 20.85970(N)    099 49 55.94873(W) AD(2002.00) 0
BN0435  ELLIP H (02/10/07)  517.733  (m)                       GP(2002.00)
BN0435  ELLIP H (10/24/00)  517.751  (m)                       GP(       ) 4 2
BN0435  NAD 83(1993)-  30 26 20.85880(N)    099 49 55.94799(W) AD(       ) B
BN0435  ELLIP H (05/09/94)  517.844  (m)                       GP(       ) 4 2
BN0435  NAVD 88             539.84   (m)         1771.1    (f) LEVELING    3
BN0435
BN0435.Superseded values are not recommended for survey control.
BN0435
BN0435.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BN0435.See file dsdata.pdf to determine how the superseded data were derived.
BN0435
BN0435_MARKER: I = METAL ROD
BN0435_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+)
BN0435_STAMPING: E 1454 1982
BN0435_MARK LOGO: NGS
BN0435_PROJECTION: FLUSH
BN0435_MAGNETIC: I = MARKER IS A STEEL ROD
BN0435_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
BN0435_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BN0435+SATELLITE: SATELLITE OBSERVATIONS - October 23, 2006
BN0435_ROD/PIPE-DEPTH: 6.1  meters
BN0435
BN0435  HISTORY     - Date     Condition        Report By
BN0435  HISTORY     - 1982     MONUMENTED       NGS
BN0435  HISTORY     - 19930222 GOOD             NGS
BN0435  HISTORY     - 19970806 GOOD             TXDOT
BN0435  HISTORY     - 19981121 MARK NOT FOUND   USPSQD
```

```
BN0435  HISTORY     - 20061023 GOOD             CDSMS
BN0435
BN0435                          STATION DESCRIPTION
BN0435
BN0435'DESCRIBED BY NATIONAL GEODETIC SURVEY 1982
BN0435'9.0 KM (5.6 MI) SW FROM JUNCTION.
BN0435'THE MARK IS ABOVE LEVEL WITH THE HIGHWAY.
BN0435'9.0 KM (5.6 MI) SOUTHWESTERLY ALONG U.S. HIGHWAY 377 FROM ITS JUNCTION
BN0435'WITH U.S. HIGHWAYS 83 AND 290 IN JUNCTION, AT A POWERLINE CROSSING,
BN0435'23.0 METERS (75.5 FT) WEST OF THE CENTERLINE OF THE HIGHWAY, 3.5
BN0435'METERS (11.5 FT) NORTH OF THE CENTER OF A FIELD ENTRANCE AND 1.5
BN0435'METERS (4.9 FT) NORTH OF A T-FENCE CORNER.  NOTE=ACCESS TO THE DATUM
BN0435'POINT IS THROUGH A 5-INCH LOGO CAP.
BN0435'THE MARK IS 0.3 METERS  E FROM  A WITNESS POST AND FENCE
BN0435
BN0435                          STATION RECOVERY (1993)
BN0435
BN0435'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1993
BN0435'STATION IS LOCATED ABOUT 8 KM (4.95 MI) SOUTHWEST OF JUNCTION, 2 KM
BN0435'(1.25 MI) SOUTHWEST OF THE ENTRANCE TO THE SOUTH LLANO RIVER STATE
BN0435'PARK, ALONG THE RIGHT-OF-WAY OF U.S. HIGHWAY 377, AT A PAVED DRIVE
BN0435'LEADING NORTHWEST TO A RESIDENCE.  OWNERSHIP--TEXAS DEPARTMENT OF
BN0435'TRANSPORTATION.
BN0435'TO REACH FROM THE UNDERPASS AT THE JUNCTION OF INTERSTATE HIGHWAY 10,
BN0435'U.S. HIGHWAYS 83, 377, AND STATE LOOP 481 (EXIT 456) AT JUNCTION, GO
BN0435'SOUTHERLY ON HIGHWAYS 377 AND LOOP 481 FOR 1.04 KM (0.65 MI) TO A
BN0435'HIGHWAY DEPARTMENT OFFICE ON THE LEFT.  CONTINUE AHEAD FOR 1.57 KM
BN0435'(0.95 MI) TO A CROSSORAD.  TURN RIGHT, SOUTHWEST, ON HIGHWAY 377 FOR
BN0435'7.11 KM (4.40 MI) TO THE STATE PARK ENTRANCE ON THE LEFT.  CONTINUE
BN0435'AHEAD FOR 2.00 KM (1.25 MI) TO THE PAVED DRIVE AND STATION ON THE
BN0435'RIGHT.
BN0435'STATION MARK IS A STAINLESS STEEL ROD ENCASED IN A PVC PIPE WITH LOGO
BN0435'CAP SURROUNDED BY CONCRETE RECESSED 10 CM BELOW GROUND.  IT IS 22.8 M
BN0435'(74.8 FT) WEST OF AND LEVEL WITH THE HIGHWAY CENTER, 3.8 M (12.5 FT)
BN0435'NORTH OF THE PAVED DRIVE CENTER, 6.4 M (21.0 FT) EAST OF THE NORTH
BN0435'GATEPOST AT DRIVE AND AT UTILITY LINE CROSSING THE HIGHWAY.
BN0435
BN0435                          STATION RECOVERY (1997)
BN0435
BN0435'RECOVERY NOTE BY TEXAS DEPARTMENT OF TRANSPORTATION 1997 (WEH)
BN0435'ADD -ACCESS COVER IS RECESSED ABOUT 3 CM BELOW GROUND-.
BN0435
BN0435                          STATION RECOVERY (1998)
BN0435
BN0435'RECOVERY NOTE BY US POWER SQUADRON 1998
BN0435'MARK NOT FOUND.
BN0435
BN0435                          STATION RECOVERY (2006)
BN0435
BN0435'RECOVERY NOTE BY CDS/MUERY SERVICES 2006 (MDM)
BN0435'RECOVERED IN GOOD CONDITION AS DESCRIBED.

*** retrieval complete.
Elapsed Time = 00:00:03
```

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 15, 2018
 AY1311 ***********************************************************************
 AY1311  DESIGNATION -  G 1091
 AY1311  PID         -  AY1311
 AY1311  STATE/COUNTY-  TX/UVALDE
 AY1311  COUNTRY     -  US
 AY1311  USGS QUAD   -  GARNER FIELD (1971)
 AY1311
 AY1311                        *CURRENT SURVEY CONTROL
 AY1311  ______________________________________________________________________
 AY1311* NAD 83(2011) POSITION- 29 13 06.45321(N) 099 44 36.05581(W)   ADJUSTED
 AY1311* NAD 83(2011) ELLIP HT-   263.473 (meters)        (06/27/12)   ADJUSTED
 AY1311* NAD 83(2011) EPOCH   -  2010.00
 AY1311* NAVD 88 ORTHO HEIGHT -   286.451 (meters)      939.80   (feet) POSTED
 AY1311  ______________________________________________________________________
 AY1311  GEOID HEIGHT    -        -23.027 (meters)                     GEOID12B
 AY1311  NAD 83(2011) X  -   -942,857.600 (meters)                     COMP
 AY1311  NAD 83(2011) Y  - -5,490,926.994 (meters)                     COMP
 AY1311  NAD 83(2011) Z  -  3,095,184.977 (meters)                     COMP
 AY1311  LAPLACE CORR    -         -0.88  (seconds)                    DEFLEC12B
 AY1311  DYNAMIC HEIGHT  -        286.04  (meters)      938.4    (feet) COMP
 AY1311  MODELED GRAVITY -    979,186.3   (mgal)                       NAVD 88
 AY1311
 AY1311  VERT ORDER      -  * POSTED, SEE BELOW
 AY1311
 AY1311  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 AY1311  Standards:
 AY1311         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 AY1311            Horiz  Ellip          SD_N   SD_E   SD_h      (unitless)
 AY1311  ------------------------------------------------------------------
 AY1311  NETWORK    1.48   3.21          0.62   0.59   1.64     -0.12080186
 AY1311  ------------------------------------------------------------------
 AY1311  Click here for local accuracies and other accuracy information.
 AY1311
 AY1311
 AY1311.The horizontal coordinates were established by GPS observations
 AY1311.and adjusted by the National Geodetic Survey in June 2012.
 AY1311
 AY1311.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 AY1311.been affixed to the stable North American tectonic plate. See
 AY1311.NA2011 for more information.
 AY1311
 AY1311.The horizontal coordinates are valid at the epoch date displayed above
 AY1311.which is a decimal equivalence of Year/Month/Day.
 AY1311
 AY1311.The orthometric height was determined by differential leveling
 AY1311.and adjusted by the NATIONAL GEODETIC SURVEY in 1992.
 AY1311
 AY1311.* This is a POSTED BENCH MARK height.
 AY1311
```

AY1311.Significant digits in the geoid height do not necessarily reflect accuracy.
AY1311.GEOID12B height accuracy estimate available here.
AY1311
AY1311.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AY1311
AY1311.The Laplace correction was computed from DEFLEC12B derived deflections.
AY1311
AY1311.The ellipsoidal height was determined by GPS observations
AY1311.and is referenced to NAD 83.
AY1311
AY1311.The dynamic height is computed by dividing the NAVD 88
AY1311.geopotential number by the normal gravity value computed on the
AY1311.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AY1311.degrees latitude (g = 980.6199 gals.).
AY1311
AY1311.The modeled gravity was interpolated from observed gravity values.
AY1311
AY1311. The following values were computed from the NAD 83(2011) position.
AY1311

		North	East	Units	Scale Factor	Converg.
AY1311;	SPC TXSC	- 4,153,738.299	527,731.947	MT	0.99986529	-0 21 51.0
AY1311;	SPC TXSC	-13,627,723.07	1,731,400.56	sFT	0.99986529	-0 21 51.0
AY1311;	UTM 14	- 3,232,418.212	427,749.566	MT	0.99966441	-0 21 46.3

AY1311

			Elev Factor	x	Scale Factor	=	Combined Factor
AY1311!	SPC TXSC	-	0.99995862	x	0.99986529	=	0.99982392
AY1311!	UTM 14	-	0.99995862	x	0.99966441	=	0.99962304

AY1311

			Primary Azimuth Mark	Grid Az
AY1311:	SPC TXSC	-	UVALPORT	195 35 33.8
AY1311:	UTM 14	-	UVALPORT	195 35 29.1

AY1311
AY1311_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RMT2774932418(NAD 83)
AY1311

PID	Reference Object	Distance	Geod. Az dddmmss.s
AY2127	UVALPORT	APPROX. 0.5 KM	1951342.8

AY1311

SUPERSEDED SURVEY CONTROL

AY1311

NAD 83(2007)-	29 13 06.45294(N)		099 44 36.05653(W)	AD(2002.00)	0	
ELLIP H (02/10/07)	263.483	(m)		GP(2002.00)		
ELLIP H (10/24/00)	263.474	(m)		GP( )	4	2
NAD 83(1993)-	29 13 06.45303(N)		099 44 36.05594(W)	AD( )	1	
ELLIP H (07/01/96)	263.613	(m)		GP( )	4	2
NAD 83(1993)-	29 13 06.45312(N)		099 44 36.05591(W)	AD( )	1	
ELLIP H (02/20/96)	263.611	(m)		GP( )	1	1
NAD 83(1993)-	29 13 06.45531(N)		099 44 36.05846(W)	AD( )	3	
ELLIP H (02/16/96)	263.650	(m)		GP( )	5	1
NAD 83(1986)-	29 13 06.46032(N)		099 44 36.03876(W)	AD( )	3	
NAVD 88 (07/01/96)	286.7	(m)	UNKNOWN model used	GPS OBS		
NAVD 88 (02/20/96)	286.7	(m)	UNKNOWN model used	GPS OBS		
NGVD 29 (??/??/92)	286.313	(m)	939.35 (f)	ADJ UNCH	1	2
NGVD 29	286.31	(m)	939.3 (f)	LEVELING	3	

AY1311
AY1311.Superseded values are not recommended for survey control.
AY1311
AY1311.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

AY1311.See file dsdata.pdf to determine how the superseded data were derived.
AY1311
AY1311_MARKER: DB = BENCH MARK DISK
AY1311_SETTING: 34 = SET IN THE FOOTINGS OF SMALL/MEDIUM STRUCTURES
AY1311_SP_SET: OLD TOWER FOUNDATION
AY1311_STAMPING: G 1091 1957
AY1311_MARK LOGO: NGS
AY1311_MAGNETIC: O = OTHER; SEE DESCRIPTION
AY1311_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AY1311+STABILITY: SURFACE MOTION
AY1311_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AY1311+SATELLITE: SATELLITE OBSERVATIONS - September 23, 2004
AY1311

AY1311	HISTORY	- Date	Condition	Report By
AY1311	HISTORY	- 1957	MONUMENTED	CGS
AY1311	HISTORY	- 1988	GOOD	USPSQD
AY1311	HISTORY	- 19881129	GOOD	NGS
AY1311	HISTORY	- 19950425	GOOD	NGS
AY1311	HISTORY	- 19950429	GOOD	NGS
AY1311	HISTORY	- 20021110	GOOD	USPSQD
AY1311	HISTORY	- 20040923	GOOD	CTBG

AY1311
AY1311 STATION DESCRIPTION
AY1311
AY1311'DESCRIBED BY COAST AND GEODETIC SURVEY 1957
AY1311'2.7 MI NE FROM UVALDE.
AY1311'ABOUT 1.0 MILE NORTHEAST ALONG U.S. HIGHWAY 90 FROM THE POST OFFICE AT
AY1311'UVALDE, THENCE 1.45 MILES NORTHEAST ALONG FARM ROAD 1023, THENCE 0.25
AY1311'MILE EAST ACROSS A FIELD TO THE CENTER ONE OF THREE HANGARS THAT ARE
AY1311'NOW USED AS FACTORY BUILDINGS, 212 FEET SOUTHWEST OF THE SOUTHWEST
AY1311'CORNER OF THE OFFICE BUILDING OF THE U.S. BORDER PATROL, 142 FEET
AY1311'SOUTH-SOUTHWEST OF THE SOUTHEAST CORNER OF A FACTORY BUILDING, 25 FEET
AY1311'NORTH OF THE NORTH EDGE OF AN ASPHALT TAXIWAY, IN THE TOP OF A 2-FOOT
AY1311'BY 2-FOOT CONCRETE BLOCK THAT IS SET IN THE CENTER OF A LARGER
AY1311'CONCRETE BLOCK AND PROJECTING 4 INCHES ABOVE THE GROUND.
AY1311
AY1311 STATION RECOVERY (1988)
AY1311
AY1311'RECOVERY NOTE BY US POWER SQUADRON 1988 (SMW)
AY1311'RECOVERED IN GOOD CONDITION.
AY1311
AY1311 STATION RECOVERY (1988)
AY1311
AY1311'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1988
AY1311'THE STATION IS LOCATED ABOUT 4 KM (2.50 MI) EAST OF UVALDE, AT GARNER
AY1311'FIELD AIRPORT. OWNERSHIP--CITY OF UVALDE, P.O. BOX 799, UVALDE, TEXAS
AY1311'78801. THE AIRPORT MANAGER IS MARK HUFFSTUTLER, TELEPHONE
AY1311'512-278-3315.
AY1311'TO REACH THE STATION FROM THE JUNCTION OF U.S. HIGHWAY 83, U.S.
AY1311'HIGHWAY 90, AND STATE HIGHWAY 55 IN UVALDE, GO NORTHEAST ON U.S.
AY1311'HIGHWAY 90 FOR 1.51 KM (0.95 MI) TO A ROAD FORK AND THE INTERSECTION
AY1311'OF FARM ROAD 1023. BEAR RIGHT AND GO EAST ON FARM ROAD 1023 FOR 2.48
AY1311'KM (1.55 MI) TO FARM ROAD 1574 LEFT. CONTINUE EAST ON FARM ROAD 1023
AY1311'FOR 0.20 KM (0.10 MI) TO A PAVED ROAD RIGHT. TURN RIGHT AND GO
AY1311'SOUTHEAST FOR 0.24 KM (0.15 MI) TO THE FIRST OF TWO ROADS RIGHT. TURN
AY1311'RIGHT AND GO 0.16 KM (0.10 MI) PAST THE WILLIAMSON-DICKIE
AY1311'MANUFACTURING COMPANY ON THE RIGHT, TO THE END OF A PARKING AREA, AND
AY1311'THE MARK ON THE RIGHT.
AY1311'THE MARK IS IN A DRILL HOLE IN A 0.7 M (2.3 FT) SQUARE CONCRETE
AY1311'FOUNDATION. IT IS 18.2 M (59.7 FT) SOUTH-SOUTHWEST OF THE CENTER OF A

AY1311'CURVED SOUTH WALL OF A WOODEN BUILDING EXTENSION OF A CONVERTED HANGAR
AY1311'THAT IS NOW A LUNCH ROOM FOR THE DICKEY MANUFACTURING COMPANY, 12.1 M
AY1311'(39.7 FT) NORTHEAST OF A FENCE ALONG THE TARMAC, AND 7.8 M (25.6 FT)
AY1311'NORTHWEST OF A LOW PIPE RAIL ALONG THE NORTHWEST EDGE OF A PARKING
AY1311'AREA.
AY1311'DESCRIBED BY V.L. FERNANDES.
AY1311
AY1311 STATION RECOVERY (1995)
AY1311
AY1311'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1995 (BWM)
AY1311'THE STATION WAS RECOVERED IN GOOD CONDITION.
AY1311
AY1311 STATION RECOVERY (1995)
AY1311
AY1311'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1995 (AJL)
AY1311'THE STATION IS LOCATED ABOUT 10.0 MI (16.1 KM) SOUTHWEST OF KNIPPA,
AY1311'2.5 MI (4.0 KM) EAST OF UVALDE AND AT GARNER FIELD AIRPORT.
AY1311'OWNERSHIP--CITY OF UVALDE, BOX 799, UVALDE, TX 78801. MANAGER IS MARK
AY1311'HUFFSTULER, PHONE (210) 278-4912. TO REACH THE STATION FROM THE
AY1311'JUNCTION OF US HIGHWAYS 90 AND 83 IN UVALDE, GO NORTHEAST ON US
AY1311'HIGHWAY 90 FOR 0.95 MI (1.53 KM) TO A ROAD FORK RIGHT AND THE
AY1311'INTERSECTION OF FARM ROAD 1023, BEAR RIGHT AND GO EASTERLY ON FARM
AY1311'ROAD 1023 FOR 1.55 MI (2.49 KM) TO FARM ROAD 1574 ON THE LEFT,
AY1311'CONTINUE AHEAD AND GO EASTERLY ON 1023 FOR O.1 MI TO A PAVED ROAD
AY1311'RIGHT, TURN RIGHT AND GO SOUTHEASTERLY ON SULL ROSS DRIVE FOR 0.2 MI
AY1311'(0.3 KM) TO THE FIRST OF TWO ROADS RIGHT, TURN RIGHT AND GO SOUTHWEST
AY1311'FOR 0.05 MI (0.08 KM) THROUGH PARKING LOT TO THE STATION ON THE RIGHT.
AY1311'THE STATION IS SET INTO A 2.3 FT (0.7 M) SQUARE CONCRETE FOUNDATION,
AY1311'59.7 FT (18.2 M) SOUTH SOUTHWEST OF THE CENTER OF A CURVED SOUTH WALL
AY1311'OF A HANGER EXTENSION, 39.7 FT (12.1 M) EAST NORTHEAST OF A CHAINLINK
AY1311'PERIMETER FENCE, 26.0 FT (7.9 M) WEST NORTHWEST OF A LOW PIPE RAIL
AY1311'ALONG THE NORTHWEST EDGE OF THE PARKING AREA AND 3.0 FT (0.9 M) EAST
AY1311'NORTHEAST OF A WITNESS POST. DRL.
AY1311
AY1311 STATION RECOVERY (2002)
AY1311
AY1311'RECOVERY NOTE BY US POWER SQUADRON 2002 (SRS)
AY1311'RECOVERED IN GOOD CONDITION.
AY1311
AY1311 STATION RECOVERY (2004)
AY1311
AY1311'RECOVERY NOTE BY CARTER AND BURGESS INCORPORATED 2004 (JG)
AY1311'RECOVERED IN GOOD CONDITION.

