

Final Survey Report Appendix

Light Detection and Ranging (LiDAR)
Contract Number 39891
Kansas Department of Agriculture South AOI
6531 SE Forbes Suite B
Topeka, Kansas
May 2016



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Section 1: Appendix

1.1 NGS Data Sheets

The NGS Data Sheet

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

PROGRAM = datasheet95, VERSION = 8.8

1 National Geodetic Survey, Retrieval Date = DECEMBER 19, 2015

HH0691 *****

HH0691 PACS - This is a Primary Airport Control Station.

HH0691 DESIGNATION - 2K3 A

HH0691 PID - HH0691

HH0691 STATE/COUNTY- KS/STANTON

HH0691 COUNTRY - US

HH0691 USGS QUAD - JOHNSON EAST (1978)

HH0691

HH0691 *CURRENT SURVEY CONTROL

HH0691

HH0691* NAD 83(2011) POSITION- 37 34 59.00955(N) 101 44 03.32012(W) ADJUSTED

HH0691* NAD 83(2011) ELLIP HT- 987.453 (meters) (06/27/12) ADJUSTED

HH0691* NAD 83(2011) EPOCH - 2010.00

HH0691* NAVD 88 ORTHO HEIGHT - 1012.26 (meters) 3321.1 (feet) GPS OBS

HH0691

HH0691 NAVD 88 orthometric height was determined with geoid model GEOID09

HH0691 GEOID HEIGHT - -24.784 (meters) GEOID09

HH0691 GEOID HEIGHT - -24.770 (meters) GEOID12B

HH0691 NAD 83(2011) X --1,029,385.236 (meters) COMP

HH0691 NAD 83(2011) Y --4,955,790.385 (meters) COMP

HH0691 NAD 83(2011) Z - 3,869,475.775 (meters) COMP

HH0691 LAPLACE CORR - -5.59 (seconds) DEFLEC12B

HH0691

HH0691 Network accuracy estimates per FGDC Geospatial Positioning Accuracy

HH0691 Standards:

HH0691 FGDC (95% conf, cm) Standard deviation (cm) CorrNE

HH0691 Horiz Ellip SD_N SD_E SD_h (unitless)

HH0691 -----

HH0691 NETWORK 0.84 0.78 0.37 0.31 0.40 0.02001438

HH0691 -----

HH0691 Click here for local accuracies and other accuracy information.

HH0691

HH0691

HH0691.This mark is at Stanton Co Municipal Airport (2K3)

HH0691

HH0691.The horizontal coordinates were established by GPS observations

HH0691.and adjusted by the National Geodetic Survey in June 2012.

HH0691

HH0691.NAD 83(2011) refers to NAD 83 coordinates where the reference

HH0691.frame has been affixed to the stable North American tectonic plate. See



HH0691.NA2011 for more information.

HH0691

HH0691.The horizontal coordinates are valid at the epoch date displayed above
HH0691.which is a decimal equivalence of Year/Month/Day.

HH0691

HH0691.The orthometric height was determined by GPS observations and a
HH0691.high-resolution geoid model.

HH0691

HH0691.GPS derived orthometric heights for airport stations designated as
HH0691.PACS or SACS are published to 2 decimal places. This maintains
HH0691.centimeter relative accuracy between the PACS and SACS. It does
HH0691.not indicate centimeter accuracy relative to other marks which are
HH0691.part of the NAVD 88 network.

HH0691

HH0691.Significant digits in the geoid height do not necessarily reflect accuracy.
HH0691.GEOID12B height accuracy estimate available here.

HH0691

HH0691.The X, Y, and Z were computed from the position and the ellipsoidal ht.
HH0691

HH0691.The Laplace correction was computed from DEFLEC12B derived deflections.
HH0691

HH0691.The ellipsoidal height was determined by GPS observations
HH0691.and is referenced to NAD 83.

HH0691

HH0691. The following values were computed from the NAD 83(2011) position.
HH0691

HH0691;	North	East	Units	Scale	Factor	Converg.
HH0691;SPC KS S	- 506,659.486	114,397.342	MT	0.99995287	-1 59 15.1	
HH0691;SPC KS S	- 1,662,265.33	375,318.61	sFT	0.99995287	-1 59 15.1	
HH0691;UTM 14	- 4,163,071.253	258,563.218	MT	1.00031807	-1 40 06.4	

HH0691

HH0691! - Elev Factor x Scale Factor = Combined Factor

HH0691!SPC KS S - 0.99984507 x 0.99995287 = 0.99979795

HH0691!UTM 14 - 0.99984507 x 1.00031807 = 1.00016309

HH0691

HH0691:	Primary Azimuth Mark	Grid Az
HH0691:SPC KS S	- JOHNSON RAD STA KAK 487 MAST	106 38 27.3
HH0691:UTM 14	- JOHNSON RAD STA KAK 487 MAST	106 19 18.6

HH0691

HH0691	-----
HH0691	PID Reference Object Distance Geod. Az
HH0691	dddmss.s
HH0691	HH0826 JOHNSON RAD STA KAK 487 MAST APPROX. 2.8 KM 1043912.2
HH0691	HH0694 2K3 B APPROX. 0.5 KM 1393114.0
HH0691	HH1039 JOHNSON COOP ELEVATOR APPROX. 2.5 KM 2042108.6
HH0691	HH0837 JOHNSON MUN WATER TANK APPROX. 2.4 KM 2194911.1
HH0691	HH1040 JOHNSON MICROWAVE MAST APPROX. 4.3 KM 2501643.2
HH0691	-----

HH0691

HH0691 SUPERSEDED SURVEY CONTROL

HH0691

HH0691 NAD 83(2007)- 37 34 59.00962(N) 101 44 03.32077(W) AD(2002.00) B

HH0691 ELLIP H (10/21/09) 987.477 (m) GP(2002.00) 4 2



HH0691 NAD 83(1997)- 37 34 59.00992(N) 101 44 03.31616(W) AD() 3
HH0691 NAD 83(1993)- 37 34 59.01125(N) 101 44 03.31622(W) AD() 3
HH0691 NAD 83(1986)- 37 34 59.01465(N) 101 44 03.31214(W) AD() 3
HH0691 NAD 27 - 37 34 58.95500(N) 101 44 01.69491(W) AD() 3
HH0691 NGVD 29 (12/08/88) 1011.82 (m) 3319.6 (f) LEVELING 3
HH0691

HH0691.Superseded values are not recommended for survey control.

HH0691

HH0691.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

HH0691.See file dsdata.txt to determine how the superseded data were derived.

HH0691

HH0691_U.S. NATIONAL GRID SPATIAL ADDRESS: 14SKG5856363071(NAD 83)

HH0691

HH0691_MARKER: DD = SURVEY DISK

HH0691_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT

HH0691_STAMPING: 2K3 A 1987

HH0691_MARK LOGO: NOSAMC

HH0691_PROJECTION: FLUSH

HH0691_MAGNETIC: N = NO MAGNETIC MATERIAL

HH0691_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO

HH0691+STABILITY: SURFACE MOTION

HH0691_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

HH0691+SATELLITE: SATELLITE OBSERVATIONS - December 10, 2008

HH0691

HH0691 HISTORY - Date Condition Report By

HH0691 HISTORY - 1987 MONUMENTED NOS

HH0691 HISTORY - 1987 GOOD NOS

HH0691 HISTORY - 20080903 GOOD INDIV

HH0691 HISTORY - 20081210 GOOD BWRCOR

HH0691

HH0691 STATION DESCRIPTION

HH0691

HH0691'DESCRIBED BY NATIONAL OCEAN SERVICE 1987 (JWB)

HH0691'THE STATION IS LOCATED ON THE STANTON COUNTY AIRPORT APPROXIMATELY

HH0691'2 MILES NE OF JOHNSON, KANSAS.

