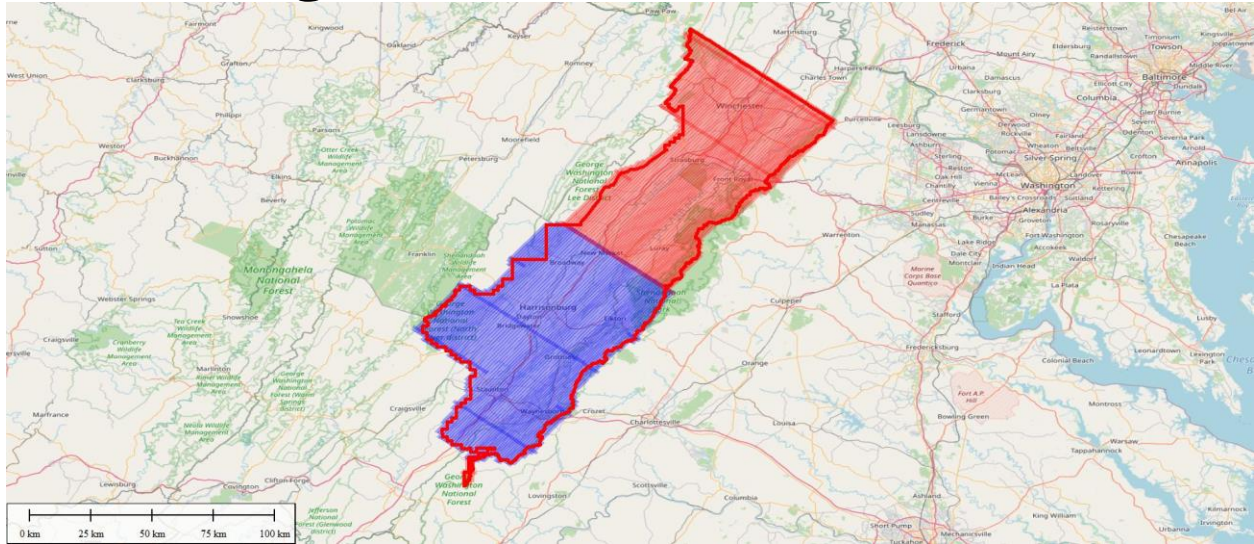


REPORT OF LIDAR SURVEY

United States Geological Survey

Ground Control Report

Virginia-Northern Shenandoah



Performed by:

TerraSurv

For:

Fugro Geospatial

Contents

Figures.....	2
Tables.....	2
INTRODUCTION.....	3
CONTROL.....	5
STATIONS.....	5
METHODOLOGY.....	11
RTX OCCUPATIONS.....	28
LEAST SQUARES ADJUSTMENTS.....	29
SUMMARY.....	34
Adjusted Coordinates.....	35

Figures

Figure 1 – Project Layout.....	3
Figure 2 – Calibration Points (GCP).....	4
Figure 3 - Non-Vegetated QC Checkpoints (NVA).....	4
Figure 4 - Vegetated QC checkpoints (Forested and Non-Forested).....	5
Figure 5 - Repeat Baseline Analysis.....	28
Figure 6 - Constrained Adjustment Residuals (meters).....	30

Tables

Table 1 - Map Symbolology and Control Quantity.....	3
Table 2 - Station List.....	5
Table 3 – VRS/RTK Occupation Summary.....	11
Table 4 - Repeat Baseline Analysis (meters).....	20
Table 5 - Locations surveyed with RTX.....	28
Table 6 - Real Time RTX Observations.....	28
Table 7 – Post-Processed RTX Observations.....	29
Table 8 - Transformed RTX Solutions (UTM Zone 17).....	29
Table 9 - Station Confidence Regions @ 95% meters.....	30
Table 10 - Adjusted Coordinates.....	35
Table 11 - State Plane Coordinates.....	40

REPORT OF USGS LIDAR SURVEY NORTHERN SHENANDOAH VIRGINIA

INTRODUCTION

Terrasurv, Inc of Pittsburgh, PA was tasked by Fugro Geospatial with performing a control survey in support of LiDAR data collection of the northern Shenandoah Valley in western Virginia. The project consisted of two parts: 40 ground control (calibration) points (GCP) and 150 quality control points (QC: NVA/VVA/VVAF), for a total of 190 new stations. The map in figure 1 shows the location of the project, with flight lines and all of the GCP and QC points. Figures 2 through 4 show the GCP, NVA, and VVA points. The control symbology for figures 1 through 4 are listed in table 1. Also shown are the Continuously Operating Reference Stations used to control the network.

Table 1 - Map Symbology and Control Quantity

Type	Symbol	VA Quantity
Ground Control (GCP)	Green Dot	40 (+2)
Non-Vegetated (NVA)	Red Dot	85
Vegetated (VVA)	Yellow X	5
Woods (VVA-F)	Red X	60
CORS	Red cross in white square	8

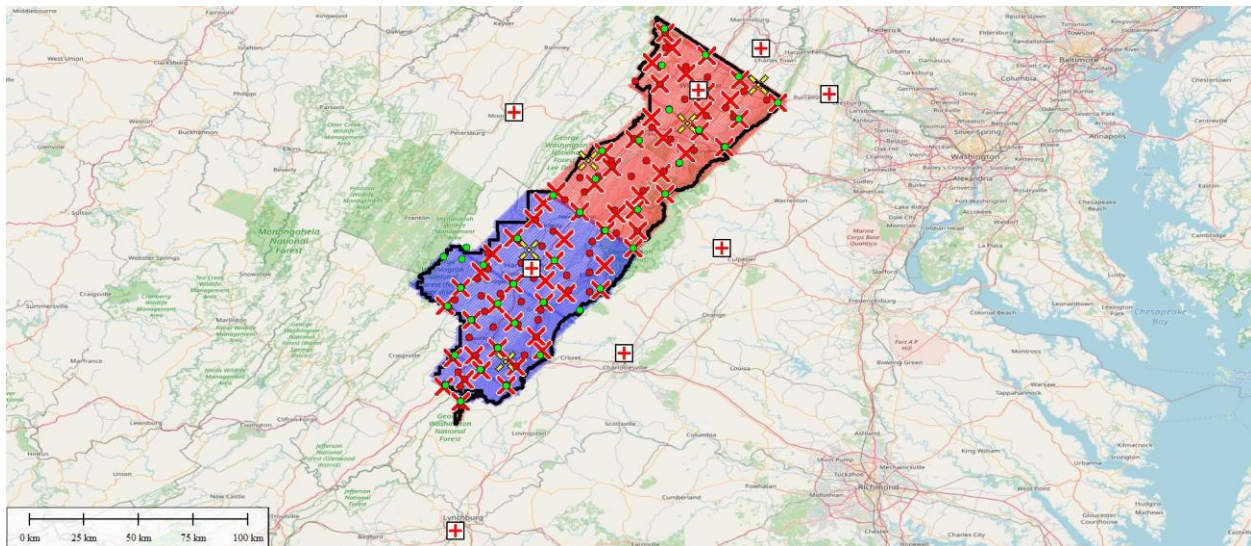


Figure 1 – Project Layout

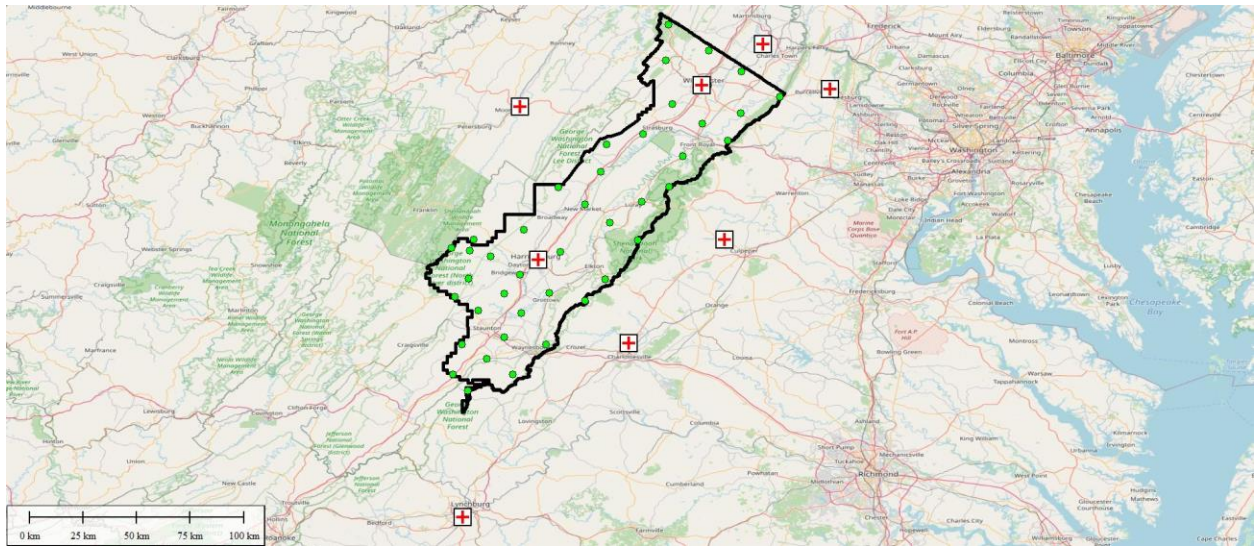


Figure 2 – Calibration Points (GCP)

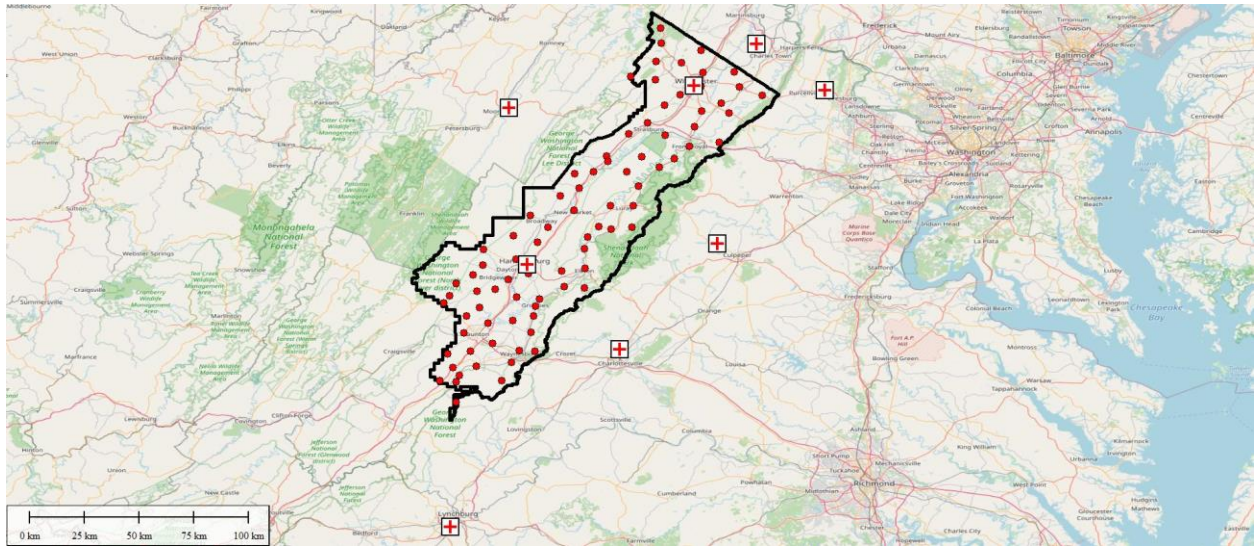


Figure 3 - Non-Vegetated QC Checkpoints (NVA)

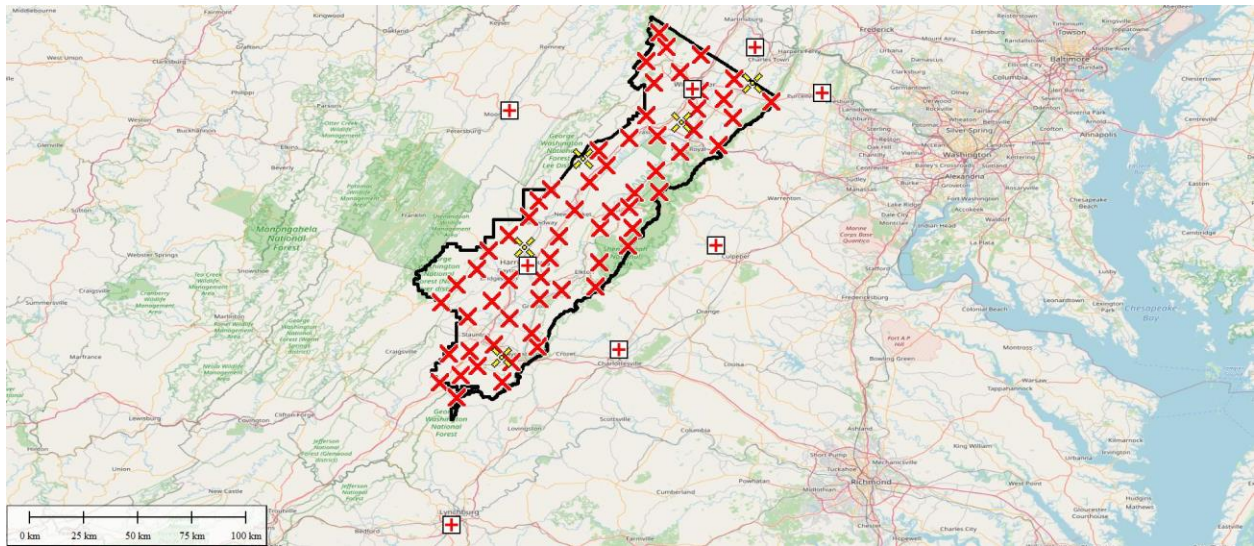


Figure 4 - Vegetated QC checkpoints (Forested and Non-Forested)

CONTROL

The National Spatial Reference System (NSRS) was used to provide control for the network. The [KeyNetGPS](#) real time network (RTN) was utilized, with a total of eight CORS from the system being used. The horizontal datum was the North American Datum of 1983 – NAD83 (2011), epoch 2010.0. The vertical datum was the North American Vertical Datum of 1988 (NAVD88), realized with the GEOID18 geoid model from the National Geodetic Survey (NGS).

STATIONS

Table 2 lists the stations established in this survey, including the GCP (calibration), NVA (Non-Vegetated QC), VVA (Non-Forested Vegetated QC), and VVA-F (Forested Vegetated QC), and the eight CORS. Not listed are the temporary base points (20046Wx, 20046Xx, and 20046JZx) set to survey the Forested VVA checkpoints. Two extra GCP points were surveyed near GCP14, which was unreachable due to ice on the 4WD trail. GCP14 was surveyed at the extreme edge of the flight lines, and the two additional stations, GCP14A and GCP14B, were surveyed at locations in the area where further travel became impossible due to the ice.

Table 2 - Station List

Station Name	GPSID	USGS Quadrangle	Description
BCC2	BCC2	WINCHESTER	KEYNET CORS
WVKE	WVKE	MIDDLEWAY	KEYNET CORS
MAS2	MAS2	PURCELLVILLE	KEYNET CORS
KP13	KP13	CASTLETON	KEYNET CORS
JMU1	JMU1	HARRISONBURG	KEYNET CORS
WVMF	WVMF	MOOREFIELD	National/KEYNET CORS
DP02	DP02	CITY FARM	KEYNET CORS
DP01	DP01	CHARLOTTESVILLE EAST	KEYNET CORS
GCP01	20046AA	RIDGE	BARE=center of a crossover along US522 at SR734.
GCP02	20046AB	WHITE HALL	BARE=center of a cul-de-sac on the north side of Baldwin Circle.

Station Name	GPSID	USGS Quadrangle	Description
GCP03	20046AC	STEPHENSON	BARE=centerline of Withers Larue Road and north side of Crums Church Road.
GCP04	20046AD	BLUEMONT	BARE=center of a gravel parking lot for the Appalachian Trail on the south side of US7.
GCP05	20046AE	VESUVIUS	BARE=gravel parking on the north side of Spottswood Road and at a garage.
GCP06	20046AF	MIDDLETOWN	BARE=centerline of a gravel drive on the east side of Clarke Road.
GCP07	20046AG	STEPHENS CITY	BARE=center of a crossover along US340 at the regional jail.
GCP08	20046AH	LINDEN	BARE=centerline of Freezeland Loop Road and north side of Freezeland Manor Road.
GCP09	20046AI	WOODSTOCK	BARE=gravel centerline of a field access on the southwest side of a corner of Wiseman Road.
GCP10	20046AJ	TIMBERVILLE	BARE=centerline of Old Kiln Lane and south edge of North mountain Road.
GCP11	20046AK	NEW MARKET	BARE=center of a gravel pull off at the Battle of New Market Civil War memorial on the west side of US11.
GCP12	20046AL	STANLEY	gravel/old road in NE quadrant of intersection of US 340 and Leaksville Road
GCP13	20046AM	BIG MEADOWS	center of Rapidan Road (asphalt) on south side of Skyline Road
GCP14	20046AN	BRANDYWINE	BARE=dirt ground at a turn in Union Springs Trail
GCP14A	20046HI	REDDISH KNOB	gravel in parking area at upstream end of reservoir on Hone Quarry Road
GCP14B	20046HJ	REDDISH KNOB	gravel road surface at road intersection at top of hill at WV/VA line
GCP15	20046AO	BRIERY BRANCH	BARE=centerline of Daniel Cupp Road and west edge of Waggy's Creek Road
GCP16	20046AP	MOUNT SIDNEY	asphalt parking lot for Monger Park on east side of US 11
GCP17	20046AQ	GROTTOES	asphalt parking lot for post office on north side of N Main Street
GCP18	20046AR	MCGAHEYSVILLE	asphalt parking lot at Loft Mountain store
GCP19	20046AS	STOKESVILLE	gravel parking lot for church on south side of N River Road
GCP20	20046AT	STOKESVILLE	mowed grass on south side of US 250
GCP21	20046AU	STAUNTON	asphalt pavement on Luck Stone Road on SE side of Franks Mill Rod/Union Church Road
GCP22	20046AV	WAYNESBORO EAST	BARE=centerline of entrance drive to parking lot for Glen Kirk Church on the east side of Calf Mountain Road.
GCP23	20046AW	SWIFT RUN GAP	gravel parking lot on east side of Sandy Bottom Road and south side of church
GCP24	20046AX	VESUVIUS	BARE=centerline of the access drive from Tye River Turnpike and east edge of the Blue Ridge Parkway.
GCP25	20046AY	GREENVILLE	BARE=gravel pull off on the southeast side of Middlebrook Road and opposite a farmhouse.
GCP26	20046AZ	SHERANDO	BARE=gravel centerline of a drive to Sand Spring Church on the west side of Mt Torrey Road
GCP27	20046BA	WAYNESBORO WEST	BARE=centerline intersection of Bobbys Way and a drive to the south.
GCP28	20046BB	FORT DEFIANCE	BARE=gravel centerline of a private drive to 1287 and on the west edge of Dam Town Road.
GCP29	20046BC	HARRISONBURG	asphalt at entrance to golf club on north side of Pack Saddle Trail
GCP30	20046BD	EDINBURG	BARE=centerline of Lindsay Lane and west edge of Old Valley Pike.
GCP31	20046BE	THORNTON GAP	pavement in parking lot at Elkwallow store
GCP32	20046BF	GORE	BARE=center of a crossover along US50 and at the Gore Post Office.
GCP33	20046BG	WINCHESTER	BARE=center of the Orkney Drive cul-de-sac.
GCP34	20046BH	BOYCE	BARE=west side of a crossover along US7/50 at Millwood Road.