*** retrieval complete.
Elapsed Time = 00:00:02

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 15, 2018
 AZ0495 ***********************************************************************
 AZ0495  FBN         -  This is a Federal Base Network Control Station.
 AZ0495  DESIGNATION -  G 1432
 AZ0495  PID         -  AZ0495
 AZ0495  STATE/COUNTY-  TX/KINNEY
 AZ0495  COUNTRY     -  US
 AZ0495  USGS QUAD   -  SPOFFORD (1974)
 AZ0495
 AZ0495                        *CURRENT SURVEY CONTROL
 AZ0495  ______________________________________________________________________
 AZ0495* NAD 83(2011) POSITION- 29 09 22.28226(N) 100 23 30.20098(W)   ADJUSTED
 AZ0495* NAD 83(2011) ELLIP HT-   274.548 (meters)        (06/27/12)   ADJUSTED
 AZ0495* NAD 83(2011) EPOCH   -  2010.00
 AZ0495* NAVD 88 ORTHO HEIGHT -   297.171 (meters)      974.97  (feet) ADJUSTED
 AZ0495  ______________________________________________________________________
 AZ0495  GEOID HEIGHT    -        -22.632 (meters)                     GEOID12B
 AZ0495  NAD 83(2011) X  - -1,005,541.523 (meters)                     COMP
 AZ0495  NAD 83(2011) Y  - -5,483,226.301 (meters)                     COMP
 AZ0495  NAD 83(2011) Z  -  3,089,164.554 (meters)                     COMP
 AZ0495  LAPLACE CORR    -          0.15  (seconds)                    DEFLEC12B
 AZ0495  DYNAMIC HEIGHT  -        296.737 (meters)      973.54  (feet) COMP
 AZ0495  MODELED GRAVITY -    979,174.9   (mgal)                       NAVD 88
 AZ0495
 AZ0495  VERT ORDER      -  FIRST     CLASS II
 AZ0495
 AZ0495  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 AZ0495  Standards:
 AZ0495         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 AZ0495            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 AZ0495  ------------------------------------------------------------------
 AZ0495  NETWORK    0.60   1.67           0.25   0.24   0.85     -0.06838841
 AZ0495  ------------------------------------------------------------------
 AZ0495  Click here for local accuracies and other accuracy information.
 AZ0495
 AZ0495
 AZ0495.The horizontal coordinates were established by GPS observations
 AZ0495.and adjusted by the National Geodetic Survey in June 2012.
 AZ0495
 AZ0495.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 AZ0495.been affixed to the stable North American tectonic plate. See
 AZ0495.NA2011 for more information.
 AZ0495
 AZ0495.The horizontal coordinates are valid at the epoch date displayed above
 AZ0495.which is a decimal equivalence of Year/Month/Day.
 AZ0495
 AZ0495.The orthometric height was determined by differential leveling and
 AZ0495.adjusted by the NATIONAL GEODETIC SURVEY
 AZ0495.in June 1991.
 AZ0495
```

AZ0495.Significant digits in the geoid height do not necessarily reflect accuracy.
AZ0495.GEOID12B height accuracy estimate available here.
AZ0495
AZ0495.Photographs are available for this station.
AZ0495
AZ0495.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AZ0495
AZ0495.The Laplace correction was computed from DEFLEC12B derived deflections.
AZ0495
AZ0495.The ellipsoidal height was determined by GPS observations
AZ0495.and is referenced to NAD 83.
AZ0495
AZ0495.The dynamic height is computed by dividing the NAVD 88
AZ0495.geopotential number by the normal gravity value computed on the
AZ0495.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AZ0495.degrees latitude (g = 980.6199 gals.).
AZ0495
AZ0495.The modeled gravity was interpolated from observed gravity values.
AZ0495
AZ0495. The following values were computed from the NAD 83(2011) position.
AZ0495
AZ0495;   North   East   Units Scale Factor Converg.
AZ0495;SPC TXSC   - 4,147,413.184   464,617.502   MT 0.99986808   -0 40 54.6
AZ0495;SPC TXSC   -13,606,971.42 1,524,332.59   sFT 0.99986808   -0 40 54.6
AZ0495;UTM 14   - 3,226,091.280   364,643.561   MT 0.99982608   -0 40 41.3
AZ0495
AZ0495!   - Elev Factor x Scale Factor =   Combined Factor
AZ0495!SPC TXSC   -   0.99995688 x   0.99986808 =   0.99982497
AZ0495!UTM 14   -   0.99995688 x   0.99982608 =   0.99978297
AZ0495
AZ0495_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RLT6464326091(NAD 83)
AZ0495
AZ0495   SUPERSEDED SURVEY CONTROL
AZ0495
AZ0495 NAD 83(2007)- 29 09 22.28207(N)   100 23 30.20163(W) AD(2002.00) 0
AZ0495 ELLIP H (02/10/07) 274.547 (m)   GP(2002.00)
AZ0495 ELLIP H (05/01/00) 274.583 (m)   GP(   ) 3 1
AZ0495 NAD 83(1993)- 29 09 22.28049(N)   100 23 30.20117(W) AD(   ) B
AZ0495 ELLIP H (05/09/94) 274.680 (m)   GP(   ) 4 2
AZ0495 NAVD 88   297.17   (m)   975.0   (f) LEVELING   3
AZ0495
AZ0495.Superseded values are not recommended for survey control.
AZ0495
AZ0495.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AZ0495.See file dsdata.pdf to determine how the superseded data were derived.
AZ0495
AZ0495_MARKER: F = FLANGE-ENCASED ROD
AZ0495_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
AZ0495_STAMPING: G 1432 1982
AZ0495_MARK LOGO: NGS
AZ0495_PROJECTION: FLUSH
AZ0495_MAGNETIC: I = MARKER IS A STEEL ROD
AZ0495_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
AZ0495_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AZ0495+SATELLITE: SATELLITE OBSERVATIONS - September 26, 2007
AZ0495_ROD/PIPE-DEPTH: 1.5 meters
AZ0495
AZ0495 HISTORY   - Date   Condition   Report By
AZ0495 HISTORY   - 1982   MONUMENTED   NGS
AZ0495 HISTORY   - 19930222 GOOD   NGS

```
AZ0495  HISTORY     - 19960109 GOOD            USPSQD
AZ0495  HISTORY     - 19980306 GOOD            NGS
AZ0495  HISTORY     - 20030403 GOOD            NGS
AZ0495  HISTORY     - 20070926 GOOD            USAF
AZ0495
AZ0495                          STATION DESCRIPTION
AZ0495
AZ0495'DESCRIBED BY NATIONAL GEODETIC SURVEY 1982
AZ0495'3.1 KM (1.9 MI) SE FROM SPOFFORD.
AZ0495'THE MARK IS 0.91 M ABOVE ROAD.
AZ0495'3.1 KM (1.9 MI) SOUTHEAST ALONG FARM ROAD 1572 FROM THE JUNCTION OF
AZ0495'STATE ROUTE 131 IN SPOFFORD, AT MIDDLE OF A SMALL CUT BANK AND ACROSS
AZ0495'ROAD FROM THE CENTER OF AN IRON GATE AND GRAVEL ROAD LEADING SOUTH,
AZ0495'18.3 METERS (60.0 FT) NORTHEAST OF CENTERLINE OF FARM ROAD,
AZ0495'0.30 METERS (1.0 FT) SOUTHWEST OF A FENCE.  NOTE, ROD DRIVEN TO
AZ0495'REFUSAL.
AZ0495'THE MARK IS 0.30 METERS  SE FROM A WITNESS POST.
AZ0495
AZ0495                          STATION RECOVERY (1993)
AZ0495
AZ0495'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1993
AZ0495'STATION IS LOCATED ABOUT 16 KM (9.95 MI) SOUTH OF BRACKETTVILLE, 3 KM
AZ0495'(1.85 MI) EAST OF SPOFFORD, ALONG FARM ROAD 1572, ON THE
AZ0495'RIGHT-OF-WAY, IN A GRADED FIRE BREAK, ACROSS THE ROAD FROM A GATED
AZ0495'ENTRANCE TO THE PETRUCHA RANCH.  OWNERSHIP--TEXAS DEPARTMENT OF
AZ0495'TRANSPORTATION.
AZ0495'TO REACH FROM THE JUNCTION OF U.S. HIGHWAY 90 AND STATE HIGHWAY 131,
AZ0495'ABOUT 2 KM (1.25 MI) EAST OF BRACKETTVILLE, GO SOUTH ON HIGHWAY 131
AZ0495'FOR 14.67 KM (9.10 MI) TO A RAILROAD CROSSING.  CONTINUE AHEAD FOR
AZ0495'0.26 KM (0.15 MI) TO A PAVED ROAD LEFT AT SPOFFORD.  TURN LEFT, EAST,
AZ0495'ON FARM ROAD 1572 FOR 1.94 KM (1.20 MI) TO A RAILROAD CROSSING.
AZ0495'CONTINUE AHEAD FOR 1.06 KM (0.65 MI) TO THE RANCH ENTRANCE ON THE
AZ0495'RIGHT AND THE STATION ON THE LEFT.
AZ0495'STATION MARK IS A PUNCH HOLE TOP CENTER ON A STAINLESS STEEL ROD
AZ0495'ENCASED IN A PVC PIPE WITH LOGO CAP SURROUNDED BY CONCRETE PROJECTING
AZ0495'1 CM ABOVE GROUND.  IT IS 18.1 M (59.4 FT) NORTHEAST OF AND 1 M
AZ0495'(3.3 FT) HIGHER THAN THE ROAD CENTER, 8.7 M (28.5 FT) NORTHWEST OF
AZ0495'THE NORTHWEST ONE OF TWO BRACED WOODEN FENCE POSTS, 0.3 M (1.0 FT)
AZ0495'SOUTHWEST OF THE RIGHT-OF-WAY FENCE AND 0.4 M (1.3 FT) SOUTHEAST OF A
AZ0495'METAL WITNESS POST.
AZ0495
AZ0495                          STATION RECOVERY (1996)
AZ0495
AZ0495'RECOVERY NOTE BY US POWER SQUADRON 1996
AZ0495'RECOVERED IN GOOD CONDITION.
AZ0495
AZ0495                          STATION RECOVERY (1998)
AZ0495
AZ0495'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1998 (CSM)
AZ0495'THE STATION IS LOCATED ABOUT 16 KM (9.95 MI) SOUTH OF BRACKETTVILLE,
AZ0495'AND 3 KM (1.85 MI) EAST OF SPOFFORD, ALONG THE NORTHEAST SIDE OF FARM
AZ0495'ROAD 1572 AT THE RIGHT-OF-WAY FENCE, IN A GRADED FIRE BREAK ACROSS THE
AZ0495'ROAD FROM A GATED ENTRANCE TO THE PATRUCHA RANCH. OWNERSHIP--TEXAS
AZ0495'DEPARTMENT OF TRANSPORTATION.  TO REACH THE STATION FROM THE JUNCTION
AZ0495'OF STATE HIGHWAY 131 AND FARM ROAD 1572 NEAR THE CENTER OF SPOFFORD,
AZ0495'GO EAST, FOR 1.94 KM (1.20 MI) ALONG ROAD 1572 TO A RAILROAD CROSSING.
AZ0495'CONTINUE EAST, FOR 1.06 KM (0.65 MI) TO THE RANCH ENTRANCE ON THE
AZ0495'RIGHT AND THE STATION ON THE LEFT, AT THE FENCE.  NOTE--THE DATUM
AZ0495'POINT IS A PUNCH MARK ON THE TOP CENTER OF A STAINLESS STEEL ROD CAP
AZ0495'CRIMPED TO THE TOP OF A STAINLESS STEEL ROD WITHOUT SLEEVE, RECESSED
```

AZ0495'ABOUT 4-CM BELOW THE GROUND SURFACE AND DRIVEN TO A DEPTH OF 1.5 M,
AZ0495'(4.9 FT) ENCASED IN A 5-INCH PVC PIPE WITH NGS LOGO CAP SURROUNDED BY
AZ0495'CONCRETE, FLUSH WITH THE GROUND SURFACE. NOTE--THE PREVIOUS
AZ0495'DESCRIPTIONS STATE 59=STAINLESS STEEL ROD IN SLEEVE, THIS IS
AZ0495'INCORRECT. STATION IS 18.1 M (59.4 FT) NORTHEAST OF THE ROAD CENTER,
AZ0495'8.7 M (28.5 FT) NORTHWEST OF THE NORTHWEST 1 OF 2 BRACED WOODEN FENCE
AZ0495'POSTS, 0.4 M (1.3 FT) SOUTHEAST OF A METAL WITNESS POST, ABOUT 0.4 M
AZ0495'(1.3 FT) ABOVE THE ROAD LEVEL, AND 0.3 M (1.0 FT) SOUTHWEST OF THE
AZ0495'RIGHT-OF-WAY FENCE. BY R.G. HAYES
AZ0495
AZ0495 STATION RECOVERY (2003)
AZ0495
AZ0495'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 2003 (DH)
AZ0495'RECOVERED IN GOOD CONDITION WITH LOGO COVER MISSING.
AZ0495
AZ0495 STATION RECOVERY (2007)
AZ0495
AZ0495'RECOVERY NOTE BY US AIR FORCE 2007 (TG)
AZ0495'1HR 38 MIN GPS OBSERVATON TAKEN, BY TINO GOMEZ, US AIR FORCE, 47TH
AZ0495'CIVIL ENGINEER SQUADRON, LAUGHLIN AFB, TX (830)298-5025.

*** retrieval complete.
Elapsed Time = 00:00:02

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 16, 2018
 AO0433 ***********************************************************************
 AO0433  CBN         -  This is a Cooperative Base Network Control Station.
 AO0433  DESIGNATION -  K 1086 RESET
 AO0433  PID         -  AO0433
 AO0433  STATE/COUNTY-  TX/DIMMIT
 AO0433  COUNTRY     -  US
 AO0433  USGS QUAD   -  CARRIZO SPRINGS WEST (1972)
 AO0433
 AO0433                        *CURRENT SURVEY CONTROL
 AO0433  ______________________________________________________________________
 AO0433* NAD 83(2011) POSITION- 28 37 10.80324(N) 099 56 37.72763(W)   ADJUSTED
 AO0433* NAD 83(2011) ELLIP HT-   164.092 (meters)        (06/27/12)   ADJUSTED
 AO0433* NAD 83(2011) EPOCH   -  2010.00
 AO0433* NAVD 88 ORTHO HEIGHT -   187.501 (meters)      615.16  (feet) ADJUSTED
 AO0433  ______________________________________________________________________
 AO0433  GEOID HEIGHT    -        -23.406 (meters)                     GEOID12B
 AO0433  NAD 83(2011) X  -   -967,590.317 (meters)                     COMP
 AO0433  NAD 83(2011) Y  - -5,519,120.887 (meters)                     COMP
 AO0433  NAD 83(2011) Z  -  3,037,044.183 (meters)                     COMP
 AO0433  LAPLACE CORR    -         -1.44  (seconds)                    DEFLEC12B
 AO0433  DYNAMIC HEIGHT  -        187.222 (meters)      614.24  (feet) COMP
 AO0433  MODELED GRAVITY -    979,153.0   (mgal)                       NAVD 88
 AO0433
 AO0433  VERT ORDER      -  FIRST     CLASS II
 AO0433
 AO0433  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 AO0433  Standards:
 AO0433         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 AO0433            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 AO0433  ------------------------------------------------------------------
 AO0433  NETWORK    2.76   4.47           0.88   1.26   2.28      0.37949935
 AO0433  ------------------------------------------------------------------
 AO0433  Click here for local accuracies and other accuracy information.
 AO0433
 AO0433
 AO0433.The horizontal coordinates were established by GPS observations
 AO0433.and adjusted by the National Geodetic Survey in June 2012.
 AO0433
 AO0433.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 AO0433.been affixed to the stable North American tectonic plate. See
 AO0433.NA2011 for more information.
 AO0433
 AO0433.The horizontal coordinates are valid at the epoch date displayed above
 AO0433.which is a decimal equivalence of Year/Month/Day.
 AO0433
 AO0433.The orthometric height was determined by differential leveling and
 AO0433.adjusted by the NATIONAL GEODETIC SURVEY
 AO0433.in June 1991.
 AO0433
```

