
KANSAS 2012 LIDAR PROJECT – AREA 2 LIDAR COLLECTION, CONTROL-FEMA CHECKPOINT AND LIDAR ADJUSTMENT REPORT

Collection and Processing Report Summary

Collection:

Kucera International was awarded the task of planning, collecting, processing, and delivering lidar data products Area 2, which falls mainly within 11 Kansas counties in west central Kansas. The project was divided into 6 flight/delivery blocks, with each treated as its own capture/delivery unit. These units are referred to as 2-1 (for block 1), 2-2 (for block2) and so on through Block 6.

The Area was divided up into blocks that were both efficient to fly, used a mixture of flight line directions to help combat typically high winds, and also limited flight line length to an acceptable length for accuracy considerations. The blocks were defined directly along the tile boundary. Each block had similar, but slightly different laser and flight parameters due to elevation variances and overall averages within the block. In the end, six flight and delivery blocks were created. In the end the blocks were flown in order of what the weather allowed, rather than directly according to DASC's priority wishes.

Flying the total project required 35 missions, one being a reflight, and a total of 295 lines with 13175 miles flown. A reference to the per missions flight progress, flight date, and corresponding block can be found in the accompanying shapefiles and other data files included in the delivery.

Missions began Jan 2nd 2012 and lasted through Jan 10th 2012. When weather permitted, data was collected around the clock in 6hr shifts. Weather and snow drifts postponed collection from Jan 11th, 2012 until Feb 25th, 2012, and then primary collection wrapped up March 1st. A reflight mission was flown April 23rd to account for sensor malfunction in part of one line in block 2.

Data was captured onto Solid State Drives, between 160GB and 300GB in size. As the data was captured, a database of the file was sent by the crew to the office to be examined for coverage and errors. After every set of missions, the raw captured data was also copied to two external drives. One drive to remain with the crew, the other to be sent to the office for processing. The drives being sent to the office were sent after every 24hr period in where there was any collection accomplished.

Processing:

At the office the data was extracted and viewed in a quick manner, in order to QC data for transfer or data corruption errors, and to review for obvious data gaps and improper coverage. The GPS/INS is processed to finality during this time, at which point the data was output in it's proper format.

Airborne GPS processing is handled using Leica's IPAS software suite together with TerraTec's TerraPOS software. TerraPOS relies on Precise Point Positioning, rather than base stations, for the processing of a final accurate trajectory. It can also make use of GLONASS satellites. The only real requirement to achieve the required accuracy for this project was uninterrupted GPS collection of at least 3hrs for any mission, and this restriction was easily met in every mission. IPAS blends the GPS trajectory with the IMU data to create a final trajectory file that is used to initially georeference the lidar data

After the data is output properly, it is cut into manageable tiles and misalignment calibrations were computed on the mission data itself. The data was checked line to line, and corrected individually per mission using these mission specific computed misalignments, and afterward checked for accurate and expected results. During this calibration process, QC of the data was performed as well.



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Once the block was completed, the data of the various missions comprising the block were checked for matching, and further corrections applied if necessary. Typically just a small vertical adjustment was needed, if anything. The data was also checked against control for reasonable accuracy, to check for obvious and large blunders that would prevent further work on the data. For areas where applicable, the data was also checked against the 2011 collected data to ensure matching between datasets.

Classification of the data then proceeded on the entire block. Data classification was handled mainly by TerraScan. The data was run through the classification process on an arbitrary 2000m X 2000m tile layout to create more efficient files sizes with which to work. Bridges and culverts were checked using automated and manual methods. The KansasOT bridge shapefile was used as the primary arbiter of what features were bridges, and not culverts. Editing and QC work was handled in TerraScan, LP360, ArcGIS 10, after which the data was cut to the final project tiles and final data products were generated.

Finally the data was edited, checked against control one more time, and checked one last time for classification/editing blunders onc. At the end, the data was cut to Kansas Tiles, and prepared for delivery of specified data products.



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Sensor Parameters

Vendor: Kucera International
Sensor: ALS60 SN6133 200khz with MPiA.
GPS/INS: IPAS w/ Honeywell uIRS
Section: Area 2

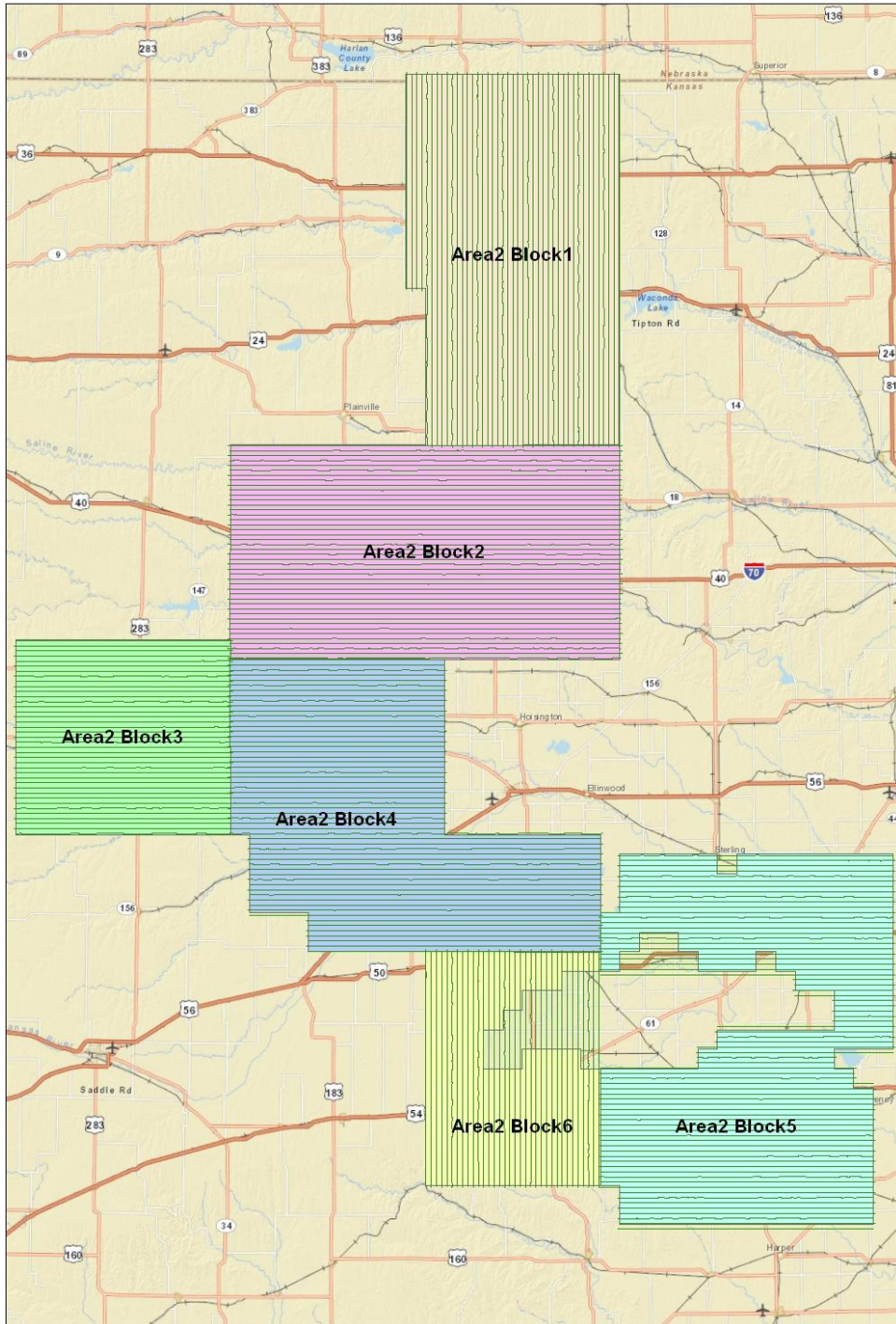
ALS60 Sensor Parameters

Altitude AMSL (ft)	~9200
Recommended Ground Speed (GS)	160
Field of View (FOV) (degrees)	40.0
Scan Rate Setting used (SR) (Hz)	35.0
Laser Pulse Rate used (Hz)	99100
Multi Pulse in Air Mode	Enabled
Recommended Laser Power (%)	100
Full Swath Width (m)	1732
Minimum Sidelap (%)	20.41
Maximum Point Spacing Across Track (m)	1.86
Maximum Point Spacing Along Track (m)	2.35
Across Track/Along Track Ratio	0.79
Average Point Density (m)	0.7
Average Point Spacing (m)	1.20
Illuminated Footprint Diameter (m)	0.54



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**Kucera International Inc - Area 2
2012 Kansas Airborne LIDAR Project**



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Mission Summary

Mission	Start Date	Aircraft	Block	Sensor	Duration (hrs)	Lines
Mission01	1/2/2012	N555DA	B6 NS	6133	4.7	6034-6024 (and boresight)
Mission02	1/2/2012	N555DA	B6 NS	6133	5	6023-6010
Mission03	1/5/2012	N35834	B6 NS	6133	3.5	6001-6009
Mission04	1/5/2012	N35834	B5 EW	6133	3.6	5121-5129
Mission05	1/5/2012	N35834	B5 EW	6133	3.9	5111-5120
Mission06	1/5/2012	N35834	B5 EW	6133	3.7	5101-5110
Mission07	1/5/2012	N35834	B5 EW	6133	3.6	5090-5100
Mission08	1/6/2012	N35834	B5 EW	6133	3.4	5077-5089
Mission09	1/6/2012	N35834	B5 EW	6133	3.9	5076-5067
Mission10	1/6/2012	N35834	B5 EW	6133	3.6	5066-5057
Mission11	1/7/2012	N35834	B1	6133	3.8	1043-1039 (2 line test over airport and boresight)
Mission12	01/08/12	N35834	B1	6133	3.4	1033-1038
Mission13	01/08/12	N35834	B1	6133	3.5	1027-1032
Mission14	1/9/2012	N35834	B1	6133	3.6	1021-1026
Mission15	1/9/2012	N35834	B1	6133	3.4	1015-1020
Mission16	1/9/2012	N35834	B1	6133	3.4	1009-1014
Mission17	1/10/2012	N35834	B1	6133	2.7	1005-1008
Mission18	1/10/2012	N35835	B1	6133	2.6	1001to1004
Snow-Drifts and Weather Postponed Collection						
Mission19	02/25/12	N35834	B2 EW	6133	3.7	2001-2007
Mission20	02/25/12	N35834	B2 EW	6133	3.4	2008-2011
Mission21	02/26/12	N35834	B2 EW	6133	3.9	2012-2018
Mission22	02/26/12	N35834	B2 EW	6133	3.7	2019-2025
Mission23	02/26/12	N35834	B2 EW	6133	3.8	2026-2032
Mission24	02/26/12	N35834	B2 EW	6133	3.5	2033-2038
Mission25	02/26/12	N35834	B2 EW	6133	3.1	2039-2044
Mission26	02/27/12	N35834	B4 EW	6133	3.8	4070-4083
Mission27	02/27/12	N35834	B4 EW	6133	3.1	4084-4093
Mission28	02/27/12	N35834	B4 EW	6133	3.7	4094-4103
Mission29	02/29/12	N35834	B4 EW	6133	4.3	4104-4113
Mission30	02/29/12	N35834	B4 EW	6133	4.4	4114-4123
Mission31	02/29/12	N35834	B4EW, B3EW	6133	3.1	4123-4127, 3077-3080
Mission32	02/29/12	N35834	B3 EW	6133	3.9	3076-3065
Mission33	2/29/2012	N35834	B3 EW	6133	4.2	3064-3051
Mission34	3/1/2012	N35834	B3 EW	6133	3	3050-3042
Mission35	4/23/2012	N350GB	B2 EW	6133	5	RF 2001



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Survey Control - Collection, Processing, and Adjustment Report

This preliminary report describes several items pertaining to Area2 of the 2012 lidar collection.

- The establishment and positioning of ground control monuments for the support of LiDAR operations and FEMA type land type class accuracy evaluations.
- The lidar adjustment/calibration as a result of the lidar control points.
- Preliminary FEMA accuracy results.
- Both lidar control and FEMA checkpoint point listings.
- Preliminary collection and processing summary.

Lidar Control/FEMA Checkpoints:

For FEMA purposes, the project area was divided into five (5) ~1000 square mile blocks to support FEMA area specifications for the number of check points per area. As per requirements a minimum of twenty (20) Bare Earth, High Grass, and Urban vegetation areas were evenly spaced throughout each 1000 square mile block. A final point count is found at the end of this report.

For LIDAR point cloud georeferencing, control points were established per flight/delivery block.

Field work commenced on the 9th of January with performing reconnaissance and recovery of all National Geodetic Survey (NGS) monuments within the project area. A criteria of open sky was mandatory or all locations as well as proximity to power lines and road traffic. Existing NGS GPS marks were recovered first and then a usable existing horizontal stations and Bench Marks that met the observation criteria.

Upon completion of reconnaissance GPS data collections started on the 17th of January in Reno County. Data collection on BASE points, LiDAR Control points and FEMA ground check points were performed at the same time. Data collection was completed on the 14th of February in Smith County.

Weather conditions had minimal or no effort on data collection throughout this period of time. There were several days of extremely high winds that resulting in stopping observations earlier than scheduled for that day. Some rain and snow on county roads did cause minor problems, requiring detours around impassable muddy roads while traveling between selected locations.

LIDAR ground control (Model) points were required to be established at selected locations throughout the project area. A total of twenty seven (27) horizontal and vertical established National Geodetic Survey (NGS) monuments were occupied in the area network. Four (4) CORS points were incorporated in the network. Twenty three (23) published horizontal and vertical NGS points were occupied with six (6) horizontal and vertical stations, nine (9) horizontal only, and eleven (11) vertical only points making up the “BASE” control network.