Station Name	GPSID	USGS Quadrangle	Description
GCP35	20046BI	MOUNT SIDNEY	gravel road surface of Slate Hill Road on NW side of Roman Road
GCP36	20046BJ	LURAY	asphalt in middle of cul-de-sac at north end of Brown Court
GCP37	20046BK	STUARTS DRAFT	BARE=south edge of Cranberry Drive at a cul-de-sac
GCP38	20046BL	SINGERS GLEN	BARE=asphalt centerline of Frank Lane Road and north edge of Turleytown road.
GCP39	20046BM	BENTONVILLE	asphalt shoulder on SE side of US 340
GCP40	20046BN	TOMS BROOK	BARE=center of entrance drive to Round Hill Church on the south shoulder of US11.
NVA01	20046BO	RIDGE	BARE=centerline of a private drive on the west side of US522 and opposite the intersection of SR696.
NVA02	20046BP	WHITE HALL	BARE=center of the intersection of Baldwin Circle and Spartan Court and Crispin Trail.
NVA03	20046BQ	STEPHENSON	BARE=northern part of the intersection of Wither Larue Road and Crums Church Road.
NVA04	20046BR	BERRYVILLE	BARE=center of a gravel pull off on the southside of Castleman Road and north side of US7.
NVA05	20046BS	GORE	BARE=center of drive and parking off of the south of US50 and the Hebron Church.
NVA06	20046BT	WINCHESTER	BARE=center of the Flanagan Drive cul-de-sac.
NVA07	20046BU	BOYCE	BARE=centerline of Thornton Road and north side of US7/US50.
NVA08	20046BV	MIDDLETOWN	BARE=center of the western drive to Richards Orchard on the north side of Middle Road.
NVA09	20046BW	FRONT ROYAL	BARE=center of Success Road cul-de-sac.
NVA10	20046BX	LINDEN	BARE=center of Freezeland View Lane cul-de-sac.
NVA11	20046BY	TOMS BROOK	BARE=southwest quadrant of the truck entrance to Pilot on the north side of Mt Olive Road
NVA12	20046BZ	WOODSTOCK	BARE=center of the Sun Poppy Court cul-de-sac.
NVA13	20046CA	BENTONVILLE	asphalt shoulder on NW ide of US 340
NVA14	20046CB	RILEYVILLE	asphalt parking lot for church on SE side of US 340
NVA15	20046CC	LURAY	asphalt in middle of cul-de-sac at north end of Hite Court
NVA16	20046CD	EDINBURG	BARE=center of a gravel parking lot for the Reasoning tree Church on the north side of US11.
NVA17	20046CE	NEW MARKET	BARE=centerline of a rock outcropping drive to Forestville-Quickburg Community Center.
NVA18	20046CF	STANLEY	gravel parking lot at NW end of Painter Drive
NVA19	20046CG	NEW MARKET	BARE=center of the Sun Briar Court cul-de-sac.
NVA20	20046CH	STANLEY	asphalt in parking lot on east side of Sunoco station on south side of US 340
NVA21	20046CI	SWIFT RUN GAP	paved driveway on SE side of Beldor Road just north of Collie Crest Drive
NVA22	20046CJ	HARRISONBURG	BARE=asphalt parking lot on the south side of Buffalo Drive and east of Old Furnace Road.
NVA23	20046CK	SINGERS GLEN	BARE=north part of a parking lot for Donovan Church
NVA24	20046CL	BRIERY BRANCH	BARE=gravel drive on the south side of US33.
NVA25	20046CM	BRIERY BRANCH	gravel parking lot for store in east quadrant of intersection of Clover Hill Road and VA 257 Ottobine Road
NVA26	20046CN	MOUNT SIDNEY	gravel parking area along entrance to truck wash on west side of US 11
NVA27	20046CO	GROTTOES	asphalt entrance (northwesterly of two) to old school now church on west side of Port Republic Road
NVA28	20046CP	GROTTOES	asphalt parking lot on east side of Verizon building in SW quadrant of intersection of Aspen Avenue and 4th Street
NVA29	20046CQ	FORT DEFIANCE	BARE=gravel centerline of a private drive on the west side of Dam Town Road.
NVA30	20046CR	PARNASSUS	asphalt parking lot behind church on east side of Spring Hill Road
NVA31	20046CS	STOKESVILLE	paved entrance to gas station on north side of N River Road and east side of Hearth Stone Lane

Station Name	GPSID	USGS Quadrangle	Description
NVA32	20046CT	STOKESVILLE	gravel and broken asphalt on SW side of US 250 between two driveways
NVA33	20046CU	STAUNTON	gravel field entrance on SE side of Union Church Road
NVA34	20046CV	STUARTS DRAFT	BARE=centerline intersection of Bobbys Way and Haggerty Lane
NVA35	20046CW	WAYNESBORO EAST	BARE=center of the northern end of a parking lot for the Glen Kirk Church on the east side of Calf Mountain Road.
NVA36	20046CX	GREENVILLE	BARE=gravel drive on the northeast side of Mt Tabor Road and northwest of Middlebrook Road.
NVA37	20046CY	VESUVIUS	BARE=asphalt parking lot for the Spottswood Community Center.
NVA38	20046CZ	STUARTS DRAFT	BARE=gravel pull off on the northeast quadrant of the intersection of Offiter Road and Cold Springs Road.
NVA39	20046DA	SHERANDO	BARE=centerline of a gravel drive to #2564 Mt Torrey Road and on the east side.
NVA40	20046DB	MONTEBELLO	BARE=eastern end of parking for the rest stop on the northwest side of the Blue Ridge Parkway at Whetland Ridge.
NVA41	20046DC	ELKTON EAST	gravel parking lot for church on east side of US 340
NVA42	20046DD	BROADWAY	BARE=asphalt parking lot for Bethel Church on the east side of Phillips Store Road.
NVA43	20046DE	HAMBURG	asphalt in cul-de-sac at north end of Beall Avenue
NVA44	20046DF	NEW MARKET	BARE=center south end of a parking lot for the New Jackson Town Hall.
NVA45	20046DG	BENTONVILLE	gravel drive at edge of asphalt in gas station on NW side of US 340
NVA46	20046DH	EDINBURG	BARE=south end of a gravel lot on the north side of US11.
NVA47	20046DI	STRASBURG	gravel parking lot on NE side of Fort Valley Road
NVA48	20046DJ	STEPHENS CITY	BARE=north center parking lot for Dinosaur Land on the south side of Fairfax Pike and west of Stonewall Jackson Highway.
NVA49	20046DK	BOYCE	BARE=northern end of a gravel parking lot on the east side of Greenway Avenue and south side of Main Street.
NVA50	20046DL	WHITE HALL	BARE=center of a crossover along US522 at Hunting Ridge Road.
NVA51	20046DM	HAYFIELD	BARE=center of a gravel area on the south side of the North Mountain Fire Station
NVA52	20046DN	ELKTON EAST	gravel road along outfield fence in park
NVA53	20046DO	MCGAHEYSVILLE	gravel and broken asphalt parking lot on east side of US 34
NVA54	20046DP	BRIDGEWATER	BARE=center of Leonard Court cul-de-sac.
NVA55	20046DQ	BRIERY BRANCH	asphalt parking lot for church and cemetery on SW side of N River Road
NVA56	20046DR	MOUNT SIDNEY	BARE=asphalt centerline of Summit Church Road and north edge of Fadley Road.
NVA57	20046DS	CRIMORA	asphalt parking lot for church and cemetery on north side of Crimora Mine Road
NVA58	20046DT	STAUNTON	pavement in sheriff's office parking lot on east side of US 11
NVA59	20046DU	WAYNESBORO WEST	BARE=end of a no parking zone at the end of a concrete walk for the southern parking lot for Estes Truck Depot on the east side of Mt Torrey Road.
NVA60	20046DV	STUARTS DRAFT	BARE=centerline of drive to Relax Inn on the north edge of White Hill Road.
NVA61	20046DW	VESUVIUS	BARE=northern end of Pines Church parking lot on the east side of Cold Springs Road.
NVA62	20046DX	VESUVIUS	BARE=dirt centerline of Old Sandbank Lane and east side of Cold Springs Road.

Station Name	GPSID	USGS Quadrangle	Description
NVA63	20046DY	GREENVILLE	BARE=dirt centerline of a drive to a turkey farm on the east side of Stove School Road.
NVA64	20046DZ	WAYNESBORO WEST	BARE=asphalt centerline of Edward Avenue and southwest edge of Fir Street.
NVA65	20046EA	BIG MEADOWS	SE edge of Ida Road at center of drive SE
NVA66	20046EB	TIMBERVILLE	BARE=gravel drive on the south side of Brocks Gap Road
NVA67	20046EC	WINCHESTER	BARE=center of a parking lot lane intersection.
NVA68	20046ED	PARNASSUS	BARE=asphalt centerline of a drive to #3817 on the south side of Scenic Highway Road.
NVA69	20046EE	MIDDLETOWN	BARE=center of the I81S exit to John Marshall Highway.
NVA70	20046EF	FRONT ROYAL	asphalt parking lot
NVA71	20046EG	RILEYVILLE	BARE=asphalt in intersection of Fort Valley Road and Frenchman Pond Road
NVA72	20046EH	RILEYVILLE	BARE=center of a gravel parking lot for the Faith Lutheran Church.
NVA73	20046EI	CAPON SPRINGS	BARE=centerline of a drive on the north side of Carpers Pike.
NVA74	20046EJ	BERRYVILLE	BARE=center of crosswalk on Stuart Court and the south side of Mosby Blvd.
NVA75	20046EK	GORE	BARE=center of the crossover along US522 and SR127.
NVA76	20046EL	STANLEY	asphalt drive to church on east side of US 340
NVA77	20046EM	BROADWAY	BARE=western part of a gravel area on the south side of Simmers Valley Road.
NVA78	20046EN	HARRISONBURG	center of cul-de-sac at SE end of Brookstone Drive
NVA79	20046EO	ELKTON WEST	asphalt parking lot at resort
NVA80	20046EP	MOUNT SIDNEY	pavement on turn radius from Chapel Hill Lane to VA 276 NB
NVA81	20046EQ	CRIMORA	paved entrance to trucking company on east side of US 340
NVA82	20046ER	STAUNTON	BARE=centerline of Exit ramp for SR626 at SR254.
NVA83	20046ES	WINCHESTER	BARE=centerline of Old Middle Road and the south side of Middle Road.
NVA84	20046ET	CONICVILLE	BARE=centerline of farm lane and the west edge of Buck Hill Road.
NVA85	20046EU	STOKESVILLE	gravel road surface in intersection of Stover Shop Road and Stribling Springs Road
VVAF01	20046EV	RIDGE	WOODS=on the west side of a drive to the west of US522 and SR696,
VVAF02	20046EW	WHITE HALL	WOODS=south side of Apple Pie Ridge Road and just north from Baldwin Circle.
VVAF03	20046EX	STEPHENSON	WOODS=south side of Crums Church Road and opposite the parking for Crums Church.
VVAF04	20046EY	BLUEMONT	WOODS=along the Appalachian Trail and south of the Snickers Gap parking lot on the south side of RT 7.
VVAF05	20046EZ	GORE	WOODS=north side of US50
VVAF06	20046FA	WINCHESTER	WOODS=west side of Pembridge Drive and north of Custer Avenue.
VVAF07	20046FB	BOYCE	WOODS=north side of a small clearing on the north side of US7/50 and east from the intersection with Millwood Road.
VVAF08	20046FC	MIDDLETOWN	WOODS=north side of Middle road and northeast from the Lebanon Church.
VVAF09	20046FD	FRONT ROYAL	WOODS=north side of the Success Road cul-de-sac.
VVAF10	20046FE	LINDEN	WOODS=north side of the Freezeland Court cul-de-sac.
VVAF11	20046FF	TOMS BROOK	WOODS=north side of Mt Olive Road and east side of I81.
VVAF12	20046FG	BENTONVILLE	woods/fence line on SE side of US 340
VVAF13	20046FH	WOODSTOCK	WOODS=north side of Dysart Road and southeast side of Back Road.
VVAF14	20046FI	THORNTON GAP	woods on south side of Skyline Drive and west side of parking lot at Elkwallow store

Station Name	GPSID	USGS Quadrangle	Description
VVAF15	20046FJ	EDINBURG	WOODS=north side of Banks Road and west side of Red Banks Road and south of a creek.
VVAF16	20046FK	LURAY	woods on SE side of US 340 east of Redwood Drive
VVAF17	20046FL	TIMBERVILLE	WOODS=between Rinker Road and Bowers Lane.
VVAF18	20046FM	NEW MARKET	WOODS=northeast end of the Battlefield at New Market.
VVAF19	20046FN	LURAY	woods between road and row fence on south side of US211
VVAF20	20046FO	STANLEY	woods in NE quadrant of intersection of US 340 and Leaksville Road
VVAF21	20046FP	BIG MEADOWS	woods on north side of Skyline Drive and west side of horse trail
VVAF22	20046FQ	SWIFT RUN GAP	woods on west side of Sandy Bottom Road and south side of rough driveway
VVAF23	20046FR	HARRISONBURG	light woods in NE quadrant of intersection of Pack Saddle Trail and Mountain Valley Road
VVAF24	20046FS	SINGERS GLEN	WOODS=on the east side of Mayberry Road and a 90 turn in the road.
VVAF25	20046FT	BRIERY BRANCH	WOODS=west side of Peake Mountain Road and north side of US33.
VVAF26	20046FU	MOUNT SIDNEY	woods on east side of US 11 and north side of stream near sewage pump station
VVAF27	20046FV	GROTTOES	woods on south side of river and west side of boat ramp and parking lot on norths side of Jacksons Way
VVAF28	20046FW	PARNASSUS	pine woods on west side of Roman Road
VVAF29	20046FX	STOKESVILLE	woods on SW side of Stokesville Road along creek
VVAF30	20046FY	STOKESVILLE	woods on south side of US 250
VVAF31	20046FZ	STAUNTON	woods on east side of Union Church Road and south side of river
VVAF32	20046GA	FORT DEFIANCE	WOODS=north side of Dam Town Road and east from River Bend Drive
VVAF33	20046GB	WAYNESBORO EAST	WOODS=north side of Dooms Crossing Road and a high-tension power line.
VVAF34	20046GC	WAYNESBORO WEST	WOODS=along a dirt trail south from Bobbys Lane
VVAF35	20046GD	GREENVILLE	WOODS=northeast side of Mt Tabor Road and northwest of Middlebrook Road.
VVAF36	20046GE	STUARTS DRAFT	WOODS=northeast of the intersection of Cold Springs Road and Offiter Road.
VVAF37	20046GF	SHERANDO	WOODS=east side of a private drive and east of Sand Springs Church.
VVAF38	20046GG	VESUVIUS	WOODS=north side of Old B&O Road.
VVAF39	20046GH	VESUVIUS	WOODS=north side of Haines Chapel dirt drive and west of the Blue Ridge Parkway.
VVAF40	20046GI	VESUVIUS	WOODS=on the east side of Cold Springs Road and north side of Pines Church.
VVAF41	20046GJ	STUARTS DRAFT	WOODS=north side of Whites Hill Road and east from US11
VVAF42	20046GK	CRIMORA	woods on north side of cemetery
VVAF43	20046GL	WAYNESBORO WEST	WOODS=between a drive to a truck depot and S Oak Lane and on the north side of MT Torrey Road.
VVAF44	20046GM	MCGAHEYSVILLE	woods on east side of US 340 and north side of Big Run Road and east of power line
VVAF45	20046GN	HARRISONBURG	woods between Old Turnpike Road and railroad
VVAF46	20046GO	TIMBERVILLE	WOODS=north side of the intersection of Brocks Gap Road and Turleytown Road.
VVAF47	20046GP	ELKTON EAST	woods between Naked Creek Road and creek
VVAF48	20046GQ	BIG MEADOWS	woods in SE quadrant of intersection of Ida Road and Ida Hollow Road
VVAF49	20046GR	HAMBURG	woods in NE quadrant of US 211 and Hamburg Road
VVAF50	20046GS	ORKNEY SPRINGS	WOODS=south side of Senedo Road
VVAF51	20046GT	EDINBURG	WOODS=west side of US11.
VVAF52	20046GU	FRONT ROYAL	woods on north side of Rivermont Drive
VVAF53	20046GV	STRASBURG	woods on south side of SR 55 and west side of Stoney Mountain Drive

Station Name	GPSID	USGS Quadrangle	Description
VVAF54	20046GW	HAYFIELD	WOODS=west side of Tomahawk Trail and opposite the intersection with Rosenberger Lane.
VVAF55	20046GX	STEPHENS CITY	WOODS=northwest of the Rainfield Road cul-de-sac.
VVAF56	20046GY	BOYCE	WOODS=north side of Summerfield Road and west of Janeville Road.
VVAF57	20046GZ	GORE	WOODS=north side of Nelson Chapel Lane
VVAF58	20046HA	WINCHESTER	WOODS=west side of Old Bethel Church Road and opposite Boggess Lane.
VVAF59	20046HB	TENTH LEGION	WOODS=behind the Boy Scouts building
VVAF60	20046HC	BRIERY BRANCH	woods on SE side of Lambert Town Road and south side of stream
VVANF01	20046HD	WAYNESBORO WEST	BRUSH=south side of Stuarts Draft Highway and west of a retention pond.
VVANF02	20046HE	BROADWAY	BRUSH=south side of Harpine Highway and opposite Woods Edge Farm Stand
VVANF03	20046HF	WOLF GAP	BRUSH=north side of Wolf Gap Road and west side of Earl Sine Road.
VVANF04	20046HG	STEPHENS CITY	GRASS=northeast field of a cemetery behind Salem Church.
VVANF05	20046HH	BERRYVILLE	BRUSH=grass median of US340 and intersection with Oakland Lane.