HH0691'

HH0691'TO REACH THE STATION CONTACT THE AIRPORT AUTHORITIES.

HH0691'

HH0691'THE STATION IS A STANDARD NOS DISK STAMPED---2K3 A 1987---,

HH0691'SET INTO THE TOP OF A 10 INCH DIAMETER CONCRETE MONUMENT

HH0691'FLUSH WITH THE EXISTING GROUND. IT IS LOCATED 778.99 METERS

HH0691'(2555.6 FT) SOUTH OF RUNWAY END 17, 473.45 METERS (1553.2 FT)

HH0691'NORTH OF RUNWAY END 35, 60.14 METERS (197.3 FT) NNE OF THE 7TH

HH0691'RUNWAY LIGHT NORTH OF RUNWAY END 35, AND 26.3 METERS (86.9 FT)

HH0691'WEST OF THE 8TH RUNWAY LIGHT NORTH OF RUNWAY END 35.

HH0691'

HH0691'DESCRIBED BY JWB.

HH0691

HH0691 STATION RECOVERY (1987)

HH0691

HH0691'RECOVERY NOTE BY NATIONAL OCEAN SERVICE 1987

HH0691'1.6 KM (1.00 MI) NE FROM JOHNSON.

HH0691'THE STATION IS A STANDARD NOS ALUMINUM DISK SET INTO THE TOP OF A 10



HH0691'INCH CONCRETE MONUMENT FLUSH WITH THE GROUND AT THE JOHNSON STANTON
HH0691'COUNTY AIRPORT. CONTACT THE AIRPORT MANAGER PRIOR TO ENTERING THE
HH0691'AIRPORT PROPER. THE STATION IS LOCATED 2555 FEET SOUTH OF THE END OF
HH0691'RUNWAY 17, 197.3 FEET NNE OF THE SEVENTH RUNWAY LIGHT NORTH OF THE
HH0691'END OF RUNWAY 35, AND 86.9 FEET WEST OF THE EIGHTH RUNWAY LIGHT NORTH
HH0691'OF THE END OF RUNWAY 35.

HH0691

HH0691 STATION RECOVERY (2008)

HH0691

HH0691'RECOVERY NOTE BY INDIVIDUAL CONTRIBUTORS 2008 (DLK)

HH0691'RECOVERED IN GOOD CONDITION.

HH0691

HH0691 STATION RECOVERY (2008)

HH0691

HH0691'RECOVERY NOTE BY BUCHER, WILLIS AND RATLIFF CORP 2008 (DLK)

HH0691'RECOVERED AS DESCRIBED. NOTE - EXISTING RUNWAY 17-35 IS TO BE

HH0691'CONVERTED TO A PARALLEL TAXIWAY WITH NEW RUNWAY 17-35 BEING

HH0691'CONSTRUCTED 260' +/- EAST OF EXISTING RUNWAY. OWNERSHIP--STANTON

HH0691'COUNTY 201 N MAIN ST JOHNSON, KS 67855 620-492-2140.

*** retrieval complete.

Elapsed Time = 00:00:03



The NGS Data Sheet

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

PROGRAM = datasheet95, VERSION = 8.8

1 National Geodetic Survey, Retrieval Date = DECEMBER 19, 2015

HH0685 *****

HH0685 DESIGNATION - HQG A

HH0685 PID - HH0685

HH0685 STATE/COUNTY- KS/STEVENS

HH0685 COUNTRY - US

HH0685 USGS QUAD - HUGOTON (1974)

HH0685

HH0685 *CURRENT SURVEY CONTROL

HH0685

HH0685* NAD 83(1997) POSITION- 37 10 01.61154(N) 101 22 07.89019(W) ADJUSTED

HH0685* NAVD 88 ORTHO HEIGHT - 954.037 (meters) 3130.04 (feet) ADJUSTED

HH0685

HH0685 LAPLACE CORR - -2.91 (seconds) DEFLEC12B

HH0685 GEOID HEIGHT - -26.086 (meters) GEOID12B

HH0685 DYNAMIC HEIGHT - 953.087 (meters) 3126.92 (feet) COMP

HH0685 MODELED GRAVITY - 979,603.1 (mgal) NAVD 88

HH0685

HH0685 HORZ ORDER - THIRD

HH0685 VERT ORDER - THIRD

HH0685

HH0685.This mark is at Hugoton Municipal Airport (HQG)

HH0685

HH0685.The horizontal coordinates were established by classical geodetic methods

HH0685.and adjusted by the National Geodetic Survey in October 1998.

HH0685.

HH0685.The orthometric height was determined by differential leveling and

HH0685.adjusted by the NATIONAL GEODETIC SURVEY

HH0685.in June 1991.

HH0685

HH0685.Significant digits in the geoid height do not necessarily reflect accuracy.

HH0685.GEOID12B height accuracy estimate available here.

HH0685

HH0685.The Laplace correction was computed from DEFLEC12B derived deflections.

HH0685

HH0685.The dynamic height is computed by dividing the NAVD 88

HH0685.geopotential number by the normal gravity value computed on the

HH0685.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45

HH0685.degrees latitude (g = 980.6199 gals.).

HH0685

HH0685.The modeled gravity was interpolated from observed gravity values.

HH0685

HH0685. The following values were computed from the NAD 83(1997) position.

HH0685

HH0685; North East Units Scale Factor Converg.

HH0685;SPC KS S - 459,462.643 145,232.902 MT 1.00002106 -1 45 46.8

HH0685;SPC KS S - 1,507,420.35 476,484.95 sFT 1.00002106 -1 45 46.8



HH0685;UTM 14 - 4,116,038.769 289,674.135 MT 1.00014497 -1 25 53.9

HH0685

HH0685! - Elev Factor x Scale Factor = Combined Factor

HH0685!SPC KS S - 0.99985440 x 1.00002106 = 0.99987546

HH0685!UTM 14 - 0.99985440 x 1.00014497 = 0.99999935

HH0685

HH0685:	Primary Azimuth Mark	Grid Az
HH0685:SPC KS S	- HUGOTON MUN TANK	081 39 16.1
HH0685:UTM 14	- HUGOTON MUN TANK	081 19 23.2

HH0685

HH0685	-----		
HH0685	PID	Reference Object	Distance Geod. Az
HH0685			ddmmss.s
HH0685	HH0765	HUGOTON FARMERS COOP ELEV	APPROX. 2.3 KM 0345122.2
HH0685	HH1037	HUGOTON TALL RADIO MAST	APPROX. 4.3 KM 0483442.8
HH0685	HH0763	HUGOTON MUN TANK	APPROX. 1.4 KM 0795329.3
HH0685	-----		

HH0685

HH0685 SUPERSEDED SURVEY CONTROL

HH0685

HH0685 NAD 83(1993)- 37 10 01.61551(N) 101 22 07.88933(W) AD() 3

HH0685 NAD 83(1986)- 37 10 01.61954(N) 101 22 07.88025(W) AD() 3

HH0685 NAD 27 - 37 10 01.52917(N) 101 22 06.32342(W) AD() 3

HH0685 NGVD 29 (12/08/88) 953.64 (m) 3128.7 (f) LEVELING 3

HH0685

HH0685.Superseded values are not recommended for survey control.