AO0433.Significant digits in the geoid height do not necessarily reflect accuracy.
AO0433.GEOID12B height accuracy estimate available here.
AO0433
AO0433.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AO0433
AO0433.The Laplace correction was computed from DEFLEC12B derived deflections.
AO0433
AO0433.The ellipsoidal height was determined by GPS observations
AO0433.and is referenced to NAD 83.
AO0433
AO0433.The dynamic height is computed by dividing the NAVD 88
AO0433.geopotential number by the normal gravity value computed on the
AO0433.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AO0433.degrees latitude (g = 980.6199 gals.).
AO0433
AO0433.The modeled gravity was interpolated from observed gravity values.
AO0433
AO0433. The following values were computed from the NAD 83(2011) position.
AO0433
AO0433;   North   East   Units Scale Factor Converg.
AO0433;SPC TXSC   - 4,087,521.342   507,707.736   MT 0.99994056   -0 27 44.6
AO0433;SPC TXSC   -13,410,476.27 1,665,704.46   sFT 0.99994056   -0 27 44.6
AO0433;UTM 14   - 3,166,213.248   407,735.892   MT 0.99970505   -0 27 07.6
AO0433
AO0433!   - Elev Factor x Scale Factor =   Combined Factor
AO0433!SPC TXSC   -   0.99997423 x   0.99994056 =   0.99991479
AO0433!UTM 14   -   0.99997423 x   0.99970505 =   0.99967928
AO0433
AO0433_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RMS0773566213(NAD 83)
AO0433
AO0433   SUPERSEDED SURVEY CONTROL
AO0433
AO0433 NAD 83(2007)- 28 37 10.80303(N)   099 56 37.72847(W) AD(2002.00) 0
AO0433 ELLIP H (02/10/07) 164.105 (m)   GP(2002.00)
AO0433 ELLIP H (10/24/00) 164.121 (m)   GP(   ) 4 2
AO0433 NAD 83(1993)- 28 37 10.80239(N)   099 56 37.72768(W) AD(   ) B
AO0433 ELLIP H (05/09/94) 164.227 (m)   GP(   ) 4 2
AO0433 NAVD 88   187.50   (m)   615.2   (f) LEVELING   3
AO0433 NGVD 29 (??/??/??) 187.28   (m)   614.4   (f) RESET   3
AO0433
AO0433.Superseded values are not recommended for survey control.
AO0433
AO0433.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AO0433.See file dsdata.pdf to determine how the superseded data were derived.
AO0433
AO0433_MARKER: DB = BENCH MARK DISK
AO0433_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AO0433_STAMPING: K 1086 RESET 1964
AO0433_MARK LOGO: CGS
AO0433_PROJECTION: FLUSH
AO0433_MAGNETIC: N = NO MAGNETIC MATERIAL
AO0433_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AO0433+STABILITY: SURFACE MOTION
AO0433_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AO0433+SATELLITE: SATELLITE OBSERVATIONS - January 16, 2015
AO0433
AO0433 HISTORY   - Date   Condition   Report By
AO0433 HISTORY   - 1964   MONUMENTED   CGS
AO0433 HISTORY   - 1982   GOOD   NGS
AO0433 HISTORY   - 19930222 GOOD   NGS

```
AO0433  HISTORY     - 19970621 GOOD             USPSQD
AO0433  HISTORY     - 20150116 GOOD             INDIV
AO0433
AO0433                          STATION DESCRIPTION
AO0433
AO0433'DESCRIBED BY COAST AND GEODETIC SURVEY 1964
AO0433'8.55 MI NW FROM CARRIZO SPRINGS.
AO0433'ABOUT 8.55 MILES NORTHWEST ALONG U. S. HIGHWAY 277 FROM THE SAN
AO0433'ANTONIO, UVALDE AND GULF RAILROAD STATION AT CARRIZO SPRINGS, AT THE
AO0433'JUNCTION OF FARM ROAD 191, 76 FEET SOUTHWEST OF THE CENTER LINE OF THE
AO0433'HIGHWAY, 1 FOOT EAST OF A METAL WITNESS POST, IN THE RIGHT-OF-WAY
AO0433'FENCE LINE, AT THE TEXAS HIGHWAY DEPARTMENT BASE LINE STATION 559 +
AO0433'16.  A STANDARD DISK SET IN A 12 X 12 IN. CONCRETE POST WHICH PROJECTS
AO0433'4 INCHES ABOVE THE SURFACE OF THE GROUND.
AO0433
AO0433                          STATION RECOVERY (1982)
AO0433
AO0433'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1982
AO0433'ONE BLOCK SOUTHWEST ALONG SIXTH STREET FROM THE POST OFFICE IN CARRIZO
AO0433'SPRINGS, THENCE 13.9 (8.65 MI) NORTHWEST ALONG U.S. HIGHWAY 277, AT
AO0433'THE JUNCTION TO FARM ROAD 191, 23.2 METERS (76.0 FT) SOUTHWEST OF
AO0433'CENTERLINE OF HIGHWAY, 41.7 METERS (137.0 FT) NORTHWEST OF A TELEPHONE
AO0433'JUNCTION BOX, AND 28.3 METERS (93.0 FT) NORTHWEST OF POWER POLE WITH
AO0433'WARNING LIGHT AT JUNCTION, NOTE, IN LINE OF RIGHT OF WAY FENCE LINE,
AO0433'AT THE TEXAS HIGHWAY DEPARTMENT BASE LINE STATION 559+16.
AO0433'THE MARK IS 0.3 METERS  E FROM A WITNESS POST.
AO0433'THE MARK IS 0.6 M ABOVE HIGHWAY.
AO0433
AO0433                          STATION RECOVERY (1993)
AO0433
AO0433'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1993
AO0433'STATION IS LOCATED ABOUT 14 KM (8.70 MI) NORTHWEST OF CARRIZO SPRINGS,
AO0433'14 KM (8.70 MI) SOUTHWEST OF CRYSTAL CITY, AT THE JUNCTION OF U.S.
AO0433'HIGHWAY 277 AND FARM ROAD 191, OUTSIDE THE RIGHT-OF-WAY FENCE ON THE
AO0433'SOUTHWEST SIDE OF THE JUNCTION.  OWNERSHIP--UNKNOWN.
AO0433'TO REACH FROM THE JUNCTION OF U.S. HIGHWAYS 83, 277 AND STATE HIGHWAY
AO0433'85 IN CARRIZO SPRINGS, GO NORTHWEST ON HIGHWAY 277 FOR 3.92 KM
AO0433'(2.45 MI) TO STATE LOOP 517 ON THE RIGHT.  CONTINUE AHEAD FOR 10.13
AO0433'KM (6.30 MI) TO FARM ROAD 191 ON THE RIGHT AND STATION ON THE LEFT.
AO0433'STATION MARK IS SET IN THE TOP OF A 25 CM SQUARE CONCRETE POST
AO0433'PROJECTING 5 CM ABOVE GROUND.  IT IS 22.7 M (74.5 FT) SOUTHWEST OF
AO0433'AND SLIGHTLY HIGHER THAN THE HIGHWAY MEDIAN CURB, 0.2 M (0.7 FT)
AO0433'SOUTHWEST OF AND PARTIALLY UNDER THE RIGHT-OF-WAY FENCE, 0.6 M
AO0433'(2.0 FT) EAST OF A METAL WITNESS POST, 2.6 M (8.5 FT) EAST OF THE
AO0433'EAST ONE OF TWO BRACED FENCE POSTS, 6.9 M (22.6 FT) WEST OF A TALL
AO0433'CABLE POST 234 AND 28.4 M (93.2 FT) WEST OF A UTILITY GUY POLE.
AO0433
AO0433                          STATION RECOVERY (1997)
AO0433
AO0433'RECOVERY NOTE BY US POWER SQUADRON 1997
AO0433'RECOVERED IN GOOD CONDITION.
AO0433
AO0433                          STATION RECOVERY (2015)
AO0433
AO0433'RECOVERY NOTE BY INDIVIDUAL CONTRIBUTORS 2015 (JTH)
AO0433'RECOVERED IN GOOD CONDITION.

*** retrieval complete.
Elapsed Time = 00:00:03
```

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1         National Geodetic Survey,   Retrieval Date = MARCH 16, 2018
 AO0410 ***********************************************************************
 AO0410  SACS        -  This is a Secondary Airport Control Station.
 AO0410  DESIGNATION -  M 1085
 AO0410  PID         -  AO0410
 AO0410  STATE/COUNTY-  TX/DIMMIT
 AO0410  COUNTRY     -  US
 AO0410  USGS QUAD   -  CARRIZO SPRINGS EAST (1972)
 AO0410
 AO0410                        *CURRENT SURVEY CONTROL
 AO0410  ______________________________________________________________________
 AO0410* NAD 83(2011) POSITION- 28 31 23.32714(N) 099 49 37.59832(W)   ADJUSTED
 AO0410* NAD 83(2011) ELLIP HT-   157.573 (meters)        (06/27/12)   ADJUSTED
 AO0410* NAD 83(2011) EPOCH   -  2010.00
 AO0410* NAVD 88 ORTHO HEIGHT -   181.243 (meters)      594.63  (feet) ADJUSTED
 AO0410  ______________________________________________________________________
 AO0410  GEOID HEIGHT    -        -23.697 (meters)                     GEOID12B
 AO0410  NAD 83(2011) X  -   -957,218.954 (meters)                     COMP
 AO0410  NAD 83(2011) Y  - -5,526,115.718 (meters)                     COMP
 AO0410  NAD 83(2011) Z  -  3,027,646.213 (meters)                     COMP
 AO0410  LAPLACE CORR    -         -1.99  (seconds)                    DEFLEC12B
 AO0410  DYNAMIC HEIGHT  -        180.971 (meters)      593.74  (feet) COMP
 AO0410  MODELED GRAVITY -    979,141.5   (mgal)                       NAVD 88
 AO0410
 AO0410  VERT ORDER      -  FIRST     CLASS II
 AO0410
 AO0410  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 AO0410  Standards:
 AO0410         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 AO0410            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 AO0410  ------------------------------------------------------------------
 AO0410  NETWORK    1.35   3.08           0.54   0.56   1.57      0.02917402
 AO0410  ------------------------------------------------------------------
 AO0410  Click here for local accuracies and other accuracy information.
 AO0410
 AO0410
 AO0410.This mark is at Dimmit Co (CZT) Airport (CZT)
 AO0410
 AO0410.The horizontal coordinates were established by GPS observations
 AO0410.and adjusted by the National Geodetic Survey in June 2012.
 AO0410
 AO0410.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 AO0410.been affixed to the stable North American tectonic plate. See
 AO0410.NA2011 for more information.
 AO0410
 AO0410.The horizontal coordinates are valid at the epoch date displayed above
 AO0410.which is a decimal equivalence of Year/Month/Day.
 AO0410
 AO0410.The orthometric height was determined by differential leveling and
 AO0410.adjusted by the NATIONAL GEODETIC SURVEY
```

```
AO0410.in June 1991.
AO0410
AO0410.Significant digits in the geoid height do not necessarily reflect accuracy.
AO0410.GEOID12B height accuracy estimate available here.
AO0410
AO0410.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AO0410
AO0410.The Laplace correction was computed from DEFLEC12B derived deflections.
AO0410
AO0410.The ellipsoidal height was determined by GPS observations
AO0410.and is referenced to NAD 83.
AO0410
AO0410.The dynamic height is computed by dividing the NAVD 88
AO0410.geopotential number by the normal gravity value computed on the
AO0410.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AO0410.degrees latitude (g = 980.6199 gals.).
AO0410
AO0410.The modeled gravity was interpolated from observed gravity values.
AO0410
AO0410. The following values were computed from the NAD 83(2011) position.
AO0410
AO0410;                    North         East     Units Scale Factor Converg.
AO0410;SPC TXSC     - 4,076,738.411   519,043.828   MT  0.99996281   -0 24 18.8
AO0410;SPC TXSC     -13,375,099.27  1,702,896.29   sFT  0.99996281   -0 24 18.8
AO0410;UTM  14      - 3,155,435.142   419,070.986   MT  0.99968083   -0 23 41.9
AO0410
AO0410!             -  Elev Factor  x  Scale Factor =   Combined Factor
AO0410!SPC TXSC     -   0.99997525  x   0.99996281  =   0.99993806
AO0410!UTM  14      -   0.99997525  x   0.99968083  =   0.99965609
AO0410
AO0410:                Primary Azimuth Mark                     Grid Az
AO0410:SPC TXSC     -  CARRPORT                                 119 45 11.2
AO0410:UTM  14      -  CARRPORT                                 119 44 34.3
AO0410
AO0410_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RMS1907055435(NAD 83)
AO0410
AO0410|-----------------------------------------------------------------------|
AO0410| PID    Reference Object                    Distance      Geod. Az   |
AO0410|                                                          dddmmss.s |
AO0410| AO0792 CARRPORT                          APPROX. 0.6 KM 1192052.4 |
AO0410|-----------------------------------------------------------------------|
AO0410
AO0410                          SUPERSEDED SURVEY CONTROL
AO0410
AO0410  NAD 83(2007)-  28 31 23.32688(N)    099 49 37.59902(W) AD(2002.00) 0
AO0410  ELLIP H (02/10/07)  157.583  (m)                        GP(2002.00)
AO0410  ELLIP H (10/24/00)  157.570  (m)                        GP(       ) 4 2
AO0410  NAD 83(1993)-  28 31 23.32702(N)    099 49 37.59832(W) AD(       ) 1
AO0410  ELLIP H (02/20/96)  157.706  (m)                        GP(       ) 1 1
AO0410  NAVD 88 (02/20/96)  181.51   (m)  GEOID93 model used   GPS OBS
AO0410  NGVD 29 (??/??/92)  181.172  (m)          594.40   (f) ADJ UNCH    1 2
AO0410
AO0410.Superseded values are not recommended for survey control.
AO0410
AO0410.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AO0410.See file dsdata.pdf to determine how the superseded data were derived.
AO0410
AO0410_MARKER: DB = BENCH MARK DISK
AO0410_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AO0410_STAMPING: M 1085 1957
```

AO0410_MARK LOGO: CGS
AO0410_PROJECTION: FLUSH
AO0410_MAGNETIC: O = OTHER; SEE DESCRIPTION
AO0410_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AO0410+STABILITY: SURFACE MOTION
AO0410_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AO0410+SATELLITE: SATELLITE OBSERVATIONS - June 26, 2010
AO0410

AO0410 HISTORY	- Date	Condition	Report By
AO0410 HISTORY	- 1957	MONUMENTED	CGS
AO0410 HISTORY	- 1982	GOOD	NGS
AO0410 HISTORY	- 19950412	GOOD	NGS
AO0410 HISTORY	- 19970531	GOOD	USPSQD
AO0410 HISTORY	- 20100626	GOOD	GRWAS

AO0410
AO0410 STATION DESCRIPTION
AO0410
AO0410'DESCRIBED BY COAST AND GEODETIC SURVEY 1957
AO0410'2.1 MI E FROM CARRIZO SPRINGS.
AO0410'0.1 MILE NORTH ALONG U.S. HIGHWAY 83 FROM THE SAN ANTONIO, UVALDE AND
AO0410'GULF RAILROAD STATION AT CARRIZO SPRINGS, THENCE 1.4 MILES NORTHEAST
AO0410'ALONG STATE HIGHWAY 85, THENCE 0.6 MILE SOUTHEAST ALONG AN OILED ROAD,
AO0410'65 FEET SOUTHEAST OF THE SOUTH CORNER OF THE HANGAR AT THE DIMMIT
AO0410'COUNTY AIRPORT, 38 FEET NORTHWEST OF THE NORTH CORNER OF THE
AO0410'ADMINISTRATION BUILDING, 1.7 FEET SOUTHEAST OF A FENCE, SET IN THE TOP
AO0410'OF A CONCRETE POST WHICH PROJECTS 0.2 FOOT ABOVE THE GROUND.
AO0410
AO0410 STATION RECOVERY (1982)
AO0410
AO0410'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1982
AO0410'MARK RECOVERED THIS DATE, 2 BLOCKS NORTH ALONG SIXTH STREET, THENCE
AO0410'2.7 KM (1.7 MI) NORTHEAST ALONG STATE HIGHWAY 85, THENCE 1.0 KM
AO0410'(0.6 MI) SOUTHEAST ALONG A BLACK TOP ROAD, 19.8 METERS (65.0 FT)
AO0410'SOUTHEAST OF SOUTH CORNER OF A HANGER AT THE DIMMIT COUNTY AIRPORT,
AO0410'AND 11.5 METERS (38.0 FT) NORTHWEST OF NORTH CORNER OF ADMINISTRATION
AO0410'BUILDING.
AO0410'THE MARK IS ABOVE LEVEL WITH GROUND.
AO0410
AO0410 STATION RECOVERY (1995)
AO0410
AO0410'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1995 (AJL)
AO0410'THE STATION IS LOCATED ABOUT 4 KM (2.50 MI) EAST OF CARRIZO SPRINGS,
AO0410'1.2 KM (0.75 MI) SOUTHEAST OF STATE HIGHWAY 85, AT THE DIMMIT COUNTY
AO0410'AIRPORT, NORTHWEST OF THE NORTH CORNER OF THE OLD OFFICE IN THE LAWN,
AO0410'OWNERSHIP--DIMMIT COUNTY, CARRIZO SPRINGS, TEXAS 78834, ERNEST
AO0410'MARTINEZ, AIRPORT MANAGER, PHONE 512 876 9339. TO REACH THE STATION
AO0410'FROM THE JUNCTION OF U.S. HIGHWAY 83, U.S. HIGHWAY 277, STATE
AO0410'HIGHWAY 85, AND LOOP 225 IN CARRIZO SPRINGS, GO EAST ON STATE HIGHWAY
AO0410'85 FOR 2.27 KM (1.40 MI) TO A PAVED ROAD RIGHT, (NEAR A LARGE WATER
AO0410'STORAGE TANK) GO SOUTHEAST 0.96 KM (0.60 MI) TO THE AIRPORT ENTRANCE
AO0410'ON THE LEFT,NORTHEAST, GO 0.14 KM (0.10 MI) TO A T-ROAD AND AN
AO0410'ABANDONED OFFICE BUILDING, AND THE STATION AHEAD IN THE NORTHWEST
AO0410'LAWN. THE STATION IS 22.0 M (72.2 FT) NORTHEAST OF THE CENTER OF THE
AO0410'T-ROAD, 19.7 M (64.6 FT) SOUTHEAST OF THE SOUTH CORNER OF A HANGAR,
AO0410'11.8 M (38.7 FT) NORTHWEST OF THE NORTH CORNER OF THE OLD OFFICE, 8.3
AO0410'M (27.2 FT) SOUTHEAST OF AND LEVEL WITH THE CENTER OF AN APRON ACCESS
AO0410'ROAD, 6.1 M (20.0 FT) SOUTHWEST OF THE CENTER OF AN ABANDONED CONCRETE
AO0410'BASE, AND THE MONUMENT IS FLUSH WITH THE GROUND SURFACE. NOTE--THE
AO0410'DISK HAS BEEN MARRED AND IS HARD TO READ. BY DEB
AO0410

```
AO0410                          STATION RECOVERY (1997)
AO0410
AO0410'RECOVERY NOTE BY US POWER SQUADRON 1997
AO0410'RECOVERED IN GOOD CONDITION.
AO0410
AO0410                          STATION RECOVERY (2010)
AO0410
AO0410'RECOVERY NOTE BY GRW AERIAL SURVEY 2010 (BN)
AO0410'RECOVERED IN GOOD CONDITION.

