

# Memorandum

City of Las Vegas  
Department of Public Works  
City Engineer Division  
Survey Section

To: Alan Riekki, PLS, City Surveyor *AR.*

From: Michael F. Kinney, PLS, Land Survey Associate *MK*

C: Alan Dill, Bart Dalton, Bill Avery, Eric Christianson, Greg Spinkelink, Jason Fackrell, Jerry Sligar, Jimmy Marlett, Jon Wooten, Mark Cornier, Michael Kidd, Rob Foley, Sean Corkill, Skip Harness; Craig Matsueda, NALS

Date: April 3, 2013

Re: NCRS Control Station Coordinates

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Pursuant to your request, this is to memorialize current efforts and development of the Nevada Coordinate Reference System (NCRS).

For current, or soon to be, users of the new NCRS low-distortion projections we've put together a list of known control stations with their respective NCRS coordinates for their use. The NCRS values were obtained via software translation from the actual latitude and longitude values into each mapping projection. These projected grid coordinates can be viewed as mathematically exact representations of those original lats & longs. This list will allow checking into actual points on the ground and also supplies a dataset that can be used to confirm software parameters.

Page 1 of the attached spreadsheet, shows the stations' coordinates in the main Las Vegas Zone. Page 2 shows them in the Las Vegas High Elevation Zone, which would be used for projects predominately above 3000 feet in elevation along the western foothill area of the City of Las Vegas. This threshold may be slightly different in other parts of the valley. For instance, the "boundary" between zones in the foothills of southern Henderson would be around 2850 feet in elevation. Just to be clear, the use of the two zones only affects linear distortion in comparison to actual ground measurements. This linear distortion has no effect on GPS use, working in either zone will result in identical latitude & longitude positions.

The list shows all Clark County GIS control stations still existing in and adjacent to the City of Las Vegas, and all Las Vegas Valley Water District (LVVWD) bases within the valley. The northings and eastings for each station are shown relative to three different NAD83 datum adjustments, or as NGS calls them, *realizations*. The spreadsheet also shows the relative horizontal differences between these realizations when available.

The coordinates for the Clark County GIS points are shown as originally published 16 years ago on the NAD83(1994) HARN realization. They are also shown as measured by the City of Las Vegas on the NAD83(CORS96) epoch 2002.0 realization, to align them with the LVVWD system, as this is

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the datum adjustment they are currently broadcasting. This is also the required realization to be used on City of Las Vegas projects. As you can see, the difference between these two datum realizations is significant and variable, and cannot be ignored. We are confident the absolute accuracy of our measured values are well within acceptable tolerances and offer them for your comparison. We recommend whenever possible to establish project control based on the LVVWD stations directly, and utilize these GIS point values for confirmation purposes.

The third set of coordinates shown correspond to the new NAD83(2011) epoch 2010.0 realization. This is the datum adjustment currently being used by NGS and all datasheets and RINEX data obtained from NGS will be on this realization. This too, as shown, differs from what is currently being broadcast by the LVVWD system. With this in mind, please use care in selecting your data sources. These coordinates are only shown for the actual NGS CORS stations as published by NGS. Recent conversations with the LVVWD have revealed that they are working on a Record of Survey to publish NAD83(2011) epoch 2010.0 values on all stations in their network. This will closely coincide with them "flipping the switch" on the system and beginning to broadcast this new realization. The City will also transition into requiring this new datum on its projects around that time. This spreadsheet will be updated to include new corresponding values as soon as the LVVWD's survey is available.

Attachment (Control Station Coordinates)