The stations were not permanently marked.

METHODOLOGY

The field survey was done by using three Trimble R10 and one Trimble Alloy dual frequency, multi-constellation GNSS receivers in a real time (RTK/VRS) mode. Corrections were obtained from the Keynet VRS network with corrections delivered over the cellular network. These corrections are applied in real time and used by the rover receiver to converge to a cm level solution. Each station was occupied once for 3 minutes (180 epochs), then re-initialized and occupied a second time immediately after the first occupation. The solutions are stored as vectors from the nearest physical CORS. The woods checkpoints (VVA-F) were located by establishing a temporary base nearby using the VRS network and then using the R10 as a rover with corrections delivered over a radio link (RTK). Three locations did not have cellular service. Four points at these three locations (two VVA-F and two GCP) were surveyed using the Trimble RTX method. These are discussed later in the report in the RTX Occupations section. Due to a bug in the field software V6.21, the vectors from the woods bases to the woods checkpoints were stored with an additional offset of up to several meters which varied at each station. The offset was corrected in the processing. Observations to woods points done after 12/26/2020 were unaffected due to a new version of field software. Table 3 summarizes the VRS/RTK occupations (precisions in meters). Occupations with ~~strikethrough~~ were rejected.

Table 3 – VRS/RTK Occupation Summary

GPS BASE	GPSID	UTC Start	UTC End	Horz Prec	Vert Prec	# of SV's	PDOP
BCC2	20046EG	11/23/2020 12:15:12	12:26:06	0.013	0.034	8	2.8
BCC2	20046EE	11/23/2020 12:33:25	12:39:54	0.030	0.098	12	1.7
BCC2	20046EC	11/23/2020 12:41:13	12:44:13	0.012	0.028	6	3.0
BCC2	20046EC	11/23/2020 12:45:28	12:49:31	0.010	0.023	7	2.3
BCC2	20046AC	11/23/2020 13:06:33	13:09:32	0.012	0.030	6	2.9
BCC2	20046AC	11/23/2020 13:10:06	13:13:05	0.014	0.034	7	3.3
BCC2	20046BQ	11/23/2020 13:15:54	13:18:53	0.013	0.030	7	3.3

GPS BASE	GPSID	UTC Start	UTC End	Horz Prec	Vert Prec	# of SV's	PDOP
BCC2	20046BQ	11/23/2020 13:19:22	13:22:21	0.012	0.029	7	3.3
WVKE	20046BQ	11/23/2020 13:39:47	13:42:46	0.009	0.014	14	1.4
WVKE	20046WA	11/23/2020 13:50:11	13:53:10	0.010	0.015	13	1.7
WVKE	20046WA	11/23/2020 13:53:34	13:56:33	0.013	0.020	13	1.8
20046WA	20046EX	11/23/2020 14:00:25	14:03:24	0.007	0.009	16	1.5
20046WA	20046EX	11/23/2020 14:03:50	14:06:49	0.006	0.009	19	1.4
WVKE	20046HH	11/23/2020 14:24:08	14:27:08	0.010	0.019	14	1.4
WVKE	20046HH	11/23/2020 14:27:34	14:32:44	0.008	0.016	14	1.5
BCC2	20046EJ	11/23/2020 14:40:37	14:43:36	0.010	0.016	16	1.2
BCC2	20046EJ	11/23/2020 14:44:26	14:46:51	0.020	0.029	16	1.2
WVKE	20046BR	11/23/2020 15:08:20	15:11:19	0.011	0.019	14	1.5
MAS2	20046BR	11/23/2020 15:23:02	15:26:52	0.011	0.019	14	1.5
MAS2	20046BR	11/23/2020 15:27:19	15:28:24	0.023	0.044	16	1.3
MAS2	20046BR	11/23/2020 15:29:18	15:32:21	0.012	0.020	14	1.5
MAS2	20046AD	11/23/2020 15:40:29	15:43:28	0.010	0.017	15	1.4
MAS2	20046AD	11/23/2020 15:44:18	15:47:17	0.010	0.018	15	1.5
MAS2	20046WB	11/23/2020 15:52:16	15:55:15	0.009	0.016	15	1.5
MAS2	20046WB	11/23/2020 15:57:07	16:00:06	0.010	0.016	14	1.6
20046WB	20046EY	11/23/2020 16:32:59	16:35:59	0.007	0.014	20	1.3
20046WB	20046EY	11/23/2020 16:36:21	16:39:20	0.004	0.010	22	1.3
BCC2	20046WC	11/23/2020 17:14:39	17:17:38	0.015	0.023	13	1.6
BCC2	20046WC	11/23/2020 17:18:07	17:21:06	0.012	0.018	13	1.6
20046WC	20046GY	11/23/2020 17:28:04	17:29:13	0.011	0.013	10	1.6
20046WC	20046GY	11/23/2020 17:30:36	17:34:18	0.011	0.013	10	2.0
BCC2	20046DK	11/23/2020 17:44:40	17:45:37	0.012	0.017	17	1.3
BCC2	20046DK	11/23/2020 17:46:55	17:49:54	0.010	0.013	16	1.3
BCC2	20046BU	11/23/2020 17:59:18	18:02:18	0.009	0.015	16	1.4
BCC2	20046BU	11/23/2020 18:02:39	18:05:04	0.018	0.040	16	1.4
BCC2	20046BU	11/23/2020 18:05:36	18:08:38	0.027	0.031	16	1.4
BCC2	20046BH	11/23/2020 18:13:02	18:16:01	0.012	0.017	14	1.4
BCC2	20046BH	11/23/2020 18:16:33	18:19:32	0.016	0.023	14	1.5
BCC2	20046BH	11/23/2020 18:20:00	18:22:56	0.014	0.039	13	1.5
BCC2	20046BH	11/23/2020 18:23:21	18:26:12	0.027	0.039	13	1.7
BCC2	20046WD	11/23/2020 18:34:55	18:37:54	0.020	0.035	14	1.3
BCC2	20046WD	11/23/2020 18:38:46	18:41:45	0.011	0.021	14	1.3
20046WD	20046FB	11/23/2020 18:46:53	18:49:52	0.008	0.009	10	1.9
20046WD	20046FB	11/23/2020 18:50:31	18:50:58	0.013	0.017	9	2.5
20046WD	20046FB	11/23/2020 18:53:25	18:56:24	0.008	0.011	11	2.5
BCC2	20046AH	11/23/2020 19:28:19	19:34:40	0.018	0.029	14	1.4
BCC2	20046AH	11/23/2020 19:35:16	19:38:15	0.009	0.017	14	1.4
BCC2	20046AH	11/23/2020 19:38:49	19:44:23	0.010	0.018	14	1.4
BCC2	20046BX	11/23/2020 19:49:31	19:53:00	0.010	0.018	15	1.3
BCC2	20046BX	11/23/2020 19:53:23	19:56:22	0.015	0.020	15	1.3
BCC2	20046WE	11/23/2020 20:08:43	20:11:42	0.012	0.025	12	1.4
BCC2	20046WE	11/23/2020 20:12:05	20:15:04	0.011	0.021	12	1.4
20046WE	20046FE	11/23/2020 20:19:36	20:22:35	0.005	0.008	12	1.6
20046WE	20046FE	11/23/2020 20:23:01	20:26:00	0.005	0.010	12	1.6
BCC2	20046BW	11/23/2020 20:47:04	20:50:03	0.009	0.019	12	1.5
BCC2	20046BW	11/23/2020 20:50:37	20:53:36	0.009	0.018	12	1.5
BCC2	20046WF	11/23/2020 20:57:56	21:04:19	0.014	0.035	6	3.4
BCC2	20046WF	11/23/2020 21:10:43	21:12:56	0.017	0.042	12	1.7
20046WF	20046FD	11/23/2020 21:18:20	21:21:19	0.005	0.013	12	1.6
20046WF	20046FD	11/23/2020 21:21:44	21:24:43	0.005	0.011	12	1.7
BCC2	20046AG	11/23/2020 21:29:28	21:35:03	0.008	0.017	12	1.7
BCC2	20046AG	11/23/2020 21:35:26	21:38:26	0.010	0.021	13	1.7
BCC2	20046HG	11/23/2020 21:52:02	21:55:01	0.008	0.014	13	1.6
BCC2	20046HG	11/23/2020 21:56:08	21:59:07	0.009	0.018	13	1.6
BCC2	20046BT	11/24/2020 13:02:15	13:05:14	0.009	0.014	15	1.3
BCC2	20046BT	11/24/2020 13:05:38	13:08:37	0.008	0.012	14	1.5
BCC2	20046BG	11/24/2020 13:17:35	13:20:34	0.004	0.006	14	1.5
BCC2	20046BG	11/24/2020 13:21:01	13:24:00	0.006	0.009	14	1.5
BCC2	20046WG	11/24/2020 13:33:25	13:36:24	0.004	0.007	15	1.4
BCC2	20046WG	11/24/2020 13:40:39	13:43:38	0.004	0.007	14	1.5
20046WG	20046FA	11/24/2020 13:50:21	13:53:20	0.007	0.008	12	1.5

GPS BASE	GPSID	UTC Start	UTC End	Horz Prec	Vert Prec	# of SV's	PDOP
20046WG	20046FA	11/24/2020 13:54:57	13:57:56	0.006	0.008	13	1.5
BCC2	20046WH	11/24/2020 14:26:39	14:29:38	0.007	0.013	14	1.4
BCC2	20046WH	11/24/2020 14:30:46	14:33:45	0.009	0.016	14	1.3
20046WH	20046GX	11/24/2020 14:40:29	14:45:28	0.026	0.030	10	1.8
20046WH	20046GX	11/24/2020 14:47:31	14:49:43	0.047	0.042	13	1.4
20046WH	20046GX	11/24/2020 14:51:33	14:54:32	0.010	0.013	12	1.4
BCC2	20046DJ	11/24/2020 15:12:03	15:15:02	0.008	0.013	16	1.3
BCC2	20046DJ	11/24/2020 15:16:02	15:19:01	0.008	0.014	16	1.3
BCC2	20046ES	11/24/2020 15:44:59	15:47:58	0.005	0.010	14	1.7
BCC2	20046ES	11/24/2020 15:48:26	15:51:25	0.006	0.011	14	1.7
BCC2	20046AB	11/24/2020 16:31:40	16:34:39	0.007	0.014	14	1.5
BCC2	20046AB	11/24/2020 16:34:58	16:37:57	0.008	0.015	14	1.5
BCC2	20046BP	11/24/2020 16:41:19	16:44:18	0.007	0.013	12	1.6
BCC2	20046BP	11/24/2020 16:44:40	16:47:39	0.008	0.015	12	1.7
BCC2	20046WI	11/24/2020 16:51:41	16:54:40	0.010	0.020	12	2.2
BCC2	20046WI	11/24/2020 16:55:12	16:58:11	0.009	0.019	12	1.7
20046WI	20046EW	11/24/2020 17:03:20	17:05:28	0.006	0.016	11	1.7
20046WI	20046EW	11/24/2020 17:07:35	17:08:09	0.019	0.041	9	2.1
20046WI	20046EW	11/24/2020 17:10:51	17:13:50	0.008	0.012	12	1.6
20046WI	20046EW	11/24/2020 17:16:07	17:19:06	0.007	0.010	12	1.8
20046WI	20046EW	11/24/2020 17:22:02	17:25:01	0.008	0.011	14	1.4
BCC2	20046DL	11/24/2020 17:43:21	17:46:20	0.008	0.011	15	1.4
BCC2	20046DL	11/24/2020 17:46:41	17:49:40	0.010	0.014	15	1.4
BCC2	20046WJ	11/24/2020 18:06:04	18:09:03	0.010	0.015	15	1.3
BCC2	20046WJ	11/24/2020 18:09:22	18:12:21	0.008	0.011	15	1.3
20046WJ	20046HA	11/24/2020 18:20:17	18:21:54	0.009	0.015	13	1.3
20046WJ	20046HA	11/24/2020 18:22:40	18:23:50	0.024	0.028	13	1.5
20046WJ	20046HA	11/24/2020 18:26:26	18:29:45	0.007	0.013	13	1.5
BCC2	20046DI	12/14/2020 13:57:01	14:00:00	0.006	0.011	13	1.7
BCC2	20046DI	12/14/2020 14:00:20	14:03:19	0.012	0.022	12	2.1
BCC2	20046JZA	12/14/2020 14:13:23	14:16:22	0.014	0.026	12	2.1
BCC2	20046JZA	12/14/2020 14:17:18	14:20:17	0.011	0.024	11	2.1
BCC2	20046JZA	12/14/2020 14:21:20	14:24:19	0.011	0.023	11	2.8
20046JZA	20046GV	12/14/2020 14:30:11	14:30:52	0.010	0.023	13	3.0
20046JZA	20046GV	12/14/2020 14:33:57	14:36:59	0.006	0.013	13	2.9
20046JZA	20046GV	12/14/2020 14:37:34	14:40:35	0.006	0.013	14	2.3
BCC2	20046EF	12/14/2020 14:59:31	15:02:30	0.011	0.017	13	1.7
BCC2	20046AA	12/14/2020 15:00:40	15:01:20	0.016	0.046	12	1.7
BCC2	20046AA	12/14/2020 15:02:51	15:07:30	0.014	0.050	11	2.0
BCC2	20046EF	12/14/2020 15:03:16	15:06:15	0.008	0.013	13	1.7
BCC2	20046AA	12/14/2020 15:08:59	15:11:58	0.012	0.025	11	1.9
BCC2	20046BO	12/14/2020 15:19:53	15:22:53	0.009	0.016	12	1.7
BCC2	20046JZB	12/14/2020 15:22:56	15:25:55	0.011	0.019	13	1.5
BCC2	20046BO	12/14/2020 15:23:27	15:26:27	0.011	0.017	12	1.7
BCC2	20046JZB	12/14/2020 15:26:33	15:27:13	0.018	0.048	12	1.6
BCC2	20046JZB	12/14/2020 15:27:55	15:29:33	0.014	0.024	12	1.6
BCC2	20046WK	12/14/2020 15:33:21	15:35:42	0.018	0.036	12	1.6
BCC2	20046WK	12/14/2020 15:36:26	15:37:08	0.018	0.036	12	1.6
20046JZB	20046GU	12/14/2020 15:37:57	15:39:06	0.013	0.030	16	1.7
BCC2	20046WK	12/14/2020 15:38:47	15:41:47	0.017	0.030	11	1.6
20046JZB	20046GU	12/14/2020 15:40:15	15:44:25	0.017	0.046	5	5.0
20046WK	20046EV	12/14/2020 15:46:49	15:49:52	0.010	0.015	22	1.5
20046WK	20046EV	12/14/2020 15:51:35	15:54:35	0.010	0.017	23	1.3
BCC2	20046BM	12/14/2020 15:57:10	16:00:27	0.007	0.010	13	1.6
BCC2	20046BM	12/14/2020 16:00:51	16:03:50	0.008	0.011	15	1.3
BCC2	20046EK	12/14/2020 16:05:27	16:08:26	0.009	0.012	14	1.3
BCC2	20046CA	12/14/2020 16:07:32	16:10:31	0.009	0.013	12	1.7
BCC2	20046EK	12/14/2020 16:09:49	16:10:51	0.030	0.044	15	1.4
BCC2	20046CA	12/14/2020 16:10:57	16:13:59	0.012	0.017	13	1.5
BCC2	20046EK	12/14/2020 16:11:46	16:14:16	0.029	0.037	15	1.4
BCC2	20046DG	12/14/2020 16:20:46	16:23:45	0.013	0.018	14	1.5
BCC2	20046DG	12/14/2020 16:24:06	16:27:05	0.008	0.012	14	1.5
BCC2	20046WL	12/14/2020 16:28:10	16:31:27	0.013	0.022	14	1.4
BCC2	20046WL	12/14/2020 16:31:56	16:32:25	0.029	0.026	13	1.6