*** retrieval complete.
Elapsed Time = 00:00:02
```

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 15, 2018
 CA0796 ***********************************************************************
 CA0796  FBN         -  This is a Federal Base Network Control Station.
 CA0796  DESIGNATION -  NINE 2
 CA0796  PID         -  CA0796
 CA0796  STATE/COUNTY-  TX/MCCULLOCH
 CA0796  COUNTRY     -  US
 CA0796  USGS QUAD   -  BRADY SW (1987)
 CA0796
 CA0796                        *CURRENT SURVEY CONTROL
 CA0796  ______________________________________________________________________
 CA0796* NAD 83(2011) POSITION- 31 03 06.37530(N) 099 22 32.37074(W)   ADJUSTED
 CA0796* NAD 83(2011) ELLIP HT-   566.444 (meters)        (06/27/12)   ADJUSTED
 CA0796* NAD 83(2011) EPOCH   -  2010.00
 CA0796* NAVD 88 ORTHO HEIGHT -   589.568 (meters)     1934.27  (feet) ADJUSTED
 CA0796  ______________________________________________________________________
 CA0796  GEOID HEIGHT    -        -23.123 (meters)                    GEOID12B
 CA0796  NAD 83(2011) X  -   -891,021.745 (meters)                    COMP
 CA0796  NAD 83(2011) Y  - -5,396,453.200 (meters)                    COMP
 CA0796  NAD 83(2011) Z  -  3,271,104.360 (meters)                    COMP
 CA0796  LAPLACE CORR    -         -1.41  (seconds)                   DEFLEC12B
 CA0796  DYNAMIC HEIGHT  -        588.768 (meters)     1931.65  (feet) COMP
 CA0796  MODELED GRAVITY -    979,265.1   (mgal)                      NAVD 88
 CA0796
 CA0796  VERT ORDER      -  FIRST     CLASS II
 CA0796
 CA0796  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 CA0796  Standards:
 CA0796         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 CA0796            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 CA0796  ------------------------------------------------------------------
 CA0796  NETWORK    0.64   1.41           0.24   0.28   0.72     -0.08759616
 CA0796  ------------------------------------------------------------------
 CA0796  Click here for local accuracies and other accuracy information.
 CA0796
 CA0796
 CA0796.The horizontal coordinates were established by GPS observations
 CA0796.and adjusted by the National Geodetic Survey in June 2012.
 CA0796
 CA0796.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 CA0796.been affixed to the stable North American tectonic plate. See
 CA0796.NA2011 for more information.
 CA0796
 CA0796.The horizontal coordinates are valid at the epoch date displayed above
 CA0796.which is a decimal equivalence of Year/Month/Day.
 CA0796
 CA0796.The orthometric height was determined by differential leveling and
 CA0796.adjusted by the NATIONAL GEODETIC SURVEY
 CA0796.in June 1991.
 CA0796
```

```
CA0796.Significant digits in the geoid height do not necessarily reflect accuracy.
CA0796.GEOID12B height accuracy estimate available here.
CA0796
CA0796.The X, Y, and Z were computed from the position and the ellipsoidal ht.
CA0796
CA0796.The Laplace correction was computed from DEFLEC12B derived deflections.
CA0796
CA0796.The ellipsoidal height was determined by GPS observations
CA0796.and is referenced to NAD 83.
CA0796
CA0796.The dynamic height is computed by dividing the NAVD 88
CA0796.geopotential number by the normal gravity value computed on the
CA0796.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
CA0796.degrees latitude (g = 980.6199 gals.).
CA0796
CA0796.The modeled gravity was interpolated from observed gravity values.
CA0796
CA0796. The following values were computed from the NAD 83(2011) position.
CA0796
CA0796;                      North         East     Units Scale Factor Converg.
CA0796;SPC TX C     - 3,153,939.190   791,400.671   MT  0.99988213   +0 29 35.7
CA0796;SPC TX C     -10,347,548.83  2,596,453.70   sFT  0.99988213   +0 29 35.7
CA0796;UTM  14      - 3,435,400.085   464,156.627   MT  0.99961585   -0 11 37.6
CA0796
CA0796!              -  Elev Factor  x  Scale Factor =   Combined Factor
CA0796!SPC TX C     -   0.99991106  x   0.99988213  =   0.99979320
CA0796!UTM  14      -   0.99991106  x   0.99961585  =   0.99952694
CA0796
CA0796:                 Primary Azimuth Mark                     Grid Az
CA0796:SPC TX C     -  NINE 2 AZ MK 2                        204 35 03.6
CA0796:UTM  14      -  NINE 2 AZ MK 2                        205 16 16.9
CA0796
CA0796_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RMV6415635400(NAD 83)
CA0796
CA0796|-----------------------------------------------------------------------|
CA0796| PID    Reference Object                     Distance      Geod. Az  |
CA0796|                                                           dddmmss.s |
CA0796| CA1102 BRADY TV ENTERPRISES MAST          APPROX. 7.3 KM 0264657.5 |
CA0796| CA0795 NINE                               28.342 METERS 08437     |
CA0796| CA0793 NINE 2 AZ MK 2                                   2050439.3 |
CA0796|-----------------------------------------------------------------------|
CA0796
CA0796                          SUPERSEDED SURVEY CONTROL
CA0796
CA0796  NAD 83(2007)-  31 03 06.37521(N)    099 22 32.37155(W) AD(2002.00) 0
CA0796  ELLIP H (02/10/07)  566.456  (m)                       GP(2002.00)
CA0796  ELLIP H (05/01/00)  566.472  (m)                       GP(       ) 3 1
CA0796  NAD 83(1993)-  31 03 06.37461(N)    099 22 32.37107(W) AD(       ) B
CA0796  ELLIP H (05/09/94)  566.565  (m)                       GP(       ) 4 2
CA0796  NAD 83(1986)-  31 03 06.38299(N)    099 22 32.35685(W) AD(       ) 1
CA0796  NAD 27      -  31 03 05.76914(N)    099 22 31.14619(W) AD(       ) 1
CA0796  NAVD 88            589.57   (m)          1934.3    (f) LEVELING    3
CA0796  NGVD 29 (07/19/86)  589.6    (m)          1934.     (f) VERT ANG
CA0796
CA0796.Superseded values are not recommended for survey control.
CA0796
CA0796.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
CA0796.See file dsdata.pdf to determine how the superseded data were derived.
CA0796
CA0796_MARKER: DS = TRIANGULATION STATION DISK
```

CA0796_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
CA0796_STAMPING: NINE 2 1967
CA0796_MARK LOGO: CGS
CA0796_PROJECTION: FLUSH
CA0796_MAGNETIC: N = NO MAGNETIC MATERIAL
CA0796_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
CA0796+STABILITY: SURFACE MOTION
CA0796_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
CA0796+SATELLITE: SATELLITE OBSERVATIONS - February 17, 1998
CA0796

CA0796 HISTORY	- Date	Condition	Report By
CA0796 HISTORY	- 1967	MONUMENTED	CGS
CA0796 HISTORY	- 1981	GOOD	NGS
CA0796 HISTORY	- 1981	GOOD	NGS
CA0796 HISTORY	- 19930222	GOOD	NGS
CA0796 HISTORY	- 19950827	GOOD	USPSQD
CA0796 HISTORY	- 19980217	GOOD	NGS

CA0796
CA0796 STATION DESCRIPTION
CA0796
CA0796'DESCRIBED BY COAST AND GEODETIC SURVEY 1967 (LGB)
CA0796'THE STATION IS LOCATED ABOUT 12 MILES NORTHWEST OF VOCA, 6 MILES
CA0796'SOUTH-SOUTHWEST OF BRADY AND ON PROPERTY OWNED BY MR. MC WILLIAMS.
CA0796'
CA0796'TO REACH THE STATION FROM THE COURTHOUSE IN BRADY, GO SOUTH ON
CA0796'U.S. HIGHWAYS 87 AND 377 FOR 1.35 MILES TO THE JUNCTION OF RANCH
CA0796'ROAD 42 ON THE RIGHT. BEAR RIGHT AND GO SOUTHWEST ON RANCH ROAD
CA0796'42 FOR 4.9 MILES TO TWO GATES ON THE RIGHT. (CONTINUE SOUTHWEST
CA0796'ON RANCH ROAD 42 FOR 0.75 MILE TO THE AZIMUTH MARK ON THE
CA0796'LEFT.) TURN RIGHT, PASS THROUGH THE SOUTH ONE OF TWO GATES AND
CA0796'GO WESTERLY ON FIELD ROAD FOR 0.05 MILE TO THE STATION.
CA0796'
CA0796'THE STATION MARK IS A STANDARD DISK, STAMPED NINE 2 1967, SET IN
CA0796'THE TOP OF A 12-INCH ROUND CONCRETE MONUMENT THAT PROJECTS
CA0796'3-INCHES. IT IS 144 FEET WEST-NORTHWEST OF THE CENTER OF RANCH
CA0796'ROAD 42, 98 FEET WEST-NORTHWEST OF A METAL WITNESS POST WITH
CA0796'SIGN ATTACHED, 89 FEET NORTH OF A 6-INCH OAK TREE AND 15 WEST
CA0796'WEST OF THE CENTER OF A FIELD ROAD.
CA0796'
CA0796'REFERENCE MARK 2 IS A STANDARD DISK, STAMPED NINE NO 2 1935,
CA0796'CEMENTED IN A DRILL HOLE IN OUTCROPPING BEDROCK THAT PROJECTS
CA0796'3-INCHES. IT IS 116 FEET SOUTH OF THE METAL WITNESS POST WITH
CA0796'SIGN, 69 FEET WEST-NORTHWEST OF THE CENTER OF RANCH ROAD 42
CA0796'AND 8 FEET WEST OF A WIRE FENCE.
CA0796'
CA0796'REFERENCE MARK 3 IS A STANDARD DISK, STAMPED NINE 2 NO 3 1967,
CA0796'SET IN THE TOP OF A 12-INCH ROUND CONCRETE MONUMENT THAT PROJECTS
CA0796'4-INCHES. IT IS 116 FEET WEST-NORTHWEST OF THE CENTER OF RANCH
CA0796'ROAD 42, 56.5 FEET WEST-NORTHWEST OF THE METAL WITNESS POST WITH
CA0796'SIGN AND 13 FEET EAST OF THE CENTER OF THE FIELD ROAD.
CA0796'
CA0796'TRIANGULATION STATION NINE 1935 IS A STANDARD DISK, STAMPED NINE
CA0796'1935, SET IN THE TOP OF A 12-INCH SQUARE CONCRETE MONUMENT THAT
CA0796'PROJECTS 6-INCHES. IT IS 65 FEET WEST-NORTHWEST OF THE CENTER
CA0796'OF RANCH ROAD 42, 65 FEET EAST OF THE CENTER OF THE FIELD ROAD
CA0796'AND 5.0 FEET WEST OF THE METAL WITNESS POST WITH SIGN.
CA0796'
CA0796'THE AZIMUTH MARK IS A STANDARD DISK, STAMPED NINE 2 AZ 2 1967,
CA0796'SET IN THE TOP OF A 12-INCH ROUND CONCRETE MONUMENT THAT PROJECTS
CA0796'4-INCHES. IT IS 61 FEET EAST-NORTHEAST OF THE CENTER OF RANCH

CA0796'ROAD 42, 31 FEET SOUTH OF A FENCE CORNER POST, 2.0 FEET NORTH OF
CA0796'A METAL WITNESS POST WITH SIGN ATTACHED AND 1 FOOT WEST OF A
CA0796'WIRE FENCE.
CA0796
CA0796 STATION RECOVERY (1981)
CA0796
CA0796'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1981 (RHK)
CA0796'THE STATION MARK AND AZIMUTH 2 WERE RECOVERED AS DESCRIBED IN 1967 IN
CA0796'GOOD CONDITION.
CA0796
CA0796 STATION RECOVERY (1981)
CA0796
CA0796'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1981
CA0796'10.2 KM (6.35 MI) SW FROM BRADY.
CA0796'THE MARK IS 1.8 M ABOVE THE HIGHWAY.
CA0796'2.3 KM (1.45 MI) SOUTHERLY ALONG U.S. HIGHWAYS 87, 190 AND 377 FROM
CA0796'THE COURTHOUSE IN BRADY, THENCE 7.9 KM (4.9 MI) SOUTHWESTERLY ALONG
CA0796'U.S. HIGHWAY 190, 43.6 METERS (143.0 FT) NORTHWEST OF THE CENTERLINE
CA0796'OF THE HIGHWAY, 28.3 METERS (92.8 FT) WEST OF TRIANGULATION STATION
CA0796'NINE, 25.2 METERS (82.7 FT) NORTHWEST OF A FENCE AND 6.9 METERS (22.6
CA0796'FT) NORTHWEST OF THE CENTER OF A TRACK ROAD.
CA0796'THE MARK IS 29.9 METERS W FROM A WITNESS POST.
CA0796
CA0796 STATION RECOVERY (1993)
CA0796
CA0796'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1993
CA0796'STATION IS LOCATED ABOUT 8 KM (4.95 MI) SOUTHWEST OF BRADY, ALONG U.S.
CA0796'HIGHWAY 190 (MENARD HIGHWAY), AT MILE 450.9, AT A GATED DIRT
CA0796'CROSSROAD, JUST INSIDE THE RIGHT-OF-WAY FENCE, ON THE ZESCH RANCH.
CA0796'OWNERSHIP--R. C. ZESCH, HC 69, BOX 554, BRADY, TX 76825. PHONE IS
CA0796'915-597-1908. CONTACT IN ADVANCE BEFORE WORKING ON THE PROPERTY DUE
CA0796'TO CATTLE AND GUARD DOG.
CA0796'TO REACH FROM THE JUNCTION OF U.S. HIGHWAYS 87, 190 AND 377 ON THE
CA0796'SOUTH SIDE OF THE COURTHOUSE SQUARE IN BRADY, GO SOUTH ON HIGHWAYS 87
CA0796'AND 190 FOR 2.24 KM (1.40 MI) TO A FORK. BEAR RIGHT, SOUTHWEST, ON
CA0796'HIGHWAY 190 FOR 3.28 KM (2.05 MI) TO A DIRT ROAD RIGHT JUST BEFORE A
CA0796'DIRT ROAD LEFT. CONTINUE AHEAD FOR 4.52 KM (2.80 MI) TO HIGH GROUND
CA0796'AND A GATED DIRT CROSSROAD. TURN RIGHT, FOR 40 M (131.2 FT) TO A LOW
CA0796'GATE AT CATTLE GUARD. CLIMB LOW GATE THEN TURN LEFT,
CA0796'SOUTH-SOUTHWEST, FOR 59 M (193.6 FT) TO THE STATION AT THE SOUTHWEST
CA0796'END OF A SMALL OAK GROVE.
CA0796'STATION MARK IS SET IN THE TOP OF A 30-CM ROUND CONCRETE POST FLUSH
CA0796'WITH THE GROUND. IT IS 58.7 M (192.6 FT) SOUTH-SOUTHWEST OF THE
CA0796'SOUTHWEST CORNER OF THE CATTLE GUARD, 25.3 M (83.0 FT) WEST-NORTHWEST
CA0796'OF THE RIGHT-OF-WAY FENCE, 29.7 M (97.4 FT) WEST OF A METAL WITNESS
CA0796'POST AT HORIZONTAL STATION NINE 1935, 37.9 M (124.3 FT) NORTHWEST OF
CA0796'A FIBERGLASS WITNESS POST AT BENCH MARK J 1447 RESET 1989, 6.5 M
CA0796'(21.3 FT) WEST-NORTHWEST OF A TRACK ROAD CENTER AND 7 M (23.0 FT)
CA0796'EAST-NORTHEAST OF A TRACK ROAD CENTER.
CA0796
CA0796 STATION RECOVERY (1995)
CA0796
CA0796'RECOVERY NOTE BY US POWER SQUADRON 1995
CA0796'RECOVERED IN GOOD CONDITION.
CA0796
CA0796 STATION RECOVERY (1998)
CA0796
CA0796'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1998 (CSM)
CA0796'RECOVERED AS DESCRIBED WITH THIS NOTE. BY R.G. HAYES NOTE-- (24-HOUR
CA0796'NOTICE REQUIRED) CALL MR. R.C. ZESCH AT 915-597-1908 BETWEEN 7 AND 8

CA0796'AM OR AROUND 8 PM WITH INTENTIONS.