## City of Las Vegas- Survey Section

## Control Station Coordinates

## NCRS-Las Vegas Zone

Control Station Type	Control Station ID	Northing NCRS-Las Vegas NAD83(1994) HARN	Easting NCRS-Las Vegas NAD83(1994) HARN	Northing NCRS-Las Vegas NAD83(CORS96) epoch 2002.0	Easting NCRS-Las Vegas NAD83(CORS96) epoch 2002.0	Northing NCRS-Las Vegas NAD83(2011) epoch 2010.0	Easting NCRS-Las Vegas NAD83(2011) epoch 2010.0	Inverse (1994) HARN to (CORS96) 2002.0	Δ Northing (1994) HARN to (CORS96) 2002.0	Δ Easting (1994) HARN to (CORS96) 2002.0	Inverse (CORS96) 2002.0 to (2011) 2010.0	Δ Northing (CORS96) 2002.0 to (2011) 2010.0	Δ Easting (CORS96) 2002.0 to (2011) 2010.0
Clark County GIS	801	687836.27	225510.91	687836.32	225510.70			0.22	0.05	-0.21			
Clark County GIS	802	687618.72	241429.17	687618.76	241428.96			0.20	0.03	-0.20			
Clark County GIS	811	655066.17	283680.59	655066.27	283680.52			0.12	0.09	-0.07			
Clark County GIS	814	638781.28	315552.48	638781.35	315552.37			0.13	0.07	-0.11			
Clark County GIS	816	639277.98	284088.44	639278.04	284088.35			0.11	0.06	-0.10			
Clark County GIS	819	640440.40	235981.75	640440.49	235981.56			0.21	0.09	-0.19			
Clark County GIS	826	623168.38	283937.01	623168.47	283936.91			0.14	0.08	-0.11			
Clark County GIS	827	623158.81	299896.35	623158.91	299896.20			0.17	0.10	-0.14			
Clark County GIS	833	601754.12	319980.77	601754.21	319980.64			0.16	0.09	-0.13			
Clark County GIS	834	607090.83	314860.87	607090.91	314860.75			0.14	0.09	-0.11			
Clark County GIS	835	606947.32	299227.66	606947.41	299227.50			0.19	0.10	-0.16			
Clark County GIS	838	606993.00	251742.06	606993.03	251741.94			0.12	0.02	-0.12			
Clark County GIS	874	655438.74	272960.71	655438.82	272960.59			0.14	0.09	-0.12			
Clark County GIS	875	639169.36	284109.15	639169.45	284109.07			0.12	0.09	-0.08			
Clark County GIS	876	639140.66	268082.62	639140.67	268082.55			0.08	0.02	-0.07			
Clark County GIS	877	644550.32	220655.10	644550.41	220654.87			0.25	0.09	-0.24			
Clark County GIS	909	655188.27	257001.41	655188.36	257001.27			0.17	0.09	-0.15			
Clark County GIS	923	623248.53	237284.23	623248.58	237284.07			0.18	0.06	-0.17			
Clark County GIS	939	607153.73	237829.87	607153.78	237829.70			0.17	0.05	-0.17			
Clark County GIS	D368	621707.38	211027.89	621707.45	211027.71			0.19	0.07	-0.18			
Clark County GIS	D371	716533.56	185382.35	716533.65	185382.16			0.21	0.09	-0.19			
Clark County GIS	FAA VGT A	641760.44	259694.23	641760.50	259694.08			0.15	0.05	-0.15			
Clark County GIS	PUPPIES	638131.83	257382.31	638131.90	257382.18			0.15	0.06	-0.13			
Clark County GIS	U368	637314.45	315187.28	637314.49	315187.16			0.13	0.05	-0.13			
LVVWD Base	CCWR			605261.90	306800.95								
LVVWD Base	CLV1			643407.76	242077.69								
LVVWD Base	NVBM			554210.41	271605.36	554210.43	271605.27				0.10	0.02	-0.09
LVVWD Base	NVCA			645226.58	267493.57	645226.64	267493.46				0.13	0.06	-0.11
LVVWD Base	NVLM			590541.57	373447.42	590541.59	373447.31				0.12	0.03	-0.11
LVVWD Base	NVPO			549650.96	171518.31	549651.00	171518.26				0.07	0.04	-0.06
LVVWD Base	NVTP			601451.20	221017.41	601451.24	221017.32				0.10	0.04	-0.09

NCRS-Las Vegas Zone equivalent coordinates of those published per Clark County Public Works Las Vegas Valley Geodetic Control Network recoded in File 88, Page 53 of Surveys, Clark County, Nevada Recorder's Office

NCRS-Las Vegas Zone coordinates established by the City of Las Vegas

NCRS-Las Vegas Zone equivalent coordinates of those established by the Las Vegas Valley Water District - *currently being broadcast by the Las Vegas Valley Water District as of April 2, 2013*NCRS-Las Vegas Zone equivalent coordinates of those published coordinates per National Geodetic Survey (CORS) - *currently being broadcast by the Las Vegas Valley Water District as of April 2, 2013*NCRS-Las Vegas Zone equivalent coordinates of those published per National Geodetic Survey (CORS) - *to be broadcast by the Las Vegas Valley Water District in the near future*