HH0685

HH0685.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

HH0685.See file dsdata.txt to determine how the superseded data were derived.

HH0685

HH0685_U.S. NATIONAL GRID SPATIAL ADDRESS: 14SKG8967416038(NAD 83)

HH0685

HH0685_MARKER: DD = SURVEY DISK

HH0685_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT

HH0685_STAMPING: HQG 1 1987

HH0685_MARK LOGO: NOS

HH0685_MAGNETIC: N = NO MAGNETIC MATERIAL

HH0685_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO

HH0685+STABILITY: SURFACE MOTION

HH0685_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

HH0685+SATELLITE: SATELLITE OBSERVATIONS - March 22, 2013

HH0685

HH0685 HISTORY - Date Condition Report By

HH0685 HISTORY - 1987 MONUMENTED NOS

HH0685 HISTORY - 1987 GOOD NOS

HH0685 HISTORY - 20130322 GOOD KSHC

HH0685

HH0685 STATION DESCRIPTION

HH0685

HH0685'DESCRIBED BY NATIONAL OCEAN SERVICE 1987 (RAH)

HH0685'STATION IS LOCATED AT HUGOTON MUNICIPAL AIRPORT IN HUGOTON, KANSAS.

HH0685'

HH0685'TO REACH FROM THE JUNCTION OF US HIGHWAY 56 (KS 25) AND KS 51, AT



HH0685'THE S EDGED OF HUGOTON, PROCEED W ON KS 51 FOR 1.15 MI TO THE DRIVE
HH0685'LEADING S INTO THE HUGOTON AIRPORT, THEN TURN LEFT ONTO DRIVE AND
HH0685'PROCEED FOR 0.15 MI TO AG AIR (WHITE) HANGAR, THEN TURN LEFT BEFORE
HH0685'HANGAR TO THE GRASS AREA SE OF HANGAR. THE STATION IS 20.40 M
HH0685'(66.89 FT) SE OF THE SE EDGE OF RAMP, 41.7 M (136.85 FT) NW OF THE
HH0685'NW EDGE OF RUNWAY 2-20, 61.1 M (200.58 FT) SE OF CORNER AND ONLINE
HH0685'WITH SW FACE OF BROWN HANGAR, 52.6 M (172.43 FT) SW OF SW EDGE OF
HH0685'TAXIWAY, AND 38.2 M (125.37 FT) ENE OF SE CORNER OF RAMP.

HH0685'

HH0685'STATION IS A STANDARD NOS DISK STAMPED---HQG A 1987---, SET INTO
HH0685'THE TOP OF A ROUND CONCRETE MONUMENT.

HH0685'

HH0685'HEIGHT OF LIGHT SHOWN WAS 1.5 METERS ABOVE THE MARK.

HH0685'

HH0685'SEE AIRPORT MANAGER FOR PERMISSION TO BE ON FIELD.

HH0685'

HH0685'DESCRIBED BY RAH.

HH0685

HH0685 STATION RECOVERY (1987)

HH0685

HH0685'RECOVERY NOTE BY NATIONAL OCEAN SERVICE 1987

HH0685'2.3 KM (1.40 MI) WEST FROM HUGOTON.

HH0685'THE STATION IS LOCATED AT THE HUGOTON AIRPORT. TO REACH THE STATION
HH0685'CONTACT THE AIRPORT MANAGER. THE STATION IS LOCATED 66.89 FEET SE
HH0685'FROM THE SE EDGE OF A RAMP, 136.85 FEET NW OF THE NW EDGE OF RUNWAY
HH0685'2-20, 200.58 FEET SE OF THE CORNER AND ON-LINE WITH SW FACE OF BROWN
HH0685'HANGAR, 172.43 FEET SW OF THE SW EDGE OF A TAXIWAY, AND 125.37 FEET
HH0685'ENE OF THE SE CORNER OF A RAMP. THE STATION IS A STANDARD NOS
HH0685'ALUMINUM DISK SET INTO THE TOP OF A 10 INCH DIAMETER CONCRETE
HH0685'MONUMENT FLUSH WITH THE EXISTING GROUND.

HH0685

HH0685 STATION RECOVERY (2013)

HH0685

HH0685'RECOVERY NOTE BY KS HIGHWAY COMM 2013 (RMB)

HH0685'I SET UP ON THIS POINT AND DID A 15MINUTE STATIC

*** retrieval complete.

Elapsed Time = 00:00:02



The NGS Data Sheet

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

PROGRAM = datasheet95, VERSION = 8.8

1 National Geodetic Survey, Retrieval Date = DECEMBER 19, 2015

HH0797 *****

HH0797 DESIGNATION - WILBUR

HH0797 PID - HH0797

HH0797 STATE/COUNTY- KS/MORTON

HH0797 COUNTRY - US

HH0797 USGS QUAD - WILBURTON (1974)

HH0797

HH0797 *CURRENT SURVEY CONTROL

HH0797

HH0797* NAD 83(1997) POSITION- 37 04 41.36169(N) 101 45 40.93007(W) ADJUSTED

HH0797* NAVD 88 ORTHO HEIGHT - 1049.4 (meters) 3443. (feet) VERTCON

HH0797

HH0797 GEOID HEIGHT - -25.316 (meters) GEOID12B

HH0797 LAPLACE CORR - -4.12 (seconds) DEFLEC12B

HH0797 HORZ ORDER - SECOND

HH0797

HH0797.The horizontal coordinates were established by classical geodetic methods

HH0797.and adjusted by the National Geodetic Survey in October 1998.

HH0797.

HH0797.The NAVD 88 height was computed by applying the VERTCON shift value to

HH0797.the NGVD 29 height (displayed under SUPERSEDED SURVEY CONTROL.)

HH0797

HH0797.Significant digits in the geoid height do not necessarily reflect accuracy.

HH0797.GEOID12B height accuracy estimate available here.

HH0797

HH0797.The Laplace correction was computed from DEFLEC12B derived deflections.

HH0797

HH0797. The following values were computed from the NAD 83(1997) position.

HH0797

HH0797; North East Units Scale Factor Converg.