*** retrieval complete.
Elapsed Time = 00:00:02

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 16, 2018
 AY0887 ***********************************************************************
 AY0887  SACS        -  This is a Secondary Airport Control Station.
 AY0887  DESIGNATION -  P 1094
 AY0887  PID         -  AY0887
 AY0887  STATE/COUNTY-  TX/MEDINA
 AY0887  COUNTRY     -  US
 AY0887  USGS QUAD   -  LA COSTE (1982)
 AY0887
 AY0887                        *CURRENT SURVEY CONTROL
 AY0887  ______________________________________________________________________
 AY0887* NAD 83(2011) POSITION- 29 20 44.85129(N) 098 50 56.04726(W)   ADJUSTED
 AY0887* NAD 83(2011) ELLIP HT-   207.925 (meters)        (06/27/12)   ADJUSTED
 AY0887* NAD 83(2011) EPOCH   -  2010.00
 AY0887* NAVD 88 ORTHO HEIGHT -   232.384 (meters)      762.41  (feet) ADJUSTED
 AY0887  ______________________________________________________________________
 AY0887  GEOID HEIGHT    -        -24.467 (meters)                     GEOID12B
 AY0887  NAD 83(2011) X  -   -855,957.709 (meters)                     COMP
 AY0887  NAD 83(2011) Y  - -5,498,107.238 (meters)                     COMP
 AY0887  NAD 83(2011) Z  -  3,107,468.473 (meters)                     COMP
 AY0887  LAPLACE CORR    -         -3.25  (seconds)                    DEFLEC12B
 AY0887  DYNAMIC HEIGHT  -        232.047 (meters)      761.31  (feet) COMP
 AY0887  MODELED GRAVITY -    979,191.6   (mgal)                       NAVD 88
 AY0887
 AY0887  VERT ORDER      -  FIRST     CLASS II
 AY0887
 AY0887  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 AY0887  Standards:
 AY0887         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 AY0887            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 AY0887  ------------------------------------------------------------------
 AY0887  NETWORK    1.87   4.06           0.78   0.75   2.07      0.09756865
 AY0887  ------------------------------------------------------------------
 AY0887  Click here for local accuracies and other accuracy information.
 AY0887
 AY0887
 AY0887.This mark is at Castroville Muni (T89) Airport (T89)
 AY0887
 AY0887.The horizontal coordinates were established by GPS observations
 AY0887.and adjusted by the National Geodetic Survey in June 2012.
 AY0887
 AY0887.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 AY0887.been affixed to the stable North American tectonic plate. See
 AY0887.NA2011 for more information.
 AY0887
 AY0887.The horizontal coordinates are valid at the epoch date displayed above
 AY0887.which is a decimal equivalence of Year/Month/Day.
 AY0887
 AY0887.The orthometric height was determined by differential leveling and
 AY0887.adjusted by the NATIONAL GEODETIC SURVEY
```

AY0887.in June 1991.
AY0887
AY0887.Significant digits in the geoid height do not necessarily reflect accuracy.
AY0887.GEOID12B height accuracy estimate available here.
AY0887
AY0887.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AY0887
AY0887.The Laplace correction was computed from DEFLEC12B derived deflections.
AY0887
AY0887.The ellipsoidal height was determined by GPS observations
AY0887.and is referenced to NAD 83.
AY0887
AY0887.The dynamic height is computed by dividing the NAVD 88
AY0887.geopotential number by the normal gravity value computed on the
AY0887.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AY0887.degrees latitude (g = 980.6199 gals.).
AY0887
AY0887.The modeled gravity was interpolated from observed gravity values.
AY0887
AY0887. The following values were computed from the NAD 83(2011) position.
AY0887
AY0887;   North   East   Units Scale Factor Converg.
AY0887;SPC TXSC   - 4,167,629.807   614,671.544   MT 0.99986326   +0 04 26.5
AY0887;SPC TXSC   -13,673,298.79 2,016,634.89   sFT 0.99986326   +0 04 26.5
AY0887;UTM 14   - 3,246,306.876   514,667.694   MT 0.99960265   +0 04 26.6
AY0887
AY0887!   - Elev Factor x Scale Factor =   Combined Factor
AY0887!SPC TXSC   -   0.99996734 x   0.99986326 =   0.99983061
AY0887!UTM 14   -   0.99996734 x   0.99960265 =   0.99957001
AY0887
AY0887_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RNT1466746306(NAD 83)
AY0887
AY0887|---|
AY0887| PID   Reference Object   Distance   Geod. Az |
AY0887| dddmmss.s |
AY0887| AY2100 CASTPORT   342.231 METERS 19533 |
AY0887|---|
AY0887
AY0887   SUPERSEDED SURVEY CONTROL
AY0887
AY0887 NAD 83(2007)- 29 20 44.85097(N)   098 50 56.04792(W) AD(2002.00) 0
AY0887 ELLIP H (02/10/07) 207.932 (m)   GP(2002.00)
AY0887 ELLIP H (10/24/00) 207.927 (m)   GP(   ) 4 2
AY0887 NAD 83(1993)- 29 20 44.85139(N)   098 50 56.04728(W) AD(   ) 1
AY0887 NAD 83(1993)- 29 20 44.85154(N)   098 50 56.04747(W) AD(   ) 1
AY0887 ELLIP H (02/20/96) 208.070 (m)   GP(   ) 1 1
AY0887 NAVD 88   232.38   (m)   762.4   (f) LEVELING   3
AY0887 NGVD 29 (??/??/92) 232.250 (m)   761.97   (f) ADJ UNCH   1 2
AY0887
AY0887.Superseded values are not recommended for survey control.
AY0887
AY0887.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AY0887.See file dsdata.pdf to determine how the superseded data were derived.
AY0887
AY0887_MARKER: DB = BENCH MARK DISK
AY0887_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AY0887_STAMPING: P 1094 1957
AY0887_MARK LOGO: CGS
AY0887_MAGNETIC: O = OTHER; SEE DESCRIPTION
AY0887_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO

AY0887+STABILITY: SURFACE MOTION
AY0887_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AY0887+SATELLITE: SATELLITE OBSERVATIONS - August 31, 2011
AY0887
AY0887 HISTORY - Date Condition Report By
AY0887 HISTORY - 1957 MONUMENTED CGS
AY0887 HISTORY - 19950425 GOOD NGS
AY0887 HISTORY - 19970210 GOOD USPSQD
AY0887 HISTORY - 20020218 GOOD USPSQD
AY0887 HISTORY - 20110831 GOOD WOOLPT
AY0887
AY0887 STATION DESCRIPTION
AY0887
AY0887'DESCRIBED BY COAST AND GEODETIC SURVEY 1957
AY0887'4.5 MI NW FROM LACOSTE.
AY0887'4.3 MILES NORTHWEST ALONG FARM ROAD 471 FROM THE TEXAS AND NEW ORLEANS
AY0887'RAILROAD STATION AT LACOSTE, THENCE 0.2 MILE SOUTH ALONG THE ACCESS
AY0887'ROAD LEADING TO THE CASTROVILLE AIRPORT, 0.3 MILE SOUTHEAST OF THE
AY0887'MAIN ENTRANCE TO THE AIRPORT, 0.15 MILE NORTH OF A WIND T, 43 FEET
AY0887'EAST OF THE SOUTHEAST CORNER OF A SMALL FIRST AID BUILDING, 3 FEET
AY0887'SOUTHEAST OF A FENCE CORNER, 2.3 FEET SOUTH OF A FENCE LEADING EAST,
AY0887'SET IN THE TOP OF A CONCRETE POST WHICH PROJECTS 0.2 FOOT ABOVE THE
AY0887'GROUND.
AY0887
AY0887 STATION RECOVERY (1995)
AY0887
AY0887'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1995 (AJL)
AY0887'THE STATION IS LOCATED ABOUT 3 KM (1.85 MI) SOUTHEAST OF CASTROVILLE,
AY0887'ON THE CASTROVILLE MUNICIIPAL AIRPORT, NEAR THE SOUTHEAST CORNER OF A
AY0887'BASEBALL FIELD, AT THE BOUNDRY FENCE CORNER NORTH OF THE AIRPORT
AY0887'OFFICE. OWNERSHIP--CITY OF CASTROVILLE, 1209 FIORELLA STREET
AY0887'CASTROVILLE, TX 78009, LOUIS P MC CASLAND,AIRPORT OPERATOR, PHONE 210
AY0887'931 3313. TO REACH THE STATION FROM THE JUNCTION OF U.S. HIGHWAY 90
AY0887'AND FARM ROAD 471 AT THE EAST SIDE OF THE MEDINA RIVER BRIDGE NEAR THE
AY0887'EAST EDGE OF CASTROVILLE, GO EAST, 1.58 KM (1.00 MI) ON U.S. HIGHWAY
AY0887'90 AND FARM ROAD 471 TO THE JUNCTION OF FARM ROAD 471 ON THE RIGHT, GO
AY0887'SOUTHEAST 0..42 KM (0.00 MI) ON 471 TO THE AIRPORT ROAD ON THE RIGHT,
AY0887'SOUTH, GO 0.86 KM (0.55 MI) TO A TRACK ROAD ON THE RIGHT, EAST, GO 0.1
AY0887'KM (0.05 MI) ALONG THE SOUTH EDGE OF THE BALL FIELD TO A BOUNDRY FENCE
AY0887'CORNER AND THE STATION ON THE LEFT. THE STATION IS 4.7 M (15.4 FT)
AY0887'WEST OF A UTILITY POLE WITH A TRANSFORMER AND A GUY CABLE, 3.0 M (9.8
AY0887'FT) NORTH OF THE CENTER OF THE TRACK ROAD, 0.8 M (2.6 FT) SOUTHEAST OF
AY0887'THE FENCE CORNER, 0.5 M (1.6 FT) SOUTH OF A WITNESS POST AND THE
AY0887'FENCE, AND THE MONUMENT IS FLUSH WITH THE GROUND SURFACE. BY DEB
AY0887
AY0887 STATION RECOVERY (1997)
AY0887
AY0887'RECOVERY NOTE BY US POWER SQUADRON 1997
AY0887'RECOVERED IN GOOD CONDITION.
AY0887
AY0887 STATION RECOVERY (2002)
AY0887
AY0887'RECOVERY NOTE BY US POWER SQUADRON 2002 (HLJ)
AY0887'RECOVERED IN GOOD CONDITION.
AY0887
AY0887 STATION RECOVERY (2011)
AY0887
AY0887'RECOVERY NOTE BY WOOLPERT CONSULTANTS 2011 (DPM)
AY0887'RECOVERED IN GOOD CONDITION.

```
*** retrieval complete.
Elapsed Time = 00:00:03
```

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 15, 2018
 BN0450 ***********************************************************************
 BN0450  DESIGNATION -  S 1449
 BN0450  PID         -  BN0450
 BN0450  STATE/COUNTY-  TX/KIMBLE
 BN0450  COUNTRY     -  US
 BN0450  USGS QUAD   -  ELM SLOUGH (1987)
 BN0450
 BN0450                        *CURRENT SURVEY CONTROL
 BN0450  ______________________________________________________________________
 BN0450* NAD 83(2011) POSITION- 30 35 13.79079(N) 099 47 02.33910(W)   NO CHECK
 BN0450* NAD 83(2011) ELLIP HT-   599.743 (meters)        (06/27/12)   NO CHECK
 BN0450* NAD 83(2011) EPOCH   -  2010.00
 BN0450* NAVD 88 ORTHO HEIGHT -   622.116 (meters)     2041.06  (feet) ADJUSTED
 BN0450  ______________________________________________________________________
 BN0450  GEOID HEIGHT    -        -22.353 (meters)                    GEOID12B
 BN0450  NAD 83(2011) X  -   -933,947.014 (meters)                    COMP
 BN0450  NAD 83(2011) Y  - -5,416,002.907 (meters)                    COMP
 BN0450  NAD 83(2011) Z  -  3,226,882.048 (meters)                    COMP
 BN0450  LAPLACE CORR    -         -1.20  (seconds)                   DEFLEC12B
 BN0450  DYNAMIC HEIGHT  -        621.235 (meters)     2038.17  (feet) COMP
 BN0450  MODELED GRAVITY -    979,205.9   (mgal)                      NAVD 88
 BN0450
 BN0450  VERT ORDER      -  FIRST     CLASS II
 BN0450
 BN0450  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 BN0450  Standards:
 BN0450         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 BN0450            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 BN0450  ------------------------------------------------------------------
 BN0450  NETWORK    2.78   5.14           1.07   1.20   2.62     -0.00796939
 BN0450  ------------------------------------------------------------------
 BN0450  Click here for local accuracies and other accuracy information.
 BN0450
 BN0450
 BN0450.The horizontal coordinates were established by GPS observations
 BN0450.and adjusted by the National Geodetic Survey in June 2012.
 BN0450
 BN0450.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 BN0450.been affixed to the stable North American tectonic plate. See
 BN0450.NA2011 for more information.
 BN0450
 BN0450.The horizontal coordinates are valid at the epoch date displayed above
 BN0450.which is a decimal equivalence of Year/Month/Day.
 BN0450
 BN0450.No horizontal observational check was made to the station.
 BN0450.
 BN0450.The orthometric height was determined by differential leveling and
 BN0450.adjusted by the NATIONAL GEODETIC SURVEY
 BN0450.in June 1991.
```

```
BN0450
BN0450.Significant digits in the geoid height do not necessarily reflect accuracy.
BN0450.GEOID12B height accuracy estimate available here.
BN0450
BN0450.The X, Y, and Z were computed from the position and the ellipsoidal ht.
BN0450
BN0450.The Laplace correction was computed from DEFLEC12B derived deflections.
BN0450
BN0450.The ellipsoidal height was determined by GPS observations
BN0450.and is referenced to NAD 83.
BN0450
BN0450.The dynamic height is computed by dividing the NAVD 88
BN0450.geopotential number by the normal gravity value computed on the
BN0450.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
BN0450.degrees latitude (g = 980.6199 gals.).
BN0450
BN0450.The modeled gravity was interpolated from observed gravity values.
BN0450
BN0450. The following values were computed from the NAD 83(2011) position.
BN0450
BN0450;                    North         East     Units Scale Factor Converg.
BN0450;SPC TX S     - 5,546,142.860   176,621.154   MT  1.00186783   -0 34 58.6
BN0450;SPC TX S     -18,195,970.37    579,464.57   sFT  1.00186783   -0 34 58.6
BN0450;UTM  14      - 3,384,112.492   424,834.597   MT  0.99966970   -0 23 56.2
BN0450
BN0450!             -  Elev Factor  x  Scale Factor =   Combined Factor
BN0450!SPC TX S     -   0.99990582  x   1.00186783  =   1.00177348
BN0450!UTM  14      -   0.99990582  x   0.99966970  =   0.99957556
BN0450
BN0450_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RMU2483484112(NAD 83)
BN0450
BN0450                           SUPERSEDED SURVEY CONTROL
BN0450
BN0450  NAD 83(2007)-  30 35 13.79083(N)    099 47 02.33966(W) AD(2002.00) 0
BN0450  ELLIP H (02/10/07)  599.738  (m)                       GP(2002.00)
BN0450  ELLIP H (10/24/00)  599.730  (m)                       GP(       ) 4 2
BN0450  NAD 83(1993)-  30 35 13.79066(N)    099 47 02.33874(W) AD(       ) 1
BN0450  ELLIP H (02/20/96)  599.876  (m)                       GP(       ) 1 1
BN0450  NAVD 88             622.12   (m)         2041.1    (f) LEVELING    3
BN0450
BN0450.Superseded values are not recommended for survey control.
BN0450
BN0450.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BN0450.See file dsdata.pdf to determine how the superseded data were derived.
BN0450
BN0450_MARKER: DB = BENCH MARK DISK
BN0450_SETTING: 66 = SET IN ROCK OUTCROP
BN0450_STAMPING: S 1449 1982
BN0450_MARK LOGO: NGS
BN0450_MAGNETIC: N = NO MAGNETIC MATERIAL
BN0450_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
BN0450+STABILITY: POSITION/ELEVATION WELL
BN0450_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BN0450+SATELLITE: SATELLITE OBSERVATIONS - September 28, 2006
BN0450
BN0450  HISTORY     - Date     Condition        Report By
BN0450  HISTORY     - 1982     MONUMENTED       NGS
BN0450  HISTORY     - 1990     GOOD             USPSQD
BN0450  HISTORY     - 1991     GOOD             USPSQD
BN0450  HISTORY     - 19950731 GOOD             USPSQD
```

```
BN0450  HISTORY     - 19950820 GOOD             NGS
BN0450  HISTORY     - 20060928 GOOD             FORD
BN0450
BN0450                          STATION DESCRIPTION
BN0450
BN0450'DESCRIBED BY NATIONAL GEODETIC SURVEY 1982
BN0450'11.8 KM (7.35 MI) NORTH FROM JUNCTION.
BN0450'11.8 KM (7.35 MI) NORTHERLY ALONG U.S. HIGHWAY 83 FROM ITS JUNCTION
BN0450'WITH U.S. HIGHWAY BUSINESS ROUTES 290 AND 377 IN JUNCTION, IN A 3 BY
BN0450'20 FT EXPOSED AREA OF OUTCROPPING BEDROCK, 28.2 METERS (92.5 FT)
BN0450'NORTHWEST OF THE NORTHWEST END OF A BOX CULVERT, 19.2 METERS (63.0 FT)
BN0450'WEST-SOUTHWEST OF THE CENTERLINE OF THE HIGHWAY, 11.0 METERS (36.1 FT)
BN0450'NORTH-NORTHWEST OF A UTILITY POLE AND 0.5 METER (1.6 FT)
BN0450'WEST-SOUTHWEST OF A FENCE.
BN0450'THE MARK IS 0.3 METERS  NNW FROM A WITNESS POST.
BN0450'THE MARK IS ABOVE LEVEL WITH THE HIGHWAY.
BN0450
BN0450                          STATION RECOVERY (1990)
BN0450
BN0450'RECOVERY NOTE BY US POWER SQUADRON 1990 (GLH)
BN0450'RECOVERED IN GOOD CONDITION.
BN0450
BN0450                          STATION RECOVERY (1991)
BN0450
BN0450'RECOVERY NOTE BY US POWER SQUADRON 1991 (GLH)
BN0450'RECOVERED IN GOOD CONDITION.
BN0450
BN0450                          STATION RECOVERY (1995)
BN0450
BN0450'RECOVERY NOTE BY US POWER SQUADRON 1995
BN0450'RECOVERED IN GOOD CONDITION.
BN0450
BN0450                          STATION RECOVERY (1995)
BN0450
BN0450'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1995 (AJL)
BN0450'THE STATION IS LOCATED 12.0 KM (7.45 MI) NORTH OF JUNCTION, IN A 3 BY
BN0450'20-FOOT EXPOSED AREA OF OUTCROPPING BEDROCK.  TO REACH THE STATION
BN0450'FROM THE INTERSECTION OF U.S.  HIGHWAY BUSINESS ROUTES 377 AND 290 AND
BN0450'U.S.  HIGHWAY 83 IN JUNCTION, GO NORTHERLY ALONG HIGHWAY 83 TO THE
BN0450'STATION LEFT.  THE STATION IS 28.2 M (92.5 FT) NORTHWEST OF THE
BN0450'NORTHWEST END OF A BOX CULVERT, 19.2 M (63.0 FT) WEST-SOUTHWEST OF THE
BN0450'CENTERLINE OF THE HIGHWAY, 11.0 M (36.1 FT) NORTH-NORTHWEST OF A
BN0450'UTILITY POLE, 0.5 M (1.6 FT) WEST-SOUTHWEST OF A FENCE, AND 0.3 M (1.0
BN0450'FT) NORTH FROM A WITNESS POST.
BN0450
BN0450                          STATION RECOVERY (2006)
BN0450
BN0450'RECOVERY NOTE BY FORD ENGINEERING FIRM 2006 (RLH)
BN0450'RECOVERED AS DESCRIBED

*** retrieval complete.
Elapsed Time = 00:00:02
```