## City of Las Vegas- Survey Section

## Control Station Coordinates

## NCRS-Las Vegas High Elevation Zone

Control Station Type	Control Station ID	Northing NCRS-LVHE NAD83(1994) HARN	Easting NCRS-LVHE NAD83(1994) HARN	Northing NCRS-LVHE NAD83(CORS96)	Easting NCRS-LVHE NAD83(CORS96) epoch 2002.0	Northing NCRS-LVHE NAD83(2011)	Easting NCRS-LVHE NAD83(2011) epoch 2010.0	Inverse (1994) HARN to (CORS96) 2002.0	Δ Northing (1994) HARN to (CORS96) 2002.0	Δ Easting (1994) HARN to (CORS96) 2002.0	Inverse (CORS96) 2002.0 to (2011) 2010.0	Δ Northing (CORS96) 2002.0 to (2011) 2010.0	Δ Easting (CORS96) 2002.0 to (2011) 2010.0
Clark County GIS	801	1344004.05	881673.99	1344004.10	881673.77			0.22	0.05	-0.21			
Clark County GIS	802	1343786.49	897592.80	1343786.52	897592.60			0.20	0.03	-0.20			
Clark County GIS	811	1311232.80	939845.71	1311232.90	939845.63			0.12	0.09	-0.07			
Clark County GIS	814	1294947.34	971718.71	1294947.41	971718.60			0.13	0.07	-0.11			
Clark County GIS	816	1295444.06	940253.57	1295444.12	940253.47			0.11	0.06	-0.10			
Clark County GIS	819	1296606.52	892145.19	1296606.61	892145.00			0.21	0.09	-0.19			
Clark County GIS	826	1279333.89	940102.14	1279333.98	940102.03			0.14	0.08	-0.11			
Clark County GIS	827	1279324.32	956062.03	1279324.42	956061.88			0.17	0.10	-0.14			
Clark County GIS	833	1257918.88	976147.16	1257918.97	976147.02			0.16	0.09	-0.13			
Clark County GIS	834	1263255.78	971027.07	1263255.86	971026.96			0.14	0.09	-0.11			
Clark County GIS	835	1263112.26	955393.32	1263112.36	955393.16			0.19	0.10	-0.16			
Clark County GIS	838	1263157.95	907906.05	1263157.97	907905.94			0.12	0.02	-0.12			
Clark County GIS	874	1311605.38	929125.44	1311605.47	929125.33			0.14	0.09	-0.12			
Clark County GIS	875	1295335.43	940274.27	1295335.53	940274.19			0.12	0.09	-0.08			
Clark County GIS	876	1295306.73	924247.19	1295306.74	924247.12			0.08	0.02	-0.07			
Clark County GIS	877	1300716.58	876818.01	1300716.67	876817.78			0.25	0.09	-0.24			
Clark County GIS	909	1311354.90	913165.59	1311354.99	913165.45			0.17	0.09	-0.15			
Clark County GIS	923	1279414.04	893447.72	1279414.10	893447.56			0.18	0.06	-0.17			
Clark County GIS	939	1263318.68	893993.38	1263318.73	893993.21			0.18	0.05	-0.17			
Clark County GIS	D368	1277872.84	867190.46	1277872.91	867190.28			0.19	0.08	-0.18			
Clark County GIS	D371	1372702.34	841544.02	1372702.43	841543.83			0.21	0.09	-0.19			
Clark County GIS	FAA VGT A	1297926.61	915858.50	1297926.66	915858.35			0.15	0.05	-0.15			
Clark County GIS	PUPPIES	1294297.87	913546.50	1294297.93	913546.37			0.15	0.06	-0.13			
Clark County GIS	U368	1293480.45	971353.50	1293480.50	971353.37			0.13	0.05	-0.13			
LVWWD Base	CCWR			1261426.79	962966.88								
LVWWD Base	CLV1			1299573.99	898241.35								
LVWWD Base	NVBM			1210373.51	927770.05	1210373.53	927769.96				0.10	0.02	-0.09
LVWWD Base	NVCA			1301392.87	923658.12	1301392.92	923658.00				0.13	0.06	-0.11
LVWWD Base	NVLM			1246705.94	1029615.68	1246705.96	1029615.56				0.11	0.02	-0.11
LVWWD Base	NVPO			1205813.90	827679.50	1205813.94	827679.44				0.07	0.04	-0.06
LVWWD Base	NVTP			1257615.96	877180.33	1257615.99	877180.24				0.10	0.04	-0.09