GPS BASE	GPSID	UTC Start	UTC End	Horz Prec	Vert Prec	# of SV's	PDOP
BCC2	20046WL	12/14/2020 16:33:17	16:36:16	0.014	0.026	12	1.5
BCC2	20046JZC	12/14/2020 16:35:07	16:35:35	0.020	0.027	15	1.4
BCC2	20046JZC	12/14/2020 16:37:33	16:37:56	0.024	0.027	14	1.4
BCC2	20046JZC	12/14/2020 16:39:07	16:39:15	0.022	0.026	14	1.5
20046WL	20046GZ	12/14/2020 16:41:33	16:44:32	0.007	0.010	11	1.9
20046JZC	20046FG	12/14/2020 16:43:07	16:45:21	0.015	0.021	16	1.7
20046JZC	20046FG	12/14/2020 16:47:20	16:49:25	0.008	0.011	12	2.3
20046WL	20046GZ	12/14/2020 16:47:42	16:50:41	0.008	0.012	12	1.7
KP13	20046CB	12/14/2020 17:06:12	17:09:11	0.006	0.009	15	1.4
KP13	20046CB	12/14/2020 17:09:37	17:12:36	0.010	0.017	15	1.4
BCC2	20046BF	12/14/2020 17:15:03	17:18:02	0.007	0.011	13	1.6
BCC2	20046BF	12/14/2020 17:18:35	17:21:34	0.010	0.014	13	1.6
KP13	20046JZD	12/14/2020 17:19:21	17:22:20	0.008	0.013	13	1.5
KP13	20046JZD	12/14/2020 17:23:03	17:26:02	0.013	0.022	14	1.5
BCC2	20046BS	12/14/2020 17:25:59	17:28:58	0.013	0.022	12	1.7
BCC2	20046BS	12/14/2020 17:29:28	17:32:27	0.009	0.015	12	1.7
20046JZD	20046FK	12/14/2020 17:35:59	17:38:58	0.007	0.013	12	2.3
20046JZD	20046FK	12/14/2020 17:40:13	17:43:12	0.007	0.012	14	1.9
BCC2	20046EI	12/14/2020 17:53:29	17:54:02	0.031	0.039	15	1.3
BCC2	20046EI	12/14/2020 17:54:36	17:57:37	0.012	0.021	14	1.4
KP13	20046JZE	12/14/2020 17:58:32	18:01:31	0.009	0.013	14	1.4
KP13	20046JZE	12/14/2020 18:02:33	18:05:32	0.009	0.013	14	1.4
20046JZE	20046FN	12/14/2020 18:09:24	18:12:23	0.006	0.009	15	1.5
BCC2	20046WM	12/14/2020 18:12:25	18:15:25	0.014	0.022	13	1.6
20046JZE	20046FN	12/14/2020 18:13:01	18:13:50	0.010	0.025	15	1.5
20046JZE	20046FN	12/14/2020 18:15:12	18:18:28	0.017	0.033	16	1.5
BCC2	20046WM	12/14/2020 18:16:00	18:18:59	0.021	0.030	13	1.6
20046WM	20046EZ	12/14/2020 18:23:39	18:26:39	0.008	0.016	11	1.7
KP13	20046BJ	12/14/2020 18:25:07	18:28:06	0.012	0.018	14	1.3
KP13	20046BJ	12/14/2020 18:28:33	18:31:32	0.009	0.013	14	1.5
KP13	20046CC	12/14/2020 18:33:46	18:36:45	0.007	0.012	13	1.5
20046WM	20046EZ	12/14/2020 18:37:00	18:40:42	0.010	0.016	10	2.0
KP13	20046CC	12/14/2020 18:37:06	18:40:05	0.011	0.017	11	1.8
BCC2	20046DM	12/14/2020 19:07:32	19:08:15	0.014	0.038	11	2.0
BCC2	20046DM	12/14/2020 19:08:53	19:12:19	0.010	0.018	12	1.7
JMU1	20046JZF	12/14/2020 19:12:03	19:15:02	0.011	0.030	11	1.5
JMU1	20046JZF	12/14/2020 19:15:43	19:19:07	0.010	0.027	12	1.5
BCC2	20046WN	12/14/2020 19:18:11	19:19:34	0.014	0.039	12	1.8
BCC2	20046WN	12/14/2020 19:20:15	19:20:58	0.018	0.038	12	1.5
BCC2	20046WN	12/14/2020 19:27:34	19:30:33	0.010	0.017	13	1.5
20046JZF	20046GR	12/14/2020 19:33:51	19:36:51	0.007	0.014	13	1.9
20046JZF	20046GR	12/14/2020 19:37:23	19:40:27	0.005	0.011	14	1.9
20046WN	20046GW	12/14/2020 19:39:46	19:41:57	0.019	0.028	10	1.8
20046WN	20046GW	12/14/2020 19:44:39	19:47:10	0.010	0.018	9	1.8
20046WN	20046GW	12/14/2020 19:49:13	19:50:20	0.020	0.019	11	1.9
JMU1	20046DE	12/14/2020 19:50:46	19:53:45	0.007	0.012	14	1.5
JMU1	20046DE	12/14/2020 19:54:12	19:57:11	0.008	0.014	15	1.4
KP13	20046EA	12/14/2020 20:20:22	20:23:31	0.008	0.013	8	2.1
KP13	20046EA	12/14/2020 20:23:59	20:26:58	0.006	0.010	14	1.5
BCC2	20046AF	12/14/2020 20:25:23	20:28:22	0.007	0.013	13	1.6
BCC2	20046AF	12/14/2020 20:28:41	20:31:41	0.015	0.034	13	1.5
KP13	20046JZG	12/14/2020 20:30:51	20:32:03	0.011	0.020	11	1.6
KP13	20046JZG	12/14/2020 20:33:34	20:36:33	0.010	0.018	12	1.6
BCC2	20046BV	12/14/2020 20:35:03	20:38:03	0.007	0.012	13	1.5
KP13	20046JZG	12/14/2020 20:37:06	20:40:05	0.012	0.023	11	2.3
BCC2	20046BV	12/14/2020 20:38:26	20:41:25	0.007	0.013	13	1.6
20046JZG	20046GQ	12/14/2020 20:43:03	20:46:02	0.016	0.029	10	4.6
20046JZG	20046GQ	12/14/2020 20:47:01	20:50:00	0.010	0.015	11	4.0
BCC2	20046WO	12/14/2020 20:52:02	20:55:01	0.009	0.015	12	1.6
BCC2	20046WO	12/14/2020 20:56:00	20:58:59	0.009	0.015	11	1.6
JMU1	20046CF	12/14/2020 21:02:18	21:05:17	0.009	0.013	11	1.9
JMU1	20046CF	12/14/2020 21:05:44	21:08:43	0.008	0.011	11	1.6
20046WO	20046FC	12/14/2020 21:09:58	21:12:57	0.014	0.019	12	1.8
20046WO	20046FC	12/14/2020 21:16:30	21:19:29	0.008	0.014	12	1.3

GPS BASE	GPSID	UTC Start	UTC End	Horz Prec	Vert Prec	# of SV's	PDOP
JMU1	20046JZH	12/14/2020 21:17:02	21:20:01	0.010	0.021	13	1.4
JMU1	20046JZH	12/14/2020 21:20:39	21:23:38	0.010	0.021	13	1.4
20046JZH	20046FO	12/14/2020 21:25:54	21:26:35	0.028	0.044	16	1.4
20046JZH	20046FO	12/14/2020 21:29:34	21:32:33	0.006	0.007	17	1.3
BCC2	20046EE	12/14/2020 21:31:49	21:34:48	0.011	0.017	13	1.5
JMU1	20046AL	12/14/2020 21:34:13	21:37:12	0.011	0.016	12	1.5
BCC2	20046EE	12/14/2020 21:35:15	21:38:14	0.009	0.015	14	1.4
JMU1	20046AL	12/14/2020 21:37:36	21:40:35	0.006	0.009	12	1.6
JMU1	20046AL	12/14/2020 21:41:03	21:44:02	0.008	0.011	12	1.6
JMU1	20046CH	12/14/2020 21:46:15	21:49:14	0.009	0.012	13	1.5
BCC2	20046BY	12/14/2020 21:48:10	21:51:12	0.010	0.015	14	1.5
JMU1	20046CH	12/14/2020 21:49:38	21:52:37	0.006	0.009	14	1.5
BCC2	20046BY	12/14/2020 21:52:28	21:55:27	0.009	0.014	15	1.4
BCC2	20046BY	12/14/2020 21:55:54	21:58:53	0.011	0.019	15	1.5
WVMF	20046BZ	12/15/2020 12:27:43	12:30:43	0.010	0.016	13	1.7
WVMF	20046BZ	12/15/2020 12:31:46	12:34:45	0.010	0.017	13	1.7
JMU1	20046EN	12/15/2020 12:38:05	12:41:04	0.005	0.007	12	1.8
JMU1	20046EN	12/15/2020 12:41:30	12:44:29	0.005	0.007	12	1.8
BCC2	20046WP	12/15/2020 12:49:52	12:52:52	0.011	0.024	11	2.1
BCC2	20046WP	12/15/2020 12:53:21	12:54:12	0.035	0.040	11	2.0
BCC2	20046WP	12/15/2020 12:54:45	12:57:01	0.024	0.049	11	2.0
20046WP	20046FF	12/15/2020 13:03:07	13:06:06	0.008	0.012	11	2.0
JMU1	20046JZI	12/15/2020 13:04:22	13:07:26	0.006	0.010	13	1.5
20046WP	20046FF	12/15/2020 13:06:27	13:09:26	0.009	0.009	13	1.6
JMU1	20046JZI	12/15/2020 13:08:09	13:11:08	0.006	0.010	14	1.3
20046JZI	20046GN	12/15/2020 13:13:59	13:16:58	0.006	0.009	17	1.2
BCC2	20046BN	12/15/2020 13:16:27	13:19:26	0.011	0.014	15	1.2
20046JZI	20046GN	12/15/2020 13:17:21	13:20:29	0.005	0.010	14	1.7
BCC2	20046BN	12/15/2020 13:20:03	13:23:03	0.013	0.015	14	1.4
JMU1	20046BC	12/15/2020 13:35:40	13:38:39	0.004	0.006	12	1.8
JMU1	20046BC	12/15/2020 13:39:00	13:41:59	0.004	0.006	12	1.9
WVMF	20046WQ	12/15/2020 13:40:57	13:44:14	0.020	0.026	10	2.2
JMU1	20046JZJ	12/15/2020 13:45:03	13:48:02	0.008	0.012	11	2.2
WVMF	20046WQ	12/15/2020 13:45:29	13:48:29	0.027	0.034	11	2.2
WVMF	20046WQ	12/15/2020 13:50:02	13:52:38	0.032	0.020	11	2.3
20046WQ	20046FH	12/15/2020 13:57:59	14:00:59	0.009	0.013	14	1.6
20046JZJ	20046FR	12/15/2020 13:59:01	14:02:00	0.010	0.019	17	1.8
20046JZJ	20046FR	12/15/2020 14:02:21	14:05:20	0.005	0.012	9	2.6
20046WQ	20046FH	12/15/2020 14:03:18	14:06:17	0.011	0.018	13	2.0
WVMF	20046AI	12/15/2020 14:11:35	14:14:35	0.011	0.021	12	1.9
WVMF	20046AI	12/15/2020 14:14:59	14:18:00	0.010	0.017	12	1.9
WVMF	20046HF	12/15/2020 14:30:02	14:33:01	0.012	0.024	12	1.9
WVMF	20046HF	12/15/2020 14:33:56	14:34:49	0.038	0.038	12	1.9
JMU1	20046EO	12/15/2020 14:35:24	14:38:23	0.004	0.008	13	1.8
WVMF	20046HF	12/15/2020 14:35:31	14:38:51	0.010	0.020	5	3.7
JMU1	20046EO	12/15/2020 14:38:42	14:41:41	0.005	0.010	12	1.9
WVMF	20046ET	12/15/2020 14:52:12	14:53:59	0.015	0.041	13	1.7
JMU1	20046DN	12/15/2020 14:55:23	14:58:22	0.006	0.011	13	1.8
WVMF	20046ET	12/15/2020 14:56:34	14:59:33	0.024	0.048	13	1.8
JMU1	20046DN	12/15/2020 14:58:41	15:01:40	0.008	0.014	7	2.4
JMU1	20046JZK	12/15/2020 15:14:40	15:17:39	0.011	0.023	12	2.4
JMU1	20046JZK	12/15/2020 15:19:05	15:22:04	0.010	0.022	13	1.7
20046JZK	20046GP	12/15/2020 15:29:55	15:32:54	0.008	0.014	15	2.1
20046JZK	20046GP	12/15/2020 15:33:30	15:36:35	0.009	0.015	15	1.9
JMU1	20046WR	12/15/2020 15:46:23	15:49:31	0.015	0.033	11	2.3
JMU1	20046WR	12/15/2020 15:50:13	15:53:13	0.014	0.031	11	2.2
JMU1	20046DC	12/15/2020 15:52:01	15:55:00	0.006	0.009	12	1.6
JMU1	20046DC	12/15/2020 15:55:23	15:58:22	0.007	0.010	12	1.6
20046WR	20046GS	12/15/2020 15:57:53	16:00:53	0.011	0.012	11	1.8
20046WR	20046GS	12/15/2020 16:03:59	16:06:58	0.011	0.010	10	1.6
JMU1	20046EL	12/15/2020 16:05:11	16:08:10	0.006	0.009	13	1.5
JMU1	20046EL	12/15/2020 16:08:30	16:11:29	0.006	0.009	13	1.5
JMU1	20046AJ	12/15/2020 16:14:55	16:17:54	0.009	0.013	15	1.4
JMU1	20046AJ	12/15/2020 16:18:35	16:21:34	0.010	0.015	15	1.4

GPS BASE	GPSID	UTC Start	UTC End	Horz Prec	Vert Prec	# of SV's	PDOP
JMU1	20046WS	12/15/2020 16:29:56	16:33:03	0.015	0.024	12	1.7
JMU1	20046WS	12/15/2020 16:47:19	16:49:26	0.034	0.049	12	2.1
20046WS	20046FL	12/15/2020 16:56:00	16:59:01	0.005	0.007	20	1.4
20046WS	20046FL	12/15/2020 16:59:25	17:02:56	0.007	0.011	22	1.4
JMU1	20046CE	12/15/2020 17:18:12	17:21:11	0.010	0.020	12	1.6
JMU1	20046AW	12/15/2020 17:22:47	17:25:46	0.006	0.012	10	2.7
JMU1	20046CE	12/15/2020 17:24:25	17:28:45	0.009	0.018	11	1.9
JMU1	20046AW	12/15/2020 17:26:06	17:29:05	0.007	0.012	11	1.7
JMU1	20046CG	12/15/2020 17:44:12	17:47:16	0.010	0.019	13	1.5
JMU1	20046CG	12/15/2020 17:47:50	17:49:41	0.014	0.025	14	1.5
JMU1	20046CG	12/15/2020 17:50:54	17:52:48	0.013	0.021	12	1.5
20046JZL	20046FQ	12/15/2020 17:54:16	17:57:15	0.005	0.010	13	2.0
JMU1	20046AK	12/15/2020 17:57:29	18:00:29	0.010	0.018	12	1.7
20046JZL	20046FQ	12/15/2020 17:57:41	18:00:40	0.006	0.010	13	2.0
JMU1	20046AK	12/15/2020 18:01:35	18:04:34	0.012	0.021	12	1.7
JMU1	20046WT	12/15/2020 18:09:01	18:12:00	0.011	0.019	11	1.5
JMU1	20046CI	12/15/2020 18:13:03	18:16:02	0.012	0.017	11	1.9
JMU1	20046WT	12/15/2020 18:13:11	18:16:10	0.011	0.018	13	1.4
JMU1	20046CI	12/15/2020 18:17:18	18:20:17	0.009	0.013	11	1.8
20046WT	20046FM	12/15/2020 18:21:11	18:24:10	0.004	0.006	13	1.4
20046WT	20046FM	12/15/2020 18:24:36	18:27:35	0.004	0.006	14	1.4
JMU1	20046DO	12/15/2020 18:40:44	18:43:43	0.010	0.015	12	1.6
JMU1	20046DO	12/15/2020 18:44:04	18:44:40	0.007	0.011	12	1.6
JMU1	20046DF	12/15/2020 18:45:32	18:48:34	0.011	0.022	11	1.8
JMU1	20046DO	12/15/2020 18:46:20	18:49:19	0.005	0.008	11	1.9
JMU1	20046DF	12/15/2020 18:49:18	18:52:17	0.010	0.021	11	1.9
JMU1	20046DO	12/15/2020 18:49:38	18:52:38	0.005	0.009	10	1.9
JMU1	20046JZM	12/15/2020 18:57:34	19:00:33	0.007	0.016	11	1.8
JMU1	20046JZM	12/15/2020 19:01:09	19:04:08	0.008	0.017	11	1.8
20046JZM	20046GM	12/15/2020 19:08:06	19:11:05	0.006	0.012	13	2.3
20046JZM	20046GM	12/15/2020 19:11:32	19:14:31	0.015	0.014	13	2.3
WVMF	20046WU	12/15/2020 19:16:45	19:17:57	0.025	0.059	10	1.8
WVMF	20046WU	12/15/2020 19:20:25	19:23:24	0.015	0.037	12	1.5
WVMF	20046WU	12/15/2020 19:24:02	19:27:01	0.011	0.023	13	1.5
JMU1	20046CO	12/15/2020 19:29:09	19:32:08	0.005	0.009	12	1.5
JMU1	20046CO	12/15/2020 19:33:04	19:36:03	0.005	0.009	12	1.5
20046WU	20046FJ	12/15/2020 19:33:16	19:33:58	0.012	0.022	11	2.0
JMU1	20046AQ	12/15/2020 19:39:07	19:42:06	0.005	0.009	11	1.9
JMU1	20046AQ	12/15/2020 19:42:23	19:45:22	0.006	0.010	12	1.6
20046WU	20046FJ	12/15/2020 19:43:24	19:47:08	0.009	0.016	11	1.6
JMU1	20046JZN	12/15/2020 19:49:00	19:51:59	0.008	0.014	12	1.5
JMU1	20046JZN	12/15/2020 19:52:34	19:55:33	0.008	0.014	12	1.8
WVMF	20046BD	12/15/2020 19:56:18	19:59:17	0.010	0.017	13	1.6
20046JZN	20046FV	12/15/2020 19:57:49	20:00:48	0.016	0.034	13	1.9
WVMF	20046BD	12/15/2020 20:00:19	20:03:18	0.009	0.017	14	1.6
20046JZN	20046FV	12/15/2020 20:01:16	20:04:15	0.010	0.012	14	1.8
WVMF	20046CD	12/15/2020 20:08:11	20:11:10	0.008	0.018	13	1.6
WVMF	20046CD	12/15/2020 20:11:40	20:14:39	0.009	0.021	13	1.7
JMU1	20046CP	12/15/2020 20:14:08	20:17:07	0.007	0.011	14	1.6
JMU1	20046CP	12/15/2020 20:17:31	20:20:30	0.006	0.010	13	1.7
WVMF	20046DH	12/15/2020 20:25:31	20:28:30	0.009	0.021	12	1.6
JMU1	20046EQ	12/15/2020 20:26:32	20:29:31	0.008	0.013	13	1.6
WVMF	20046DH	12/15/2020 20:29:16	20:32:15	0.010	0.020	13	1.6
JMU1	20046EQ	12/15/2020 20:30:05	20:33:07	0.006	0.009	8	2.0
WVMF	20046WV	12/15/2020 20:39:01	20:42:00	0.011	0.020	13	1.6
JMU1	20046DS	12/15/2020 20:40:53	20:43:52	0.006	0.010	12	1.7
WVMF	20046WV	12/15/2020 20:42:41	20:45:41	0.011	0.022	13	1.6
JMU1	20046DS	12/15/2020 20:44:21	20:47:20	0.006	0.010	12	1.7
JMU1	20046JZO	12/15/2020 20:48:13	20:51:21	0.011	0.017	11	2.1
20046WV	20046GT	12/15/2020 20:52:11	20:56:38	0.008	0.011	12	1.6
JMU1	20046JZO	12/15/2020 20:53:10	20:56:15	0.010	0.016	11	1.6
20046WV	20046GT	12/15/2020 20:58:54	21:02:19	0.008	0.012	13	1.6
20046JZO	20046GK	12/15/2020 21:01:59	21:05:02	0.018	0.035	10	2.6
20046JZO	20046GK	12/15/2020 21:10:37	21:17:13	0.010	0.013	13	2.3