HH0797;SPC KS S - 450,741.672 110,044.291 MT 1.00004240 -2 00 15.1

HH0797;SPC KS S - 1,478,808.30 361,036.98 sFT 1.00004240 -2 00 15.1

HH0797;UTM 14 - 4,107,110.421 254,529.728 MT 1.00034235 -1 39 56.4

HH0797

HH0797! - Elev Factor x Scale Factor = Combined Factor

HH0797!SPC KS S - 0.99983931 x 1.00004240 = 0.99988170

HH0797!UTM 14 - 0.99983931 x 1.00034235 = 1.00018160

HH0797

HH0797: Primary Azimuth Mark Grid Az

HH0797:SPC KS S - ELKHART MUNICIPAL STANDPIPE 236 55 43.9

HH0797:UTM 14 - ELKHART MUNICIPAL STANDPIPE 236 35 25.2

HH0797

HH0797|-----|

HH0797| PID Reference Object Distance Geod. Az |

HH0797| dddmmss.s |

HH0797| CM9546 WILBUR RM 2 21.932 METERS 06715 |



HH0797| HH0800 ELKHART MUNICIPAL STANDPIPE APPROX.15.0 KM 2345528.8 |
HH0797| CM9545 WILBUR RM 1 20.520 METERS 24954 |
HH0797|-----|

HH0797

HH0797 SUPERSEDED SURVEY CONTROL

HH0797

HH0797 NAD 83(1993)- 37 04 41.36139(N) 101 45 40.92950(W) AD() 2

HH0797 NAD 83(1992)- 37 04 41.37009(N) 101 45 40.91940(W) AD() 2

HH0797 NAD 83(1986)- 37 04 41.37095(N) 101 45 40.91929(W) AD() 2

HH0797 NAD 27 - 37 04 41.28151(N) 101 45 39.33845(W) AD() 2

HH0797 NGVD 29 (07/19/86) 1049.0 (m) 3442. (f) VERT ANG

HH0797

HH0797.Superseded values are not recommended for survey control.

HH0797

HH0797.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

HH0797.See file dsdata.txt to determine how the superseded data were derived.

HH0797

HH0797_U.S. NATIONAL GRID SPATIAL ADDRESS: 14SKG5452907110(NAD 83)

HH0797

HH0797_MARKER: DD = SURVEY DISK

HH0797_SETTING: 0 = UNSPECIFIED SETTING

HH0797_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

HH0797+SATELLITE: SATELLITE OBSERVATIONS - February 15, 2002

HH0797

HH0797 HISTORY - Date Condition Report By

HH0797 HISTORY - 1972 MONUMENTED USGS

HH0797 HISTORY - 20020215 GOOD INDIV

HH0797

HH0797 STATION DESCRIPTION

HH0797

HH0797'DESCRIBED BY US GEOLOGICAL SURVEY 1972 (JSA)

HH0797'STATION IS ABOUT 8.0 MI. SW. ALONG U. S. HIGHWAY 56 FROM ROLLA, NEAR

HH0797'CENTER SW 1/4, NE 1/4, SEC. 22, T. 34 S., R. 41 W., AT HIGHEST CUT

HH0797'BANK ALONG S. RIGHT-OF-WAY FENCE ABOUT 0.7 MI. E. OF WILBERTON.

HH0797'

HH0797'TO REACH FROM THE INTERSECTION OF U. S. HIGHWAY 56 AND STATE HIGHWAY

HH0797'51 IN ROLLA GO 8.0 MI. SW. ALONG U. S. HIGHWAY 56 TO THE HIGHEST CUT

HH0797'BANK ON THE LEFT AND THE STATION.

HH0797'

HH0797'STATION MARK STAMPED ET WILBUR 1972 IS 138 FT. SE. (NORMAL) OF U. S.

HH0797'HIGHWAY 56, 2 FT. NW. OF S. RIGHT-OF-WAY FENCE AND USGS WITNESS

HH0797'POST.

HH0797'

HH0797'REFERENCE MARK NO. 1 STAMPED WILBUR NO 1 1972 IS SW. OF THE STATION,

HH0797'140 FT. SE. (NORMAL) OF U. S. HIGHWAY 56, 1 FT. NW. OF S.

HH0797'RIGHT-OF-WAY FENCE.

HH0797'

HH0797'REFERENCE MARK NO. 2 STAMPED WILBUR NO 2 1972 IS NE. OF THE STATION,

HH0797'140 FT. SE (NORMAL) OF U. S. HIGHWAY 56, 1 FT. NW. OF S.

HH0797'RIGHT-OF-WAY FENCE.

HH0797'

HH0797'ALL MARKS ARE STANDARD TABLETS CRIMPED ON 1/2-IN. COPPER COATED RODS,

HH0797'CENTERED IN 6-IN. DIAMETER TILE 12 IN. LONG AND FILLED WITH GRAVEL



HH0797'TO WITHIN 1 IN. OF CAP. ALL MARKS ARE FLUSH WITH THE GROUND.

HH0797'

HH0797'HEIGHT OF INSTRUMENT 4.71 FT. STANDARD BRACED TRIPOD USED.

HH0797

HH0797 STATION RECOVERY (2002)

HH0797

HH0797'RECOVERY NOTE BY INDIVIDUAL CONTRIBUTORS 2002 (SCH)

HH0797'NO SEARCH MADE FOR REFERENCE MARKS

*** retrieval complete.

Elapsed Time = 00:00:02



1.2 Primary Control Network Survey Minimally Constrained Adjustment Report

* NETWORK - WEIGHTED GNSS NETWORK ADJUSTMENT *
* *
* (c) Copyright NovAtel Inc., (2015) *
* *
* Version: 8.60.4331 *
* *
* FILE:
V:\2015\15164_2016_Kansas_LiDAR\400_Working\402_Survey\06_Control_Network\15164_Network_South\151
64_Network_South.net

DATE(m/d/y): Wed. 2/10/16 TIME: 13:16:41

DATUM: 'NAD83(2011)'
SCALE_FACTOR: 1.0000
CONFIDENCE LEVEL: 95.00 % (Scale factor is 2.4479)

INPUT CONTROL/CHECK POINTS

Table with 8 columns: STA ID, TYPE, LATITUDE, LONGITUDE, ELLHGT, HZ-SD, V-SD. Rows include 2K3A, HQGA, and WILBUR.

INPUT VECTORS

Table with 3 columns: SESSION NAME, VECTOR(m), and Covariance (m) [unscaled]. Rows show vectors between 2K3A, HQGA, and WILBUR.

OUTPUT VECTOR RESIDUALS (East, North, Height - Local Level)

Table with 7 columns: SESSION NAME, RE, RN, RH, PPM, DIST, STD. Rows show residuals for 2K3A to HQGA, 2K3A to WILBUR, and HQGA to WILBUR.



RMS 0.0237 0.0125 0.0503

\$ - This session is flagged as a 3-sigma outlier

CHECK POINT RESIDUALS (East, North, Height - Local Level)

STA. NAME	-- RE -- (m)	-- RN -- (m)	-- RH -- (m)
HQGA	0.0349	-0.0010	0.0698
WILBUR	-0.0462	0.0406	-0.0540

RMS	0.0409	0.0287	0.0624

CONTROL POINT RESIDUALS (ADJUSTMENT MADE)

STA. NAME	-- RE -- (m)	-- RN -- (m)	-- RH -- (m)
2K3A	-0.0000	-0.0000	0.0000

RMS	0.0000	0.0000	0.0000

OUTPUT STATION COORDINATES (LAT/LONG/HT)

STA_ID	-- LATITUDE --	-- LONGITUDE --	- ELLHGT -
2K3A	37 34 59.00955	-101 44 03.32012	987.4910
HQGA	37 10 01.59465	-101 22 07.90822	928.1008
WILBUR	37 04 41.35060	-101 45 40.95192	1025.5551

OUTPUT VARIANCE/COVARIANCE

STA_ID	SE/SN/SUP (95.00 %)	----- CX matrix (m) ----- (not scaled by confidence level) (ECEF, XYZ cartesian)			
2K3A	0.0122	2.5000e-005			
	0.0122	3.4050e-019	2.5000e-005		
	0.0122	3.0986e-020	-1.2289e-019	2.5000e-005	
HQGA	0.0123	2.5460e-005			
	0.0123	6.2793e-008	2.5460e-005		
	0.0124	-3.4639e-008	-1.3615e-007	2.5174e-005	
WILBUR	0.0123	2.5441e-005			
	0.0123	5.7263e-008	2.5444e-005		
	0.0124	-2.8697e-008	-1.1073e-007	2.5152e-005	

VARIANCE FACTOR = 1932.1496

Note: Values < 1.0 indicate statistics are pessimistic, while values > 1.0 indicate optimistic statistics. Entering this value as the network adjustment scale factor will bring variance factor to one.