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 15, 2018
 BN0260 ***********************************************************************
 BN0260  SACS        -  This is a Secondary Airport Control Station.
 BN0260  DESIGNATION -  U 120
 BN0260  PID         -  BN0260
 BN0260  STATE/COUNTY-  TX/MASON
 BN0260  COUNTRY     -  US
 BN0260  USGS QUAD   -  MASON (1979)
 BN0260
 BN0260                        *CURRENT SURVEY CONTROL
 BN0260  ______________________________________________________________________
 BN0260* NAD 83(2011) POSITION- 30 44 29.70712(N) 099 10 30.59590(W)   ADJUSTED
 BN0260* NAD 83(2011) ELLIP HT-   450.177 (meters)        (06/27/12)   ADJUSTED
 BN0260* NAD 83(2011) EPOCH   -  2010.00
 BN0260* NAVD 88 ORTHO HEIGHT -   472.821 (meters)     1551.25  (feet) ADJUSTED
 BN0260  ______________________________________________________________________
 BN0260  GEOID HEIGHT    -        -22.619 (meters)                     GEOID12B
 BN0260  NAD 83(2011) X  -   -874,932.778 (meters)                     COMP
 BN0260  NAD 83(2011) Y  - -5,416,873.769 (meters)                     COMP
 BN0260  NAD 83(2011) Z  -  3,241,532.833 (meters)                     COMP
 BN0260  LAPLACE CORR    -         -0.52  (seconds)                    DEFLEC12B
 BN0260  DYNAMIC HEIGHT  -        472.184 (meters)     1549.16  (feet) COMP
 BN0260  MODELED GRAVITY -    979,278.0   (mgal)                       NAVD 88
 BN0260
 BN0260  VERT ORDER      -  SECOND    CLASS 0
 BN0260
 BN0260  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 BN0260  Standards:
 BN0260         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 BN0260            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 BN0260  ------------------------------------------------------------------
 BN0260  NETWORK    1.94   1.86           0.81   0.69   0.95      0.58665278
 BN0260  ------------------------------------------------------------------
 BN0260  Click here for local accuracies and other accuracy information.
 BN0260
 BN0260
 BN0260.This mark is at Mason Co (T92) Airport (T92)
 BN0260
 BN0260.The horizontal coordinates were established by GPS observations
 BN0260.and adjusted by the National Geodetic Survey in June 2012.
 BN0260
 BN0260.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 BN0260.been affixed to the stable North American tectonic plate. See
 BN0260.NA2011 for more information.
 BN0260
 BN0260.The horizontal coordinates are valid at the epoch date displayed above
 BN0260.which is a decimal equivalence of Year/Month/Day.
 BN0260
 BN0260.The orthometric height was determined by differential leveling and
 BN0260.adjusted by the NATIONAL GEODETIC SURVEY
```

```
BN0260.in June 1991.
BN0260
BN0260.Significant digits in the geoid height do not necessarily reflect accuracy.
BN0260.GEOID12B height accuracy estimate available here.
BN0260
BN0260.The X, Y, and Z were computed from the position and the ellipsoidal ht.
BN0260
BN0260.The Laplace correction was computed from DEFLEC12B derived deflections.
BN0260
BN0260.The ellipsoidal height was determined by GPS observations
BN0260.and is referenced to NAD 83.
BN0260
BN0260.The dynamic height is computed by dividing the NAVD 88
BN0260.geopotential number by the normal gravity value computed on the
BN0260.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
BN0260.degrees latitude (g = 980.6199 gals.).
BN0260
BN0260.The modeled gravity was interpolated from observed gravity values.
BN0260
BN0260. The following values were computed from the NAD 83(2011) position.
BN0260
BN0260;                    North         East     Units Scale Factor Converg.
BN0260;SPC TX C     - 3,119,737.437   810,893.125   MT  0.99989196   +0 35 47.5
BN0260;SPC TX C     -10,235,338.57  2,660,405.19   sFT  0.99989196   +0 35 47.5
BN0260;UTM  14      - 3,400,976.770   483,232.701   MT  0.99960347   -0 05 22.3
BN0260
BN0260!             -  Elev Factor  x  Scale Factor =   Combined Factor
BN0260!SPC TX C     -   0.99992931  x   0.99989196  =   0.99982128
BN0260!UTM  14      -   0.99992931  x   0.99960347  =   0.99953281
BN0260
BN0260_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RMV8323200976(NAD 83)
BN0260
BN0260                           SUPERSEDED SURVEY CONTROL
BN0260
BN0260  NAD 83(2007)-  30 44 29.70713(N)    099 10 30.59663(W) AD(2002.00) 0
BN0260  ELLIP H (02/10/07)  450.192  (m)                       GP(2002.00)
BN0260  ELLIP H (07/06/01)  450.218  (m)                       GP(       ) 4 1
BN0260  NAD 83(1993)-  30 44 29.70694(N)    099 10 30.59613(W) AD(       ) 1
BN0260  ELLIP H (09/06/96)  450.254  (m)                       GP(       ) 4 1
BN0260  NAVD 88 (09/06/96)  472.96   (m)  GEOID93 model used   GPS OBS
BN0260  NGVD 29 (??/??/92)  472.768  (m)         1551.07   (f) ADJ UNCH    2 0
BN0260
BN0260.Superseded values are not recommended for survey control.
BN0260
BN0260.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BN0260.See file dsdata.pdf to determine how the superseded data were derived.
BN0260
BN0260_MARKER: DB = BENCH MARK DISK
BN0260_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
BN0260_STAMPING: U 120 1933
BN0260_MARK LOGO: CGS
BN0260_PROJECTION: PROJECTING 8 CENTIMETERS
BN0260_MAGNETIC: N = NO MAGNETIC MATERIAL
BN0260_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
BN0260+STABILITY: SURFACE MOTION
BN0260_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BN0260+SATELLITE: SATELLITE OBSERVATIONS - March 03, 1995
BN0260
BN0260  HISTORY     - Date     Condition        Report By
BN0260  HISTORY     - 1933     MONUMENTED       CGS
```

```
BN0260  HISTORY     - 1967     GOOD            USGS
BN0260  HISTORY     - 1982     GOOD            NGS
BN0260  HISTORY     - 19950303 GOOD            NGS
BN0260
BN0260                          STATION DESCRIPTION
BN0260
BN0260'DESCRIBED BY COAST AND GEODETIC SURVEY 1933
BN0260'3.3 MI E FROM MASON.
BN0260'3.3 MILES EAST OF MASON ALONG LLANO-MASON ROAD ON SMALL RISE 250 FEET
BN0260'EAST OF SMALL CONCRETE CULVERT AND IN THE SOUTH RIGHT OF WAY FENCE
BN0260'LINE.
BN0260
BN0260                          STATION RECOVERY (1967)
BN0260
BN0260'RECOVERY NOTE BY US GEOLOGICAL SURVEY 1967
BN0260'RECOVERED IN GOOD CONDITION.
BN0260
BN0260                          STATION RECOVERY (1982)
BN0260
BN0260'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1982
BN0260'5.6 KM (3.3 MI) EAST ALONG STATE HIGHWAY 29 FROM THE COURTHOUSE IN
BN0260'MASON, ON A SMALL RISE, SET IN THE SOUTH RIGHT-OF-WAY FENCE LINE,
BN0260'141.7 METERS (465 FT) EAST OF THE SOUTH END OF A ONE CHANNEL CONCRETE
BN0260'CULVERT, AND 86.8 METERS (285 FT) EAST OF THE CENTER OF A CATTLE GATE.
BN0260'THE MARK IS 0.3 METERS  N FROM A WITNESS POST.
BN0260'THE MARK IS 2.1 M ABOVE HIGHWAY.
BN0260
BN0260                          STATION RECOVERY (1995)
BN0260
BN0260'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1995 (AJL)
BN0260'THE STATION IS LOCATED ABOUT 5.6 KM (3.45 MI) EAST OF MASON, ALONG
BN0260'STATE HIGHWAYY 29 FROM THE COURTHOUSE IN MASON.  ON A SMALL RISE, IN
BN0260'THE SOUTH RIGHT-OF-WAY FENCE LINE.  TO REACH THE STATION FROM THE
BN0260'JUNCTION OF U.S.  HIGHWAY 87, STATE HIGHWAY 29, AND FARM ROAD 386, AT
BN0260'THE NORTHEAST CORNER OF THE COURTHOUSE SQUARE IN MASON, GO EAST ON
BN0260'STATE HIGHWAY 29, 1.0 KM (0.60 MI) TO THE BRIDGE OVER COMANCHE CREEK.
BN0260'CONTINUE FOR 4.6 KM (2.85 MI) TO A SMALL RISE AND THE STATION ON THE
BN0260'RIGHT.  STATION IS 139.0 M (456.0 FT) EAST OF THE SOUTH END OF A
BN0260'CONCRETE CULVERT, 118.0 M (387.1 FT) SOUTHEAST OF THE CENTER OF A
BN0260'POWERLINE CROSSING THE HIGHWAY, 86.0 M (282.2 FT) EAST OF THE CENTER
BN0260'OF A GATE, 17.7 M (58.1 FT) SOUTH OF THE HIGHWAY CENTERLINE, 2.1 M
BN0260'(6.9 FT) ABOVE THE LEVEL OF THE HIGHWAY, 0.4 M (1.3 FT) NORTH OF A
BN0260'WITNESS POST AND FENCE, AND THE MONUMENT PROJECTS 0.3 M (1.0 FT) ABOVE
BN0260'THE GROUND SURFACE.  BY R.G.H.  THIS IS AN AIRPORT SAC STATION.

*** retrieval complete.
Elapsed Time = 00:00:02
```

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 15, 2018
 CA0807 ***********************************************************************
 CA0807  SACS        -  This is a Secondary Airport Control Station.
 CA0807  DESIGNATION -  X 1419
 CA0807  PID         -  CA0807
 CA0807  STATE/COUNTY-  TX/MCCULLOCH
 CA0807  COUNTRY     -  US
 CA0807  USGS QUAD   -  BRADY NORTH (1987)
 CA0807
 CA0807                        *CURRENT SURVEY CONTROL
 CA0807  ______________________________________________________________________
 CA0807* NAD 83(2011) POSITION- 31 10 34.45609(N) 099 19 08.79230(W)   ADJUSTED
 CA0807* NAD 83(2011) ELLIP HT-   529.991 (meters)        (06/27/12)   ADJUSTED
 CA0807* NAD 83(2011) EPOCH   -  2010.00
 CA0807* NAVD 88 ORTHO HEIGHT -   553.598 (meters)     1816.26  (feet) ADJUSTED
 CA0807  ______________________________________________________________________
 CA0807  GEOID HEIGHT    -        -23.616 (meters)                     GEOID12B
 CA0807  NAD 83(2011) X  -   -884,535.252 (meters)                     COMP
 CA0807  NAD 83(2011) Y  - -5,390,261.746 (meters)                     COMP
 CA0807  NAD 83(2011) Z  -  3,282,901.130 (meters)                     COMP
 CA0807  LAPLACE CORR    -         -1.11  (seconds)                    DEFLEC12B
 CA0807  DYNAMIC HEIGHT  -        552.853 (meters)     1813.82  (feet) COMP
 CA0807  MODELED GRAVITY -    979,277.1   (mgal)                       NAVD 88
 CA0807
 CA0807  VERT ORDER      -  FIRST     CLASS II
 CA0807
 CA0807  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 CA0807  Standards:
 CA0807         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 CA0807            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 CA0807  ------------------------------------------------------------------
 CA0807  NETWORK    1.74   1.63           0.67   0.68   0.83      0.60589612
 CA0807  ------------------------------------------------------------------
 CA0807  Click here for local accuracies and other accuracy information.
 CA0807
 CA0807
 CA0807.This mark is at Curtis Fld (BBD) Airport (BBD)
 CA0807
 CA0807.The horizontal coordinates were established by GPS observations
 CA0807.and adjusted by the National Geodetic Survey in June 2012.
 CA0807
 CA0807.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 CA0807.been affixed to the stable North American tectonic plate. See
 CA0807.NA2011 for more information.
 CA0807
 CA0807.The horizontal coordinates are valid at the epoch date displayed above
 CA0807.which is a decimal equivalence of Year/Month/Day.
 CA0807
 CA0807.The orthometric height was determined by differential leveling and
 CA0807.adjusted by the NATIONAL GEODETIC SURVEY
```

```
CA0807.in June 1991.
CA0807
CA0807.Significant digits in the geoid height do not necessarily reflect accuracy.
CA0807.GEOID12B height accuracy estimate available here.
CA0807
CA0807.The X, Y, and Z were computed from the position and the ellipsoidal ht.
CA0807
CA0807.The Laplace correction was computed from DEFLEC12B derived deflections.
CA0807
CA0807.The ellipsoidal height was determined by GPS observations
CA0807.and is referenced to NAD 83.
CA0807
CA0807.The dynamic height is computed by dividing the NAVD 88
CA0807.geopotential number by the normal gravity value computed on the
CA0807.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
CA0807.degrees latitude (g = 980.6199 gals.).
CA0807
CA0807.The modeled gravity was interpolated from observed gravity values.
CA0807
CA0807. The following values were computed from the NAD 83(2011) position.
CA0807
CA0807;                    North         East     Units Scale Factor Converg.
CA0807;SPC TX C     - 3,167,784.671   796,671.827   MT  0.99988638   +0 31 20.6
CA0807;SPC TX C     -10,392,973.54  2,613,747.49   sFT  0.99988638   +0 31 20.6
CA0807;UTM  14      - 3,449,177.612   469,592.021   MT  0.99961140   -0 09 54.7
CA0807
CA0807!             -  Elev Factor  x  Scale Factor =   Combined Factor
CA0807!SPC TX C     -   0.99991678  x   0.99988638  =   0.99980317
CA0807!UTM  14      -   0.99991678  x   0.99961140  =   0.99952821
CA0807
CA0807_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RMV6959249177(NAD 83)
CA0807
CA0807                           SUPERSEDED SURVEY CONTROL
CA0807
CA0807  NAD 83(2007)-  31 10 34.45610(N)    099 19 08.79304(W) AD(2002.00) 0
CA0807  ELLIP H (02/10/07)  530.005  (m)                       GP(2002.00)
CA0807  ELLIP H (10/24/00)  530.034  (m)                       GP(       ) 4 2
CA0807  NAD 83(1993)-  31 10 34.45584(N)    099 19 08.79257(W) AD(       ) B
CA0807  ELLIP H (02/20/96)  530.071  (m)                       GP(       ) 1 1
CA0807  NAVD 88 (02/20/96)  553.85   (m)  GEOID93 model used   GPS OBS
CA0807
CA0807.Superseded values are not recommended for survey control.
CA0807
CA0807.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
CA0807.See file dsdata.pdf to determine how the superseded data were derived.
CA0807
CA0807_MARKER: I = METAL ROD
CA0807_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
CA0807_STAMPING: X 1419 1981
CA0807_MARK LOGO: NGS
CA0807_PROJECTION: RECESSED 6 CENTIMETERS
CA0807_MAGNETIC: I = MARKER IS A STEEL ROD
CA0807_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
CA0807_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
CA0807+SATELLITE: SATELLITE OBSERVATIONS - October 21, 2006
CA0807_ROD/PIPE-DEPTH: 3.0  meters
CA0807
CA0807  HISTORY     - Date     Condition        Report By
CA0807  HISTORY     - 1981     MONUMENTED       NGS
CA0807  HISTORY     - 19950308 GOOD             NGS
```

```
CA0807  HISTORY     - 19950308 GOOD            NGS
CA0807  HISTORY     - 19950826 GOOD            USPSQD
CA0807  HISTORY     - 19981214 GOOD            TXDOT
CA0807  HISTORY     - 20061021 GOOD            CDSMS
CA0807
CA0807                          STATION DESCRIPTION
CA0807
CA0807'DESCRIBED BY NATIONAL GEODETIC SURVEY 1981
CA0807'4.9 KM (3.05 MI) NNE FROM BRADY.
CA0807'4.9 KM (3.05 MI) NORTHERLY ALONG U.S. HIGHWAY 377 FROM THE COURTHOUSE
CA0807'IN BRADY, AT THE ENTRANCE TO MUNICIPAL AIRPORT CURTIS FIELD, 14.8
CA0807'METERS (48.6 FT) EAST-SOUTHEAST OF THE CENTERLINE OF THE HIGHWAY, 4.2
CA0807'METERS (13.8 FT) EAST-SOUTHEAST OF THE EAST-SOUTHEAST LEG OF HIGHWAY
CA0807'INFORMATION SIGN, MUNICIPAL AIRPORT CURTIS FIELD.  NOTE= ACCESS TO THE
CA0807'DATUM POINT IS THROUGH A 5-INCH LOGO CAP.
CA0807'THE MARK IS 0.3 METERS  WNW FROM  A WITNESS POST AND FENCE
CA0807'THE MARK IS ABOVE LEVEL WITH THE HIGHWAY.
CA0807
CA0807                          STATION RECOVERY (1995)
CA0807
CA0807'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1995 (AJL)
CA0807'THE STATION IS LOCATED ABOUT 4.9 KM (3.05 MI) NORTH OF BRADY ALONG
CA0807'U.S.  HIGHWAY 377, ON THE EAST SIDE OF THE HIGHWAY, AT THE ENTRANCE TO
CA0807'THE CURTIS FIELD AIRPORT.  OWNERSHIP--CITY OF BRADY, P.O.  BOX 351,
CA0807'BRADY, TX.  76825.  PHONE 915-597-2152.  HAROLD MYERS AIRPORT MANAGER.
CA0807'PHONE 915-597-1461.  TO REACH THE STATION FROM THE COURTHOUSE IN
CA0807'BRADY, GO 4.9 KM (3.05 MI) NORTHERLY ALONG U.S. HIGHWAY 377 TO THE
CA0807'AIRPORT ENTRANCE ON THE LEFT AND THE STATION ON THE LEFT.  STATION IS
CA0807'24.3 M (79.7 FT) NORTH OF A HISTORICAL MARKER ARROW SIGN, 14.6 M (47.9
CA0807'FT) EAST-SOUTHEAST OF AND LEVEL WITH THE HIGHWAY CENTERLINE, 8.0 M
CA0807'(26.2 FT) SOUTH OF THE EXTENDED CENTER OF THE AIRPORT ENTRANCE, 6.1 M
CA0807'(20.0 FT) EAST-SOUTHEAST OF THE CURTIS FIELD AIRPORT SIGN, AND 0.3 M
CA0807'(1.0 FT) WEST-SOUTHWEST OF A WITNESS POST AND FENCE.  NOTE--ACCESS TO
CA0807'THE DATUM POINT IS THROUGH A 5-INCH LOGO CAP.  BY R.G.H.
CA0807
CA0807                          STATION RECOVERY (1995)
CA0807
CA0807'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1995 (AJL)
CA0807'THE STATION IS LOCATED ABOUT 4.9 KM (3.05 MI) NORTH OF BRADY ALONG
CA0807'U.S.  HIGHWAY 377, ON THE EAST SIDE OF THE HIGHWAY, AT THE ENTRANCE TO
CA0807'THE CURTIS FIELD AIRPORT.  OWNERSHIP--CITY OF BRADY, P.O.  BOX 351,
CA0807'BRADY, TX.  76825.  PHONE 915-597-2152.  HAROLD MYERS AIRPORT MANAGER.
CA0807'PHONE 915-597-1461.  TO REACH THE STATION FROM THE COURTHOUSE IN
CA0807'BRADY, GO 4.9 KM (3.05 MI) NORTHERLY ALONG U.S. HIGHWAY 377 TO THE
CA0807'AIRPORT ENTRANCE ON THE LEFT AND THE STATION ON THE LEFT.  STATION IS
CA0807'24.3 M (79.7 FT) NORTH OF A HISTORICAL MARKER ARROW SIGN, 14.6 M (47.9
CA0807'FT) EAST-SOUTHEAST OF AND LEVEL WITH THE HIGHWAY CENTERLINE, 8.0 M
CA0807'(26.2 FT) SOUTH OF THE EXTENDED CENTER OF THE AIRPORT ENTRANCE, 6.1 M
CA0807'(20.0 FT) EAST-SOUTHEAST OF THE CURTIS FIELD AIRPORT SIGN, AND 0.3 M
CA0807'(1.0 FT) WEST-SOUTHWEST OF A WITNESS POST AND FENCE.  NOTE--ACCESS TO
CA0807'THE DATUM POINT IS THROUGH A 5-INCH LOGO CAP.  BY R.G.H.  THIS IS AN
CA0807'AIRPORT SAC STATION.
CA0807
CA0807                          STATION RECOVERY (1995)
CA0807
CA0807'RECOVERY NOTE BY US POWER SQUADRON 1995
CA0807'RECOVERED IN GOOD CONDITION.
CA0807
CA0807                          STATION RECOVERY (1998)
CA0807
```

```
CA0807'RECOVERY NOTE BY TEXAS DEPARTMENT OF TRANSPORTATION 1998 (WEH)
CA0807'GOOD.
CA0807
CA0807                          STATION RECOVERY (2006)
CA0807
CA0807'RECOVERY NOTE BY CDS/MUERY SERVICES 2006 (MDM)
CA0807'RECOVERED AS DESCRIBED.

*** retrieval complete.
Elapsed Time = 00:00:02
```