GPS BASE	GPSID	UTC Start	UTC End	Horz Prec	Vert Prec	# of SV's	PDOP
BCC2	20046EH	12/15/2020 21:27:19	21:30:19	0.012	0.020	13	1.5
BCC2	20046EH	12/15/2020 21:30:45	21:33:45	0.012	0.020	14	1.4
BCC2	20046EG	12/15/2020 21:43:16	21:46:15	0.010	0.017	13	1.4
JMU1	20046DT	12/15/2020 21:44:38	21:47:37	0.006	0.009	13	1.5
BCC2	20046EG	12/15/2020 21:47:20	21:50:19	0.010	0.017	14	1.5
JMU1	20046DT	12/15/2020 21:48:00	21:50:59	0.006	0.009	14	1.5
JMU1	20046CJ	12/28/2020 13:40:13	13:43:12	0.004	0.008	12	2.0
JMU1	20046CJ	12/28/2020 13:43:44	13:46:43	0.004	0.008	12	1.8
JMU1	20046EM	12/28/2020 14:00:38	14:03:37	0.007	0.015	12	1.9
JMU1	20046EM	12/28/2020 14:04:05	14:07:04	0.007	0.016	12	1.9
JMU1	20046WW	12/28/2020 14:36:06	14:39:05	0.010	0.017	12	1.6
JMU1	20046WW	12/28/2020 14:39:41	14:42:40	0.010	0.017	11	1.7
20046WW	20046HB	12/28/2020 14:46:33	14:47:51	0.048	0.027	12	1.5
20046WW	20046HB	12/28/2020 14:50:28	14:53:27	0.008	0.013	13	1.5
20046WW	20046HB	12/28/2020 14:54:10	14:57:10	0.008	0.012	13	1.7
JMU1	20046DD	12/28/2020 15:06:24	15:09:23	0.011	0.015	10	2.1
JMU1	20046DD	12/28/2020 15:09:47	15:12:46	0.010	0.015	10	2.2
JMU1	20046EB	12/28/2020 15:24:39	15:27:39	0.011	0.017	11	1.7
JMU1	20046EB	12/28/2020 15:27:58	15:30:57	0.011	0.017	11	1.7
JMU1	20046WX	12/28/2020 15:36:49	15:39:48	0.011	0.018	11	1.8
JMU1	20046WX	12/28/2020 15:40:52	15:43:52	0.010	0.017	11	1.9
20046WX	20046GO	12/28/2020 15:50:28	15:53:27	0.008	0.011	12	1.5
20046WX	20046GO	12/28/2020 15:56:59	16:01:15	0.008	0.011	12	1.7
JMU1	20046BL	12/28/2020 16:15:25	16:18:24	0.009	0.014	11	1.7
JMU1	20046BL	12/28/2020 16:18:49	16:19:42	0.012	0.019	12	1.6
JMU1	20046CK	12/28/2020 16:27:44	16:30:43	0.009	0.015	9	2.8
JMU1	20046CK	12/28/2020 16:31:02	16:34:01	0.011	0.019	8	2.8
JMU1	20046WY	12/28/2020 16:52:54	16:55:53	0.019	0.020	7	3.2
JMU1	20046WY	12/28/2020 16:59:40	17:01:14	0.025	0.019	7	3.2
JMU1	20046WY	12/28/2020 17:10:21	17:11:21	0.024	0.018	9	2.3
JMU1	20046WY	12/28/2020 17:12:31	17:15:32	0.013	0.015	9	2.1
20046WY	20046FS	12/28/2020 17:28:57	17:32:34	0.014	0.011	9	2.3
20046WY	20046FS	12/28/2020 17:40:57	17:41:34	0.021	0.023	10	2.1
20046WY	20046FS	12/28/2020 17:44:36	17:47:38	0.016	0.034	9	2.1
JMU1	20046HE	12/28/2020 18:06:43	18:09:42	0.007	0.012	10	1.7
JMU1	20046HE	12/28/2020 18:11:09	18:14:08	0.009	0.015	10	1.7
JMU1	20046DP	12/28/2020 18:34:43	18:37:42	0.006	0.012	12	1.4
JMU1	20046DP	12/28/2020 18:38:13	18:41:13	0.006	0.012	12	1.5
JMU1	20046WZ	12/28/2020 18:54:49	18:57:48	0.009	0.017	10	2.1
JMU1	20046WZ	12/28/2020 19:01:22	19:04:21	0.010	0.020	10	2.1
JMU1	20046WZ	12/28/2020 19:05:02	19:08:01	0.011	0.021	10	1.9
20046WZ	20046FT	12/28/2020 19:13:00	19:16:27	0.008	0.014	10	1.9
20046WZ	20046FT	12/28/2020 19:19:09	19:21:59	0.010	0.011	10	2.1
JMU1	20046CL	12/28/2020 19:30:57	19:33:56	0.009	0.015	12	1.7
JMU1	20046CL	12/28/2020 19:37:23	19:40:22	0.010	0.017	11	1.7
JMU1	20046AN	12/28/2020 20:59:18	21:02:17	0.019	0.033	9	1.7
JMU1	20046AN	12/28/2020 21:03:56	21:07:13	0.018	0.034	9	2.1
JMU1	20046AN	12/28/2020 21:10:24	21:13:23	0.016	0.033	9	1.8
JMU1	20046AO	12/28/2020 22:00:37	22:03:37	0.005	0.009	13	1.8
JMU1	20046AO	12/28/2020 22:05:14	22:08:13	0.007	0.016	13	1.8
JMU1	20046ER	12/29/2020 12:45:21	12:48:20	0.012	0.025	12	1.8
JMU1	20046ER	12/29/2020 12:48:52	12:51:51	0.014	0.019	12	1.6
JMU1	20046ER	12/29/2020 12:53:35	12:56:34	0.011	0.019	11	2.0
JMU1	20046AY	12/29/2020 13:09:41	13:12:40	0.011	0.022	11	1.9
JMU1	20046AY	12/29/2020 13:14:40	13:17:54	0.012	0.021	12	1.9
JMU1	20046CX	12/29/2020 13:24:34	13:27:33	0.012	0.019	13	1.6
JMU1	20046CX	12/29/2020 13:28:08	13:31:08	0.011	0.018	11	2.1
JMU1	20046XA	12/29/2020 13:36:49	13:39:49	0.013	0.022	11	2.1
JMU1	20046XA	12/29/2020 13:40:32	13:43:31	0.013	0.028	11	2.1
20046XA	20046GD	12/29/2020 13:51:09	13:52:05	0.040	0.050	14	1.8
20046XA	20046GD	12/29/2020 13:56:56	13:59:55	0.010	0.020	13	2.1
JMU1	20046DV	12/29/2020 14:21:53	14:25:05	0.011	0.018	11	1.9
JMU1	20046DV	12/29/2020 14:25:50	14:28:49	0.011	0.018	11	2.0
JMU1	20046XB	12/29/2020 14:32:59	14:35:58	0.012	0.020	12	1.5

GPS BASE	GPSID	UTC Start	UTC End	Horz Prec	Vert Prec	# of SV's	PDOP
JMU1	20046XB	12/29/2020 14:36:31	14:39:30	0.011	0.018	12	1.8
20046XB	20046GJ	12/29/2020 14:45:19	14:45:33	0.016	0.024	12	1.7
20046XB	20046GJ	12/29/2020 14:46:47	14:49:47	0.009	0.013	13	1.6
JMU1	20046BK	12/29/2020 15:03:17	15:06:16	0.012	0.019	13	1.7
JMU1	20046BK	12/29/2020 15:06:40	15:09:39	0.012	0.018	11	2.2
JMU1	20046CZ	12/29/2020 15:13:15	15:16:14	0.014	0.020	12	1.6
JMU1	20046CZ	12/29/2020 15:16:44	15:19:43	0.014	0.020	12	1.6
JMU1	20046XC	12/29/2020 15:21:56	15:24:55	0.012	0.020	12	2.0
JMU1	20046XC	12/29/2020 15:25:23	15:28:22	0.015	0.024	11	2.0
20046XC	20046GE	12/29/2020 15:31:41	15:34:40	0.009	0.013	11	1.7
20046XC	20046GE	12/29/2020 15:35:05	15:38:04	0.010	0.014	11	2.1
JMU1	20046DY	12/29/2020 15:53:40	15:56:41	0.012	0.021	12	1.7
JMU1	20046DY	12/29/2020 15:58:05	16:01:05	0.010	0.019	12	1.7
JMU1	20046DW	12/29/2020 16:21:32	16:24:32	0.011	0.021	11	1.5
JMU1	20046DW	12/29/2020 16:26:06	16:29:05	0.012	0.022	10	1.7
JMU1	20046DW	12/29/2020 16:29:59	16:32:58	0.012	0.022	10	1.7
JMU1	20046EP	12/29/2020 16:30:34	16:33:33	0.006	0.010	10	1.7
JMU1	20046EP	12/29/2020 16:33:57	16:36:56	0.005	0.009	10	2.0
JMU1	20046XD	12/29/2020 16:34:04	16:37:03	0.021	0.047	8	2.0
JMU1	20046XD	12/29/2020 16:43:50	16:45:03	0.029	0.064	11	1.7
JMU1	20046XD	12/29/2020 16:52:21	16:55:36	0.011	0.022	11	1.6
JMU1	20046CN	12/29/2020 16:53:21	16:56:20	0.004	0.006	12	1.6
JMU1	20046CN	12/29/2020 16:56:43	16:59:42	0.004	0.006	10	1.7
20046XD	20046GI	12/29/2020 17:00:08	17:02:10	0.027	0.033	12	1.7
JMU1	20046AP	12/29/2020 17:02:17	17:05:16	0.007	0.010	12	1.5
20046XD	20046GI	12/29/2020 17:04:06	17:04:27	0.010	0.020	13	1.5
JMU1	20046AP	12/29/2020 17:05:50	17:08:49	0.005	0.006	12	1.5
20046XD	20046GI	12/29/2020 17:10:02	17:13:05	0.010	0.017	11	1.6
JMU1	20046JZP	12/29/2020 17:12:48	17:15:47	0.006	0.011	11	1.6
JMU1	20046JZP	12/29/2020 17:16:24	17:19:23	0.006	0.011	11	1.6
20046JZP	20046FU	12/29/2020 17:22:44	17:25:55	0.006	0.009	9	2.5
JMU1	20046DX	12/29/2020 17:22:58	17:25:57	0.010	0.019	10	2.0
20046JZP	20046FU	12/29/2020 17:27:14	17:30:18	0.016	0.025	12	1.7
JMU1	20046DX	12/29/2020 17:29:28	17:32:27	0.009	0.020	10	1.7
JMU1	20046AE	12/29/2020 17:48:19	17:51:18	0.015	0.027	10	1.9
JMU1	20046CM	12/29/2020 17:52:53	17:55:52	0.007	0.012	11	1.7
JMU1	20046CM	12/29/2020 17:56:19	17:59:18	0.005	0.009	11	1.7
JMU1	20046AE	12/29/2020 17:59:44	18:02:59	0.021	0.045	10	1.9
JMU1	20046CY	12/29/2020 18:07:07	18:10:08	0.014	0.028	9	3.0
JMU1	20046CY	12/29/2020 18:16:22	18:19:03	0.040	0.070	10	2.4
JMU1	20046CY	12/29/2020 18:20:41	18:24:44	0.012	0.030	10	2.4
JMU1	20046BI	12/29/2020 18:20:58	18:23:57	0.006	0.012	9	2.9
JMU1	20046BI	12/29/2020 18:24:19	18:26:37	0.008	0.014	11	1.9
JMU1	20046CY	12/29/2020 18:26:04	18:29:10	0.012	0.029	11	2.0
JMU1	20046JZQ	12/29/2020 18:38:01	18:41:05	0.010	0.018	11	2.4
JMU1	20046XE	12/29/2020 18:38:07	18:41:06	0.013	0.025	12	1.6
JMU1	20046JZQ	12/29/2020 18:42:01	18:45:00	0.009	0.015	12	1.6
JMU1	20046XE	12/29/2020 18:42:49	18:45:48	0.011	0.020	12	1.6
20046JZQ	20046FW	12/29/2020 18:49:01	18:52:09	0.006	0.012	14	1.7
20046XE	20046GG	12/29/2020 18:51:16	18:54:15	0.011	0.014	12	1.6
20046JZQ	20046FW	12/29/2020 18:53:53	18:58:09	0.006	0.010	13	1.7
20046XE	20046GG	12/29/2020 18:55:06	18:58:05	0.009	0.011	11	1.8
JMU1	20046CR	12/29/2020 19:08:28	19:11:28	0.005	0.009	13	1.6
JMU1	20046CR	12/29/2020 19:11:59	19:14:58	0.006	0.011	13	1.6
DP02	20046AX	12/29/2020 19:23:49	19:26:49	0.010	0.021	12	1.6
JMU1	20046AU	12/29/2020 19:24:21	19:27:20	0.007	0.011	12	1.8
DP02	20046AX	12/29/2020 19:28:14	19:31:13	0.010	0.023	12	1.6
JMU1	20046AU	12/29/2020 19:29:19	19:32:18	0.006	0.010	12	1.8
JMU1	20046CU	12/29/2020 19:34:41	19:37:45	0.007	0.011	11	2.3
DP02	20046XF	12/29/2020 19:35:08	19:38:07	0.013	0.025	11	1.7
JMU1	20046CU	12/29/2020 19:38:34	19:41:33	0.009	0.014	11	2.3
DP02	20046XF	12/29/2020 19:38:58	19:41:57	0.013	0.022	11	1.9
JMU1	20046JZR	12/29/2020 19:44:43	19:44:59	0.021	0.034	12	1.5
JMU1	20046JZR	12/29/2020 19:45:15	19:48:14	0.011	0.019	11	1.8

GPS BASE	GPSID	UTC Start	UTC End	Horz Prec	Vert Prec	# of SV's	PDOP
20046JZR	20046FZ	12/29/2020 19:51:42	19:52:04	0.010	0.018	13	1.8
20046JZR	20046FZ	12/29/2020 19:53:18	19:56:18	0.005	0.009	15	1.8
20046XF	20046GH	12/29/2020 19:56:49	19:57:03	0.019	0.046	11	2.1
20046JZR	20046FZ	12/29/2020 19:56:50	19:59:49	0.005	0.009	14	1.8
20046XF	20046GH	12/29/2020 20:05:34	20:09:07	0.011	0.015	11	2.2
JMU1	20046CT	12/29/2020 20:15:46	20:18:45	0.012	0.017	14	1.4
DP02	20046DB	12/29/2020 20:18:08	20:21:07	0.019	0.027	11	1.5
JMU1	20046CT	12/29/2020 20:19:04	20:22:03	0.008	0.011	13	1.4
DP02	20046DB	12/29/2020 20:25:12	20:25:32	0.018	0.032	13	1.4
DP02	20046DB	12/29/2020 20:26:49	20:29:49	0.014	0.026	11	1.6
JMU1	20046JZS	12/29/2020 20:28:26	20:31:25	0.012	0.021	12	1.5
JMU1	20046JZS	12/29/2020 20:32:05	20:35:04	0.011	0.020	12	1.6
20046JZS	20046FY	12/29/2020 20:39:31	20:42:42	0.014	0.015	14	1.8
20046JZS	20046FY	12/29/2020 20:43:25	20:46:35	0.006	0.008	16	1.6
JMU1	20046AT	12/29/2020 20:52:43	20:55:42	0.021	0.034	13	1.5
JMU1	20046AT	12/29/2020 20:56:02	20:59:01	0.006	0.009	12	1.6
JMU1	20046AT	12/29/2020 20:59:23	21:02:23	0.009	0.014	12	1.7
JMU1	20046EU	12/29/2020 21:14:46	21:17:58	0.006	0.010	13	1.7
DP01	20046AZ	12/29/2020 21:15:17	21:18:16	0.009	0.018	12	1.8
JMU1	20046EU	12/29/2020 21:18:16	21:21:15	0.006	0.010	11	2.0
DP01	20046AZ	12/29/2020 21:19:12	21:22:24	0.010	0.019	11	2.1
DP01	20046XG	12/29/2020 21:26:02	21:29:01	0.022	0.038	11	2.2
DP01	20046XG	12/29/2020 21:29:57	21:32:56	0.013	0.026	11	2.2
JMU1	20046AS	12/29/2020 21:32:22	21:36:24	0.006	0.011	12	1.7
JMU1	20046AS	12/29/2020 21:36:43	21:39:42	0.005	0.011	7	2.2
20046XG	20046GF	12/29/2020 21:37:41	21:40:40	0.007	0.014	12	2.2
20046XG	20046GF	12/29/2020 21:42:08	21:45:07	0.006	0.016	13	2.0
JMU1	20046JZT	12/29/2020 21:43:17	21:46:16	0.008	0.017	12	1.8
JMU1	20046JZT	12/29/2020 21:46:46	21:49:45	0.008	0.017	13	1.7
DP01	20046DA	12/29/2020 21:51:02	21:54:02	0.010	0.022	12	1.8
20046JZT	20046FX	12/29/2020 21:52:21	21:55:22	0.006	0.013	15	1.8
DP01	20046DA	12/29/2020 21:54:33	21:57:32	0.010	0.021	13	1.7
20046JZT	20046FX	12/29/2020 21:56:53	21:59:52	0.007	0.015	14	2.0
DP01	20046DA	12/29/2020 21:58:02	22:01:01	0.009	0.022	13	1.7
JMU1	20046CS	12/29/2020 22:03:01	22:06:00	0.006	0.015	12	1.9
JMU1	20046CS	12/29/2020 22:06:26	22:09:25	0.005	0.014	11	2.1
JMU1	20046CS	12/29/2020 22:09:45	22:12:44	0.006	0.014	12	2.0
DP01	20046DU	12/29/2020 22:13:23	22:16:23	0.009	0.022	12	1.7
DP01	20046DU	12/29/2020 22:16:47	22:19:46	0.009	0.024	12	1.7
JMU1	20046CV	12/30/2020 12:33:36	12:36:35	0.014	0.026	11	2.2
JMU1	20046CV	12/30/2020 12:37:28	12:40:27	0.013	0.022	11	2.2
JMU1	20046BA	12/30/2020 12:46:01	12:49:00	0.012	0.019	11	2.4
JMU1	20046BA	12/30/2020 12:50:00	12:52:59	0.012	0.022	12	2.0
JMU1	20046XH	12/30/2020 12:59:59	13:02:58	0.010	0.019	12	1.9
20046JZU	20046BE	12/30/2020 13:03:07	13:06:06	0.002	0.004	19	1.3
JMU1	20046XH	12/30/2020 13:03:49	13:06:49	0.010	0.020	12	2.0
20046JZU	20046BE	12/30/2020 13:08:53	13:11:56	0.005	0.009	18	1.4
20046XH	20046GC	12/30/2020 13:10:26	13:13:25	0.006	0.010	14	1.8
20046XH	20046GC	12/30/2020 13:13:47	13:16:46	0.005	0.008	14	1.8
20046JZU	20046BE	12/30/2020 13:14:40	13:17:38	0.002	0.004	20	1.3
20046JZU	20046FI	12/30/2020 13:26:20	13:30:04	0.006	0.011	15	2.2
20046JZU	20046FI	12/30/2020 13:30:30	13:35:49	0.018	0.021	13	1.9
20046JZU	20046FI	12/30/2020 13:36:12	13:42:58	0.006	0.010	13	1.8
DP01	20046HD	12/30/2020 13:39:45	13:42:44	0.010	0.025	12	2.0
DP01	20046HD	12/30/2020 13:43:35	13:46:34	0.010	0.021	12	2.0
DP01	20046XI	12/30/2020 13:55:58	13:58:57	0.011	0.022	11	1.9
DP01	20046XI	12/30/2020 14:01:55	14:04:54	0.010	0.021	12	1.8
20046XI	20046GL	12/30/2020 14:10:12	14:13:12	0.010	0.012	12	1.6
20046XI	20046GL	12/30/2020 14:14:54	14:17:53	0.009	0.011	13	1.7
KP13	20046AM	12/30/2020 14:28:58	14:31:57	0.007	0.010	13	1.5
KP13	20046AM	12/30/2020 14:32:39	14:34:20	0.010	0.015	13	1.5
KP13	20046AM	12/30/2020 14:36:22	14:38:13	0.008	0.012	13	1.5
DP01	20046DZ	12/30/2020 14:37:02	14:39:51	0.030	0.054	12	1.6
KP13	20046JZV	12/30/2020 14:40:17	14:43:16	0.010	0.028	14	1.4