Note. In the case of inadequate horizontal and or vertical values published for selected NGS monuments, those points were occupied for a minimum of three (3)- five (5) hour GPS observations times to meet required FEMA specifications for establishing base points. The points were utilized to constrain all new LiDAR control ground locations as well as the FEMA vegetation check locations points.

A total of one hundred seventeen (117) LiDAR control ground points were positioned in support of airborne LiDAR georeferencing. A total of three hundred seventy-two (372) FEMA points (Bare Earth, High Grass, and Urban) were positioned among the five (5) FEMA blocks.



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All FEMA checkpoints and lidar control points were positioned utilizing geodetic grade dual frequency Ashtech and Trimble GPS receivers in a “*Static*” mode. A minimum of sixty (60) minutes of occupation time was taken at both LiDAR check and FEMA vegetation locations. GPS receivers were set at BASE points throughout data collections periods with BASE spacing to ensure that no new locations, either LiDAR control or FEMA vegetation, were more than forty (40) kilometers from any BASE point.

Local CORS stations *ICT4*, *ICT5*, *HVLK*, and *NEAP* were incorporated in both the BASE network and LiDAR control points. Post processing was performed with Spectrum GPS vector software. Only “*Fixed*” ambiguity resolved vectors were accepted. All data was processed utilizing the NGS “*Precise*” final orbit ephemeris.

Additionally, Base point raw data was submitted through OPUS to obtain a CORS referenced position and orthometric height as a check to fully constrained least squares adjustment.

Processed vectors were entered into the StarNet Least Squares adjustment program holding the referenced CORS and all existing NGS control, both horizontal and vertical. The adjusted results reference the GRS-80 ellipsoid while incorporating the 2009 NGS Geoid to achieve NAVD88 orthometric heights. The result provides horizontal accuracy of 2nd Order Class I (1:50,000) and vertical accuracy of 2nd Order (+/- 0.06’). The geodetic positions were transformed into UTM Zone 14N, units in meters.



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LIDAR Vertical Adjustment

Vertical adjustment of LIDAR was determined by comparing unadjusted lidar to the lidar control, comparing unadjusted lidar to the FEMA checkpoints, comparing bare earth data between delivery blocks in multiple locations, and comparing 2012 bare earth data to 2011 bare earth data (where overlapping). The values below represent a best fit solution to all above checks.

LIDAR Vertical Adjustment to Control

Area 2	Lidar Control to Surface (Dz)	Actual Vertical Adjustment (m)
Block1	0.33	-0.35
Block2	0.32	-0.35
Block3	0.40	-0.40
Block4	0.39	-0.37
Block5	0.36	-0.36
Block6	0.39	-0.39
average	0.37	



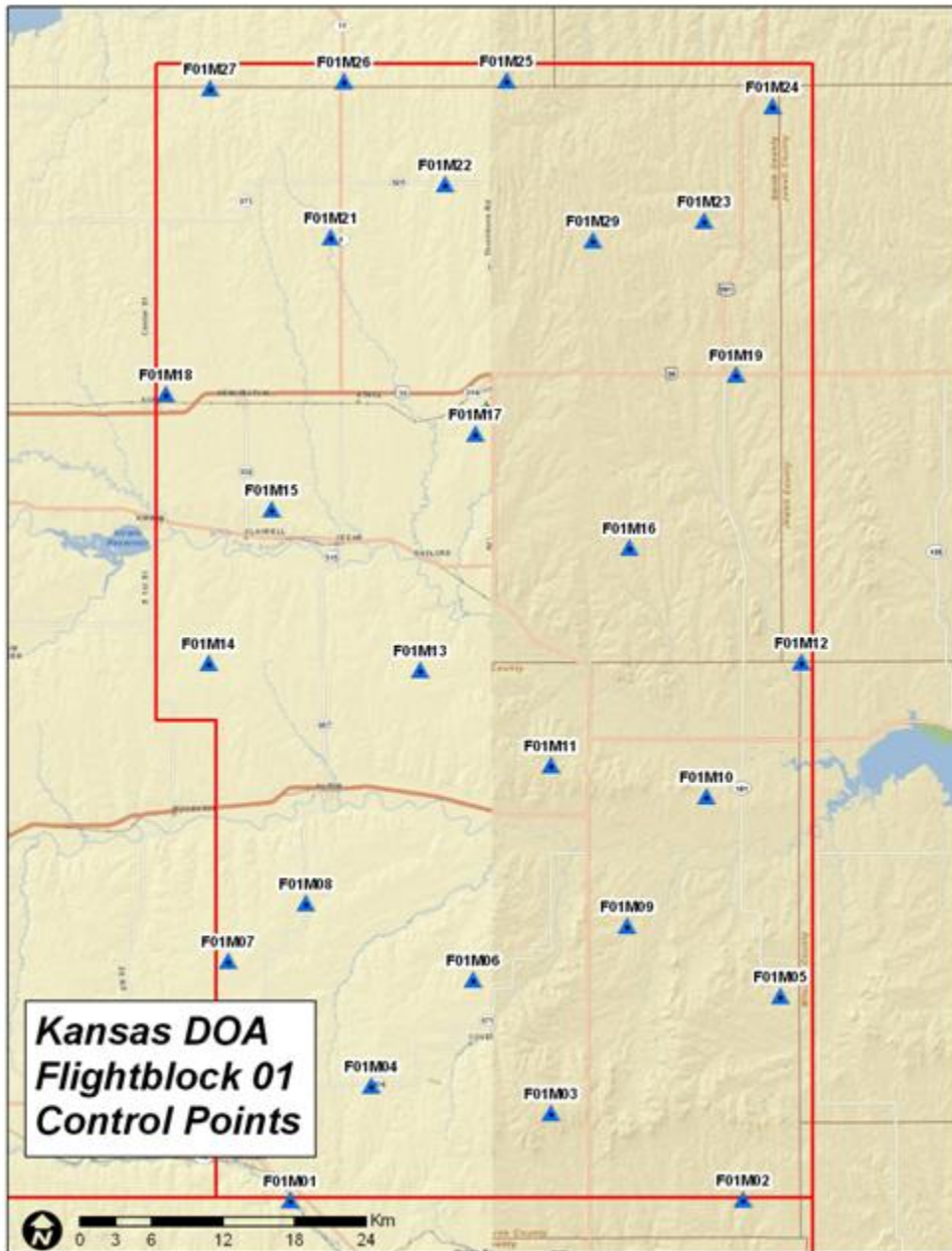
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Area 2 - Delivery Block 1

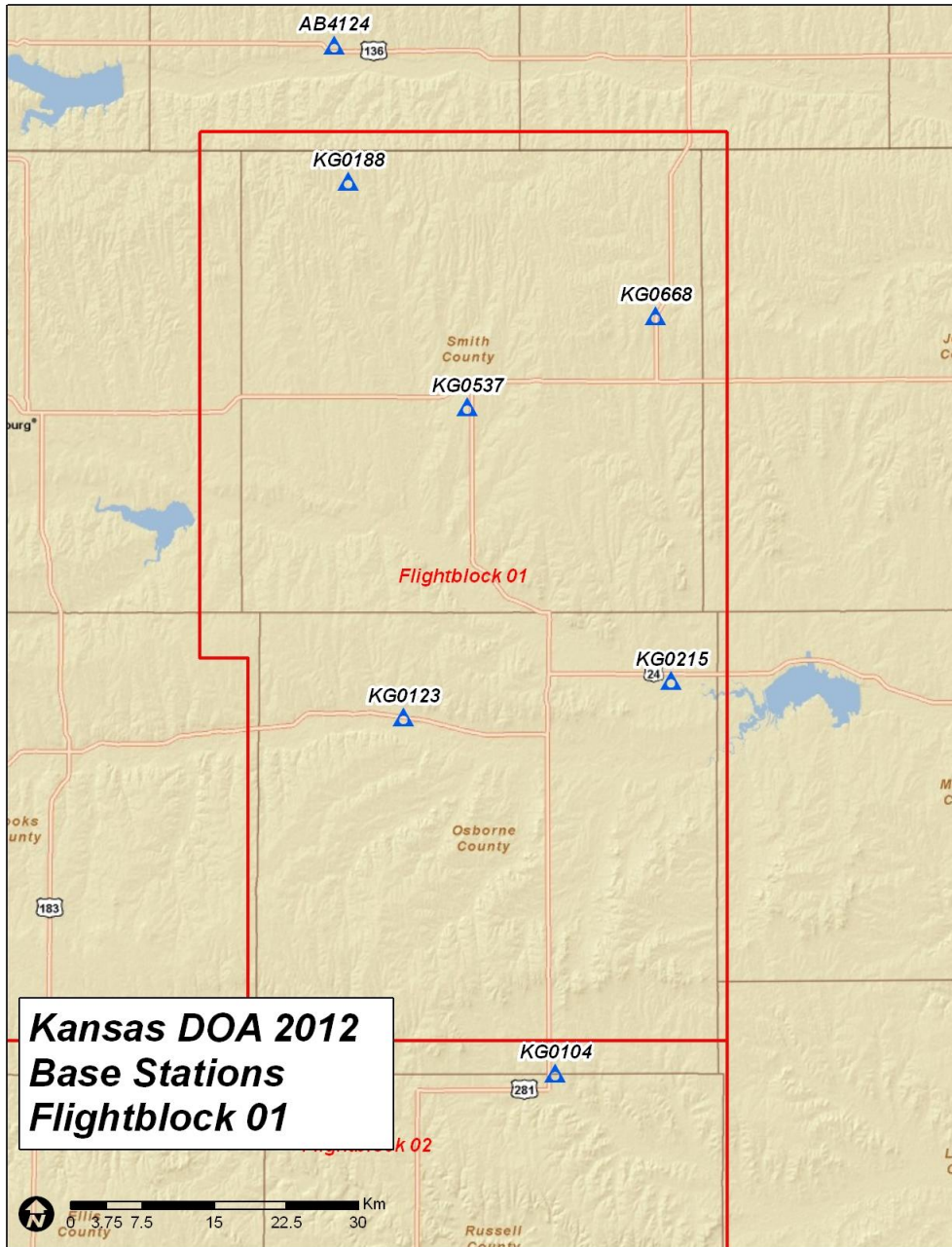
Number	Easting	Northing	Elevation	LIDAR Elevation	DZ
F01M01	501217.928	4334850.531	547.413	547.300	-0.113
F01M02	539205.386	4334883.163	506.765	506.790	0.025
F01M03	523092.502	4342110.645	584.018	584.040	0.022
F01M04	508013.706	4344442.636	625.951	625.940	-0.011
F01M05	542343.989	4351964.973	507.946	507.970	0.024
F01M06	516578.128	4353321.045	553.310	553.250	-0.060
F01M07	495970.499	4354878.230	592.764	592.710	-0.054
F01M08	502523.814	4359679.370	559.448	559.370	-0.078
F01M09	529481.711	4357809.095	490.056	490.040	-0.016
F01M10	536174.670	4368627.153	473.230	473.290	0.060
F01M11	523107.343	4371246.934	529.214	529.190	-0.024
F01M12	544110.919	4379881.539	466.781	466.710	-0.071
F01M13	512113.309	4379239.320	544.618	544.480	-0.138
F01M14	494324.004	4379836.788	570.806	570.730	-0.076
F01M15	499614.184	4392660.545	540.244	540.180	-0.064
F01M16	529675.405	4389500.795	519.704	519.710	0.006
F01M17	516754.774	4399010.940	541.112	541.020	-0.092
F01M18	490762.119	4402344.047	569.515	569.470	-0.045
F01M19	538643.437	4403961.881	529.649	529.670	0.021
F01M21	504568.179	4415493.661	587.069	587.050	-0.019
F01M22	514192.058	4419936.851	612.307	612.240	-0.067
F01M23	535982.594	4416839.686	570.083	570.170	0.087
F01M24	541698.998	4426474.450	595.539	595.500	-0.039
F01M25	519350.519	4428614.102	595.958	595.970	0.012
F01M26	505714.213	4428548.350	641.912	641.990	0.078
F01M27	494498.549	4427975.852	649.004	648.980	-0.024
F01M29	526625.966	4415202.686	609.047	609.030	-0.017
KG0123	511297.160	4368833.519	491.253	491.220	-0.033
KG0188	505507.065	4424803.907	626.609	626.510	-0.099
KG0215	539179.887	4372666.133	452.462	452.490	0.028
KG0537	517887.530	4401197.471	548.393	548.480	0.087
KG0668	537606.089	4410737.343	591.417	591.570	0.153
				Average Dz	-0.017
				Minimum Dz	-0.138
				Maximum Dz	0.153
				Average Magnitude	0.054
				RMS	0.066
				STD	0.065