1.3 Primary Control Network Survey Constrained Adjustment Report

* NETWORK - WEIGHTED GNSS NETWORK ADJUSTMENT *
*
* (c) Copyright NovAtel Inc., (2015) *
*
* Version: 8.60.4331 *
*
*

FILE:
V:\2015\15164_2016_Kansas_LiDAR\400_Working\402_Survey\06_Control_Network\15164_South_MinConstrained_Network.net

DATE(m/d/y): Fri. 2/26/16 TIME: 9:54:13

DATUM: 'NAD83(2011)'
GRID: UTM, Zone 14
SCALE_FACTOR: 1.2177
CONFIDENCE LEVEL: 95.00 % (Scale factor is 2.4479)

INPUT CONTROL/CHECK POINTS

Table with 8 columns: STA_ID, TYPE, LATITUDE, LONGITUDE, ELLHGT, HZ-SD, V-SD. Rows include 2K3A, HQGA, and WILBUR.

INPUT VECTORS

Table with 3 columns: SESSION NAME, VECTOR(m) DX/DY/DZ, and Covariance (m) [unscaled] standard deviations in brackets. Rows include 2K3A to HQGA, 2K3A to WILBUR, and HQGA to WILBUR.

OUTPUT VECTOR RESIDUALS (East, North, Height - Local Level)

Table with 7 columns: SESSION NAME, RE (m), RN (m), RH (m), PPM, DIST (km), STD (m). Rows include 2K3A to HQGA, 2K3A to WILBUR, HQGA to WILBUR, and RMS.

\$ - This session is flagged as a 3-sigma outlier



CHECK POINT RESIDUALS (East, North, Height - Local Level)

STA. NAME	-- RE -- (m)	-- RN -- (m)	-- RH -- (m)
HQGA	-0.0078	-0.0058	0.0144
WILBUR	-0.0176	0.0241	-0.0276

RMS	0.0136	0.0175	0.0220

CONTROL POINT RESIDUALS (ADJUSTMENT MADE)

STA. NAME	-- RE -- (m)	-- RN -- (m)	-- RH -- (m)
2K3A	0.0000	0.0000	-0.0000

RMS	0.0000	0.0000	0.0000

OUTPUT STATION COORDINATES (LAT/LONG/HT)

STA_ID	-- LATITUDE --	-- LONGITUDE --	- ELLHGT -
2K3A	37 34 59.00955	-101 44 03.32012	987.4530
HQGA	37 10 01.59449	-101 22 07.90996	928.0454
WILBUR	37 04 41.35006	-101 45 40.95076	1025.5814

OUTPUT STATION COORDINATES (GRID)

STA_ID	- EASTING - (m)	- NORTHING - (m)	- ELLHGT - (m)
2K3A	258563.2182	4163071.2535	987.4530
HQGA	289673.6339	4116038.2562	928.0454
WILBUR	254529.2067	4107110.0773	1025.5814

OUTPUT VARIANCE/COVARIANCE

STA_ID	SE/SN/SUP (95.00 %) (m)	----- CX matrix (m) (not scaled by confidence level) (ECEF, XYZ cartesian)		
2K3A	0.0122	2.5000e-005		
	0.0122	-9.3452e-022	2.5000e-005	
	0.0122	5.2363e-023	4.6402e-022	2.5000e-005
HQGA	0.0258	1.1783e-004		
	0.0295	4.5195e-005	3.9755e-004	
	0.0546	-2.9781e-005	-1.5649e-004	2.3751e-004
WILBUR	0.0239	1.1292e-004		
	0.0308	7.9841e-005	4.5060e-004	
	0.0583	-4.1433e-005	-1.7751e-004	2.5740e-004

VARIANCE FACTOR = 1.0000

Note: Values < 1.0 indicate statistics are pessimistic, while values > 1.0 indicate optimistic statistics. Entering this value as the network adjustment scale factor will bring variance factor to one.

1.4 Final Coordinates

Final Coordinates are reported in UTM, Zone 14 North American Datum 1983 (NAD83), 2011 Epoch of 2010.0000 High Accuracy Reference Network (HARN) horizontally unit of measure in meters, and the North American Vertical Datum of 1988 (NAVD88) utilizing Geoid 12B, unit of measure in meters.

PointID	Easting	Northing	Height	Class	Field Designations
0001	237397.830	4181095.885	1073.065	OPEN TERRAIN	NVA08
0002	237396.416	4180454.430	1073.856	OPEN TERRAIN	NVA08_X
0003	256326.655	4178616.996	1003.670	OPEN TERRAIN	NVA09
0004	275205.704	4176425.833	976.657	OPEN TERRAIN	NVA10
0005	267646.038	4173507.394	980.884	OPEN TERRAIN	NVA11
0006	267595.293	4172523.330	974.442	OPEN TERRAIN	NVA11_X
0007	248733.925	4174117.369	1036.700	OPEN TERRAIN	NVA12
0008	234007.235	4173101.712	1093.305	OPEN TERRAIN	NVA13
0009	272235.945	4166831.086	957.159	OPEN TERRAIN	NVA14
0010	259331.896	4165661.266	1009.945	OPEN TERRAIN	NVA15
0011	244207.787	4166156.564	1070.607	OPEN TERRAIN	NVA16
0012	232057.740	4165011.330	1119.139	OPEN TERRAIN	NVA17
0013	238308.047	4159433.650	1076.132	OPEN TERRAIN	NVA18
0014	251176.674	4159459.847	1043.119	OPEN TERRAIN	NVA19
0015	265664.587	4161425.062	991.139	OPEN TERRAIN	NVA20
0016	256860.380	4161760.039	1017.528	OPEN TERRAIN	NVA20_X
0017	276931.853	4161062.325	955.009	OPEN TERRAIN	NVA21
0018	276882.603	4161825.562	956.588	OPEN TERRAIN	NVA21_X
0019	316942.889	4099676.136	903.299	OPEN TERRAIN	NVA22
0020	316614.780	4099629.034	902.423	OPEN TERRAIN	NVA22_X
0021	260130.345	4157535.197	1005.846	OPEN TERRAIN	NVA23
0022	247811.972	4154857.320	1053.831	OPEN TERRAIN	NVA24
0023	232432.863	4155360.815	1095.234	OPEN TERRAIN	NVA25
0024	239616.158	4150265.152	1082.741	OPEN TERRAIN	NVA26
0025	239616.484	4150168.383	1082.555	OPEN TERRAIN	NVA26_X
0026	254778.386	4151266.462	1025.204	OPEN TERRAIN	NVA28
0027	274153.100	4145865.782	965.062	OPEN TERRAIN	NVA29
0028	274930.295	4145891.579	964.122	OPEN TERRAIN	NVA29_X
0029	262751.294	4144522.296	999.508	OPEN TERRAIN	NVA30
0030	262786.413	4144397.206	999.695	OPEN TERRAIN	NVA30_X
0031	304261.637	4109553.111	927.162	OPEN TERRAIN	NVA31
0032	233024.856	4146509.243	1106.382	OPEN TERRAIN	NVA32
0033	245096.404	4145133.730	1060.112	OPEN TERRAIN	NVA33
0034	269582.000	4138031.376	982.252	OPEN TERRAIN	NVA34