GPS BASE	GPSID	UTC Start	UTC End	Horz Prec	Vert Prec	# of SV's	PDOP
DP01	20046DZ	12/30/2020 14:40:33	14:41:38	0.028	0.052	12	1.6
DP01	20046DZ	12/30/2020 14:43:41	14:47:12	0.010	0.016	11	1.8
KP13	20046JZV	12/30/2020 14:43:49	14:46:48	0.013	0.031	14	1.5
20046JZV	20046FP	12/30/2020 14:50:17	14:55:11	0.012	0.017	12	2.0
20046JZV	20046FP	12/30/2020 14:55:34	14:58:53	0.012	0.016	10	2.0
DP01	20046AV	12/30/2020 14:58:47	15:01:47	0.010	0.017	13	1.6
DP01	20046AV	12/30/2020 15:02:28	15:04:05	0.031	0.050	14	1.5
DP01	20046AV	12/30/2020 15:05:34	15:08:34	0.020	0.029	14	1.5
DP01	20046CW	12/30/2020 15:12:28	15:15:27	0.009	0.015	13	1.5
DP01	20046CW	12/30/2020 15:16:40	15:19:39	0.009	0.015	14	1.5
DP01	20046XJ	12/30/2020 15:27:38	15:30:37	0.012	0.022	12	1.8
DP01	20046XJ	12/30/2020 15:31:10	15:34:09	0.012	0.023	12	1.9
20046XJ	20046GB	12/30/2020 15:45:34	15:49:12	0.011	0.019	9	2.0
20046XJ	20046GB	12/30/2020 15:50:11	15:53:37	0.008	0.014	11	1.8
DP01	20046AR	12/30/2020 15:55:49	15:57:00	0.009	0.014	12	1.8
DP01	20046AR	12/30/2020 15:59:31	16:02:30	0.011	0.019	11	2.1
DP01	20046AR	12/30/2020 16:02:50	16:05:49	0.006	0.010	7	2.3
JMU1	20046CQ	12/30/2020 16:12:27	16:15:27	0.010	0.017	12	1.6
JMU1	20046CQ	12/30/2020 16:16:25	16:19:24	0.009	0.016	12	1.7
JMU1	20046BB	12/30/2020 16:23:26	16:26:26	0.010	0.018	11	1.6
JMU1	20046BB	12/30/2020 16:26:58	16:29:58	0.010	0.017	11	1.8
JMU1	20046XK	12/30/2020 16:33:38	16:36:37	0.012	0.020	11	2.0
JMU1	20046XK	12/30/2020 16:37:42	16:40:41	0.010	0.016	12	1.6
20046XK	20046GA	12/30/2020 16:45:31	16:48:30	0.006	0.010	12	1.3
20046XK	20046GA	12/30/2020 16:48:54	16:51:53	0.005	0.008	11	1.4
JMU1	20046DR	12/30/2020 17:12:24	17:15:23	0.008	0.013	12	1.5
JMU1	20046DR	12/30/2020 17:15:48	17:18:47	0.008	0.013	13	1.4
JMU1	20046DQ	12/30/2020 17:27:17	17:30:16	0.006	0.009	12	1.6
JMU1	20046ED	12/30/2020 17:29:40	17:32:45	0.010	0.016	12	1.6
JMU1	20046DQ	12/30/2020 17:30:38	17:33:37	0.006	0.009	11	1.8
JMU1	20046ED	12/30/2020 17:34:18	17:37:18	0.008	0.015	12	1.6
JMU1	20046JZW	12/30/2020 17:42:59	17:45:58	0.009	0.020	10	2.5
JMU1	20046JZW	12/30/2020 17:46:43	17:49:42	0.009	0.019	10	2.7
20046JZW	20046HC	12/30/2020 17:52:49	17:56:57	0.005	0.009	9	3.4
20046JZW	20046HC	12/30/2020 17:58:28	18:01:40	0.008	0.016	9	3.5
JMU1	20046HJ	12/30/2020 18:56:13	18:59:12	0.006	0.010	13	1.7
JMU1	20046HJ	12/30/2020 19:00:48	19:03:47	0.011	0.019	13	1.7

As mentioned, each station was occupied twice (at least) in succession. The Earth Centered Earth Fixed (ECEF) vector differences were rotated into a local horizon system (N, E, Up) for analysis, as summarized in table 4. Stations which had observations that differed by more than 0.03 m in the vertical component were re-observed until agreement was achieved. Vectors with an asterisk (*) were rejected.

Table 4 - Repeat Baseline Analysis (meters)

From	To	Vector 1	Vector 2	Δ North	Δ East	Δ Horiz	Δ Up	Length
BCC2	20046AA	224	225	0.018	-0.005	0.018	0.002	30393
BCC2	20046AA	224	226	0.014	-0.013	0.019	0.032	30393
BCC2	20046AA	225	226	-0.004	-0.008	0.009	0.029	30393
BCC2	20046AB	18	19	-0.013	0.003	0.013	-0.026	16089
BCC2	20046AC	40	41	-0.015	-0.001	0.015	-0.006	15623
MAS2	20046AD	57	58	-0.008	0.001	0.008	-0.005	18579
JMU1	20046AE	418	419	0.014	-0.011	0.018	0.002	61606
BCC2	20046AF	260	261	0.001	-0.010	0.010	0.030	13715
BCC2	20046AG	96	97	-0.004	-0.007	0.008	-0.001	18122
BCC2	20046AH	81	82	0.009	-0.019	0.021	0.039	27476
BCC2	20046AH	81	83	0.011	-0.009	0.015	0.036	27476

From	To	Vector 1	Vector 2	Δ North	Δ East	Δ Horiz	Δ Up	Length
BCC2	20046AH	82	83	0.002	0.009	0.009	-0.004	27476
WVMF	20046AI	287	288	-0.002	0.003	0.003	-0.022	35893
JMU1	20046AJ	298	299	0.009	0.005	0.010	-0.010	34279
JMU1	20046AK	309	310	0.007	0.005	0.009	-0.004	30859
JMU1	20046AL	140	141	-0.003	0.006	0.007	0.031	31448
JMU1	20046AL	140	142	-0.003	0.009	0.010	0.014	31448
JMU1	20046AL	141	142	0.000	0.003	0.003	-0.016	31448
KP13	20046AM	531	532	-0.015	0.020	0.025	-0.013	31635
KP13	20046AM	531	533	-0.017	0.012	0.020	-0.015	31635
KP13	20046AM	532	533	-0.002	-0.008	0.008	-0.002	31635
JMU1	20046AN	375*	376	0.016	0.018	0.024	0.049	25368
JMU1	20046AN	375*	377	0.023	0.023	0.032	0.078	25368
JMU1	20046AN	376	377	0.007	0.005	0.008	0.029	25368
JMU1	20046AO	378	379	0.006	0.002	0.006	0.020	17441
JMU1	20046AP	490	491	-0.006	0.005	0.007	-0.017	9733
JMU1	20046AQ	177	178	-0.002	0.001	0.002	-0.008	15853
DP01	20046AR	536	537	0.000	-0.010	0.010	-0.012	25290
DP01	20046AR	536	538	-0.003	-0.018	0.018	-0.005	25290
DP01	20046AR	537	538	-0.003	-0.008	0.008	0.008	25290
JMU1	20046AS	518	519	-0.002	-0.005	0.006	-0.025	26950
JMU1	20046AT	513	514	-0.001	0.017	0.017	-0.035	34860
JMU1	20046AT	513	515	0.015	0.030	0.034	-0.036	34860
JMU1	20046AT	514	515	0.015	0.014	0.021	0.000	34860
JMU1	20046AU	502	503	-0.001	-0.003	0.004	-0.007	32083
DP01	20046AV	465	466	0.013	0.006	0.014	-0.024	30355
DP01	20046AV	465	467	0.008	0.004	0.009	-0.012	30355
DP01	20046AV	466	467	-0.005	-0.002	0.005	0.011	30355
JMU1	20046AW	163	164	-0.012	0.005	0.013	0.023	26203
DP02	20046AX	428	429	-0.008	-0.008	0.011	-0.010	58715
JMU1	20046AY	383	384	0.006	0.005	0.008	-0.007	48243
DP01	20046AZ	437	438	0.016	0.006	0.017	0.019	44930
JMU1	20046BA	450	451	0.003	-0.002	0.003	-0.008	38124
JMU1	20046BB	476	477	0.001	-0.002	0.003	-0.007	25638
JMU1	20046BC	149	150	0.000	0.002	0.002	0.007	8933
WVMF	20046BD	322	323	-0.005	0.001	0.005	-0.014	42241
20046JZU	20046BE	525	526	-0.015	0.065	0.067	0.008	6
20046JZU	20046BE	525	527	-0.014	0.066	0.067	0.007	6
20046JZU	20046BE	526	527	0.000	0.001	0.001	-0.001	6
BCC2	20046BF	242	243	-0.016	0.007	0.017	0.027	17094
BCC2	20046BG	3	4	0.003	0.002	0.004	-0.015	2545
BCC2	20046BH	72	73	-0.002	-0.012	0.012	-0.039	19487
BCC2	20046BH	72	74	-0.016	-0.024	0.028	-0.033	19487
BCC2	20046BH	72	75	-0.023	-0.019	0.030	-0.042	19487
BCC2	20046BH	73	74	-0.014	-0.012	0.018	0.006	19487
BCC2	20046BH	73	75	-0.021	-0.007	0.022	-0.003	19487
BCC2	20046BH	74	75	-0.007	0.005	0.009	-0.009	19487
JMU1	20046BI	496	497	0.002	-0.005	0.005	0.019	20041
KP13	20046BJ	124	125	-0.007	0.006	0.010	-0.001	34829
JMU1	20046BK	397	398	0.004	0.001	0.004	0.011	49776
JMU1	20046BL	353	354	-0.004	0.005	0.006	-0.002	14775
BCC2	20046BM	109	110	0.003	0.012	0.012	-0.015	33732
BCC2	20046BN	280	281	-0.004	0.009	0.010	-0.025	31126
BCC2	20046BO	227	228	-0.019	0.002	0.019	0.008	28609
BCC2	20046BP	20	21	0.014	-0.001	0.014	0.029	16097
BCC2	20046BQ	42	43	-0.002	0.002	0.003	0.003	15624

From	To	Vector 1	Vector 2	Δ North	Δ East	Δ Horiz	Δ Up	Length
MAS2	20046BR	54	55	-0.002	-0.013	0.013	0.027	22411
MAS2	20046BR	54	56	0.008	-0.014	0.016	0.015	22411
MAS2	20046BR	55	56	0.010	-0.002	0.010	-0.011	22411
BCC2	20046BS	244	245	-0.008	-0.001	0.008	0.001	17292
BCC2	20046BT	1	2	-0.002	0.002	0.003	-0.009	2543
BCC2	20046BU	69	70	0.005	0.006	0.008	-0.005	17554
BCC2	20046BU	69	71	-0.017	0.000	0.017	-0.035	17554
BCC2	20046BU	70	71	-0.022	-0.006	0.022	-0.030	17554
BCC2	20046BV	262	263	-0.003	0.010	0.011	0.005	13617
BCC2	20046BW	90	91	0.003	0.000	0.003	0.026	18671
BCC2	20046BX	84	85	0.004	-0.006	0.007	-0.019	27366
BCC2	20046BY	270	271	0.006	-0.014	0.015	-0.032	31883
BCC2	20046BY	270	272	0.011	-0.006	0.013	0.005	31883
BCC2	20046BY	271	272	0.006	0.008	0.010	0.036	31883
WVMF	20046BZ	273	274	0.001	-0.004	0.004	-0.006	41224
BCC2	20046CA	111	112	0.003	0.007	0.008	-0.005	33993
KP13	20046CB	117	118	-0.003	0.008	0.009	-0.006	38447
KP13	20046CC	126	127	-0.003	-0.001	0.003	-0.002	34716
WVMF	20046CD	324	325	0.003	0.003	0.005	-0.005	41871
JMU1	20046CE	304	305	-0.003	0.003	0.005	0.012	33333
JMU1	20046CF	136	137	0.014	-0.007	0.016	0.013	34166
JMU1	20046CG	306	307*	0.006	-0.057	0.057	0.052	29824
JMU1	20046CG	306	308	0.001	-0.002	0.003	-0.009	29824
JMU1	20046CG	307*	308	-0.004	0.054	0.054	-0.061	29824
JMU1	20046CH	143	144	0.001	0.005	0.005	0.000	30980
JMU1	20046CI	167	168	0.004	0.006	0.007	0.010	23330
JMU1	20046CJ	336	337	-0.001	0.000	0.001	-0.001	2881
JMU1	20046CK	355	356	0.004	0.003	0.005	-0.029	13984
JMU1	20046CL	373	374	-0.014	0.006	0.015	-0.016	17082
JMU1	20046CM	494	495	-0.008	0.005	0.009	0.014	15794
JMU1	20046CN	488	489	0.001	-0.004	0.004	0.012	9634
JMU1	20046CO	175	176	0.003	-0.005	0.005	0.005	16369
JMU1	20046CP	181	182	0.000	0.002	0.002	-0.007	19379
JMU1	20046CQ	474	475	-0.009	-0.003	0.010	0.019	25967
JMU1	20046CR	500	501	-0.008	0.001	0.008	0.026	25990
JMU1	20046CS	522	523	-0.020	-0.001	0.020	-0.037	26746
JMU1	20046CS	522	524	-0.016	0.003	0.016	-0.042	26746
JMU1	20046CS	523	524	0.004	0.003	0.005	-0.005	26746
JMU1	20046CT	509	510	0.003	-0.004	0.004	0.001	34651
JMU1	20046CU	504	505	-0.004	0.002	0.005	-0.012	32030
JMU1	20046CV	448	449	-0.004	0.001	0.004	-0.012	38102
DP01	20046CW	468	469	0.004	-0.004	0.006	-0.007	30331
JMU1	20046CX	385	386	-0.004	0.000	0.004	0.002	49655
JMU1	20046CY	420	421	-0.006	0.002	0.006	-0.020	61524
JMU1	20046CY	420	422	-0.016	-0.002	0.016	-0.053	61524
JMU1	20046CY	420	423	0.005	-0.004	0.006	-0.024	61524
JMU1	20046CY	421	422	-0.010	-0.004	0.011	-0.033	61524
JMU1	20046CY	421	423	0.011	-0.006	0.012	-0.004	61524
JMU1	20046CY	422	423	0.021	-0.002	0.021	0.029	61524
JMU1	20046CZ	399	400	0.003	0.006	0.007	0.017	49715
DP01	20046DA	443	444	0.005	0.002	0.006	0.037	44701
DP01	20046DA	443	445	0.001	0.005	0.005	0.039	44701
DP01	20046DA	444	445	-0.005	0.003	0.005	0.002	44702
DP02	20046DB	434	435	-0.001	-0.009	0.009	0.004	56760
DP02	20046DB	434	436	-0.012	-0.001	0.012	0.025	56760