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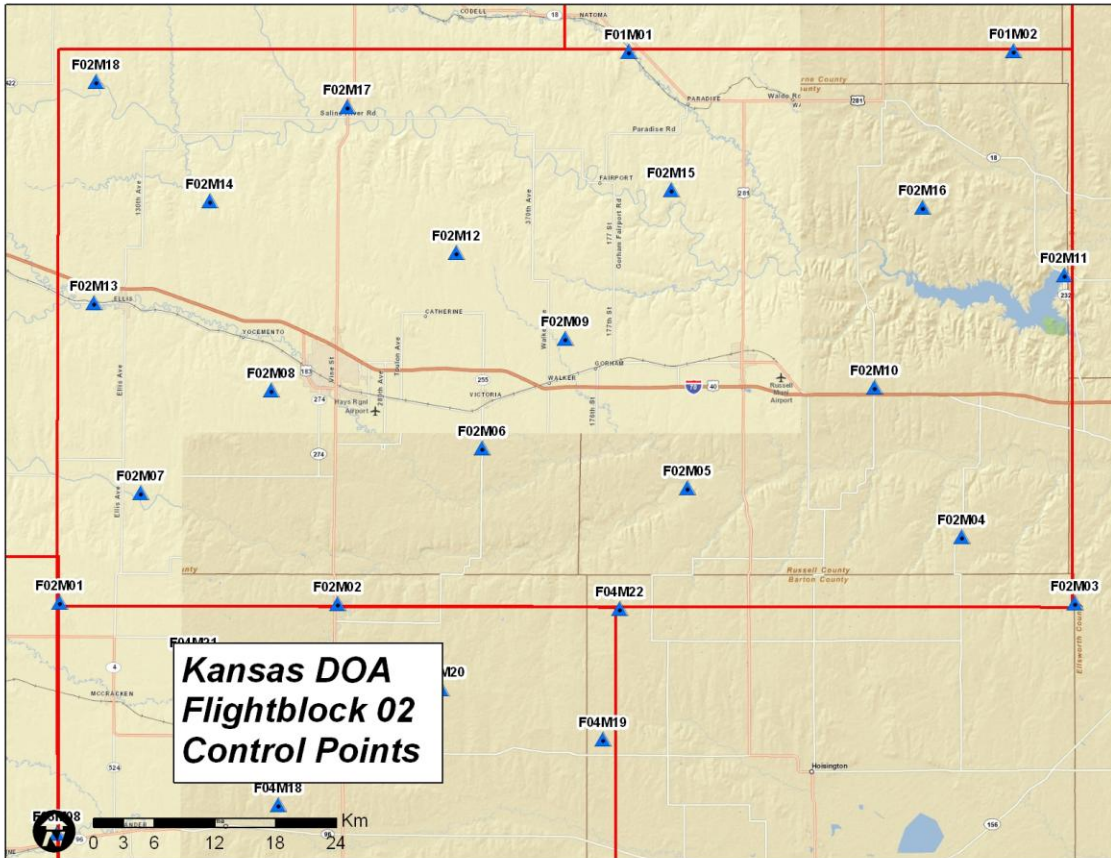
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Area 2 – Delivery Block 2

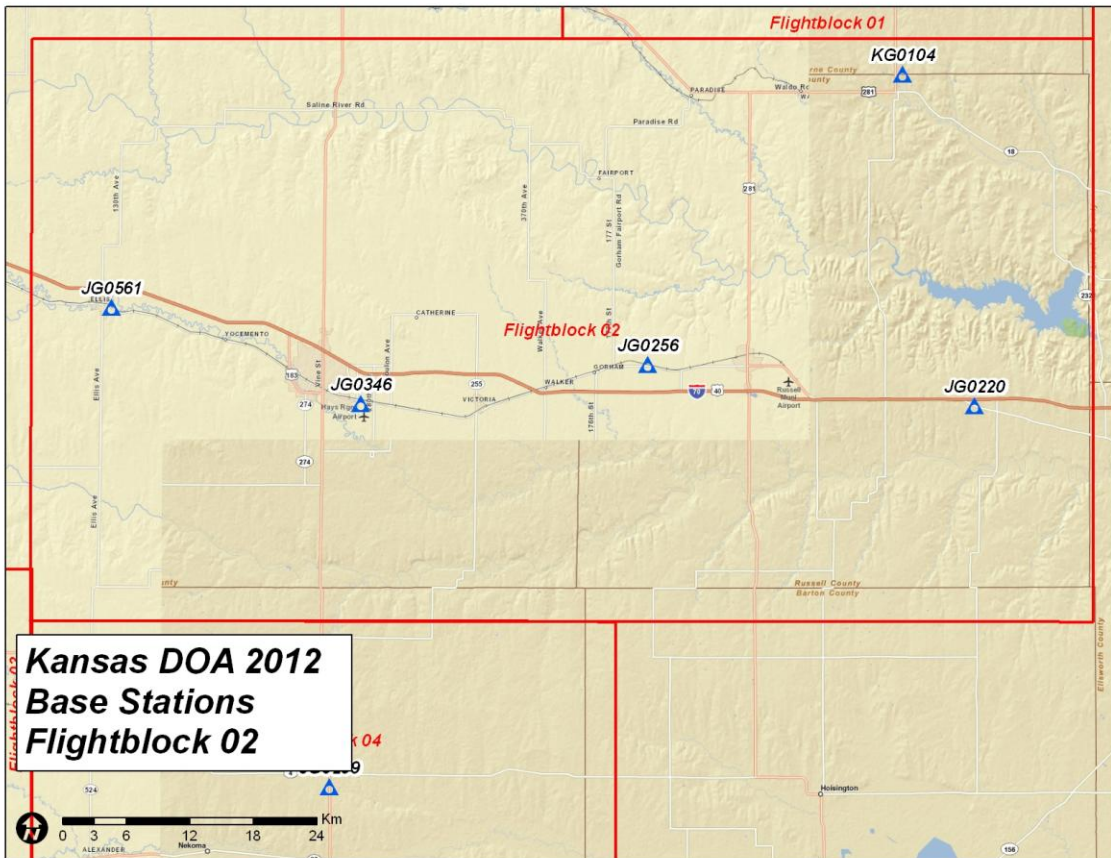
Number	Easting	Northing	Elevation	LIDAR Elevation	DZ
F01M01	501217.928	4334850.531	547.413	547.270	-0.143
F01M02	539205.386	4334883.163	506.765	506.730	-0.035
F02M02	472538.501	4280320.745	604.157	604.200	0.043
F02M03	545232.418	4280373.872	577.537	577.640	0.103
F02M04	534078.428	4286919.790	562.779	562.820	0.041
F02M05	506993.851	4291746.338	527.849	527.810	-0.039
F02M06	486786.453	4295707.327	591.986	591.950	-0.036
F02M07	453058.149	4291269.799	615.443	615.330	-0.113
F02M08	465959.637	4301443.211	674.604	674.590	-0.014
F02M09	494957.871	4306510.148	595.479	595.500	0.021
F02M10	525459.987	4301683.463	566.889	566.960	0.071
F02M11	544191.566	4312811.062	464.188	464.060	-0.128
F02M12	484226.589	4314992.464	653.989	653.920	-0.069
F02M13	448466.558	4310055.651	652.915	652.990	0.075
F02M14	459889.260	4320116.419	680.744	680.700	-0.044
F02M15	505411.556	4321212.284	535.354	535.440	0.086
F02M16	530223.237	4319482.568	515.251	515.240	-0.011
F02M17	473506.961	4329385.633	579.904	579.900	-0.004
F02M18	448709.004	4331857.913	630.920	630.880	-0.040
F04M22	500309.210	4279846.019	608.913	608.920	0.007
JG0220	533869.094	4300364.623	535.286	535.200	-0.086
JG0256	503015.716	4304195.841	580.322	580.210	-0.112
JG0346	475975.038	4300533.968	608.426	608.410	-0.016
JG0561	452492.550	4309599.316	646.410	646.350	-0.060
KG0104	527034.490	4331601.490	504.959	504.810	-0.149
				<i>Average Dz</i>	-0.026
				<i>Minimum Dz</i>	-0.149
				<i>Maximum Dz</i>	0.103
				<i>Average Magnitude</i>	0.062
				<i>RMS</i>	0.075
				<i>STD</i>	0.072



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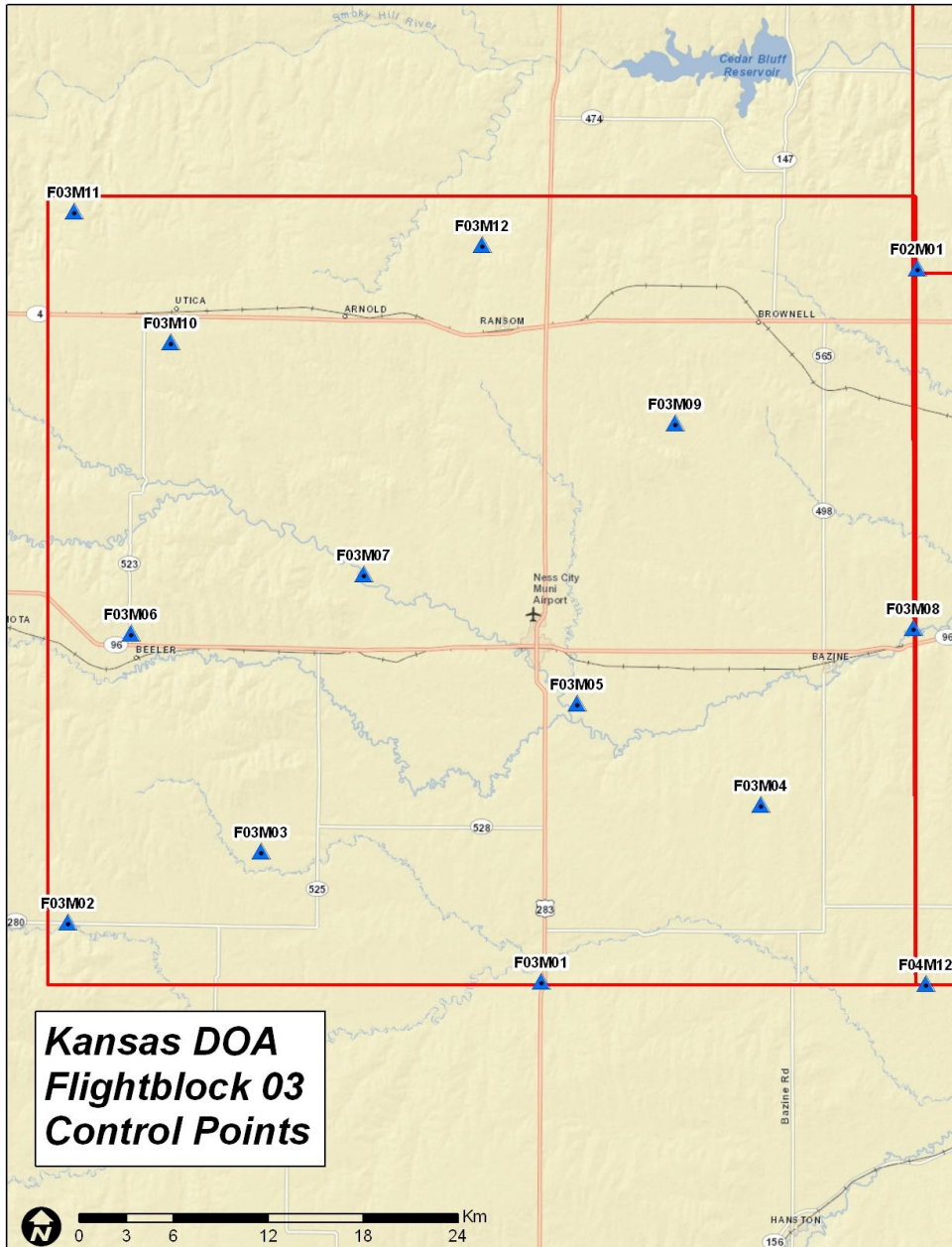
Area 2 – Delivery Block 3

Number	Easting	Northing	Elevation	LIDAR Elevation	DZ
F02M01	445095.963	4280492.512	695.096	695.12	0.024
F03M01	421261.003	4235209.147	681.175	681.18	0.005
F03M02	391221.375	4239001.483	761.409	761.35	-0.059
F03M03	403502.309	4243500.432	749.234	749.25	0.016
F03M04	435185.359	4246432.916	691.06	691.13	0.07
F03M05	423548.804	4252867.345	681.001	680.98	-0.021
F03M06	395214.793	4257311.579	781.728	781.68	-0.048
F03M07	409979.388	4261044.784	705.895	705.88	-0.015
F03M08	444851.084	4257659.384	642.097	642.12	0.023
F03M09	429755.727	4270648.079	723.543	723.67	0.127
F03M10	397748.228	4275776.209	803.214	803.17	-0.044
F03M11	391629.994	4284085.313	794.759	794.71	-0.049
F03M12	417487.269	4281957.075	733.833	733.84	0.007
				Average Dz	0.003
				Minimum Dz	-0.059
				Maximum Dz	0.127
				Average Magnitude	0.039
				RMS	0.051
				STD	0.053