PointID	Easting	Northing	Height	Class	Field Designations
0035	293499.196	4105002.439	951.559	OPEN TERRAIN	NVA37
0036	293810.063	4104961.243	950.598	OPEN TERRAIN	NVA37_X
0037	229045.147	4138397.506	1123.634	OPEN TERRAIN	NVA38
0038	242915.510	4133946.222	1065.542	OPEN TERRAIN	NVA39
0039	238834.369	4124375.524	1079.845	OPEN TERRAIN	NVA41
0040	228237.640	4123890.691	1122.952	OPEN TERRAIN	NVA42
0041	309794.717	4105822.572	917.881	OPEN TERRAIN	NVA43
0042	247573.369	4125221.676	1060.667	OPEN TERRAIN	NVA44
0043	264612.949	4130874.934	997.571	OPEN TERRAIN	NVA45
0044	269998.517	4121639.710	991.445	OPEN TERRAIN	NVA46
0045	259699.784	4123774.045	1027.051	OPEN TERRAIN	NVA47
0046	253736.716	4118679.745	1051.316	OPEN TERRAIN	NVA49
0047	240072.051	4116203.863	1084.649	OPEN TERRAIN	NVA50
0048	232650.178	4109906.829	1090.288	OPEN TERRAIN	NVA51
0049	247081.291	4106247.182	1065.294	OPEN TERRAIN	NVA52
0050	262594.662	4113872.050	1013.823	OPEN TERRAIN	NVA53
0051	269184.715	4105686.941	1020.756	OPEN TERRAIN	NVA54
0052	256627.250	4105044.067	1040.984	OPEN TERRAIN	NVA55
0053	262114.952	4100333.924	1034.832	OPEN TERRAIN	NVA56
0054	261404.268	4101018.784	1041.184	OPEN TERRAIN	NVA56_X
0055	239083.149	4103276.024	1083.298	OPEN TERRAIN	NVA58
0056	230301.246	4100307.038	1100.685	OPEN TERRAIN	NVA59
0057	278347.109	4134448.012	970.403	OPEN TERRAIN	NVA60
0058	279123.311	4135268.523	968.798	OPEN TERRAIN	NVA60_X
0059	289853.791	4140770.948	917.186	OPEN TERRAIN	NVA61
0060	292023.707	4135679.668	946.602	OPEN TERRAIN	NVA62
0061	302951.230	4140370.869	915.147	OPEN TERRAIN	NVA63
0062	316131.110	4136646.861	899.290	OPEN TERRAIN	NVA64
0063	316130.762	4136636.962	899.088	OPEN TERRAIN	NVA64_X
0064	308665.992	4131112.846	922.722	OPEN TERRAIN	NVA65
0065	317441.262	4127067.594	903.810	OPEN TERRAIN	NVA66
0066	286975.601	4129319.595	960.794	OPEN TERRAIN	NVA68
0067	276153.587	4129642.007	975.368	OPEN TERRAIN	NVA69
0068	283346.686	4124573.825	972.907	OPEN TERRAIN	NVA70
0069	294871.402	4124302.427	950.112	OPEN TERRAIN	NVA71
0070	306977.892	4124510.705	924.722	OPEN TERRAIN	NVA72
0071	300831.962	4098315.505	930.684	OPEN TERRAIN	NVA74
0072	295557.338	4116440.402	938.624	OPEN TERRAIN	NVA75
0073	279566.591	4119840.937	972.349	OPEN TERRAIN	NVA76
0074	276197.084	4113110.544	985.108	OPEN TERRAIN	NVA77_X



PointID	Easting	Northing	Height	Class	Field Designations
0075	309195.258	4115925.898	912.070	OPEN TERRAIN	NVA78
0076	315362.419	4109340.708	905.163	OPEN TERRAIN	NVA79
0077	315315.252	4109335.059	905.580	OPEN TERRAIN	NVA79_X
0078	256734.336	4161778.090	1017.357	OPEN TERRAIN	NVA01
0079	238428.607	4129179.950	1088.033	URBAN	VVA24
0080	266315.101	4110742.996	1010.317	URBAN	NVA04
0081	242424.747	4098856.212	1098.333	URBAN	NVA05
0082	291478.431	4117029.960	948.230	URBAN	NVA06
0083	284791.616	4101973.062	969.785	URBAN	NVA48
0084	233960.207	4103577.143	1078.533	BRUSH	VVA35
0085	263250.102	4106695.534	1023.073	BRUSH	VVA40
0086	316848.862	4135689.381	897.185	BRUSH	VVA41
0087	274739.245	4116779.860	982.414	BRUSH	VVA43
0088	285838.330	4140681.043	938.864	BRUSH	VVA44
0089	313978.153	4141561.914	882.751	BRUSH	VVA46
0090	316848.862	4135689.382	897.185	BRUSH	VVA47
0091	289266.583	4123635.505	960.172	BRUSH	VVA51
0092	297280.183	4121373.345	941.522	BRUSH	VVA53
0093	310084.048	4122303.318	922.142	BRUSH	VVA55
0094	280165.730	4106855.522	999.660	BRUSH	VVA59
0095	309943.943	4111876.932	913.500	BRUSH	VVA63
0096	233457.320	4179552.117	1093.926	CROPS	VVA01
0097	243719.101	4175986.153	1053.290	CROPS	VVA02
0098	251453.704	4178909.329	1023.353	CROPS	VVA03
0099	261891.017	4175191.156	991.246	CROPS	VVA04
0100	267828.263	4179934.453	1007.822	CROPS	VVA05
0101	267825.182	4168569.763	977.163	CROPS	VVA06
0102	253042.169	4169430.987	1024.084	CROPS	VVA07
0103	246289.812	4164491.916	1053.841	CROPS	VVA08
0104	235262.372	4163318.079	1105.024	CROPS	VVA09
0105	274594.472	4155503.220	968.401	CROPS	VVA11
0106	260995.611	4151045.043	1006.982	CROPS	VVA12
0107	253696.222	4157723.632	1030.902	CROPS	VVA13
0108	244467.022	4152403.950	1064.503	CROPS	VVA14
0109	254810.247	4144797.217	1025.863	CROPS	VVA16
0110	235402.424	4143808.701	1096.901	CROPS	VVA17
0111	235845.221	4155209.273	1092.247	CROPS	VVA18
0112	227918.668	4146677.290	1125.745	CROPS	VVA19
0113	276575.870	4142570.610	966.523	CROPS	VVA20
0114	276712.496	4171526.060	956.903	CROPS	VVA21