From	To	Vector 1	Vector 2	Δ North	Δ East	Δ Horiz	Δ Up	Length
DP02	20046DB	435	436	-0.011	0.008	0.013	0.021	56760
JMU1	20046DC	159	160	0.001	-0.002	0.003	0.007	21736
JMU1	20046DD	345	346	-0.002	0.007	0.007	-0.014	18538
JMU1	20046DE	130	131	0.015	-0.005	0.016	-0.004	39973
JMU1	20046DF	315	316	0.001	-0.010	0.010	0.015	39475
BCC2	20046DG	113	114	0.002	0.007	0.008	-0.013	38996
WVMF	20046DH	326	327	-0.005	-0.006	0.008	-0.005	42862
BCC2	20046DI	100	101	0.003	-0.001	0.003	0.003	24584
BCC2	20046DJ	14	15	0.002	-0.006	0.006	-0.013	12054
BCC2	20046DK	67	68	0.001	0.002	0.002	0.005	12743
BCC2	20046DL	29	30	-0.002	0.003	0.003	-0.022	11337
BCC2	20046DM	252	253	-0.001	-0.002	0.003	-0.022	13815
JMU1	20046DN	155	156	0.002	0.005	0.005	-0.014	20896
JMU1	20046DO	169	170	-0.011	-0.003	0.011	0.005	16702
JMU1	20046DO	169	171	-0.006	0.014	0.015	-0.034	16702
JMU1	20046DO	169	172	-0.007	0.013	0.014	-0.032	16702
JMU1	20046DO	170	171	0.005	0.017	0.018	-0.039	16702
JMU1	20046DO	170	172	0.004	0.016	0.016	-0.037	16702
JMU1	20046DO	171	172	-0.001	-0.001	0.002	0.001	16702
JMU1	20046DP	366	367	0.002	0.000	0.002	0.003	4474
JMU1	20046DQ	539	540	-0.003	0.005	0.006	0.005	20025
JMU1	20046DR	482	483	0.004	-0.007	0.008	0.000	16121
JMU1	20046DS	185	186	0.011	-0.006	0.012	0.010	31089
JMU1	20046DT	191	192	0.002	0.002	0.003	-0.005	30119
DP01	20046DU	446	447	0.007	-0.002	0.007	-0.004	39388
JMU1	20046DV	391	392	0.014	0.005	0.015	-0.016	44402
JMU1	20046DW	407	408	0.012	-0.004	0.012	-0.039	56065
JMU1	20046DW	407	409	-0.001	-0.010	0.010	-0.017	56065
JMU1	20046DW	408	409	-0.012	-0.006	0.014	0.022	56065
JMU1	20046DX	416	417	0.008	0.004	0.009	-0.011	59414
JMU1	20046DY	405	406	0.013	0.005	0.014	-0.001	54135
DP01	20046DZ	462	463	-0.015	0.000	0.015	0.008	36069
DP01	20046DZ	462	464	-0.022	0.009	0.024	0.019	36069
DP01	20046DZ	463	464	-0.007	0.009	0.011	0.011	36069
KP13	20046EA	132	133	0.007	-0.005	0.008	0.024	31330
JMU1	20046EB	347	348	0.009	0.003	0.010	0.011	22132
BCC2	20046EC	36*	37*	0.017	0.016	0.023	-0.015	6814
BCC2	20046EC	36*	38	0.024	-0.002	0.024	-0.120	6814
BCC2	20046EC	36*	39	0.024	-0.002	0.024	-0.123	6814
BCC2	20046EC	37*	38	0.007	-0.018	0.019	-0.105	6814
BCC2	20046EC	37*	39	0.006	-0.018	0.019	-0.108	6814
BCC2	20046EC	38	39	0.000	0.000	0.000	-0.003	6814
JMU1	20046ED	484	485	0.003	0.000	0.003	0.001	21824
BCC2	20046EE	268	269	-0.009	0.011	0.015	0.006	23547
BCC2	20046EF	105	106	0.014	0.002	0.015	0.024	27532
BCC2	20046EG	334	335	-0.005	-0.016	0.016	-0.022	37223
BCC2	20046EH	332	333	-0.009	0.007	0.012	0.011	45820
BCC2	20046EI	246	247	0.006	0.005	0.008	0.001	22781
BCC2	20046EJ	51	52	0.000	-0.002	0.002	-0.003	16336
BCC2	20046EK	234	235	-0.008	0.002	0.008	0.016	22484
BCC2	20046EK	234	236	-0.001	0.002	0.003	-0.004	22484
BCC2	20046EK	235	236	0.006	0.000	0.006	-0.020	22484
JMU1	20046EL	161	162	-0.005	-0.004	0.007	-0.001	24925
JMU1	20046EM	338	339	0.002	0.002	0.003	-0.013	10744
JMU1	20046EN	145	146	0.000	-0.003	0.003	0.001	4397

From	To	Vector 1	Vector 2	Δ North	Δ East	Δ Horiz	Δ Up	Length
JMU1	20046EO	153	154	0.000	0.000	0.000	-0.004	12888
JMU1	20046EP	486	487	-0.003	-0.003	0.004	0.016	15525
JMU1	20046EQ	183	184	-0.003	0.004	0.005	-0.008	23554
JMU1	20046ER	380	381	-0.002	0.000	0.002	0.045	38637
JMU1	20046ER	380	382	0.003	-0.002	0.003	0.011	38637
JMU1	20046ER	381	382	0.005	-0.002	0.005	-0.034	38637
BCC2	20046ES	16	17	-0.002	0.001	0.002	0.017	6314
WVMF	20046ET	292	293	-0.003	-0.003	0.004	-0.022	38028
JMU1	20046EU	516	517	0.002	-0.006	0.007	-0.007	31209
20046WK	20046EV	232	233	0.018	0.000	0.018	-0.004	28
20046WI	20046EW	24*	25*	0.044	-0.011	0.045	0.003	31
20046WI	20046EW	24*	26	-0.573	1.257	1.381	0.279	31
20046WI	20046EW	24*	27	-0.574	1.255	1.380	0.273	31
20046WI	20046EW	24*	28	-0.582	1.243	1.372	0.274	31
20046WI	20046EW	25*	26	-0.617	1.268	1.410	0.276	31
20046WI	20046EW	25*	27	-0.618	1.266	1.409	0.270	31
20046WI	20046EW	25*	28	-0.626	1.254	1.401	0.272	31
20046WI	20046EW	26	27	-0.001	-0.002	0.002	-0.006	30
20046WI	20046EW	26	28	-0.008	-0.014	0.016	-0.005	30
20046WI	20046EW	27	28	-0.008	-0.012	0.014	0.001	30
20046WA	20046EX	47	48	-0.005	0.003	0.005	-0.004	22
20046WB	20046EY	61	62	0.005	-0.010	0.011	0.007	36
20046WM	20046EZ	250	251	0.007	0.024	0.025	-0.020	13
20046WG	20046FA	7	8	-0.008	-0.011	0.014	-0.011	22
20046WD	20046FB	78	79	-0.005	-0.007	0.009	-0.005	48
20046WD	20046FB	78	80	-0.002	-0.003	0.004	-0.018	48
20046WD	20046FB	79	80	0.002	0.004	0.005	-0.013	48
20046WO	20046FC	266	267	0.015	-0.013	0.021	-0.004	35
20046WF	20046FD	94	95	-0.003	0.009	0.010	-0.027	28
20046WE	20046FE	88	89	0.007	0.005	0.008	-0.021	30
20046WP	20046FF	278	279	0.008	0.003	0.009	-0.013	28
20046JZC	20046FG	115	116	0.010	0.017	0.020	-0.020	14
20046WQ	20046FH	285	286	0.005	0.020	0.021	-0.030	16
20046JZU	20046FI	528	529	-0.028	-0.009	0.030	-0.037	81
20046JZU	20046FI	528	530	-0.021	-0.002	0.021	-0.010	81
20046JZU	20046FI	529	530	0.008	0.007	0.010	0.027	81
20046WU	20046FJ	320	321	-0.012	0.014	0.018	0.026	22
20046JZD	20046FK	119	120	-0.006	-0.007	0.010	0.008	57
20046WS	20046FL	302	303	0.007	0.009	0.011	-0.030	14
20046WT	20046FM	313	314	-0.004	0.001	0.004	0.006	49
20046JZE	20046FN	121	122	0.001	0.000	0.002	0.005	85
20046JZE	20046FN	121	123	-0.004	0.006	0.007	0.003	85
20046JZE	20046FN	122	123	-0.006	0.006	0.008	-0.002	85
20046JZH	20046FO	138	139	0.008	-0.009	0.012	0.022	21
20046JZV	20046FP	534	535	0.008	0.023	0.024	-0.009	104
20046JZL	20046FQ	165	166	0.006	0.014	0.015	0.014	57
20046JZJ	20046FR	151	152	0.003	0.006	0.006	0.008	94
20046WY	20046FS	361	362	-0.017	-0.009	0.019	-0.014	22
20046WY	20046FS	361	363	-0.011	-0.001	0.011	0.029	22
20046WY	20046FS	362	363	0.006	0.007	0.009	0.044	22
20046WZ	20046FT	371	372	-0.020	-0.001	0.020	0.030	21
20046JZP	20046FU	492	493	-0.018	-0.011	0.021	0.014	44
20046JZN	20046FV	179	180	0.007	-0.005	0.009	-0.019	46
20046JZQ	20046FW	498	499	-0.020	-0.013	0.023	0.008	61
20046JZT	20046FX	520	521	0.012	0.005	0.013	-0.020	49

From	To	Vector 1	Vector 2	Δ North	Δ East	Δ Horiz	Δ Up	Length
20046JZS	20046FY	511	512	0.001	0.000	0.001	0.019	157
20046JZR	20046FZ	506	507	-0.006	0.008	0.010	-0.035	30
20046JZR	20046FZ	506	508	-0.005	0.009	0.011	-0.025	30
20046JZR	20046FZ	507	508	0.001	0.001	0.001	0.010	30
20046XK	20046GA	480	481	-0.004	0.004	0.005	0.019	81
20046XJ	20046GB	472	473	-0.007	0.010	0.012	0.037	47
20046XH	20046GC	454	455	0.000	0.007	0.007	-0.008	53
20046XA	20046GD	389	390	0.005	0.013	0.014	0.023	17
20046XC	20046GE	403	404	0.011	0.005	0.012	-0.012	25
20046XG	20046GF	441	442	-0.005	-0.009	0.010	0.011	56
20046XE	20046GG	426	427	0.011	-0.008	0.013	0.003	27
20046XF	20046GH	432	433	0.004	0.022	0.022	-0.009	27
20046XD	20046GI	413	414	0.014	0.004	0.015	0.023	34
20046XD	20046GI	413	415	0.014	-0.013	0.019	0.030	34
20046XD	20046GI	414	415	0.000	-0.017	0.017	0.007	34
20046XB	20046GJ	395	396	-0.004	-0.007	0.008	0.023	29
20046JZO	20046GK	187	188	0.040	0.006	0.041	-0.064	73
20046XI	20046GL	460	461	0.010	0.002	0.010	0.017	54
20046JZM	20046GM	173	174	-0.001	-0.008	0.008	0.032	37
20046JZI	20046GN	147	148	0.004	-0.006	0.007	0.007	35
20046WX	20046GO	351	352	0.016	0.001	0.017	0.025	37
20046JZK	20046GP	157	158	-0.013	0.003	0.014	0.023	54
20046JZG	20046GQ	134	135	-0.008	0.004	0.008	-0.015	41
20046JZF	20046GR	128	129	0.008	-0.014	0.016	-0.007	19
20046WR	20046GS	296	297	-0.012	-0.003	0.013	-0.002	16
20046WV	20046GT	330	331	-0.010	0.011	0.015	0.008	26
20046JZB	20046GU	107	108	0.016	0.000	0.016	-0.037	76
20046JZA	20046GV	102*	103	0.002	0.021	0.021	-0.123	38
20046JZA	20046GV	102*	104	-0.006	0.022	0.023	-0.115	38
20046JZA	20046GV	103	104	-0.008	0.000	0.008	0.008	38
20046WN	20046GW	257	258	0.009	0.004	0.010	0.019	21
20046WN	20046GW	257	259	-0.009	-0.017	0.019	0.002	21
20046WN	20046GW	258	259	-0.018	-0.020	0.027	-0.016	21
20046WH	20046GX	11	12*	0.110	-0.021	0.112	0.131	47
20046WH	20046GX	11	13	-0.012	0.037	0.039	0.024	47
20046WH	20046GX	12*	13	-0.123	0.058	0.136	-0.107	47
20046WC	20046GY	65	66	0.008	0.016	0.017	-0.021	23
20046WL	20046GZ	240	241	-0.004	0.005	0.006	-0.012	17
20046WJ	20046HA	33	34	-0.001	0.022	0.022	0.036	31
20046WJ	20046HA	33	35	0.000	0.010	0.010	0.025	31
20046WJ	20046HA	34	35	0.002	-0.012	0.012	-0.011	31
20046WW	20046HB	342	343	0.002	-0.009	0.009	0.049	39
20046WW	20046HB	342	344	-0.006	-0.015	0.017	0.037	39
20046WW	20046HB	343	344	-0.008	-0.006	0.010	-0.012	39
20046JZW	20046HC	541	542	0.004	0.005	0.006	0.026	50
DP01	20046HD	456	457	0.016	-0.013	0.020	-0.015	42867
JMU1	20046HE	364	365	0.008	0.005	0.010	-0.001	8363
WVMF	20046HF	289	290	-0.004	0.007	0.008	-0.004	34558
WVMF	20046HF	289	291	-0.001	0.007	0.007	0.018	34558
WVMF	20046HF	290	291	0.002	-0.001	0.003	0.023	34558
BCC2	20046HG	98	99	-0.001	0.004	0.004	-0.007	15854
WVKE	20046HH	49	50	0.012	0.001	0.012	-0.006	16540
JMU1	20046HJ	543	544	0.010	0.000	0.010	0.012	32135
BCC2	20046JZA	545	546	-0.018	-0.013	0.023	-0.056	24805
BCC2	20046JZA	545	547	-0.002	-0.014	0.014	-0.028	24805

From	To	Vector 1	Vector 2	Δ North	Δ East	Δ Horiz	Δ Up	Length
BCC2	20046JZA	546	547	0.016	-0.001	0.016	0.027	24805
BCC2	20046JZB	548	549	0.002	-0.014	0.014	-0.005	29068
BCC2	20046JZB	548	550	0.014	-0.017	0.022	0.027	29068
BCC2	20046JZB	549	550	0.012	-0.003	0.012	0.032	29068
BCC2	20046JZC	551	552	0.017	0.024	0.029	0.035	39934
BCC2	20046JZC	551	553	0.013	0.026	0.029	-0.028	39934
BCC2	20046JZC	552	553	-0.005	0.002	0.005	-0.063	39934
KP13	20046JZD	554	555	0.007	0.003	0.007	0.004	37864
KP13	20046JZE	556	557	0.004	-0.006	0.007	0.019	35889
JMU1	20046JZF	558	559	0.007	0.004	0.008	-0.013	39159
KP13	20046JZG	560	561	-0.012	0.001	0.012	0.027	31148
KP13	20046JZG	560	562	-0.016	0.006	0.017	0.010	31148
KP13	20046JZG	561	562	-0.004	0.005	0.006	-0.017	31148
JMU1	20046JZH	563	564	0.005	-0.002	0.006	0.002	31455
JMU1	20046JZI	565	566	-0.004	-0.001	0.004	0.001	7129
JMU1	20046JZK	568	569	0.016	0.010	0.019	-0.026	26091
JMU1	20046JZM	570	571	0.006	0.006	0.009	-0.024	16650
JMU1	20046JZN	572	573	-0.002	0.006	0.006	-0.010	16056
JMU1	20046JZO	574	575	-0.009	0.001	0.009	0.016	31093
JMU1	20046JZP	576	577	0.000	-0.005	0.005	0.002	9500
JMU1	20046JZQ	578	579	-0.008	-0.002	0.009	0.000	20712
JMU1	20046JZR	580	581	-0.016	0.017	0.023	-0.018	31944
JMU1	20046JZS	582	583	0.011	-0.001	0.011	-0.025	35480
JMU1	20046JZT	584	585	-0.003	-0.002	0.004	0.005	27048
KP13	20046JZV	586	587	-0.002	-0.001	0.002	-0.025	31642
JMU1	20046JZW	588	589	0.005	0.002	0.005	0.011	18455
WVKE	20046WA	45	46	-0.006	-0.002	0.006	0.009	16043
MAS2	20046WB	59	60	0.001	0.016	0.016	0.019	18624
BCC2	20046WC	63	64	0.011	0.017	0.021	0.010	12263
BCC2	20046WD	76	77	-0.024	0.003	0.024	-0.001	19682
BCC2	20046WE	86	87	0.001	-0.003	0.004	-0.005	27602
BCC2	20046WF	92	93	-0.020	-0.007	0.021	0.028	18658
BCC2	20046WG	5	6	0.001	-0.004	0.004	0.003	2668
BCC2	20046WH	9	10	0.000	-0.023	0.023	-0.030	9354
BCC2	20046WI	22	23	-0.011	-0.006	0.013	-0.013	15947
BCC2	20046WJ	31	32	0.003	0.002	0.004	-0.011	8994
BCC2	20046WK	229	230	-0.018	0.013	0.022	-0.031	28612
BCC2	20046WK	229	231	-0.010	0.004	0.011	0.023	28612
BCC2	20046WK	230	231	0.008	-0.009	0.012	0.054	28612
BCC2	20046WL	237	238	-0.005	-0.006	0.008	0.008	21554
BCC2	20046WL	237	239	0.003	-0.013	0.013	-0.011	21554
BCC2	20046WL	238	239	0.009	-0.007	0.011	-0.019	21554
BCC2	20046WM	248	249	0.012	-0.016	0.020	0.002	20806
BCC2	20046WN	254	255*	0.016	-0.006	0.018	0.097	13970
BCC2	20046WN	254	256	0.003	0.010	0.010	0.042	13970
BCC2	20046WN	255*	256	-0.014	0.016	0.021	-0.054	13970
BCC2	20046WO	264	265	-0.005	0.001	0.005	0.014	20659
BCC2	20046WP	275	276*	0.002	-0.003	0.004	0.058	31864
BCC2	20046WP	275	277	0.012	0.004	0.012	0.012	31864
BCC2	20046WP	276*	277	0.010	0.007	0.012	-0.046	31864
WVMF	20046WQ	282	283	-0.025	-0.009	0.027	-0.035	36951
WVMF	20046WQ	282	284	-0.027	0.001	0.027	-0.040	36951
WVMF	20046WQ	283	284	-0.001	0.011	0.011	-0.005	36951
JMU1	20046WR	294	295	0.004	0.000	0.005	-0.027	36204
JMU1	20046WS	300	301	-0.014	-0.005	0.015	-0.021	30209

From	To	Vector 1	Vector 2	Δ North	Δ East	Δ Horiz	Δ Up	Length
JMU1	20046WT	311	312	0.012	0.006	0.013	-0.015	30988
WVMF	20046WU	317*	318	0.014	0.030	0.033	0.087	43537
WVMF	20046WU	317*	319	0.022	0.015	0.027	0.094	43537
WVMF	20046WU	318	319	0.008	-0.015	0.017	0.007	43537
WVMF	20046WV	328	329	-0.013	0.012	0.018	-0.018	43032
JMU1	20046WW	340	341	0.007	0.000	0.007	-0.003	17733
JMU1	20046WX	349	350	-0.001	-0.003	0.004	-0.007	22481
JMU1	20046WY	357	358	-0.036	-0.039	0.053	-0.020	15477
JMU1	20046WY	357	359	-0.025	-0.019	0.031	-0.010	15477
JMU1	20046WY	357	360	-0.025	-0.026	0.036	-0.001	15477
JMU1	20046WY	358	359	0.011	0.020	0.023	0.010	15477
JMU1	20046WY	358	360	0.011	0.013	0.017	0.019	15477
JMU1	20046WY	359	360	0.000	-0.007	0.007	0.009	15477
JMU1	20046WZ	368	369	-0.002	0.008	0.009	-0.036	15583
JMU1	20046WZ	368	370	-0.001	0.017	0.017	-0.038	15583
JMU1	20046WZ	369	370	0.001	0.009	0.009	-0.002	15583
JMU1	20046XA	387	388	0.002	-0.005	0.005	0.002	49664
JMU1	20046XB	393	394	0.004	0.000	0.004	0.003	44778
JMU1	20046XC	401	402	0.001	0.004	0.004	0.004	49708
JMU1	20046XD	410	411	-0.006	0.018	0.019	0.027	56060
JMU1	20046XD	410	412	0.013	0.010	0.017	-0.025	56060
JMU1	20046XD	411	412	0.019	-0.008	0.020	-0.051	56060
JMU1	20046XE	424	425	-0.012	0.008	0.015	0.007	62293
DP02	20046XF	430	431	-0.016	0.014	0.021	-0.017	58763
DP01	20046XG	439	440	-0.017	-0.004	0.017	-0.009	44938
JMU1	20046XH	452	453	0.010	0.002	0.010	-0.025	38370
DP01	20046XI	458	459	0.002	0.026	0.026	-0.002	39397
DP01	20046XJ	470	471	-0.006	-0.007	0.009	-0.016	29763
JMU1	20046XK	478	479	-0.006	0.010	0.012	0.010	25166

Figure 5 is a plot of the repeat baseline data (reject lines omitted).