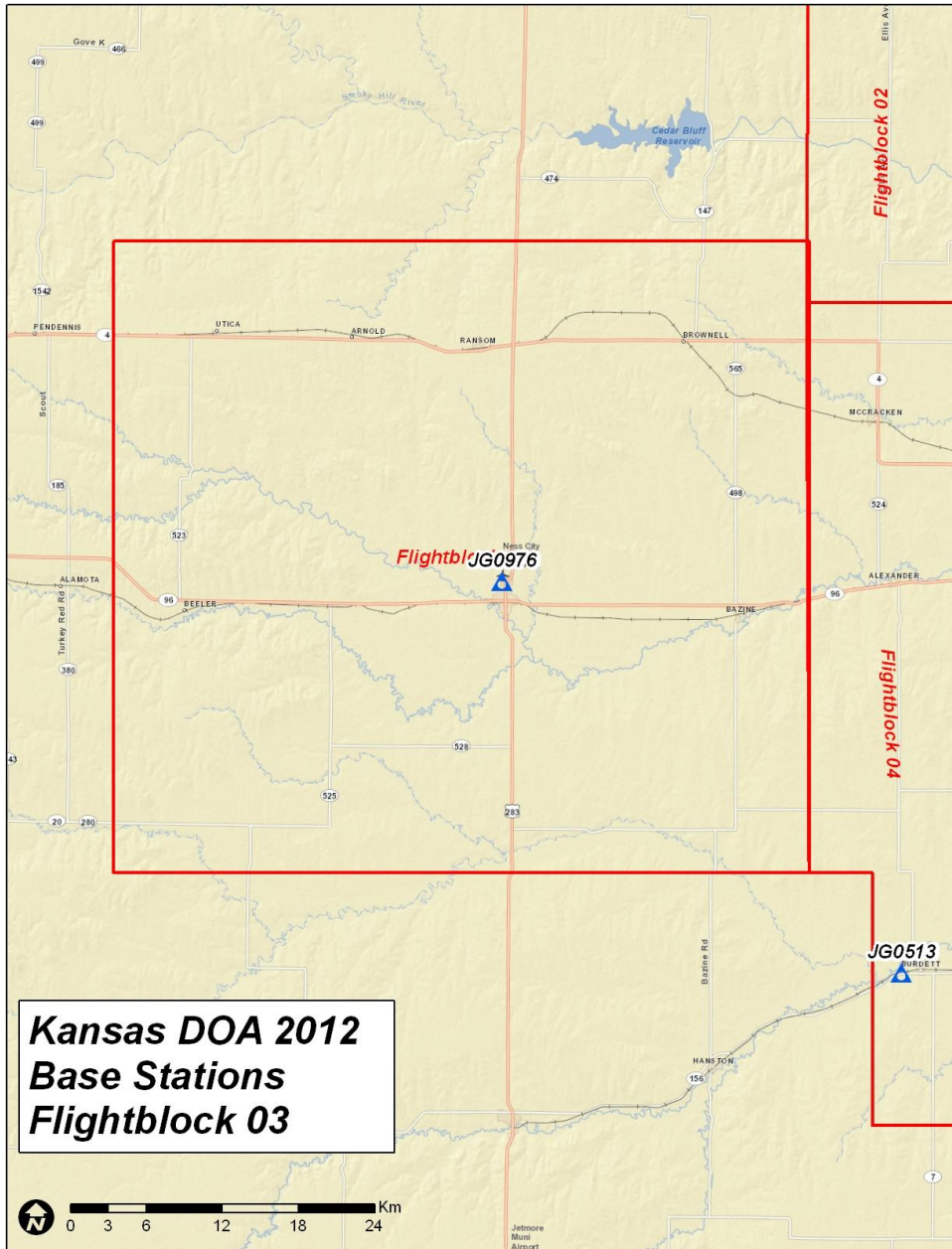


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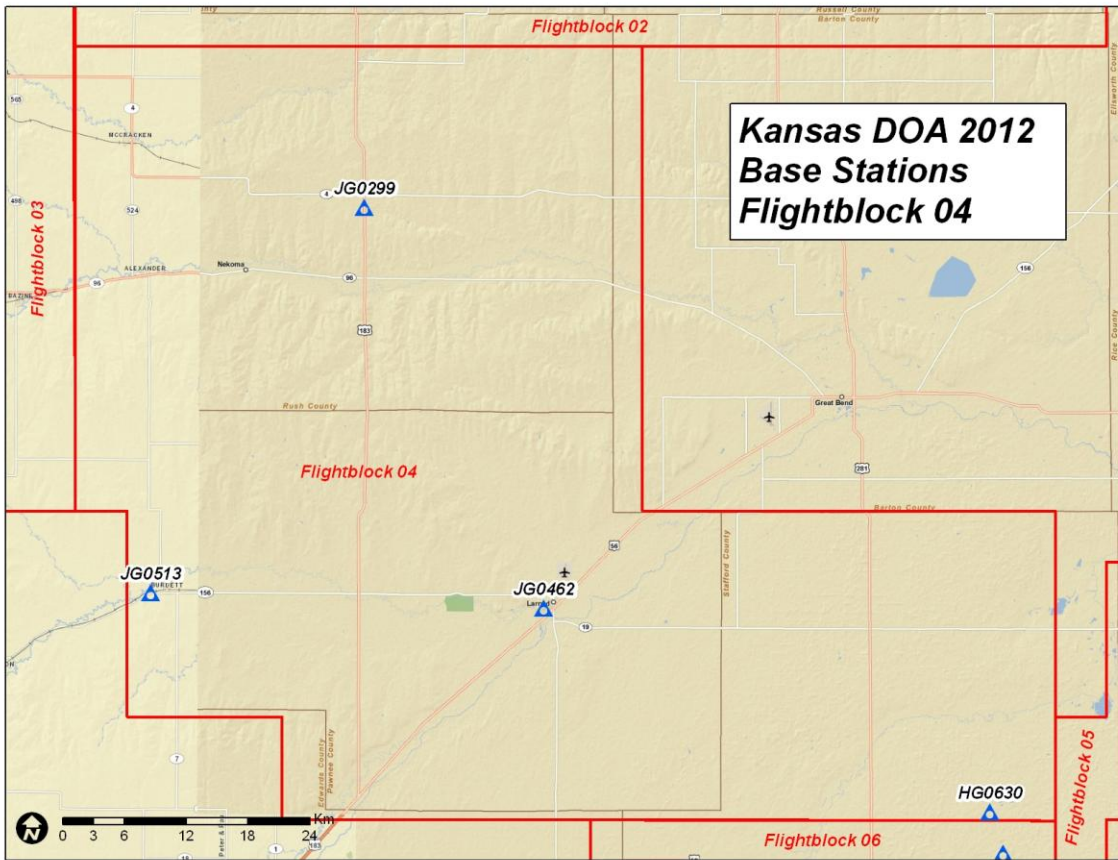
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Area 2 – Delivery Block 4

Number	Easting	Northing	Elevation	LIDAR Elevation	DZ
F02M01	445095.963	4280492.512	695.096	695.090	-0.006
F03M08	444851.084	4257659.384	642.097	642.190	0.093
F04M01	538851.423	4234358.213	547.231	547.230	-0.001
F04M02	526913.530	4227114.494	569.668	569.670	0.002
F04M03	507763.882	4233573.556	587.702	587.640	-0.062
F04M04	499623.044	4220792.323	606.403	606.400	-0.003
F04M05	515698.348	4217889.736	586.200	586.270	0.070
F04M06	496041.401	4205164.078	625.887	625.910	0.023
F04M07	483476.327	4212926.138	640.362	640.360	-0.002
F04M08	469087.607	4207553.259	658.715	658.710	-0.005
F04M09	450060.577	4217304.424	684.615	684.680	0.065
F04M10	459689.176	4224172.334	642.540	642.540	0.000
F04M11	479881.918	4229989.317	631.024	631.050	0.026
F04M12	445663.714	4235083.419	667.767	667.720	-0.047
F04M13	461826.689	4240603.643	668.457	668.490	0.033
F04M14	499014.529	4241259.712	635.092	635.140	0.048
F04M15	474929.217	4244719.650	662.559	662.620	0.061
F04M16	452989.329	4247930.667	687.388	687.380	-0.008
F04M17	489081.863	4253547.416	622.149	622.170	0.021
F04M18	466640.972	4260474.743	632.097	632.120	0.023
F04M19	498681.259	4266958.962	617.667	617.770	0.103
F04M20	482676.893	4271938.321	636.159	636.200	0.041
F04M21	458290.098	4274802.133	633.299	633.340	0.041
F05M06	539809.582	4214543.123	550.345	550.340	-0.005
F05M09	539885.477	4204982.763	554.544	554.500	-0.044
F06M01	526604.602	4204528.733	575.355	575.420	0.065
				<i>Average Dz</i>	0.020
				<i>Minimum Dz</i>	-0.062
				<i>Maximum Dz</i>	0.103
				<i>Average Magnitude</i>	0.035
				<i>RMS</i>	0.045
				<i>STD</i>	0.041



KANSAS 2012 LIDAR PROJECT – AREA 2 LIDAR COLLECTION, CONTROL-FEMA CHECKPOINT AND LIDAR ADJUSTMENT REPORT



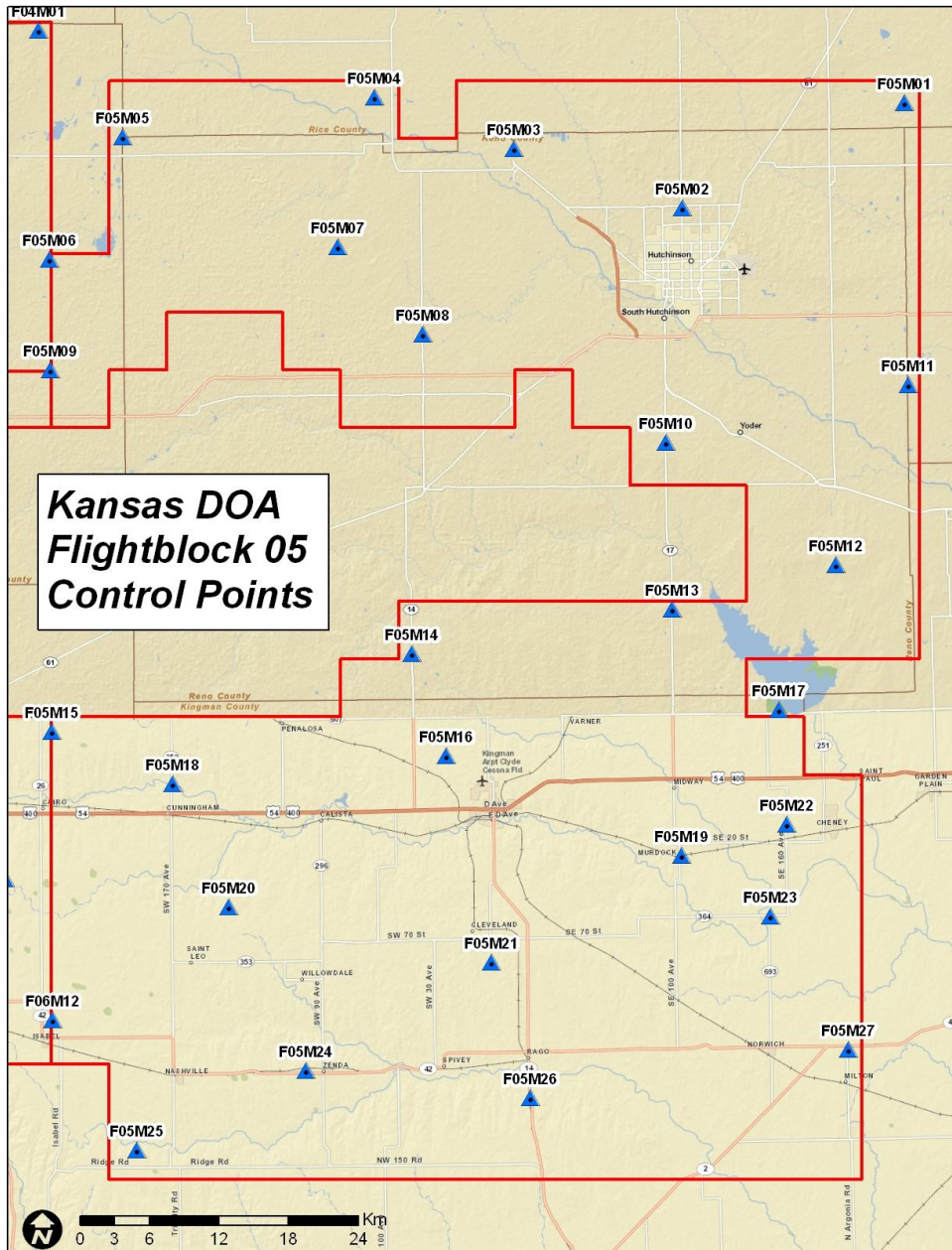
**KANSAS 2012 LIDAR PROJECT – AREA 2
LIDAR COLLECTION, CONTROL-FEMA CHECKPOINT
AND LIDAR ADJUSTMENT REPORT**