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 16, 2018
 AY1596 ***********************************************************************
 AY1596  DESIGNATION -  Q 1387
 AY1596  PID         -  AY1596
 AY1596  STATE/COUNTY-  TX/UVALDE
 AY1596  COUNTRY     -  US
 AY1596  USGS QUAD   -  BLANCO LAKE (1971)
 AY1596
 AY1596                        *CURRENT SURVEY CONTROL
 AY1596  ______________________________________________________________________
 AY1596* NAD 83(1986) POSITION- 29 18 59.     (N) 099 32 21.     (W)    SCALED
 AY1596* NAVD 88 ORTHO HEIGHT -   295.414 (meters)      969.20  (feet) ADJUSTED
 AY1596  ______________________________________________________________________
 AY1596  GEOID HEIGHT    -        -23.339 (meters)                     GEOID12B
 AY1596  DYNAMIC HEIGHT  -        294.985 (meters)      967.80  (feet) COMP
 AY1596  MODELED GRAVITY -    979,183.0   (mgal)                       NAVD 88
 AY1596
 AY1596  VERT ORDER      -  FIRST     CLASS II
 AY1596
 AY1596.The horizontal coordinates were scaled from a topographic map and have
 AY1596.an estimated accuracy of +/- 6 seconds.
 AY1596.
 AY1596.The orthometric height was determined by differential leveling and
 AY1596.adjusted by the NATIONAL GEODETIC SURVEY
 AY1596.in June 1991.
 AY1596
 AY1596.Significant digits in the geoid height do not necessarily reflect accuracy.
 AY1596.GEOID12B height accuracy estimate available here.
 AY1596
 AY1596.The dynamic height is computed by dividing the NAVD 88
 AY1596.geopotential number by the normal gravity value computed on the
 AY1596.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 AY1596.degrees latitude (g = 980.6199 gals.).
 AY1596
 AY1596.The modeled gravity was interpolated from observed gravity values.
 AY1596
 AY1596;                    North         East     Units  Estimated Accuracy
 AY1596;SPC TXSC     - 4,164,480.      547,630.      MT  (+/- 180 meters Scaled)
 AY1596
 AY1596_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RMT476431(NAD 83)
 AY1596
 AY1596                           SUPERSEDED SURVEY CONTROL
 AY1596
 AY1596.No superseded survey control is available for this station.
 AY1596
 AY1596_MARKER: I = METAL ROD
 AY1596_SETTING: 15 = METAL ROD DRIVEN INTO GROUND. SEE TEXT FOR ADDITIONAL
 AY1596+WITH SETTING: INFORMATION.
 AY1596_STAMPING: Q 1387 1982
 AY1596_MARK LOGO: NGS
```

AY1596_PROJECTION: FLUSH
AY1596_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
AY1596_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AY1596+SATELLITE: SATELLITE OBSERVATIONS - October 07, 2004
AY1596_ROD/PIPE-DEPTH: 1.5 meters
AY1596
AY1596 HISTORY - Date Condition Report By
AY1596 HISTORY - 1982 MONUMENTED NGS
AY1596 HISTORY - 1988 GOOD USPSQD
AY1596 HISTORY - 20041007 GOOD USPSQD
AY1596
AY1596 STATION DESCRIPTION
AY1596
AY1596'DESCRIBED BY NATIONAL GEODETIC SURVEY 1982
AY1596'10.6 KM (6.55 MI) EAST FROM KNIPPA.
AY1596'10.6 KM (6.55 MI) EASTERLY ALONG U.S. HIGHWAY 90 FROM THE JUNCTION OF
AY1596'FARM ROAD 1049 SOUTH IN KNIPPA, ALSO 7.5 KM (4.5 MI) WESTERLY ALONG
AY1596'U.S. HIGHWAY 90 FROM THE JUNCTION OF RANCH ROAD 187 IN SABINAL AT THE
AY1596'SOUTHERN PACIFIC RAILROAD MILEPOLE 284 AND ACROSS TRACKS AND IN LINE
AY1596'WITH RAILROAD SIGNAL NUMBER 2840, SET BETWEEN TWO METAL WITNESS POSTS,
AY1596'23.8 METERS (78.0 FT) NORTHEAST OF CENTERLINE OF HIGHWAY, 16.5 METERS
AY1596'(54.0 FT) SOUTHWEST OF RAILROAD SIGNAL 2840, 12.2 METERS (40.0 FT)
AY1596'SOUTHWEST OF SOUTHWEST RAIL, AND 12.2 METERS (4.0 FT) SOUTH SOUTHEAST
AY1596'OF MILEPOLE 284. NOTE, ROD DRIVEN TO REFUSAL.
AY1596'THE MARK IS 0.30 METERS SE FROM A WITNESS POST.
AY1596'THE MARK IS ABOVE LEVEL WITH RAILROAD TRACKS.
AY1596
AY1596 STATION RECOVERY (1988)
AY1596
AY1596'RECOVERY NOTE BY US POWER SQUADRON 1988 (SMW)
AY1596'RECOVERED IN GOOD CONDITION.
AY1596
AY1596 STATION RECOVERY (2004)
AY1596
AY1596'RECOVERY NOTE BY US POWER SQUADRON 2004 (HLJ)
AY1596'RECOVERED IN GOOD CONDITION.

*** retrieval complete.
Elapsed Time = 00:00:01

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 16, 2018
 AY1326 ***********************************************************************
 AY1326  DESIGNATION -  R 33
 AY1326  PID         -  AY1326
 AY1326  STATE/COUNTY-  TX/UVALDE
 AY1326  COUNTRY     -  US
 AY1326  USGS QUAD   -  KNIPPA (1971)
 AY1326
 AY1326                        *CURRENT SURVEY CONTROL
 AY1326  ______________________________________________________________________
 AY1326* NAD 83(1986) POSITION- 29 17 33.     (N) 099 38 59.     (W)    SCALED
 AY1326* NAVD 88 ORTHO HEIGHT -   299.002 (meters)      980.98  (feet) ADJUSTED
 AY1326  ______________________________________________________________________
 AY1326  GEOID HEIGHT    -        -23.175 (meters)                     GEOID12B
 AY1326  DYNAMIC HEIGHT  -        298.568 (meters)      979.55  (feet) COMP
 AY1326  MODELED GRAVITY -    979,182.1   (mgal)                       NAVD 88
 AY1326
 AY1326  VERT ORDER      -  FIRST     CLASS II
 AY1326
 AY1326.The horizontal coordinates were scaled from a topographic map and have
 AY1326.an estimated accuracy of +/- 6 seconds.
 AY1326.
 AY1326.The orthometric height was determined by differential leveling and
 AY1326.adjusted by the NATIONAL GEODETIC SURVEY
 AY1326.in June 1991.
 AY1326
 AY1326.Significant digits in the geoid height do not necessarily reflect accuracy.
 AY1326.GEOID12B height accuracy estimate available here.
 AY1326
 AY1326.The dynamic height is computed by dividing the NAVD 88
 AY1326.geopotential number by the normal gravity value computed on the
 AY1326.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 AY1326.degrees latitude (g = 980.6199 gals.).
 AY1326
 AY1326.The modeled gravity was interpolated from observed gravity values.
 AY1326
 AY1326;                    North         East     Units  Estimated Accuracy
 AY1326;SPC TXSC     - 4,161,890.      536,880.      MT  (+/- 180 meters Scaled)
 AY1326
 AY1326_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RMT368405(NAD 83)
 AY1326
 AY1326                           SUPERSEDED SURVEY CONTROL
 AY1326
 AY1326  NGVD 29 (??/??/92)  298.872  (m)          980.55   (f) ADJ UNCH    1 2
 AY1326
 AY1326.Superseded values are not recommended for survey control.
 AY1326
 AY1326.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 AY1326.See file dsdata.pdf to determine how the superseded data were derived.
 AY1326
```

AY1326_MARKER: DB = BENCH MARK DISK
AY1326_SETTING: 36 = SET IN A MASSIVE STRUCTURE
AY1326_SP_SET: BRIDGE
AY1326_STAMPING: R 33 1917 ELEV 980.595 FT
AY1326_MARK LOGO: CGS
AY1326_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
AY1326_SATELLITE: THE SITE LOCATION WAS REPORTED AS NOT SUITABLE FOR
AY1326+SATELLITE: SATELLITE OBSERVATIONS - September 24, 2004
AY1326
AY1326 HISTORY - Date Condition Report By
AY1326 HISTORY - 1917 MONUMENTED CGS
AY1326 HISTORY - 1957 GOOD CGS
AY1326 HISTORY - 1982 GOOD NGS
AY1326 HISTORY - 1988 POOR USPSQD
AY1326 HISTORY - 20040924 GOOD CTBG
AY1326
AY1326 STATION DESCRIPTION
AY1326
AY1326'DESCRIBED BY COAST AND GEODETIC SURVEY 1957
AY1326'0.7 MI W FROM KNIPPA.
AY1326'0.7 MILE WEST ALONG THE TEXAS AND NEW ORLEANS RAILROAD FROM THE
AY1326'STATION AT KNIPPA, 1 POLE EAST OF MILEPOST 291, 7.4 FEET SOUTH OF THE
AY1326'SOUTH RAIL, 1.5 FEET BELOW THE TOP OF THE RAILS, SET IN THE TOP OF THE
AY1326'SOUTH END OF THE WEST STONE ABUTMENT OF A STEEL BRIDGE OVER THE EAST
AY1326'FRIO RIVER.
AY1326
AY1326 STATION RECOVERY (1982)
AY1326
AY1326'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1982
AY1326'MARK RECOVERED THIS DATE, NOTE, 1.2 KM (0.75 MI) WEST SOUTHWEST ALONG
AY1326'U.S. HIGHWAY 90 FROM THE JUNCTION OF FARM ROAD 1049 SOUTH IN KNIPPA.
AY1326
AY1326 STATION RECOVERY (1988)
AY1326
AY1326'RECOVERY NOTE BY US POWER SQUADRON 1988 (SMW)
AY1326'MARK RECOVERED IN POOR CONDITION.
AY1326
AY1326 STATION RECOVERY (2004)
AY1326
AY1326'RECOVERY NOTE BY CARTER AND BURGESS INCORPORATED 2004 (JG)
AY1326'TOO CLOSE TO MAINLINE RR TRACKS FOR STABLE GPS OBSERVATIONS

*** retrieval complete.
Elapsed Time = 00:00:01

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 16, 2018
 AY1587 ***********************************************************************
 AY1587  DESIGNATION -  S 1387
 AY1587  PID         -  AY1587
 AY1587  STATE/COUNTY-  TX/UVALDE
 AY1587  COUNTRY     -  US
 AY1587  USGS QUAD   -  UVALDE (1971)
 AY1587
 AY1587                         *CURRENT SURVEY CONTROL
 AY1587  ______________________________________________________________________
 AY1587* NAD 83(1986) POSITION- 29 14 36.     (N) 099 52 21.     (W)    SCALED
 AY1587* NAVD 88 ORTHO HEIGHT -   293.444 (meters)      962.74  (feet) ADJUSTED
 AY1587  ______________________________________________________________________
 AY1587  GEOID HEIGHT    -        -22.940 (meters)                     GEOID12B
 AY1587  DYNAMIC HEIGHT  -        293.017 (meters)      961.34  (feet) COMP
 AY1587  MODELED GRAVITY -    979,179.9   (mgal)                       NAVD 88
 AY1587
 AY1587  VERT ORDER      -  FIRST     CLASS II
 AY1587
 AY1587.The horizontal coordinates were scaled from a topographic map and have
 AY1587.an estimated accuracy of +/- 6 seconds.
 AY1587.
 AY1587.The orthometric height was determined by differential leveling and
 AY1587.adjusted by the NATIONAL GEODETIC SURVEY
 AY1587.in June 1991.
 AY1587
 AY1587.Significant digits in the geoid height do not necessarily reflect accuracy.
 AY1587.GEOID12B height accuracy estimate available here.
 AY1587
 AY1587.The dynamic height is computed by dividing the NAVD 88
 AY1587.geopotential number by the normal gravity value computed on the
 AY1587.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 AY1587.degrees latitude (g = 980.6199 gals.).
 AY1587
 AY1587.The modeled gravity was interpolated from observed gravity values.
 AY1587
 AY1587;                    North         East     Units  Estimated Accuracy
 AY1587;SPC TXSC     - 4,156,580.      515,200.      MT  (+/- 180 meters Scaled)
 AY1587
 AY1587_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RMT152352(NAD 83)
 AY1587
 AY1587                           SUPERSEDED SURVEY CONTROL
 AY1587
 AY1587.No superseded survey control is available for this station.
 AY1587
 AY1587_MARKER: I = METAL ROD
 AY1587_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AY1587_STAMPING: S 1387 1982
 AY1587_MARK LOGO: NGS
 AY1587_PROJECTION: FLUSH
```

```
AY1587_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
AY1587_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AY1587+SATELLITE: SATELLITE OBSERVATIONS - October 07, 2004
AY1587_ROD/PIPE-DEPTH: 3.7  meters
AY1587
AY1587  HISTORY     - Date     Condition        Report By
AY1587  HISTORY     - 1982     MONUMENTED       NGS
AY1587  HISTORY     - 20041007 GOOD             USPSQD
AY1587
AY1587                          STATION DESCRIPTION
AY1587
AY1587'DESCRIBED BY NATIONAL GEODETIC SURVEY 1982
AY1587'7.7 KM (4.75 MI) WEST FROM UVALDE.
AY1587'5.5 KM (3.4 METERS) WESTERLY ALONG STATE ROUTE 2369 FROM THE
AY1587'JUNCTION OF SPUR 144 AND THE SOUTHERN PACIFIC RAILROAD STATION IN
AY1587'UVALDE, THENCE WEST ALONG A GRAVEL ROAD (RAILROAD SERVICE ROAD) FOR
AY1587'2.2 KM (1.35 MI), AT A GRAVEL ROAD ENTRANCE LEADING SOUTH TO A WATER
AY1587'IRRIGATION WELL, 7.3 METERS (24.0 FT) SOUTH OF A GRAVEL ROAD,
AY1587'1.8 METERS (60.0 FT) WEST OF A GRAVEL ROAD AND IRON GATE, 14.9 METERS
AY1587'(48.8 FT) WEST OF A CORNER FENCE POST, 0.30 METERS (1.0 FT) NORTH OF A
AY1587'FENCE, 0.91 METERS (3.0 FT) NORTH OF POWERLINE POLE WITH 3
AY1587'TRANSFORMERS.  NOTE, ROD DRIVEN TO REFUSAL.
AY1587'THE MARK IS 0.30 METERS  W FROM A WITNESS POST.
AY1587'THE MARK IS ABOVE LEVEL WITH ROAD.
AY1587
AY1587                          STATION RECOVERY (2004)
AY1587
AY1587'RECOVERY NOTE BY US POWER SQUADRON 2004 (HLJ)
AY1587'RECOVERED IN GOOD CONDITION.