PointID	Easting	Northing	Height	Class	Field Designations
0115	235368.472	4137417.057	1095.584	CROPS	VVA22
0116	226704.766	4132032.323	1128.868	CROPS	VVA23
0117	251353.656	4135273.002	1036.617	CROPS	VVA25
0118	259613.596	4130120.240	1016.752	CROPS	VVA26
0119	266923.077	4126746.298	1007.455	CROPS	VVA27
0120	230673.298	4119711.964	1117.027	CROPS	VVA30
0121	245846.205	4122510.133	1060.092	CROPS	VVA31
0122	258688.679	4119640.434	1037.984	CROPS	VVA32
0123	239259.762	4114615.244	1088.692	CROPS	VVA33
0124	227412.093	4115850.148	1132.144	CROPS	VVA34
0125	234969.238	4098301.476	1109.249	CROPS	VVA36
0126	254838.569	4110888.534	1030.794	CROPS	VVA38
0127	256472.352	4097915.807	1056.798	CROPS	VVA39
0128	271160.818	4101633.456	1010.616	CROPS	VVA42
0129	299204.308	4137190.507	928.517	CROPS	VVA45
0130	296754.136	4132209.495	941.205	CROPS	VVA48
0131	300563.271	4125390.665	937.608	CROPS	VVA49
0132	277767.480	4124721.428	978.261	CROPS	VVA50
0133	285867.753	4118088.652	959.169	CROPS	VVA52
0134	313724.709	4125461.144	912.062	CROPS	VVA54
0135	316467.328	4116556.713	895.180	CROPS	VVA56
0136	303600.309	4116280.623	923.062	CROPS	VVA57
0137	283166.540	4111708.167	976.388	CROPS	VVA58
0138	280633.020	4097498.759	983.158	CROPS	VVA60
0139	290483.698	4104238.344	957.382	CROPS	VVA61
0140	303385.045	4107173.721	930.837	CROPS	VVA62
0141	307529.783	4098259.270	915.892	CROPS	VVA64
0142	296356.367	4095006.718	940.806	CROPS	VVA65
0143	252970.245	4127878.805	1035.521	TREE	NVA03
0144	272973.990	4136195.581	982.054	TREE	VVA28
0145	255289.765	4123848.799	1036.440	TREE	VVA29
0146	247873.750	4106300.161	1061.512	TREE	VVA37
1001	255977.718	4135087.816	1029.959	OPEN TERRAIN	GCP08
1002	236489.095	4131277.879	1091.921	OPEN TERRAIN	GCP09
1003	251453.962	4120756.224	1039.459	OPEN TERRAIN	GCP10
1004	269842.843	4126640.534	999.877	OPEN TERRAIN	GCP11
1005	262526.870	4113962.721	1014.448	OPEN TERRAIN	GCP12
1006	245451.914	4108777.605	1057.375	OPEN TERRAIN	GCP14
1007	232797.666	4114834.376	1113.615	OPEN TERRAIN	GCP15
1008	237397.828	4181095.881	1073.068	OPEN TERRAIN	NVA08

PointID	Easting	Northing	Height	Class	Field Designations
1009	267646.041	4173507.399	980.864	OPEN TERRAIN	NVA11
1010	248733.926	4174117.371	1036.704	OPEN TERRAIN	NVA12
1011	265664.591	4161425.061	991.067	OPEN TERRAIN	NVA20
1012	276931.855	4161062.324	955.020	OPEN TERRAIN	NVA21
1013	316942.889	4099676.137	903.298	OPEN TERRAIN	NVA22
1014	247811.975	4154857.314	1053.834	OPEN TERRAIN	NVA24
1015	239616.154	4150265.153	1082.735	OPEN TERRAIN	NVA26
1016	274153.100	4145865.782	965.062	OPEN TERRAIN	NVA29
1017	262751.294	4144522.296	999.508	OPEN TERRAIN	NVA30
1018	293499.196	4105002.439	951.558	OPEN TERRAIN	NVA37
1019	262114.952	4100333.924	1034.832	OPEN TERRAIN	NVA56
1020	278347.109	4134448.012	970.404	OPEN TERRAIN	NVA60
1021	316131.110	4136646.861	899.290	OPEN TERRAIN	NVA64
1022	294871.402	4124302.427	950.112	OPEN TERRAIN	NVA71
1023	276148.941	4110852.001	993.647	OPEN TERRAIN	NVA77
1024	309195.258	4115925.898	912.071	OPEN TERRAIN	NVA78
1025	315362.419	4109340.708	905.163	OPEN TERRAIN	NVA79



1.5 Magnet Relay Report

Project name: 1164_MAG RELAY

Project folder: C:\Users\scott.jones\Documents\MAGNET Tools Jobs

Creation time: 2/18/2016

2:17:54 PM

Created by: Scott

Jones

Comment:

Linear unit: Meters

Angular unit: DMS

Projection: UTMNorth-Zone_14 : 102W to

96W

Datum: NAD83_NO_TRANS

Geoid: None

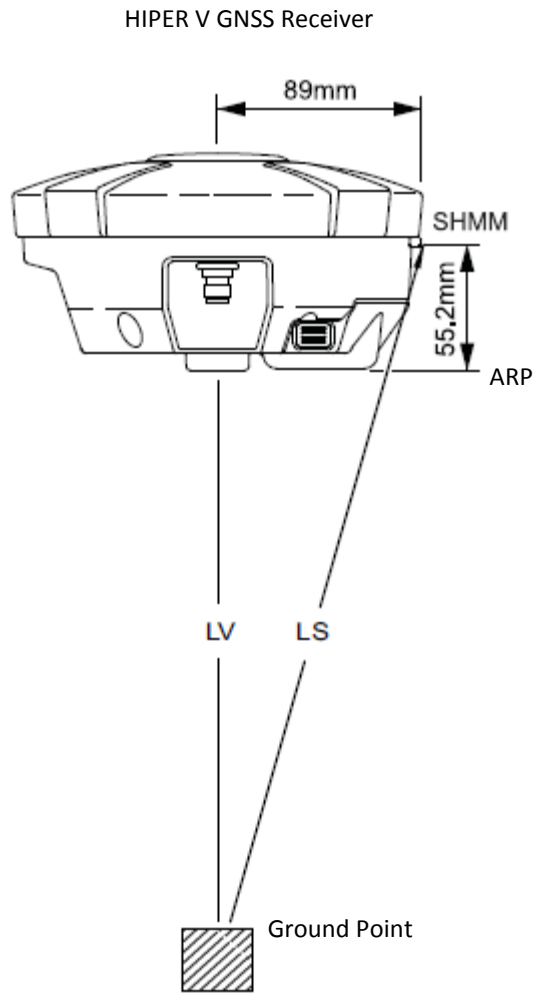
Time Zone: GMT Standard Time

Name	Horz RMS (m)	Vert RMS (m)	RMS	Epochs	GPS Satellites	GLONASS Satellites	PDOP
Base1 (0)-NVA01	0.001	0.001	0.001	90	7	6	1.508
Base1 (0)-NVA20	0.001	0.001	0.001	90	6	6	1.719
Base2 (0)-NVA31	0.002	0.002	0.003	90	0	6	2.287
Base2 (0)-NVA37	0.002	0.003	0.003	90	0	6	2.358
Base2 (0)-NVA40	0.001	0.001	0.001	90	0	6	2.296
Base2 (0)-NVA40	0.001	0.001	0.002	90	0	5	3.006
Base2 (0)-NVA40	0.001	0.001	0.001	90	7	6	1.546
Base2 (0)-NVA40	0.001	0.001	0.002	90	0	5	2.976
Base2 (0)-NVA40	0.001	0.001	0.002	90	0	5	3.095
Base2 (0)-NVA40	0.001	0.001	0.001	90	7	6	1.461
Base2 (0)-NVA43	0.001	0.002	0.002	90	7	5	1.729
Base2 (0)-NVA64	0.001	0.002	0.002	90	7	6	1.621
Base2 (0)-NVA75	0.001	0.001	0.002	90	0	6	2.821
Base2 (0)-NVA75	0.001	0.001	0.002	90	0	5	3.225
Base2 (0)-NVA75	0.001	0.001	0.001	90	7	6	1.669
Base2 (0)-NVA75	0.001	0.001	0.002	90	0	6	2.227
Base2 (0)-NVA75	0.001	0.001	0.002	90	0	6	2.313
Base2 (0)-NVA75	0.001	0.001	0.002	90	0	5	3.135
Base2 (0)-NVA76	0.001	0.004	0.004	90	0	7	3.097
Base2 (0)-NVA79	0.001	0.002	0.003	90	6	6	1.798
Base2 (0)-VVA43	0.002	0.003	0.003	90	0	7	2.227
Base2 (0)-VVA51	0.001	0.001	0.001	90	7	5	1.857
Base2 (0)-VVA52	0.001	0.002	0.002	90	0	7	3.314
Base2 (0)-VVA62	0.002	0.003	0.003	90	0	6	2.263
Base2 (0)-VVA63	0.002	0.003	0.004	90	0	5	2.973
HQGA (0)-1209_NVA40	0.001	0.001	0.001	90	6	6	1.808



HQGA (0)-1209_NVA40	0.001	0.001	0.002	90	0	5	3.049
HQGA (0)-1209_NVA40	0.001	0.001	0.001	90	7	6	1.517
HQGA (0)-1209_NVA40	0.001	0.001	0.002	90	0	5	2.927
HQGA (0)-1209_NVA40	0.001	0.001	0.002	90	0	6	2.685
HQGA (0)-1209_NVA40	0.001	0.001	0.001	90	0	6	2.534
HQGA (0)-1209_NVA75	0.001	0.001	0.002	90	0	6	2.611
HQGA (0)-1209_NVA75	0.001	0.001	0.002	90	0	6	2.653
HQGA (0)-1209_NVA75	0.001	0.001	0.001	90	7	6	1.656
HQGA (0)-1209_NVA75	0.001	0.001	0.002	90	0	6	2.227
HQGA (0)-1209_NVA75	0.001	0.001	0.001	90	7	6	1.508
HQGA (0)-1209_NVA75	0.001	0.001	0.001	90	0	6	2.294

1.6 GNSS Receiver Diagrams

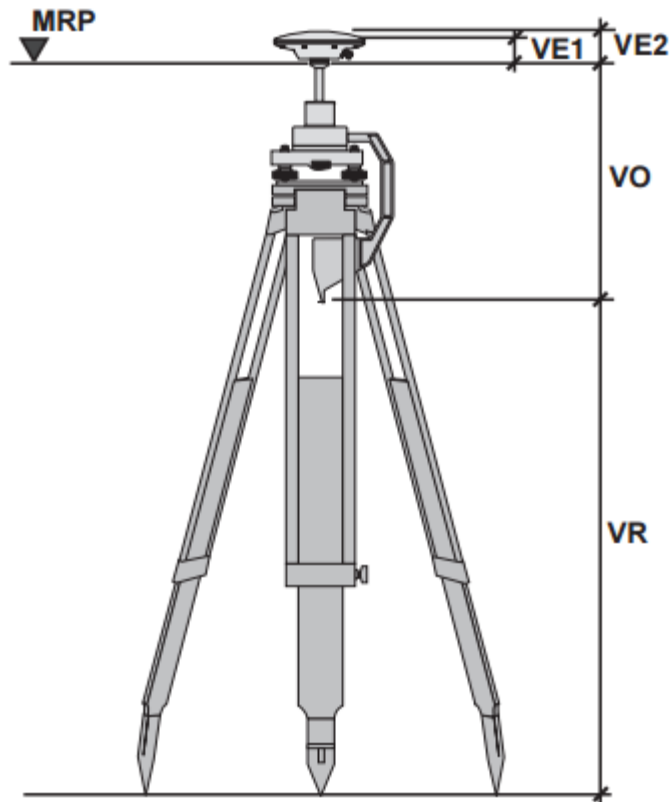


ARP = Antenna Reference Point
 LV = Level Vertical
 LS = Level Slope
 SHMM = Slant Height Measurement Mark

Note:

Fixed Rod setup would use the LV measurement.
 Tripod setup would use the LS measurement and
 Calculate the LV measurement.

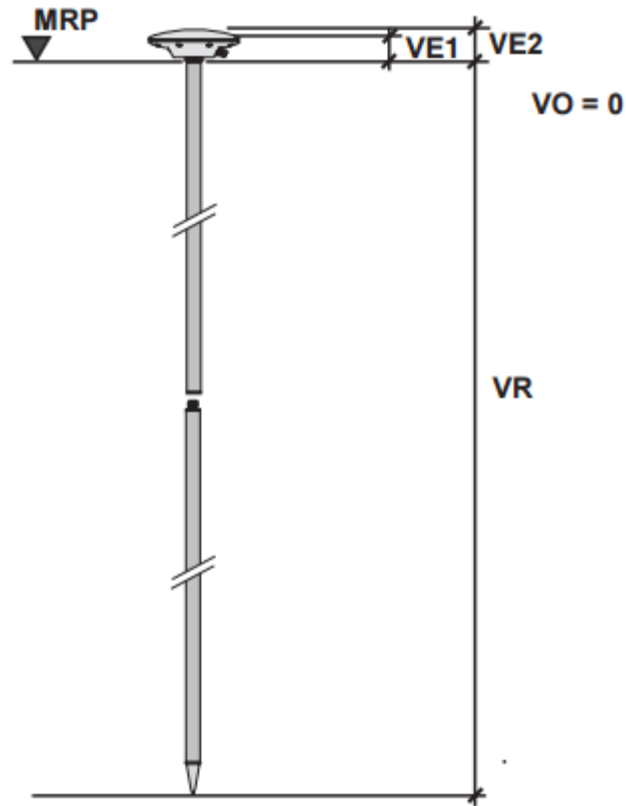
Leica SR530 GPS Receiver
(Tripod setup measurement)



- VO = Vertical Offset (0.36m standard offset for tripod setup)
- VR = Vertical Height Reading
- VE1 = Vertical Phase Center Eccentricity for L1
- VE2 = Vertical Phase Center Eccentricity for L2 MRP Mechanical Reference Plane
- MRP = Mechanical Reference Plane (Also known as ARP = Antenna Reference Point)

$VO + VR (0.36m) = \text{Vertical Height to MRP}$

Leica SR530 GPS Receiver
 (Fixed Rod setup)



- VO = Vertical Offset (0.00m standard offset for fixed rod setup)
- VR = Vertical Height Reading
- VE1 = Vertical Phase Center Eccentricity for L1
- VE2 = Vertical Phase Center Eccentricity for L2 MRP Mechanical Reference Plane
- MRP = Mechanical Reference Plane (Also known as ARP = Antenna Reference Point)

1.7 Custody Transference Assurance

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