Area 2 – Delivery Block 5

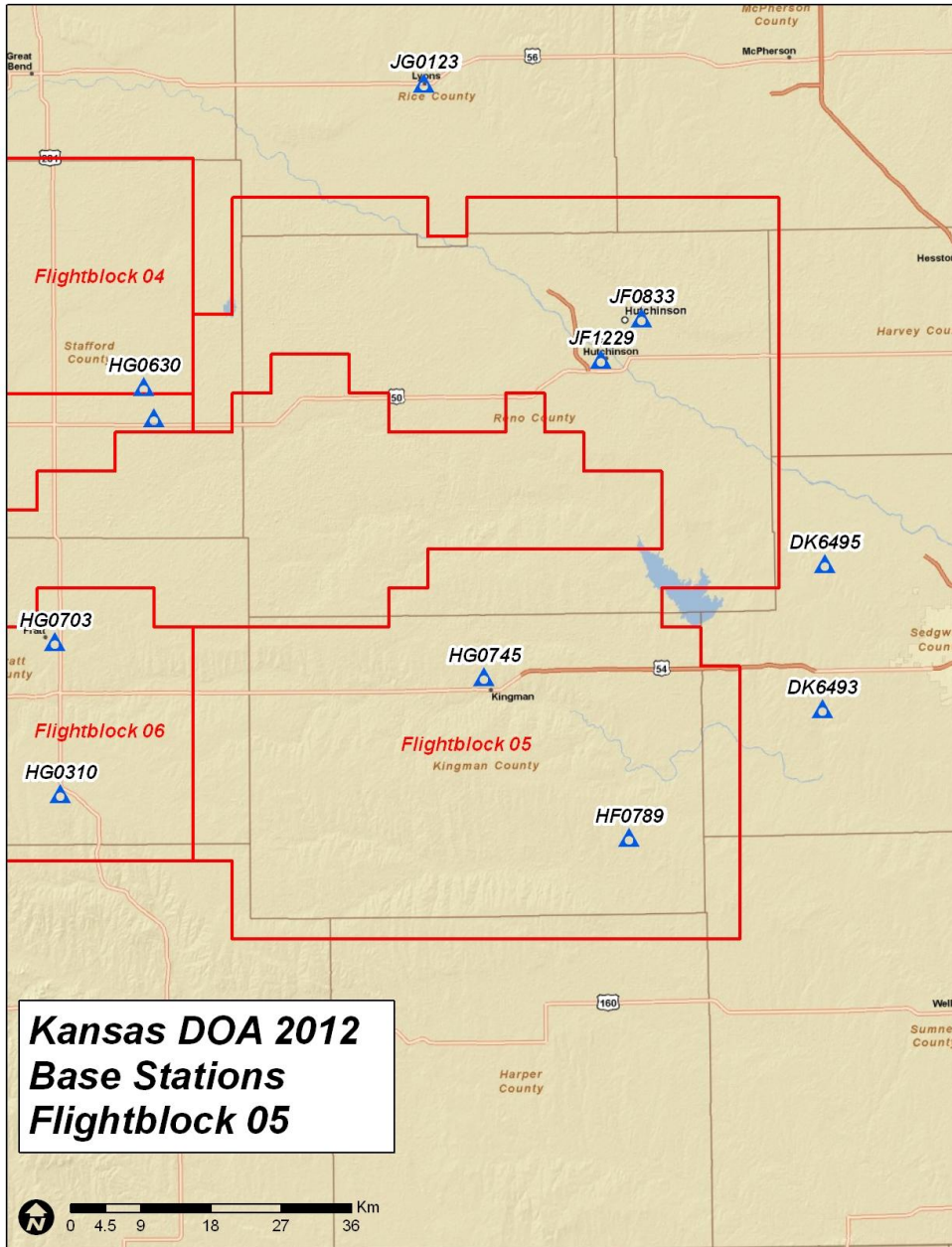
<u>Number</u>	<u>Easting</u>	<u>Northing</u>	<u>Elevation</u>	<u>LIDAR Elevation</u>	<u>DZ</u>
F05M01	613673.608	4228113.269	443.415	443.410	-0.005
F05M02	594499.008	4219027.633	478.137	478.160	0.023
F05M03	579971.714	4224110.911	486.822	486.760	-0.062
F05M04	567875.639	4228595.926	500.612	500.640	0.028
F05M05	546157.284	4225105.751	536.719	536.710	-0.009
F05M06	539809.582	4214543.123	550.345	550.310	-0.035
F05M07	564730.290	4215660.936	519.826	519.760	-0.066
F05M08	572103.280	4208068.129	499.251	499.260	0.009
F05M09	539885.477	4204982.763	554.544	554.540	-0.004
F05M10	593098.025	4198717.734	475.188	475.160	-0.028
F05M11	614020.737	4203747.911	443.484	443.550	0.066
F05M12	607789.580	4188133.264	479.468	479.520	0.052
F05M13	593604.950	4184290.551	463.725	463.710	-0.015
F05M14	571141.259	4180511.101	508.184	508.130	-0.054
F05M15	539993.112	4173719.434	552.353	552.410	0.057
F05M16	574129.976	4171650.710	491.997	492.090	0.093
F05M17	602832.031	4175644.555	444.403	444.380	-0.023
F05M18	550437.684	4169232.333	502.505	502.580	0.075
F05M19	594420.498	4163063.500	450.103	450.060	-0.043
F05M20	555323.594	4158571.718	534.209	534.210	0.001
F05M21	578000.053	4153810.123	488.762	488.750	-0.012
F05M22	603533.421	4165703.121	430.586	430.560	-0.026
F05M23	602083.415	4157750.640	418.005	417.980	-0.025
F05M24	562002.633	4144477.275	508.782	508.760	-0.022
F05M25	547370.630	4137602.582	543.705	543.750	0.045
F05M26	581378.652	4142062.119	459.577	459.490	-0.087
F05M27	608828.126	4146282.816	444.025	444.010	-0.015
F06M12	540058.935	4148797.239	561.231	561.260	0.029
				Average Dz	-0.002
				Minimum Dz	-0.087
				Maximum Dz	0.093
				Average Magnitude	0.036
				RMS	0.044
				STD	0.045



KANSAS 2012 LIDAR PROJECT – AREA 2 LIDAR COLLECTION, CONTROL-FEMA CHECKPOINT AND LIDAR ADJUSTMENT REPORT



KANSAS 2012 LIDAR PROJECT – AREA 2 LIDAR COLLECTION, CONTROL-FEMA CHECKPOINT AND LIDAR ADJUSTMENT REPORT



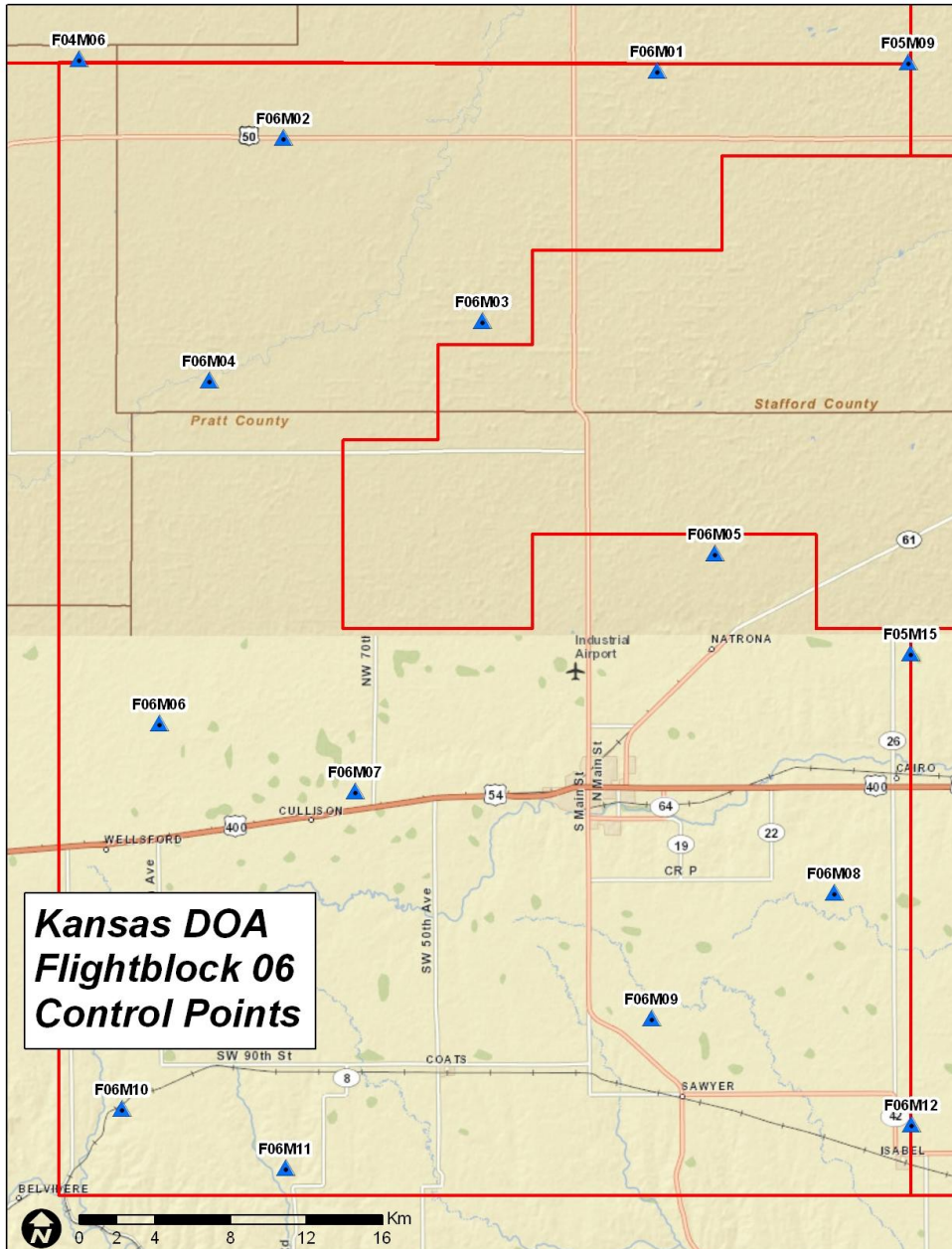
**KANSAS 2012 LIDAR PROJECT – AREA 2
LIDAR COLLECTION, CONTROL-FEMA CHECKPOINT
AND LIDAR ADJUSTMENT REPORT**

Area 2 – Delivery Block 6

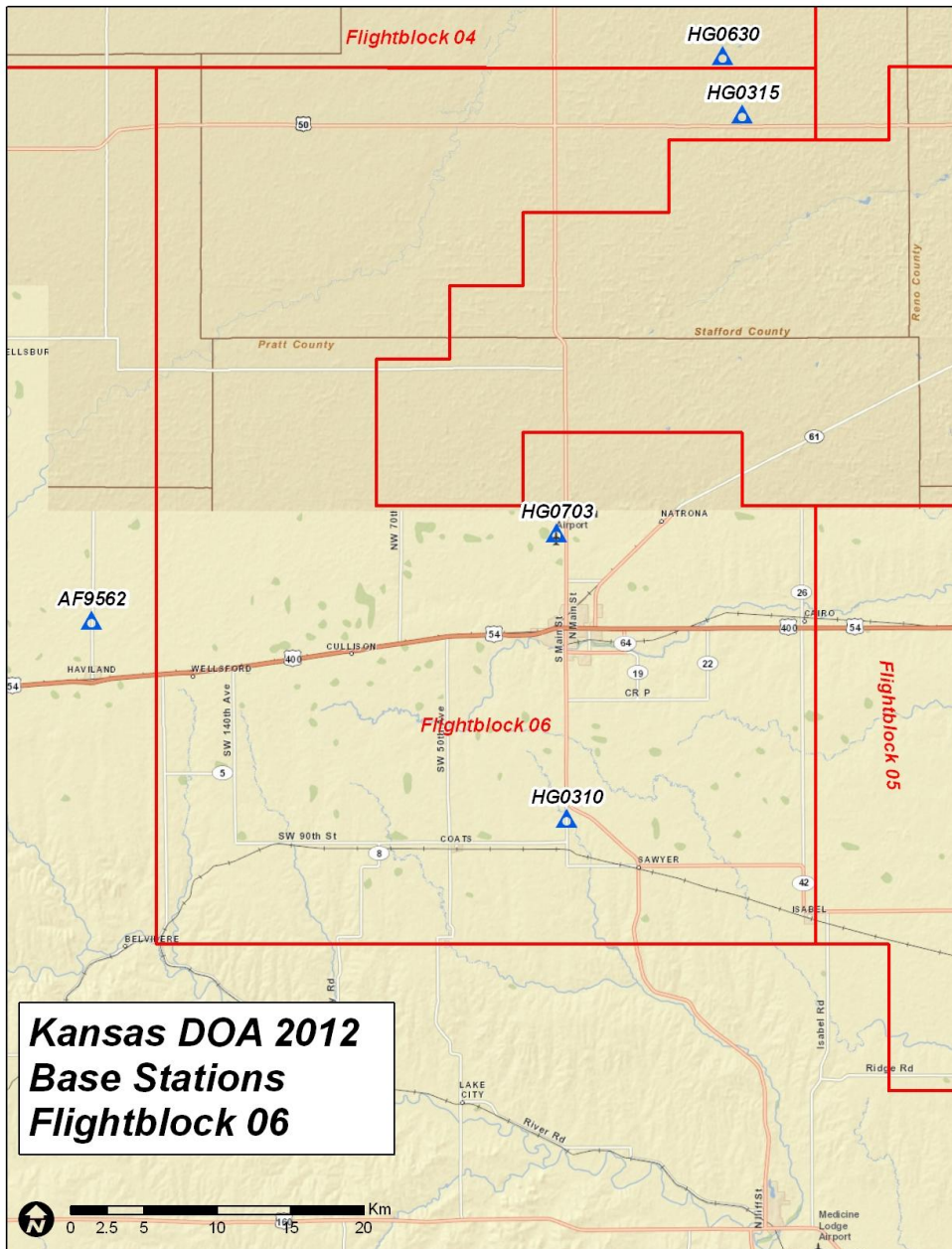
Number	Easting	Northing	Elevation	LIDAR Elevation	DZ
F04M06	496041.401	4205164.078	625.887	625.840	-0.047
F05M09	539885.477	4204982.763	554.544	554.550	0.006
F05M15	539993.112	4173719.434	552.353	552.410	0.057
F06M01	526604.602	4204528.733	575.355	575.380	0.025
F06M02	506843.742	4200989.234	612.897	612.930	0.033
F06M03	517346.018	4191278.947	601.446	601.400	-0.046
F06M04	502912.521	4188149.526	614.945	614.950	0.005
F06M05	529634.066	4178981.586	581.913	581.910	-0.003
F06M06	500291.892	4170009.227	629.692	629.640	-0.052
F06M07	510611.673	4166403.567	615.624	615.680	0.056
F06M08	535963.663	4161044.606	567.226	567.220	-0.006
F06M09	526294.439	4154412.694	587.557	587.620	0.063
F06M10	498303.335	4149648.232	609.505	609.430	-0.075
F06M11	506971.660	4146498.311	595.169	595.180	0.011
F06M12	540058.935	4148797.239	561.231	561.290	0.059
				Average Dz	0.006
				Minimum Dz	-0.075
				Maximum Dz	0.063
				Average Magnitude	0.036
				RMS	0.044
				STD	0.045



KANSAS 2012 LIDAR PROJECT – AREA 2 LIDAR COLLECTION, CONTROL-FEMA CHECKPOINT AND LIDAR ADJUSTMENT REPORT



KANSAS 2012 LIDAR PROJECT – AREA 2 LIDAR COLLECTION, CONTROL-FEMA CHECKPOINT AND LIDAR ADJUSTMENT REPORT



**KANSAS 2012 LIDAR PROJECT – AREA 2
LIDAR COLLECTION, CONTROL-FEMA CHECKPOINT
AND LIDAR ADJUSTMENT REPORT**

FEMA Checkpoints

Due to differing requirements in size and scope, delivery blocks and FEMA blocks do not correspond perfectly, and as a result there are five FEMA blocks. Below is a listing of FEMA points, as well as summary count. Seven BR points <brush> were surveyed in erroneously, and may be incorporated into the final count as HG points at the end of the project.