*** retrieval complete.
Elapsed Time = 00:00:01
```

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 15, 2018
 AZ0489 ***********************************************************************
 AZ0489  DESIGNATION -  T 1444
 AZ0489  PID         -  AZ0489
 AZ0489  STATE/COUNTY-  TX/EDWARDS
 AZ0489  COUNTRY     -  US
 AZ0489  USGS QUAD   -  BLACK WATERHOLE (1971)
 AZ0489
 AZ0489                        *CURRENT SURVEY CONTROL
 AZ0489  ______________________________________________________________________
 AZ0489* NAD 83(1986) POSITION- 29 59 35.     (N) 100 29 27.     (W)    SCALED
 AZ0489* NAVD 88 ORTHO HEIGHT -   677.353 (meters)     2222.28  (feet) ADJUSTED
 AZ0489  ______________________________________________________________________
 AZ0489  GEOID HEIGHT    -        -22.355 (meters)                     GEOID12B
 AZ0489  DYNAMIC HEIGHT  -        676.349 (meters)     2218.99  (feet) COMP
 AZ0489  MODELED GRAVITY -    979,137.2   (mgal)                       NAVD 88
 AZ0489
 AZ0489  VERT ORDER      -  FIRST     CLASS II
 AZ0489
 AZ0489.The horizontal coordinates were scaled from a topographic map and have
 AZ0489.an estimated accuracy of +/- 6 seconds.
 AZ0489.
 AZ0489.The orthometric height was determined by differential leveling and
 AZ0489.adjusted by the NATIONAL GEODETIC SURVEY
 AZ0489.in June 1991.
 AZ0489
 AZ0489.Significant digits in the geoid height do not necessarily reflect accuracy.
 AZ0489.GEOID12B height accuracy estimate available here.
 AZ0489
 AZ0489.The dynamic height is computed by dividing the NAVD 88
 AZ0489.geopotential number by the normal gravity value computed on the
 AZ0489.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 AZ0489.degrees latitude (g = 980.6199 gals.).
 AZ0489
 AZ0489.The modeled gravity was interpolated from observed gravity values.
 AZ0489
 AZ0489;                    North         East     Units  Estimated Accuracy
 AZ0489;SPC TXSC     - 4,240,280.      456,160.      MT  (+/- 180 meters Scaled)
 AZ0489
 AZ0489_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RLU561189(NAD 83)
 AZ0489
 AZ0489                           SUPERSEDED SURVEY CONTROL
 AZ0489
 AZ0489.No superseded survey control is available for this station.
 AZ0489
 AZ0489_MARKER: DB = BENCH MARK DISK
 AZ0489_SETTING: 66 = SET IN ROCK OUTCROP
 AZ0489_STAMPING: T 1444 1981
 AZ0489_MARK LOGO: NGS
 AZ0489_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
```

```
AZ0489+STABILITY: POSITION/ELEVATION WELL
AZ0489
AZ0489  HISTORY     - Date     Condition        Report By
AZ0489  HISTORY     - 1981     MONUMENTED       NGS
AZ0489
AZ0489                          STATION DESCRIPTION
AZ0489
AZ0489'DESCRIBED BY NATIONAL GEODETIC SURVEY 1981
AZ0489'28.8 KM (17.9 MI) SW FROM ROCKSPRINGS.
AZ0489'28.8 KM (17.9 MI) SOUTHWEST ALONG U.S. HIGHWAY 377 FROM ITS EAST
AZ0489'JUNCTION WITH STATE HIGHWAY 55 IN ROCKSPRINGS, IN A 2 BY 5 FT EXPOSED
AZ0489'AREA OF OUTCROPPING BEDROCK, 14.4 METERS (47.2 FT) NORTH-NORTHWEST OF
AZ0489'THE CENTERLINE OF THE HIGHWAY, 10.7 METERS (35.1 FT) NORTH-NORTHEAST
AZ0489'OF THE NORTHWEST END OF A DRAINAGE PIPE AND 4.4 METERS (14.4 FT)
AZ0489'SOUTH-SOUTHEAST OF A FENCE.
AZ0489'THE MARK IS 0.3 METERS  SW FROM A WITNESS POST.
AZ0489'THE MARK IS 0.9 M BELOW THE HIGHWAY.

*** retrieval complete.
Elapsed Time = 00:00:02
```

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 15, 2018
 CA0772 ***********************************************************************
 CA0772  DESIGNATION -  U 1447
 CA0772  PID         -  CA0772
 CA0772  STATE/COUNTY-  TX/MCCULLOCH
 CA0772  COUNTRY     -  US
 CA0772  USGS QUAD   -  NEEDLE CREEK (1970)
 CA0772
 CA0772                         *CURRENT SURVEY CONTROL
 CA0772  ______________________________________________________________________
 CA0772* NAD 83(1986) POSITION- 31 00 23.     (N) 099 31 34.     (W)    SCALED
 CA0772* NAVD 88 ORTHO HEIGHT -   566.981 (meters)     1860.17  (feet) ADJUSTED
 CA0772  ______________________________________________________________________
 CA0772  GEOID HEIGHT    -        -22.967 (meters)                     GEOID12B
 CA0772  DYNAMIC HEIGHT  -        566.207 (meters)     1857.63  (feet) COMP
 CA0772  MODELED GRAVITY -    979,256.9   (mgal)                       NAVD 88
 CA0772
 CA0772  VERT ORDER      -  FIRST     CLASS II
 CA0772
 CA0772.The horizontal coordinates were scaled from a topographic map and have
 CA0772.an estimated accuracy of +/- 6 seconds.
 CA0772.
 CA0772.The orthometric height was determined by differential leveling and
 CA0772.adjusted by the NATIONAL GEODETIC SURVEY
 CA0772.in June 1991.
 CA0772
 CA0772.Significant digits in the geoid height do not necessarily reflect accuracy.
 CA0772.GEOID12B height accuracy estimate available here.
 CA0772
 CA0772.The dynamic height is computed by dividing the NAVD 88
 CA0772.geopotential number by the normal gravity value computed on the
 CA0772.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 CA0772.degrees latitude (g = 980.6199 gals.).
 CA0772
 CA0772.The modeled gravity was interpolated from observed gravity values.
 CA0772
 CA0772;                    North         East     Units  Estimated Accuracy
 CA0772;SPC TX C     - 3,148,800.      777,080.      MT  (+/- 180 meters Scaled)
 CA0772
 CA0772_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RMV497304(NAD 83)
 CA0772
 CA0772                           SUPERSEDED SURVEY CONTROL
 CA0772
 CA0772.No superseded survey control is available for this station.
 CA0772
 CA0772_MARKER: I = METAL ROD
 CA0772_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 CA0772_STAMPING: U 1447 1981
 CA0772_MARK LOGO: NGS
 CA0772_PROJECTION: FLUSH
```

```
CA0772_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
CA0772_ROD/PIPE-DEPTH: 4.6  meters
CA0772
CA0772  HISTORY     - Date     Condition        Report By
CA0772  HISTORY     - 1981     MONUMENTED       NGS
CA0772  HISTORY     - 19990108 MARK NOT FOUND   USPSQD
CA0772
CA0772                          STATION DESCRIPTION
CA0772
CA0772'DESCRIBED BY NATIONAL GEODETIC SURVEY 1981
CA0772'26.0 KM (16.2 MI) SW FROM BRADY.
CA0772'2.3 KM (1.45 MI) SOUTHERLY ALONG U.S. HIGHWAYS 87, 190 AND 377 FROM
CA0772'THE COURTHOUSE IN BRADY, THENCE 23.7 KM (14.75 MI) SOUTHWESTERLY ALONG
CA0772'U.S. HIGHWAY 190, OR 25.7 KM (15.95 MI) NORTHEASTERLY ALONG U.S.
CA0772'HIGHWAY 190 FROM ITS JUNCTION WITH U.S. HIGHWAY 83 AT THE NORTH EDGE
CA0772'OF MENARD, 0.1 KM (0.05 MI) WEST-SOUTHWEST OF A CULVERT, 18.0 METERS
CA0772'(59.1 FT) NORTH-NORTHWEST OF THE CENTERLINE OF THE HIGHWAY AND 0.3
CA0772'METER (1.0 FT) SOUTH-SOUTHWEST OF A FENCE.  NOTE=ACCESS TO THE DATUM
CA0772'POINT IS THROUGH A 5-INCH LOGO CAP.
CA0772'THE MARK IS 0.3 METERS  SSW FROM A WITNESS POST.
CA0772'THE MARK IS ABOVE LEVEL WITH THE HIGHWAY.
CA0772
CA0772                          STATION RECOVERY (1999)
CA0772
CA0772'RECOVERY NOTE BY US POWER SQUADRON 1999
CA0772'MARK NOT FOUND.

*** retrieval complete.
Elapsed Time = 00:00:01
```

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 15, 2018
 BO0405 ***********************************************************************
 BO0405  DESIGNATION -  W 1444
 BO0405  PID         -  BO0405
 BO0405  STATE/COUNTY-  TX/EDWARDS
 BO0405  COUNTRY     -  US
 BO0405  USGS QUAD   -  RAY LAKE SW (1987)
 BO0405
 BO0405                         *CURRENT SURVEY CONTROL
 BO0405  ______________________________________________________________________
 BO0405* NAD 83(1986) POSITION- 30 00 33.     (N) 100 24 13.     (W)    SCALED
 BO0405* NAVD 88 ORTHO HEIGHT -   677.025 (meters)     2221.21  (feet) ADJUSTED
 BO0405  ______________________________________________________________________
 BO0405  GEOID HEIGHT    -        -22.303 (meters)                     GEOID12B
 BO0405  DYNAMIC HEIGHT  -        676.019 (meters)     2217.91  (feet) COMP
 BO0405  MODELED GRAVITY -    979,134.6   (mgal)                       NAVD 88
 BO0405
 BO0405  VERT ORDER      -  FIRST     CLASS II
 BO0405
 BO0405.The horizontal coordinates were scaled from a topographic map and have
 BO0405.an estimated accuracy of +/- 6 seconds.
 BO0405.
 BO0405.The orthometric height was determined by differential leveling and
 BO0405.adjusted by the NATIONAL GEODETIC SURVEY
 BO0405.in June 1991.
 BO0405
 BO0405.Significant digits in the geoid height do not necessarily reflect accuracy.
 BO0405.GEOID12B height accuracy estimate available here.
 BO0405
 BO0405.The dynamic height is computed by dividing the NAVD 88
 BO0405.geopotential number by the normal gravity value computed on the
 BO0405.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BO0405.degrees latitude (g = 980.6199 gals.).
 BO0405
 BO0405.The modeled gravity was interpolated from observed gravity values.
 BO0405
 BO0405;                    North         East     Units  Estimated Accuracy
 BO0405;SPC TXSC     - 4,241,960.      464,600.      MT  (+/- 180 meters Scaled)
 BO0405
 BO0405_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RLU646206(NAD 83)
 BO0405
 BO0405                           SUPERSEDED SURVEY CONTROL
 BO0405
 BO0405.No superseded survey control is available for this station.
 BO0405
 BO0405_MARKER: DB = BENCH MARK DISK
 BO0405_SETTING: 66 = SET IN ROCK OUTCROP
 BO0405_STAMPING: W 1444 1981
 BO0405_MARK LOGO: NGS
 BO0405_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
```

```
BO0405+STABILITY: POSITION/ELEVATION WELL
BO0405
BO0405  HISTORY     - Date     Condition        Report By
BO0405  HISTORY     - 1981     MONUMENTED       NGS
BO0405
BO0405                          STATION DESCRIPTION
BO0405
BO0405'DESCRIBED BY NATIONAL GEODETIC SURVEY 1981
BO0405'19.6 KM (12.2 MI) SW FROM ROCKSPRINGS.
BO0405'19.6 KM (12.2 MI) SOUTHWEST ALONG U.S. HIGHWAY 377 FROM ITS EAST
BO0405'JUNCTION WITH STATE HIGHWAY 55 IN ROCKSPRINGS, IN A 4 BY 6 FT EXPOSED
BO0405'AREA OF OUTCROPPING BEDROCK, 0.1 KM (0.05 MI) EAST OF A SIDE ROAD
BO0405'LEADING NORTH, 15.3 METERS (50.2 FT) SOUTH OF THE CENTERLINE OF THE
BO0405'HIGHWAY AND 3.3 METERS (10.8 FT) NORTH OF A FENCE.
BO0405'THE MARK IS 0.4 METERS  E FROM A WITNESS POST.
BO0405'THE MARK IS ABOVE LEVEL WITH THE HIGHWAY.

*** retrieval complete.
Elapsed Time = 00:00:02
```

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.4.1
1        National Geodetic Survey,   Retrieval Date = MARCH 15, 2018
 BO0406 ***********************************************************************
 BO0406  DESIGNATION -  X 1444
 BO0406  PID         -  BO0406
 BO0406  STATE/COUNTY-  TX/EDWARDS
 BO0406  COUNTRY     -  US
 BO0406  USGS QUAD   -  RAY LAKE SE (1987)
 BO0406
 BO0406                         *CURRENT SURVEY CONTROL
 BO0406  ______________________________________________________________________
 BO0406* NAD 83(1986) POSITION- 30 00 16.     (N) 100 21 58.     (W)    SCALED
 BO0406* NAVD 88 ORTHO HEIGHT -   653.013 (meters)     2142.43   (feet) ADJUSTED
 BO0406  ______________________________________________________________________
 BO0406  GEOID HEIGHT    -        -22.278 (meters)                      GEOID12B
 BO0406  DYNAMIC HEIGHT  -        652.041 (meters)     2139.24   (feet) COMP
 BO0406  MODELED GRAVITY -    979,132.8   (mgal)                        NAVD 88
 BO0406
 BO0406  VERT ORDER      -  FIRST     CLASS II
 BO0406
 BO0406.The horizontal coordinates were scaled from a topographic map and have
 BO0406.an estimated accuracy of +/- 6 seconds.
 BO0406.
 BO0406.The orthometric height was determined by differential leveling and
 BO0406.adjusted by the NATIONAL GEODETIC SURVEY
 BO0406.in June 1991.
 BO0406
 BO0406.Significant digits in the geoid height do not necessarily reflect accuracy.
 BO0406.GEOID12B height accuracy estimate available here.
 BO0406
 BO0406.The dynamic height is computed by dividing the NAVD 88
 BO0406.geopotential number by the normal gravity value computed on the
 BO0406.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BO0406.degrees latitude (g = 980.6199 gals.).
 BO0406
 BO0406.The modeled gravity was interpolated from observed gravity values.
 BO0406
 BO0406;                    North         East     Units  Estimated Accuracy
 BO0406;SPC TXSC     - 4,241,390.      468,210.      MT  (+/- 180 meters Scaled)
 BO0406
 BO0406_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RLU682200(NAD 83)
 BO0406
 BO0406                           SUPERSEDED SURVEY CONTROL
 BO0406
 BO0406.No superseded survey control is available for this station.
 BO0406
 BO0406_MARKER: DB = BENCH MARK DISK
 BO0406_SETTING: 66 = SET IN ROCK OUTCROP
 BO0406_STAMPING: X 1444 1981
 BO0406_MARK LOGO: NGS
 BO0406_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
```

```
BO0406+STABILITY: POSITION/ELEVATION WELL
BO0406
BO0406  HISTORY     - Date     Condition        Report By
BO0406  HISTORY     - 1981     MONUMENTED       NGS
BO0406
BO0406                          STATION DESCRIPTION
BO0406
BO0406'DESCRIBED BY NATIONAL GEODETIC SURVEY 1981
BO0406'16.0 KM (9.95 MI) SW FROM ROCKSPRINGS.
BO0406'16.0 KM (9.95 MI) SOUTHWEST ALONG U.S. HIGHWAY 377 FROM ITS EAST
BO0406'JUNCTION WITH STATE HIGHWAY 55 IN ROCKSPRINGS, IN A 5 BY 8 FT EXPOSED
BO0406'AREA OF OUTCROPPING BEDROCK, 0.6 KM (0.35 MI) EAST OF A SIDE ROAD
BO0406'LEADING NORTH, 11.6 METERS (38.1 FT) NORTH-NORTHEAST OF THE CENTERLINE
BO0406'OF THE HIGHWAY AND 6.9 METERS (22.6 FT) SOUTH-SOUTHWEST OF A FENCE.
BO0406'THE MARK IS 0.3 METERS  SSW FROM A WITNESS POST.
BO0406'THE MARK IS 0.5 M BELOW THE HIGHWAY.

*** retrieval complete.
Elapsed Time = 00:00:03
```