NCRS-Las Vegas High Elevation Zone equivalent coordinates of those published per Clark County Las Vegas Valley Geodetic Control Network recoded in File 88, Page 53 of Surveys, Clark County, Nevada Recorder's Office

NCRS-Las Vegas High Elevation Zone coordinates established by the City of Las Vegas

NCRS-Las Vegas High Elevation Zone equivalent coordinates of those established by the Las Vegas Valley Water District - *currently being broadcast by the Las Vegas Valley Water District as of April 2, 2013*NCRS-Las Vegas High Elevation Zone equivalent coordinates of those published coordinates per National Geodetic Survey (CORS) - *currently being broadcast by the Las Vegas Valley Water District as of April 2, 2013*NCRS-Las Vegas High Elevation Zone equivalent coordinates of those published per National Geodetic Survey (CORS) - *to be broadcast by the Las Vegas Valley Water District in the near future*

## City of Las Vegas- Survey Section

## Control Station Coordinates

## NCRS-Las Vegas Zone

Control Station Type	Control Station ID	Northing NCRS-Las Vegas NAD83(1994) HARN	Easting NCRS-Las Vegas NAD83(1994) HARN	Northing NCRS-Las Vegas NAD83(CORS96) epoch 2002.0	Easting NCRS-Las Vegas NAD83(CORS96) epoch 2002.0	Northing NCRS-Las Vegas NAD83(2011) epoch 2010.0	Easting NCRS-Las Vegas NAD83(2011) epoch 2010.0	Inverse (1994) HARN to (CORS96) 2002.0	Δ Northing (1994) HARN to (CORS96) 2002.0	Δ Easting (1994) HARN to (CORS96) 2002.0	Inverse (CORS96) 2002.0 to (2011) 2010.0	Δ Northing (CORS96) 2002.0 to (2011) 2010.0	Δ Easting (CORS96) 2002.0 to (2011) 2010.0
Clark County GIS	801	687836.27	225510.91	687836.3249	225510.6965	687836.4665	225510.6847	0.22	0.05	-0.21	0.14	0.14	-0.01
Clark County GIS	802	687618.72	241429.17	687618.7558	241428.9637	687618.9114	241428.9217	0.20	0.03	-0.20	0.16	0.16	-0.04
Clark County GIS	811	655066.17	283680.59	655066.2682	283680.5197	655066.3135	283680.4224	0.12	0.09	-0.07	0.11	0.05	-0.10
Clark County GIS	814	638781.28	315552.48	638781.3509	315552.3704	638781.4088	315552.2318	0.13	0.07	-0.11	0.15	0.06	-0.14
Clark County GIS	816	639277.98	284088.44	639278.0390	284088.3463	639278.1038	284088.2372	0.11	0.06	-0.10	0.13	0.06	-0.11
Clark County GIS	819	640440.40	235981.75	640440.4934	235981.5602	640440.5116	235981.4693	0.21	0.09	-0.19	0.09	0.02	-0.09
Clark County GIS	826	623168.38	283937.01	623168.4657	283936.9050	623168.4982	283936.7725	0.14	0.08	-0.11	0.14	0.03	-0.13
Clark County GIS	827	623158.81	299896.35	623158.9064	299896.2021	623158.9529	299896.0806	0.17	0.10	-0.14	0.13	0.05	-0.12
Clark County GIS	833	601754.12	319980.77	601754.2094	319980.6410	601754.2141	319980.5191	0.16	0.09	-0.13	0.12	0.00	-0.12
Clark County GIS	834	607090.83	314860.87	607090.9131	314860.7529	607090.9396	314860.6420	0.14	0.09	-0.11	0.11	0.03	-0.11
Clark County GIS	835	606947.32	299227.66	606947.4120	299227.5024	606947.4447	299227.4192	0.19	0.10	-0.16	0.09	0.03	-0.08
Clark County GIS	838	606993.00	251742.06	606993.0276	251741.9419	606993.0733	251741.8413	0.12	0.02	-0.12	0.11	0.05	-0.10