Station	Latitude (N)	Longitude (W)	Easting (m)	Northing (m)	H-Ell (m)	H-MSL (m)
F1BE01	39 30 30.66366N	98 32 26.12149W	539494.939	4373310.543	427.193	453.511
F1BE02	39 20 05.85033N	98 29 24.39726W	543943.424	4354072.291	462.879	489.287
F1BE03	39 12 20.89131N	98 31 02.96250W	541660.216	4339726.068	485.576	511.984
F1BE04	39 11 28.21166N	98 37 10.62772W	532849.106	4338060.167	489.039	515.308
F1BE05	39 12 46.42471N	98 41 42.26296W	526324.876	4340446.572	514.777	540.949
F1BE06	39 19 16.47768N	98 39 42.94189W	529141.420	4352480.817	487.730	513.931
F1BE07	39 26 15.38831N	98 41 12.78007W	526945.540	4365386.998	445.263	471.457
F1BE08	39 27 20.76150N	98 47 23.61614W	518076.213	4367376.592	462.402	488.516
F1BE09	39 28 17.28130N	98 56 38.44999W	504815.599	4369099.404	475.727	501.759
F1BE10	39 22 54.78121N	98 58 14.41545W	502525.945	4359156.427	533.322	559.348
F1BE11	39 17 06.74056N	99 00 40.93705W	499019.295	4348427.006	603.905	629.874
F1BE12	39 11 22.49356N	99 00 58.82359W	498588.884	4337815.121	542.681	568.660
F1BE13	39 15 01.77793N	98 51 44.35481W	511879.737	4344583.787	558.235	584.264
F1BE14	39 33 47.05364N	98 41 32.58741W	526424.505	4379309.326	443.607	469.750
F1BE15	39 48 53.37080N	98 33 17.97161W	538088.217	4407299.670	535.001	560.910
F1BE16	39 54 54.33637N	98 32 29.47235W	539184.210	4418434.087	546.560	572.399
F1BE17	39 59 15.51932N	98 32 08.21549W	539646.949	4426489.105	575.176	601.055
F1BE18	39 36 30.89594N	98 46 00.26955W	520024.101	4384341.129	463.504	489.563
F1BE19	39 39 15.93317N	98 39 15.41228W	529658.710	4389460.120	494.702	520.787
F1BE20	39 39 16.23493N	98 32 44.54165W	538973.201	4389510.922	465.257	491.419
F1BE21	39 39 32.75629N	98 56 06.98336W	505552.441	4389923.656	470.950	496.847
F1BE22	39 46 28.90731N	99 01 52.79413W	497316.766	4402751.688	517.885	543.531
F1BE23	39 47 06.44391N	98 47 45.34180W	517473.986	4403928.364	518.658	544.538
F1BE24	39 58 28.48076N	98 42 37.82926W	524720.119	4424975.752	561.307	587.098
F1BE25	39 56 39.74911N	98 47 06.17991W	518362.957	4421605.506	606.927	632.670
F1BE26	39 57 33.57241N	99 01 44.71330W	497515.668	4423243.187	618.900	644.430
F1HG01	39 30 34.25794N	98 32 34.77060W	539287.833	4373420.297	431.599	457.914
F1HG02	39 20 08.68082N	98 29 26.43023W	543894.264	4354159.273	464.990	491.396
F1HG03	39 12 18.70948N	98 31 04.17475W	541631.500	4339658.655	485.194	511.602
F1HG04	39 11 29.01742N	98 37 13.72151W	532774.787	4338084.694	489.950	516.217
F1HG05	39 12 45.96142N	98 41 39.02808W	526402.500	4340432.552	514.534	540.707
F1HG06	39 19 18.30431N	98 39 44.63683W	529100.625	4352536.976	487.613	513.814
F1HG07	39 26 18.09769N	98 40 49.06377W	527512.170	4365472.511	445.337	471.537
F1HG08	39 27 22.25399N	98 47 32.54599W	517862.700	4367422.108	463.034	489.146
F1HG09	39 28 16.73694N	98 56 37.17714W	504846.021	4369082.642	475.357	501.390
F1HG10	39 23 08.39542N	98 58 16.73504W	502470.319	4359576.099	528.796	554.823
F1HG11	39 17 07.64035N	99 00 41.01333W	499017.472	4348454.743	604.241	630.210
F1HG12	39 11 12.89422N	99 01 09.03257W	498343.919	4337519.257	533.171	559.149
F1HG13	39 14 58.44808N	98 51 50.13613W	511741.323	4344480.929	556.908	582.936



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F1HG14	39 34 05.15110N	98 41 34.41775W	526378.925	4379867.092	450.166	476.305
F1HG15	39 48 40.70284N	98 33 03.21362W	538441.050	4406910.872	523.207	549.122
F1HG16	39 54 52.84537N	98 32 32.19958W	539119.700	4418387.786	547.437	573.275
F1HG17	39 59 16.58355N	98 32 07.59782W	539661.426	4426521.992	575.045	600.925
F1HG18	39 36 38.44816N	98 45 07.15837W	521289.942	4384577.344	462.450	488.514
F1HG19	39 39 18.62495N	98 39 15.69328W	529651.694	4389543.079	492.839	518.923
F1HG20	39 39 16.42042N	98 32 30.00060W	539319.688	4389518.402	456.059	482.223
F1HG21	39 39 31.78007N	98 55 54.62558W	505846.932	4389893.778	470.202	496.102
F1HG22	39 46 40.69402N	99 01 45.52442W	497489.823	4403115.007	515.413	541.056
F1HG23	39 47 05.76239N	98 49 17.48982W	515282.268	4403902.671	500.694	526.557
F1UR01	39 30 28.56323N	98 32 25.79191W	539503.139	4373245.830	427.081	453.400
F1UR02	39 20 08.79448N	98 29 23.89242W	543954.998	4354163.119	463.285	489.693
F1UR03	39 12 19.72041N	98 31 03.29397W	541652.458	4339689.931	486.581	512.989
F1UR04	39 11 28.53360N	98 37 12.73503W	532798.513	4338069.879	490.806	517.073
F1UR05	39 12 45.85549N	98 41 40.94372W	526356.571	4340429.132	515.261	541.434
F1UR06	39 19 17.33174N	98 39 44.15596W	529112.251	4352507.037	488.422	514.623
F1UR07	39 26 13.31901N	98 40 57.02644W	527322.347	4365324.523	445.155	471.353
F1UR08	39 27 22.04222N	98 47 30.89972W	517902.058	4367415.670	463.126	489.238
F1UR09	39 27 57.67599N	98 56 52.29896W	504485.057	4368494.817	476.540	502.575
F1UR10	39 22 59.13797N	98 58 15.82826W	502492.103	4359290.724	535.305	561.331
F1UR11	39 17 06.40771N	99 00 39.94034W	499043.172	4348416.742	604.856	630.825
F1UR12	39 11 14.29344N	99 01 25.95664W	497937.924	4337562.486	531.826	557.801
F1UR13	39 15 01.00371N	98 51 46.52785W	511827.689	4344559.841	558.022	584.050
F1UR14	39 33 39.43533N	98 41 29.00202W	526510.863	4379074.759	441.930	468.075
F1UR15	39 48 44.06468N	98 33 18.70397W	538072.232	4407012.678	536.940	562.853
F1UR16	39 54 54.30032N	98 32 32.14424W	539120.784	4418432.650	549.076	574.913
F1UR18	39 36 39.88197N	98 45 37.83017W	520558.450	4384619.563	474.130	500.191
F1UR19	39 39 16.87775N	98 39 24.24776W	529448.048	4389488.433	502.851	528.934
F1UR20	39 39 16.82233N	98 32 39.18792W	539100.689	4389529.678	459.196	485.359
F1UR21	39 39 32.25222N	98 55 51.54156W	505920.408	4389908.390	470.318	496.219
F1UR22	39 46 29.29496N	99 01 55.62957W	497249.319	4402763.663	518.648	544.292
F1UR23	39 47 07.46179N	98 47 44.70130W	517489.148	4403959.780	519.032	544.913
F1UR24	39 58 24.80561N	98 42 37.53409W	524727.488	4424862.468	563.931	589.722
F1UR25	39 56 39.85266N	98 47 07.69841W	518326.914	4421608.611	608.309	634.052
F1UR26	39 57 33.57401N	99 01 46.77912W	497466.656	4423243.252	618.094	643.624
F2BE01	38 48 41.93070N	99 15 54.48672W	476980.716	4295908.615	565.973	592.108
F2BE02	38 47 00.90067N	99 23 33.44180W	465898.728	4292834.248	616.090	642.215
F2BE03	38 51 09.34687N	99 14 38.73427W	478819.773	4300447.552	583.756	609.863
F2BE04	38 55 36.97687N	99 12 56.47760W	481303.977	4308690.979	589.005	615.056
F2BE05	38 56 22.04413N	99 33 58.34426W	450929.240	4310210.454	620.209	646.192
F2BE06	39 06 09.70734N	99 32 47.52480W	452742.945	4328315.181	591.814	617.685
F2BE07	39 05 45.43388N	99 25 34.49340W	463140.258	4327511.237	570.708	596.624
F2BE08	39 06 10.75668N	99 18 26.33670W	473427.584	4328250.317	546.520	572.465
F2BE09	39 00 06.86313N	99 18 58.43925W	472617.525	4317035.699	630.242	656.238
F2BE10	38 47 53.93683N	99 33 34.75890W	451401.026	4294544.581	612.590	638.601
F2BE11	38 52 49.51640N	99 01 26.94736W	497905.117	4303507.211	557.157	583.246
F2BE12	39 02 48.76976N	99 00 50.31730W	498790.504	4321979.075	507.336	533.405
F2BE13	39 07 06.66567N	98 54 57.72090W	507258.655	4329932.170	512.417	538.479
F2BE14	39 07 17.65444N	98 47 51.36332W	517496.067	4330287.052	500.424	526.544



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F2BE15	39 07 06.93676N	98 41 31.57166W	526616.783	4329982.293	457.655	483.879
F2BE16	39 03 37.99697N	98 31 58.37900W	540414.069	4323600.252	434.874	461.304
F2BE17	38 50 44.45450N	98 35 07.89299W	535967.942	4299733.554	501.097	527.309
F2BE18	38 52 30.36909N	98 42 11.93874W	525735.489	4302958.544	540.815	566.949
F2BE19	38 47 34.32059N	98 40 11.12467W	528679.556	4293842.984	496.118	522.216
F2BE20	38 48 43.10201N	98 49 03.38358W	515835.490	4295927.135	498.884	524.940
F2BE21	38 42 51.44191N	98 50 16.86086W	514082.639	4285084.202	552.308	578.296
F2BE22	38 52 24.79358N	98 48 16.31546W	516956.002	4302763.014	544.308	570.399
F2HG02	38 47 01.11269N	99 23 26.14368W	466074.834	4292840.029	614.020	640.145
F2HG03	38 51 26.75544N	99 14 38.90047W	478817.201	4300984.174	582.059	608.162
F2HG04	38 55 34.81613N	99 13 04.32679W	481114.825	4308624.823	583.740	609.791
F2HG05	38 56 18.45719N	99 34 06.88351W	450722.977	4310101.165	621.581	647.562
F2HG06	39 06 10.55318N	99 32 47.79540W	452736.602	4328341.294	590.999	616.870
F2HG07	39 05 44.19727N	99 25 35.88045W	463106.760	4327473.274	570.804	596.720
F2HG08	39 06 12.61417N	99 18 21.51701W	473543.539	4328307.185	546.692	572.636
F2HG09	39 00 06.92455N	99 18 56.84526W	472655.871	4317037.459	630.019	656.016
F2HG10	38 47 53.14090N	99 33 37.31047W	451339.327	4294520.424	611.764	637.775
F2HG11	38 52 49.53190N	99 01 29.68016W	497839.273	4303507.707	557.179	583.268
F2HG12	39 02 49.63600N	99 00 50.38913W	498788.781	4322005.778	507.274	533.342
F2HG13	39 07 05.63020N	98 54 56.52672W	507287.360	4329900.277	512.156	538.217
F2HG14	39 07 18.56758N	98 47 50.23028W	517523.211	4330315.261	500.976	527.096
F2HG15	39 07 08.02293N	98 41 32.98419W	526582.750	4330015.660	458.288	484.511
F2HG16	39 03 34.00718N	98 31 32.04672W	541047.552	4323480.540	424.427	450.868
F2HG17	38 50 43.33537N	98 34 50.04375W	536398.367	4299701.021	499.081	525.296
F2HG18	38 52 29.85153N	98 42 01.37251W	525990.141	4302943.422	539.369	565.505
F2HG19	38 47 34.62410N	98 40 12.13784W	528655.081	4293852.252	496.535	522.633
F2HG20	38 48 45.12511N	98 49 06.18203W	515767.877	4295989.362	498.506	524.561
F2HG21	38 42 19.84255N	98 50 48.48902W	513320.456	4284108.876	551.478	577.463
F2HG22	38 52 39.78873N	98 48 29.81319W	516629.789	4303224.545	542.273	568.365
F2HG23	38 51 04.84740N	98 36 33.73899W	533895.889	4300353.039	508.590	534.784
F2UR01	38 48 39.75176N	99 15 53.58379W	477002.297	4295841.387	566.317	592.452
F2UR02	38 47 00.04998N	99 23 34.64451W	465869.598	4292808.150	616.581	642.705
F2UR03	38 51 13.15472N	99 14 38.08511W	478835.733	4300564.885	584.665	610.771
F2UR04	38 55 39.41312N	99 12 54.58000W	481349.844	4308765.968	590.515	616.566
F2UR05	38 56 15.21304N	99 33 59.76484W	450893.733	4310000.096	620.549	646.532
F2UR06	39 06 25.75648N	99 32 47.49953W	452746.529	4328809.910	586.747	612.613
F2UR07	39 05 44.55417N	99 25 34.30656W	463144.618	4327484.099	570.691	596.607
F2UR08	39 06 11.86496N	99 18 20.85205W	473559.432	4328284.036	548.170	574.114
F2UR09	39 00 05.46787N	99 18 59.03151W	472603.130	4316992.739	630.492	656.489
F2UR10	38 47 52.58136N	99 33 33.94938W	451420.297	4294502.679	613.242	639.253
F2UR11	38 52 45.19250N	99 01 21.67598W	498032.090	4303373.896	555.625	581.713
F2UR12	39 02 44.48108N	99 00 38.76445W	499068.188	4321846.837	503.962	530.031
F2UR13	39 07 05.85207N	98 54 57.85451W	507255.469	4329907.087	512.888	538.949
F2UR14	39 07 16.91088N	98 47 51.90192W	517483.186	4330264.102	500.048	526.168
F2UR15	39 06 54.12519N	98 41 34.31241W	526552.305	4329587.140	459.684	485.909
F2UR16	39 03 35.08326N	98 31 57.87862W	540426.556	4323510.497	433.805	460.236
F2UR17	38 50 45.31641N	98 35 15.37907W	535787.366	4299759.305	500.169	526.378
F2UR18	38 52 27.65819N	98 42 19.52010W	525553.082	4302874.390	542.657	568.789
F2UR19	38 47 29.43685N	98 40 11.09386W	528680.843	4293692.449	497.165	523.262



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F2UR20	38 48 46.46127N	98 49 03.26896W	515838.048	4296030.688	499.326	525.382
F2UR21	38 42 40.71186N	98 50 17.09954W	514077.459	4284753.450	553.059	579.045
F2UR22	38 52 38.07892N	98 48 31.95987W	516578.176	4303171.733	542.425	568.517
F3BE01	38 18 21.55735N	99 38 25.05102W	444018.189	4239959.827	655.850	681.825
F3BE02	38 17 28.19297N	99 46 09.75260W	432718.341	4238401.083	639.370	665.321
F3BE03	38 17 25.20892N	99 53 47.66428W	421593.855	4238409.323	662.468	688.374
F3BE04	38 20 54.37546N	100 03 46.83574W	407112.646	4245010.700	704.202	730.003
F3BE05	38 17 30.02604N	100 08 02.84137W	400821.217	4238785.947	717.708	743.456
F3BE06	38 27 15.30306N	99 54 39.66640W	420510.141	4256610.075	653.073	678.922
F3BE07	38 26 38.58391N	100 11 46.48002W	395607.651	4255762.900	734.309	759.963
F3BE08	38 38 43.86512N	100 10 27.56184W	397806.312	4278094.614	776.189	801.786
F3BE09	38 38 34.74833N	100 02 47.27049W	408930.112	4277678.907	756.053	781.731
F3BE10	38 38 20.53558N	99 55 34.93987W	419377.053	4277128.436	739.725	765.477
F3BE11	38 38 24.95629N	99 44 42.40055W	435153.671	4277121.007	710.949	736.821
F3BE12	38 26 43.76541N	99 41 23.57808W	439798.044	4255470.343	622.093	648.022
3BE13	38 31 30.66274N	99 18 12.05551W	473557.819	4264131.499	598.564	624.561
F3BE14	38 27 57.36001N	99 18 49.06591W	472639.274	4257559.930	583.353	609.302
F3BE15	38 28 23.57729N	99 26 27.54926W	461532.645	4258413.531	594.839	620.791
F3BE16	38 28 04.78147N	99 33 08.23999W	451820.111	4257886.551	607.382	633.335
F3BE17	38 35 04.23022N	99 34 03.78805W	450553.832	4270823.461	624.517	650.475
F3BE18	38 31 22.26622N	99 11 43.49584W	482965.561	4263847.188	586.678	612.681
F3BE19	38 28 10.92212N	99 10 49.41006W	484263.636	4257946.777	573.222	599.181
F3BE20	38 32 16.25251N	99 03 24.90160W	495039.547	4265494.640	595.749	621.742
F3BE21	38 39 11.78289N	99 10 52.12719W	484237.940	4278316.627	584.461	610.546
F3BE22	38 39 11.82078N	99 19 01.93362W	472399.191	4278349.953	573.565	599.673
F3BE23	38 19 11.88371N	99 18 31.01317W	473022.568	4241362.120	642.170	668.062
F3HG01	38 18 21.40100N	99 38 20.59870W	444126.288	4239954.260	656.508	682.483
F3HG02	38 17 26.27337N	99 46 12.60905W	432648.460	4238342.494	638.655	664.606
F3HG03	38 17 26.55605N	99 53 51.83656W	421492.903	4238451.828	662.836	688.742
F3HG04	38 20 54.35179N	100 03 44.32254W	407173.641	4245009.268	703.927	729.728
F3HG05	38 17 26.45116N	100 08 01.13804W	400861.244	4238675.251	716.234	741.983
F3HG06	38 27 27.54804N	99 55 02.50999W	419960.224	4256993.000	658.426	684.269
F3HG07	38 26 33.68143N	100 11 45.90027W	395619.743	4255611.604	734.003	759.658
F3HG08	38 38 44.60100N	100 10 27.25586W	397814.000	4278117.203	776.578	802.174
F3HG09	38 38 30.15983N	100 02 50.66279W	408846.490	4277538.405	755.695	781.373
F3HG10	38 38 23.22538N	99 55 50.48232W	419002.144	4277215.150	739.926	765.675
F3HG11	38 38 27.57668N	99 44 44.86305W	435094.797	4277202.261	710.709	736.581
F3HG12	38 26 44.04084N	99 41 19.00386W	439908.988	4255478.003	621.617	647.546
F3HG13	38 31 46.25788N	99 18 03.81084W	473759.022	4264611.530	598.443	624.444
F3HG14	38 28 01.39372N	99 18 37.51776W	472919.541	4257683.311	582.754	608.704
F3HG15	38 28 23.10782N	99 26 21.97066W	461667.749	4258398.414	594.263	620.215
F3HG16	38 28 07.03112N	99 33 09.00231W	451802.054	4257956.002	606.991	632.944
F3HG17	38 35 00.47839N	99 33 55.59912W	450751.240	4270706.595	624.048	650.006
F3HG18	38 31 23.40134N	99 11 51.02778W	482783.257	4263882.565	587.201	613.205
F3HG19	38 19 12.30130N	99 18 28.28913W	473088.756	4241374.770	639.619	665.511
F3HG20	38 32 11.83822N	99 03 39.48713W	494686.356	4265358.805	593.833	619.827
F3HG21	38 39 13.85917N	99 10 38.09903W	484577.127	4278379.963	578.175	604.258
F3HG22	38 39 10.47791N	99 19 10.03402W	472203.258	4278309.241	575.054	601.161
F3HG25	38 38 56.35850N	99 03 06.88680W	495482.637	4277826.909	570.388	596.428



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F3UR01	38 18 20.59763N	99 38 23.88849W	444046.218	4239930.051	656.629	682.604
F3UR02	38 17 26.69107N	99 46 09.06038W	432734.772	4238354.651	639.840	665.791
F3UR03	38 17 25.66438N	99 53 50.68742W	421520.552	4238424.074	662.615	688.522
F3UR04	38 20 55.10144N	100 03 45.68917W	407140.735	4245032.756	704.797	730.598
F3UR05	38 17 27.33955N	100 08 02.60761W	400825.880	4238703.072	717.523	743.271
F3UR06	38 27 15.81041N	99 54 43.32047W	420421.729	4256626.589	657.478	683.327
F3UR07	38 26 33.49645N	100 11 44.37652W	395656.608	4255605.423	733.724	759.379
F3UR08	38 38 41.08319N	100 10 17.76716W	398041.993	4278005.834	774.538	800.136
F3UR09	38 38 34.00169N	100 02 48.89124W	408890.669	4277656.340	756.792	782.469
F3UR10	38 38 23.37369N	99 55 53.04403W	418940.260	4277220.350	741.272	767.021
F3UR11	38 38 23.36146N	99 44 43.94402W	435115.958	4277072.151	709.323	735.195
F3UR12	38 26 41.88158N	99 41 24.70719W	439770.240	4255412.483	621.818	647.747
F3UR13	38 31 33.03564N	99 18 43.97212W	472785.261	4264207.224	600.315	626.311
F3UR14	38 27 58.05597N	99 18 41.27577W	472828.126	4257580.741	582.919	608.868
F3UR15	38 28 23.84213N	99 26 30.48886W	461461.455	4258422.035	594.832	620.784
F3UR16	38 28 07.01178N	99 33 11.21132W	451748.521	4257955.727	607.218	633.170
F3UR17	38 35 11.20762N	99 34 10.42460W	450394.604	4271039.522	625.702	651.660
F3UR18	38 31 21.96408N	99 11 45.10635W	482926.544	4263837.958	586.639	612.642
F3UR19	38 28 10.73870N	99 10 47.73906W	484304.116	4257941.044	573.461	599.420
F3UR20	38 32 17.08779N	99 03 02.43652W	495583.417	4265520.067	594.382	620.373
F3UR21	38 39 13.36843N	99 10 49.26890W	484307.121	4278365.363	583.893	609.977
F3UR22	38 39 11.39087N	99 19 04.17694W	472344.923	4278336.890	574.024	600.132
F3UR23	38 19 11.54533N	99 18 23.69574W	473200.215	4241351.099	641.436	667.328
F4BE01	38 11 04.17738N	99 06 32.35600W	490455.185	4226290.916	595.900	621.912
F4BE02	38 06 58.07344N	99 05 01.62422W	492655.559	4218703.495	596.291	622.430
F4BE03	38 03 30.53510N	98 58 16.49513W	502522.286	4212304.139	588.757	615.103
F4BE04	37 59 59.23640N	98 50 21.96259W	514097.306	4205803.647	566.991	593.591
F4BE05	38 11 23.46426N	99 05 29.81085W	491977.304	4226883.710	592.120	618.140
F4BE06	38 15 41.21787N	99 05 15.52398W	492332.354	4234827.654	589.057	615.010
F4BE07	37 33 24.54444N	98 59 38.91643W	500517.268	4156644.916	599.154	626.425
F4BE08	38 11 09.10545N	99 18 49.99853W	472511.097	4226483.742	600.579	626.544
F4BE09	38 11 50.63242N	99 24 02.03848W	464925.765	4227792.912	606.025	631.997
F4BE10	38 11 40.29632N	99 31 41.24997W	453754.631	4227530.316	621.060	647.062
F4BE11	38 13 58.05489N	99 32 01.34530W	453290.302	4231779.037	619.192	645.187
F4BE12	38 17 27.28599N	99 32 53.20423W	452067.758	4238235.268	629.092	655.070
F4BE13	37 49 30.53646N	98 52 16.16473W	511338.891	4186423.047	582.659	609.554
F4BE14	37 51 14.97908N	99 00 17.54038W	499571.377	4189634.076	593.992	620.685
F4BE15	37 48 19.54929N	98 59 41.64254W	500448.885	4184227.484	596.758	623.549
F4BE16	37 43 05.81754N	99 00 52.20654W	498721.924	4174558.743	604.240	631.164
F4BE17	37 57 18.97140N	98 35 59.42129W	535154.444	4200927.639	538.532	565.541
F4BE18	37 57 40.74000N	98 38 55.99076W	530843.076	4201581.171	546.399	573.324
F4BE19	37 57 17.36884N	98 42 34.42885W	525515.204	4200842.518	553.018	579.871
F4BE20	37 58 02.26432N	98 52 36.09359W	510830.863	4202193.584	577.527	604.142
F4BE21	37 57 53.42475N	98 58 02.90282W	502857.146	4201914.479	589.812	616.326
F4BE22	37 57 23.51619N	99 02 13.38225W	496745.135	4200992.851	600.239	626.702
F4BE23	37 39 06.06853N	98 33 22.13938W	539152.552	4167262.609	499.082	526.810
F4BE24	37 29 59.18209N	98 33 20.73408W	539266.675	4150408.806	536.704	564.649
F4BE25	37 28 14.74998N	98 33 21.12001W	539272.382	4147190.418	535.838	563.818
F4BE26	37 29 51.64972N	98 40 59.93091W	527992.790	4150131.100	556.424	584.206