Clark County GIS	874	655438.74	272960.71	655438.8243	272960.5908	655438.9011	272960.4787	0.14	0.09	-0.12	0.14	0.08	-0.11
Clark County GIS	875	639169.36	284109.15	639169.4527	284109.0669	639169.5043	284108.9640	0.12	0.09	-0.08	0.12	0.05	-0.10
Clark County GIS	876	639140.66	268082.62	639140.6709	268082.5486	639140.7316	268082.4569	0.08	0.02	-0.07	0.11	0.06	-0.09
Clark County GIS	877	644550.32	220655.10	644550.4139	220654.8693	644550.4445	220654.8376	0.25	0.09	-0.24	0.04	0.03	-0.03
Clark County GIS	909	655188.27	257001.41	655188.3584	257001.2685	655188.4306	257001.1667	0.17	0.09	-0.15	0.12	0.07	-0.10
Clark County GIS	923	623248.53	237284.23	623248.5844	237284.0680	623248.6651	237283.9968	0.18	0.06	-0.17	0.11	0.08	-0.07
Clark County GIS	939	607153.73	237829.87	607153.7764	237829.7049	607153.8200	237829.6158	0.17	0.05	-0.17	0.10	0.04	-0.09
Clark County GIS	D368	621707.38	211027.89	621707.4508	211027.7133	621707.5344	211027.6368	0.19	0.07	-0.18	0.11	0.08	-0.08
Clark County GIS	D371	716533.56	185382.35	716533.6521	185382.1575	716533.6936	185382.1424	0.21	0.09	-0.19	0.04	0.04	-0.02
Clark County GIS	FAA VGT A	641760.44	259694.23	641760.4967	259694.0802	641760.5812	259693.9600	0.15	0.05	-0.15	0.15	0.08	-0.12
Clark County GIS	PUPPIES	638131.83	257382.31	638131.8969	257382.1773	638131.9596	257382.0880	0.15	0.06	-0.13	0.11	0.06	-0.09
Clark County GIS	U368	637314.45	315187.28	637314.4949	315187.1564	637314.5669	315187.0362	0.13	0.05	-0.13	0.14	0.07	-0.12
LVVWD Base	CCWR			605261.9000	306800.9541	605261.9160	306800.8330				0.12	0.02	-0.12
LVVWD Base	CLV1			643407.7646	242077.6949	643407.7930	242077.6470				0.06	0.03	-0.05
LVVWD Base	NVBM			554210.4072	271605.3597	554210.4296	271605.2661				0.10	0.02	-0.09
LVVWD Base	NVCA			645226.5817	267493.5696	645226.6396	267493.4558				0.13	0.06	-0.11
LVVWD Base	NVLM			590541.5689	373447.4218	590541.5940	373447.3093				0.12	0.03	-0.11
LVVWD Base	NVPO			549650.9622	171518.3119	549650.9999	171518.2554				0.07	0.04	-0.06
LVVWD Base	NVTP			601451.2042	221017.4062	601451.2420	221017.3161				0.10	0.04	-0.09

Average	0.11	0.05	-0.09
NCRS-Las Vegas Zone equivalent coordinates of those published per Clark County Public Works Las Vegas Valley Geodetic Control Network recorded in File 88, Page 53 of Surveys			
NCRS-Las Vegas Zone coordinates established by the City of Las Vegas			
NCRS-Las Vegas Zone equivalent coordinates of those established by the Las Vegas Valley Water District - <i>previously broadcast by the Las Vegas Valley Water District up until 6:00 am, April 22, 2013</i>			
NCRS-Las Vegas Zone equivalent coordinates of those published per Las Vegas Valley Water District - <i>currently being broadcast by the Las Vegas Valley Water District as of 6:00 am, April 22, 2013</i>			
NCRS-Las Vegas Zone equivalent coordinates of those published per National Geodetic Survey (CORS) - <i>previously broadcast by the Las Vegas Valley Water District up until 6:00 am, April 22, 2013</i>			
NCRS-Las Vegas Zone equivalent coordinates of those published per National Geodetic Survey (CORS) - <i>currently being broadcast by the Las Vegas Valley Water District as of April 22, 2013</i>			