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F4BE27	37 30 36.23494N	98 49 31.25132W	515435.473	4151472.334	572.264	599.819
F4BE28	37 30 49.77448N	98 59 37.04410W	500563.528	4151875.283	596.270	623.626
F4BE29	37 36 58.82394N	99 01 38.26989W	497590.948	4163248.885	619.139	646.245
F4BE30	37 37 41.01852N	98 54 15.16011W	508452.305	4164553.202	594.215	621.440
F4BE31	37 39 02.59331N	98 42 53.55397W	525151.406	4167101.099	545.591	573.052
F4BE32	37 41 43.56697N	98 44 25.36771W	522887.916	4172055.515	564.379	591.710
F4BE33	37 43 44.61274N	98 44 08.00569W	523302.557	4175787.164	569.035	596.306
F4HG01	38 11 05.15808N	99 06 52.82122W	489957.367	4226321.742	596.497	622.504
F4HG02	38 06 57.41896N	99 05 41.32145W	491688.925	4218684.253	595.019	621.147
F4HG03	38 03 29.42864N	98 58 23.81042W	502344.031	4212269.984	589.121	615.465
F4HG04	37 59 59.39449N	98 50 23.39015W	514062.482	4205808.459	566.874	593.473
F4HG05	38 11 34.91876N	99 05 27.97289W	492022.360	4227236.705	590.437	616.454
F4HG06	38 15 40.62671N	99 05 31.97455W	491932.565	4234809.822	586.049	611.998
F4HG07	37 33 24.04369N	98 59 48.16073W	500290.467	4156629.473	603.719	630.987
F4HG08	37 36 59.68804N	99 01 38.97009W	497573.790	4163275.520	618.748	645.853
F4HG09	38 11 53.63916N	99 24 15.28364W	464604.010	4227886.983	606.497	632.470
F4HG10	38 11 33.43589N	99 31 47.74373W	453595.468	4227319.770	621.763	647.765
F4HG11	38 13 59.62905N	99 32 02.37235W	453265.613	4231827.699	619.759	645.755
F4HG12	38 17 28.63861N	99 32 50.67623W	452129.415	4238276.594	628.612	654.589
F4HG13	37 49 29.85655N	98 52 07.79550W	511543.514	4186402.378	581.709	608.607
F4HG14	37 51 28.40540N	99 00 15.86746W	499612.277	4190047.863	595.291	621.977
F4HG15	37 48 19.70017N	98 59 43.85938W	500394.677	4184232.131	597.169	623.960
F4HG16	37 42 57.67723N	99 00 51.01263W	498751.114	4174307.867	602.872	629.801
F4HG17	37 57 20.65312N	98 36 02.89866W	535069.364	4200979.105	538.228	565.235
F4HG18	37 57 42.31633N	98 39 01.27545W	530713.942	4201629.268	545.675	572.597
F4HG19	37 57 15.73314N	98 42 35.70627W	525484.188	4200792.009	552.641	579.495
F4HG20	37 39 05.38959N	98 33 05.06936W	539570.923	4167243.676	496.181	523.917
F4HG21	37 58 12.32701N	98 58 03.47045W	502843.094	4202497.039	589.744	616.248
F4HG22	37 57 27.91485N	99 02 24.93972W	496463.162	4201128.534	599.149	625.606
F4HG23	37 29 58.63488N	98 33 20.90761W	539262.494	4150391.922	536.257	564.202
F4HG24	37 28 15.33033N	98 33 19.94404W	539301.182	4147208.439	535.757	563.738
F4HG25	37 29 50.96339N	98 40 57.44668W	528053.858	4150110.155	556.487	584.270
F4HG26	37 30 36.52097N	98 49 32.45347W	515405.945	4151481.094	572.368	599.922
F4HG27	37 30 48.83559N	98 59 42.48207W	500430.036	4151846.341	596.529	623.884
F4HG28	37 37 43.45412N	98 54 18.14485W	508379.070	4164628.188	595.211	622.433
F4HG29	37 39 01.69567N	98 42 52.73950W	525171.447	4167073.496	545.423	572.884
F4HG30	37 41 42.03747N	98 44 18.98838W	523044.269	4172008.812	565.089	592.423
F4HG31	37 43 43.99313N	98 43 50.02222W	523742.806	4175769.323	564.711	591.989
F4HG32	37 58 10.28530N	98 52 36.10356W	510830.292	4202440.789	577.168	603.779
F4UR01	38 11 04.57537N	99 06 30.91462W	490490.264	4226303.141	596.347	622.359
F4UR02	38 06 58.42521N	99 05 16.88171W	492284.055	4218714.680	595.692	621.826
F4UR03	38 03 30.14657N	98 58 22.09371W	502385.859	4212292.123	589.993	616.338
F4UR04	38 00 00.14394N	98 50 22.72679W	514078.621	4205831.585	567.789	594.389
F4UR05	38 11 24.17194N	99 05 37.68868W	491785.697	4226905.713	593.982	620.000
F4UR06	38 15 46.38824N	99 05 15.18865W	492340.654	4234987.004	590.109	616.060
F4UR07	37 33 24.91687N	98 59 45.42528W	500357.578	4156656.385	602.285	629.554
F4UR08	38 11 09.35162N	99 18 51.30220W	472479.409	4226491.436	603.786	629.751
F4UR09	38 11 42.54338N	99 23 57.13115W	465044.051	4227543.083	605.536	631.510
F4UR10	38 11 41.41892N	99 31 38.39075W	453824.375	4227564.520	620.707	646.708



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F4UR11	38 13 59.20231N	99 32 02.93110W	453251.953	4231814.625	620.220	646.215
F4UR12	38 17 28.13937N	99 32 51.36818W	452112.515	4238261.306	629.427	655.405
F4UR13	37 49 31.07295N	98 52 24.44648W	511136.413	4186439.305	582.359	609.251
F4UR14	37 51 15.88954N	99 00 16.26629W	499602.512	4189662.134	594.636	621.328
F4UR15	37 48 20.68835N	98 59 43.23830W	500409.863	4184262.587	596.871	623.662
F4UR16	37 43 05.38389N	99 00 50.43713W	498765.239	4174545.373	604.146	631.071
F4UR17	37 57 18.40950N	98 35 58.50625W	535176.848	4200910.417	538.625	565.635
F4UR18	37 57 42.13679N	98 38 54.94153W	530868.516	4201624.316	546.188	573.112
F4UR19	37 57 18.15442N	98 42 34.14595W	525522.032	4200866.751	553.606	580.459
F4UR20	37 58 15.09844N	98 52 35.22080W	510851.633	4202589.158	578.445	605.054
F4UR21	37 57 46.97812N	98 58 03.76738W	502836.120	4201715.787	589.638	616.156
F4UR22	37 57 23.33026N	99 02 26.07206W	496435.469	4200987.250	600.643	627.102
F4UR23	37 39 05.65344N	98 33 14.11606W	539349.210	4167250.750	498.209	525.941
F4UR24	37 29 52.56709N	98 33 22.53594W	539223.395	4150204.739	538.574	566.521
F4UR25	37 28 04.88226N	98 33 03.79523W	539699.372	4146888.337	535.606	563.595
F4UR26	37 29 58.03968N	98 40 46.11044W	528331.462	4150329.172	551.958	579.743
F4UR27	37 30 42.82976N	98 49 34.14563W	515364.044	4151675.439	576.376	603.926
F4UR28	37 30 49.74189N	98 59 41.71834W	500448.783	4151874.271	597.369	624.724
F4UR29	37 37 08.26213N	99 01 47.70572W	497359.724	4163539.821	618.753	645.850
F4UR30	37 37 47.41711N	98 54 16.73182W	508413.580	4164750.356	594.410	621.632
F4UR31	37 39 03.80140N	98 42 54.72399W	525122.623	4167138.243	546.270	573.729
F4UR32	37 41 55.30377N	98 44 30.75179W	522755.070	4172416.861	564.157	591.479
F4UR33	37 43 41.42414N	98 44 13.73159W	523162.677	4175688.501	569.158	596.428
F5BE01	38 02 08.46053N	97 46 31.52475W	607464.414	4210481.846	424.795	452.945
F5BE02	38 08 38.74046N	97 46 29.68247W	607350.629	4222511.722	426.903	455.027
F5BE03	38 10 25.58741N	97 56 01.92935W	593383.407	4225632.928	468.417	496.323
F5BE04	38 05 11.56849N	97 58 40.55119W	589630.523	4215910.801	443.856	471.782
F5BE05	38 00 15.16162N	97 58 36.77293W	589823.111	4206776.124	447.217	475.187
F5BE06	37 56 25.54601N	97 51 56.74285W	599665.180	4199812.160	439.068	467.099
F5BE07	37 58 05.28692N	98 12 22.81190W	569712.210	4202576.628	476.107	503.894
F5BE08	38 03 25.84776N	98 22 23.10293W	554999.038	4212344.772	505.806	533.108
F5BE09	38 03 22.62289N	98 27 17.06193W	547835.985	4212200.206	514.486	541.609
F5BE10	38 12 09.85379N	98 25 05.35265W	550943.818	4228469.495	500.804	527.782
F5BE11	38 12 30.49108N	98 12 38.22407W	569109.514	4229240.055	472.520	499.935
F5BE13	37 27 17.58347N	97 50 42.54110W	602140.452	4145962.150	426.950	455.464
F5BE14	37 38 02.42220N	97 47 03.84047W	607256.718	4165903.321	394.814	423.306
F5BE15	37 39 43.53195N	97 56 10.67036W	593818.522	4168856.670	407.639	435.910
F5BE16	37 46 41.20230N	98 01 08.87148W	586377.573	4181649.488	450.230	478.323
F5BE17	37 26 25.64192N	98 04 46.38114W	581424.098	4144133.047	411.197	439.527
F5BE18	37 26 32.09151N	98 09 46.46461W	574048.369	4144263.049	425.838	454.111
F5BE19	37 26 44.05288N	98 16 56.69205W	563473.887	4144544.467	483.351	511.560
F5BE20	37 26 27.93545N	98 25 15.91864W	551210.429	4143963.383	504.709	532.839
F5BE21	37 39 01.08777N	98 15 16.64641W	565752.030	4167277.734	453.418	481.555
F5BR01	38 02 08.23998N	97 46 32.41032W	607442.915	4210474.764	424.276	452.426
F5BR02	38 08 40.71504N	97 46 28.23002W	607385.180	4222573.050	428.000	456.124
F5BR03	38 10 25.12962N	97 56 02.14478W	593378.327	4225618.758	468.625	496.531
F5BR04	38 05 08.60960N	97 58 40.91919W	589622.562	4215819.504	443.987	471.913
F5BR05	38 00 11.50690N	97 58 37.46721W	589807.418	4206663.295	447.688	475.658
F5BR06	37 56 28.80929N	97 52 22.52588W	599034.624	4199905.102	444.258	472.281



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F5BR07	37 58 04.48291N	98 12 18.81341W	569809.982	4202552.680	475.360	503.150
F5HG01	38 02 07.06316N	97 46 32.65560W	607437.414	4210438.413	424.225	452.375
F5HG02	38 08 41.97214N	97 46 08.85474W	607856.289	4222618.042	426.842	454.972
F5HG03	38 10 25.73607N	97 56 00.91138W	593408.123	4225637.795	467.611	495.517
F5HG04	38 05 08.56566N	97 58 39.79787W	589649.893	4215818.451	443.788	471.715
F5HG05	38 00 13.36232N	97 58 37.31357W	589810.536	4206720.522	447.316	475.286
F5HG06	37 56 28.60577N	97 52 21.95569W	599048.618	4199898.997	444.116	472.139
F5HG07	37 58 05.52876N	98 12 18.31174W	569821.947	4202585.018	475.156	502.945
F5HG08	38 03 24.73323N	98 22 23.59717W	554987.225	4212310.340	505.724	533.027
F5HG09	38 03 27.72305N	98 27 17.06652W	547834.951	4212357.396	514.704	541.825
F5HG10	38 12 01.16723N	98 25 04.75611W	550960.009	4228201.854	501.596	528.579
F5HG11	38 11 55.27324N	98 12 58.00849W	568637.552	4228150.493	472.592	500.008
F5HG12	38 09 40.17896N	98 05 13.92204W	579966.458	4224089.991	459.034	486.733
F5HG13	37 27 09.47156N	97 50 39.17171W	602226.301	4145713.166	426.579	455.095
F5HG14	37 37 58.51355N	97 47 40.23812W	606366.150	4165771.346	397.217	425.695
F5HG15	37 39 42.47768N	97 56 10.43258W	593824.717	4168824.244	407.709	435.980
F5HG16	37 46 37.64914N	98 01 08.75287W	586381.623	4181540.009	449.292	477.385
F5HG17	37 26 25.69141N	98 04 48.31475W	581376.569	4144134.108	411.740	440.069
F5HG18	37 26 32.77084N	98 09 46.77287W	574040.608	4144283.917	425.766	454.040
F5HG19	37 26 44.24662N	98 17 00.38028W	563383.218	4144549.748	483.154	511.363
F5HG20	37 26 25.35479N	98 25 18.21742W	551154.431	4143883.506	504.385	532.514
F5HG21	37 39 06.13038N	98 15 15.55051W	565777.649	4167433.355	465.796	493.931
F5UR01	38 01 45.73312N	97 56 23.50623W	593041.369	4209604.048	437.607	465.596
F5UR02	38 03 03.37055N	97 56 48.73051W	592399.309	4211989.963	439.933	467.910
F5UR03	38 03 31.26583N	97 56 38.00480W	592650.949	4212852.705	438.875	466.852
F5UR04	38 03 29.31804N	97 55 33.78767W	594216.597	4212810.606	440.259	468.252
F5UR05	38 03 50.75292N	97 51 58.00744W	599467.094	4213533.733	435.204	463.249
F5UR06	38 03 00.84771N	97 50 22.21569W	601820.563	4212024.381	432.169	460.240
F5UR07	38 00 50.00590N	97 50 54.60109W	601081.185	4207981.797	429.685	457.744
F5UR08	38 00 50.03157N	97 46 34.38363W	607426.531	4208063.602	424.416	452.565
F5UR09	38 03 27.45125N	98 27 16.01746W	547860.565	4212349.169	515.062	542.184
F5UR10	38 12 09.46267N	98 25 03.84707W	550980.511	4228457.671	502.006	528.986
F5UR11	38 12 30.20257N	98 12 33.14018W	569233.227	4229232.218	472.643	500.061
F5UR12	38 08 38.94607N	98 05 17.54566W	579896.831	4222201.818	457.932	485.652
F5UR12A	38 08 55.86488N	98 04 38.49472W	580842.186	4222732.685	457.638	485.369
F5UR13	37 27 19.28136N	97 50 44.16478W	602099.919	4146013.988	426.771	455.285
F5UR14	37 37 57.48803N	97 46 58.69944W	607384.699	4165752.884	395.358	423.854
F5UR15	37 39 39.51849N	97 56 09.51294W	593848.284	4168733.298	407.754	436.026
F5UR16	37 46 40.11111N	98 01 10.38718W	586340.848	4181615.468	450.530	478.622
F5UR17	37 26 22.34494N	98 04 50.96662W	581312.410	4144030.341	413.402	441.731
F5UR18	37 26 31.32902N	98 09 48.06492W	574009.254	4144239.201	426.616	454.888
F5UR19	37 26 38.60993N	98 16 59.21706W	563413.121	4144376.256	480.376	508.584
F5UR20	37 26 25.60371N	98 25 15.43888W	551222.660	4143891.597	504.937	533.067
F5UR21	37 39 03.04980N	98 15 17.74262W	565724.688	4167337.988	454.018	482.154
F5UR23	38 00 50.74726N	97 42 06.95651W	613947.430	4208174.059	416.143	444.441
F5UR24	37 38 49.64072N	98 25 53.17071W	550156.831	4166815.702	489.491	517.413



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FEMA Check Point TOTALS

FEMA BLOCK	BE	HG	UR	BR	TOTAL
01	26	23	25		74
02	22	22	22		66
03	23	23	23		69
04	33	32	33		98
05	20	21	24	7	65
TOTAL	124	121	127		
					372

FEMA - Final Reports

The FEMA reports are in their own separate report.