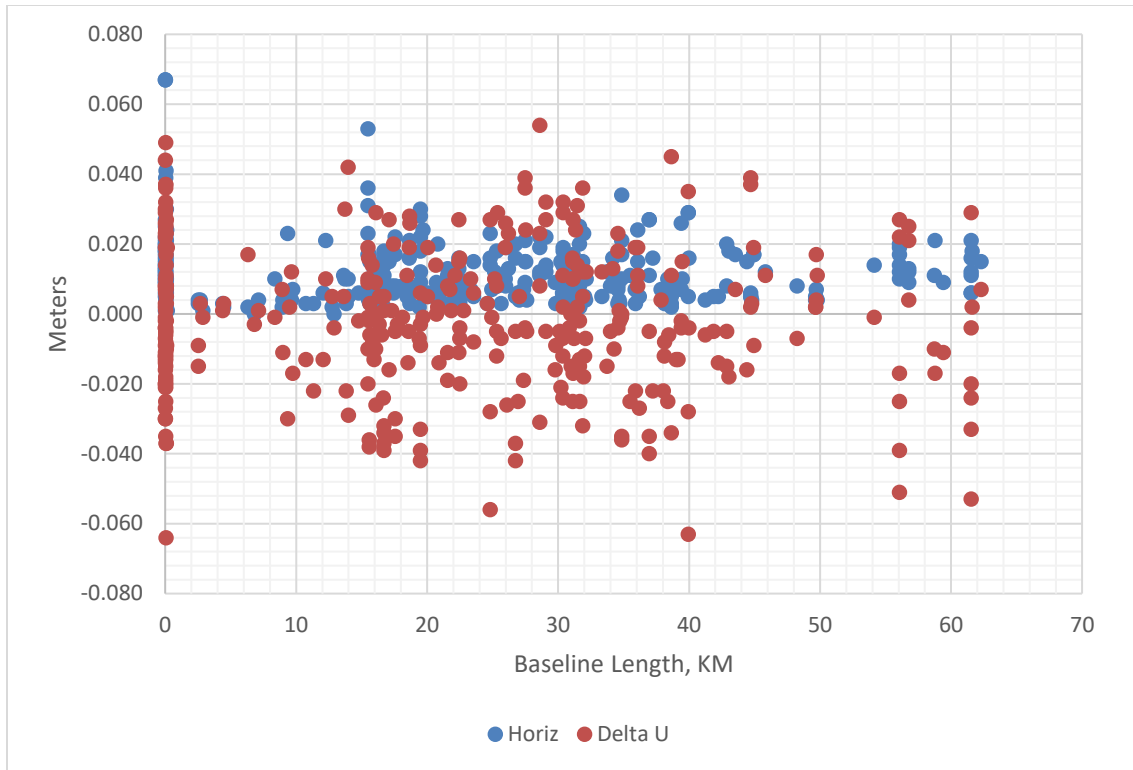


Figure 5 - Repeat Baseline Analysis

RTX OCCUPATIONS

Three locations did not have cellular service, which is required to receive corrections from the Keynet VRS. The Trimble Centerpoint RTX system was used. In the RTX method the corrections are generated from a global network of CORS, and delivered over a satellite communications link. Table 5 lists the locations surveyed using RTX.

Table 5 - Locations surveyed with RTX

Station Name	GPSID	Comments
GCP31	20046BE	Surveyed from 20046JZU
VVAF14	20046FI	Surveyed from 20046JZU
VVAF22	20046FQ	Surveyed from 20046JZL
GCP14A	20046HI	Additional GCP, directly surveyed

Temporary station 20046JZU was surveyed with RTX and also collected static data for post processing using the RTX online service.

Table 6 summarizes the Real-Time RTX observations, and table 7 summarizes the RTX post processed solution.

Table 6 - Real Time RTX Observations

GPSID	UTC Start	# of epochs	Horz Prec	Vert Prec	# of SV's	PDOP	GDOP	HDOP	VDOP
20046HI	12/30/20 18:24	191	0.010	0.043	18	1.5	2.3	0.8	1.3
20046HI	12/30/20 18:29	67	0.012	0.054	18	1.4	2.1	0.7	1.2
20046HI	12/30/20 18:31	64	0.021	0.073	18	1.4	2.1	0.7	1.2
20046JZL	12/15/20 17:37	180	0.010	0.037	19	1.3	1.9	0.7	1.0
20046JZL	12/15/20 17:41	180	0.010	0.043	19	1.3	1.9	0.7	1.1
20046JZL	12/15/20 17:47	80	0.019	0.074	19	1.2	1.8	0.7	1.0

GPSID	UTC Start	# of epochs	Horz Prec	Vert Prec	# of SV' s	PDOP	GDOP	HDOP	VDOP
20046JZU	12/30/20 13:07	315	0.008	0.029	21	1.2	1.7	0.6	1.0
20046JZU	12/30/20 13:12	270	0.009	0.036	21	1.3	1.8	0.7	1.0

Table 7 – Post-Processed RTX Observations

GPSID	UTC start	Dur. Mins	Total Obs	Obs Used	SV' s Used	σ North	σ East	σ Height
20046JZU	12/30/2020 13:00	44	268	268	22	0.005	0.005	0.014

The RTX system returns the positions referenced to the ITRF2014 reference frame with an epoch date 2020.9. The NGS utility Horizontal Time Dependent Positioning (HTDP) was used to transform the ITRF positions to NAD83 (2011) epoch 2010.0. Table 8 lists the transformed UTM Zone 17 positions and NAD83 (2011) epoch 2010.0 ellipsoid heights for each RTX solution.

Table 8 - Transformed RTX Solutions (UTM Zone 17)

GPSID	UTM17 Northing	UTM17 Easting	Ellip Height	Solution Type
20046HI	4259860.898	661827.656	580.140	Real-Time
20046HI	4259860.892	661827.659	580.122	Real-Time
20046HI	4259860.892	661827.659	580.086	Real-Time
20046JZL	4246905.784	711824.634	450.330	Real-Time
20046JZL	4246905.796	711824.626	450.268	Real-Time
20046JZL	4246905.796	711824.639	450.315	Real-Time
20046JZU	4291175.649	733831.164	713.889	Real-Time
20046JZU	4291175.644	733831.164	713.919	Real-Time
20046JZU	4291175.640	733831.163	713.908	Post-Processed

LEAST SQUARES ADJUSTMENTS

Geolab was used to adjust the VRS/RTK vectors and the RTX positions. No scaling of the a priori GPS statistics was done. Station errors (centering, HI, and HT) of 0.005 m were input. The GEOID18 model was used.

The adjustment constrained the CORS positions (as computed and broadcast by the network) in all three dimensions (NAD83 (2011) epoch 2010.0 latitude, longitude, and ellipsoidal height). The estimated variance factor for adjustment was 0.49. This adjustment provided the adjusted positions (NAD83 (2011) epoch 2010.0) and GPS derived orthometric heights (NAVD88) for the stations in the network. The adjusted latitude/longitudes were transformed to UTM Zone 17 grid coordinates. Figure 6 shows the GNSS horizontal and vertical residuals for this adjustment (in meters).

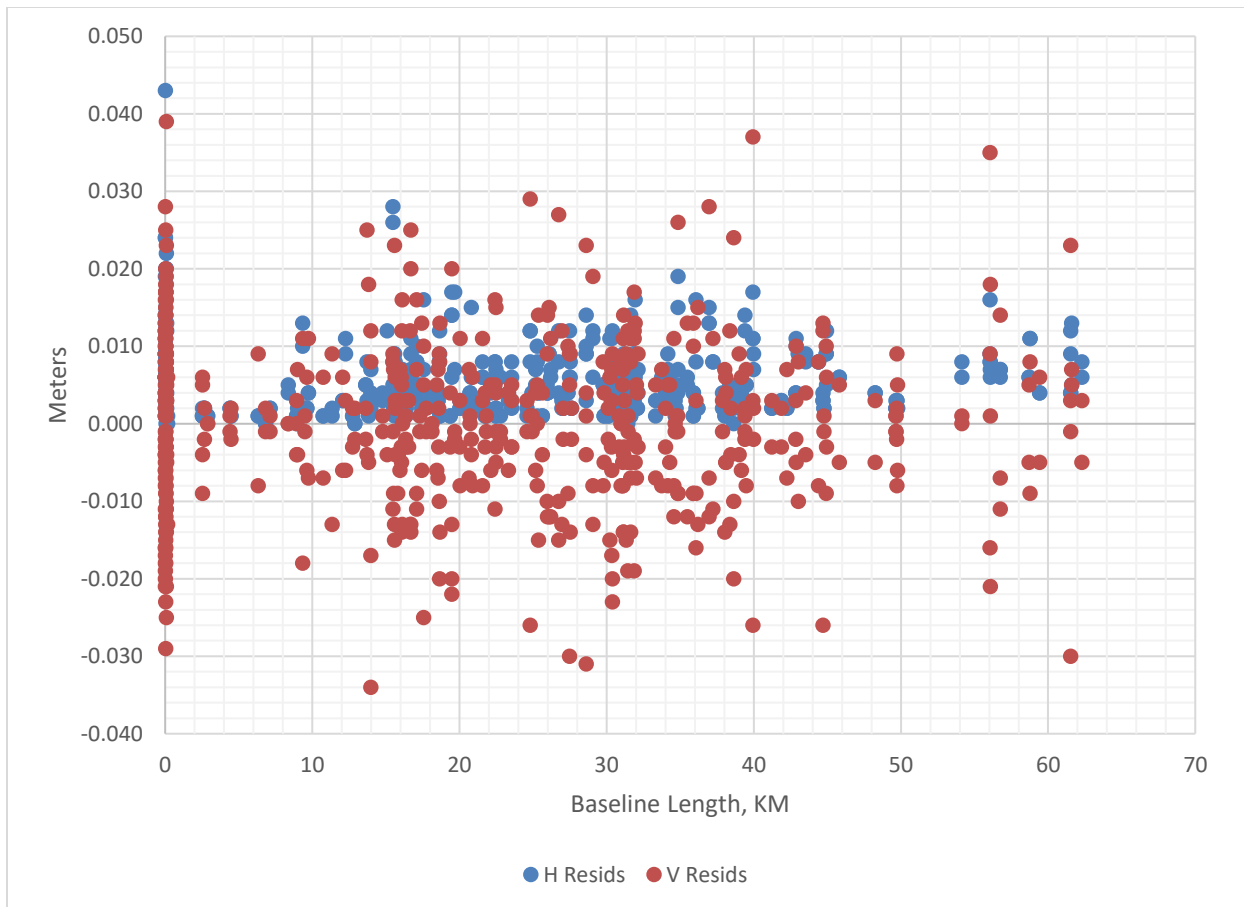


Figure 6 - Constrained Adjustment Residuals (meters)

Table 9 lists the station confidence regions at the 95% level, in meters.

Table 9 - Station Confidence Regions @ 95% meters

Station Name	Semi-Major Axis	Azimuth	Semi-Minor Axis	Vertical
20046AA	0.012	163	0.011	0.028
20046AB	0.011	169	0.010	0.016
20046AC	0.016	167	0.012	0.032
20046AD	0.013	180	0.011	0.018
20046AE	0.018	99	0.014	0.031
20046AF	0.013	151	0.011	0.018
20046AG	0.012	179	0.011	0.020
20046AH	0.011	35	0.010	0.016
20046AI	0.013	7	0.012	0.020
20046AJ	0.012	26	0.011	0.015
20046AK	0.013	8	0.012	0.020
20046AL	0.009	177	0.009	0.011
20046AM	0.010	0	0.008	0.011
20046AN	0.019	142	0.015	0.033
20046AO	0.010	153	0.010	0.013
20046AP	0.010	173	0.010	0.010
20046AQ	0.010	20	0.010	0.012
20046AR	0.010	40	0.009	0.012
20046AS	0.010	149	0.010	0.013
20046AT	0.010	143	0.009	0.012

Station Name	Semi-Major Axis	Azimuth	Semi-Minor Axis	Vertical
20046AU	0.011	154	0.010	0.012
20046AV	0.014	21	0.010	0.018
20046AW	0.010	159	0.010	0.013
20046AX	0.013	155	0.011	0.022
20046AY	0.013	34	0.012	0.021
20046AZ	0.012	81	0.012	0.019
20046BA	0.015	24	0.011	0.021
20046BB	0.012	25	0.012	0.018
20046BC	0.010	25	0.009	0.009
20046BD	0.012	26	0.011	0.018
20046BE	0.010	16	0.009	0.018
20046BF	0.012	42	0.011	0.014
20046BG	0.010	175	0.009	0.010
20046BH	0.012	38	0.010	0.018
20046BI	0.011	22	0.010	0.014
20046BJ	0.013	13	0.012	0.016
20046BK	0.015	20	0.012	0.019
20046BL	0.014	16	0.011	0.017
20046BM	0.011	27	0.010	0.012
20046BN	0.015	35	0.011	0.016
20046BO	0.013	159	0.011	0.017
20046BP	0.011	174	0.010	0.015
20046BQ	0.011	162	0.009	0.017
20046BR	0.012	14	0.011	0.019
20046BS	0.013	8	0.012	0.019
20046BT	0.012	1	0.010	0.014
20046BU	0.013	54	0.011	0.019
20046BV	0.011	154	0.010	0.014
20046BW	0.012	7	0.011	0.019
20046BX	0.014	177	0.012	0.019
20046BY	0.010	17	0.009	0.013
20046BZ	0.013	172	0.011	0.017
20046CA	0.014	30	0.011	0.016
20046CB	0.011	41	0.010	0.014
20046CC	0.012	17	0.011	0.015
20046CD	0.012	172	0.011	0.020
20046CE	0.012	170	0.012	0.020
20046CF	0.012	150	0.010	0.014
20046CG	0.014	168	0.012	0.020
20046CH	0.011	6	0.010	0.012
20046CI	0.014	134	0.010	0.016
20046CJ	0.009	142	0.009	0.010
20046CK	0.012	92	0.012	0.018
20046CL	0.013	158	0.011	0.017
20046CM	0.010	26	0.010	0.012
20046CN	0.009	174	0.009	0.009
20046CO	0.010	15	0.010	0.011
20046CP	0.011	162	0.010	0.012
20046CQ	0.012	48	0.011	0.018
20046CR	0.010	165	0.010	0.012
20046CS	0.008	161	0.008	0.013
20046CT	0.013	156	0.011	0.015
20046CU	0.012	151	0.010	0.014
20046CV	0.017	34	0.011	0.024
20046CW	0.012	20	0.011	0.016
20046CX	0.014	151	0.012	0.019
20046CY	0.013	32	0.008	0.022
20046CZ	0.017	17	0.012	0.021
20046DA	0.010	20	0.009	0.018
20046DB	0.016	155	0.010	0.023
20046DC	0.011	23	0.009	0.012
20046DD	0.013	23	0.011	0.016
20046DE	0.011	178	0.010	0.014
20046DF	0.013	33	0.012	0.022

Station Name	Semi-Major Axis	Azimuth	Semi-Minor Axis	Vertical
20046DG	0.013	22	0.011	0.016
20046DH	0.013	155	0.011	0.021
20046DI	0.012	26	0.011	0.016
20046DJ	0.012	18	0.010	0.015
20046DK	0.014	29	0.011	0.016
20046DL	0.012	35	0.011	0.014
20046DM	0.013	18	0.012	0.023
20046DN	0.011	170	0.010	0.014
20046DO	0.007	28	0.007	0.009
20046DP	0.011	16	0.010	0.013
20046DQ	0.010	18	0.010	0.011
20046DR	0.011	26	0.011	0.014
20046DS	0.011	156	0.010	0.012
20046DT	0.010	177	0.010	0.011
20046DU	0.012	174	0.011	0.023
20046DV	0.014	166	0.011	0.019
20046DW	0.011	129	0.010	0.018
20046DX	0.013	50	0.011	0.020
20046DY	0.013	17	0.012	0.020
20046DZ	0.014	20	0.011	0.020
20046EA	0.011	156	0.010	0.013
20046EB	0.013	29	0.012	0.018
20046EC	0.013	169	0.012	0.026
20046ED	0.012	35	0.011	0.017
20046EE	0.013	170	0.012	0.017
20046EF	0.013	164	0.011	0.016
20046EG	0.012	29	0.012	0.018
20046EH	0.015	169	0.012	0.021
20046EI	0.017	23	0.016	0.026
20046EJ	0.015	36	0.012	0.020
20046EK	0.015	33	0.011	0.017
20046EL	0.011	28	0.009	0.011
20046EM	0.011	133	0.010	0.017
20046EN	0.010	1	0.009	0.010
20046EO	0.010	160	0.009	0.011
20046EP	0.010	17	0.010	0.011
20046EQ	0.011	158	0.010	0.012
20046ER	0.012	38	0.009	0.017
20046ES	0.010	9	0.009	0.012
20046ET	0.019	1	0.016	0.042
20046EU	0.010	92	0.010	0.012
20046EV	0.020	156	0.016	0.030
20046EW	0.016	175	0.014	0.023
20046EX	0.018	179	0.015	0.021
20046EY	0.016	169	0.014	0.022
20046EZ	0.021	15	0.019	0.031
20046FA	0.014	143	0.014	0.014
20046FB	0.018	138	0.017	0.028
20046FC	0.018	156	0.016	0.024
20046FD	0.018	5	0.017	0.037
20046FE	0.017	16	0.015	0.026
20046FF	0.021	5	0.017	0.033
20046FG	0.024	43	0.016	0.026
20046FH	0.024	23	0.017	0.026
20046FI	0.011	154	0.010	0.019
20046FJ	0.020	29	0.016	0.033
20046FK	0.017	16	0.016	0.022
20046FL	0.024	37	0.019	0.031
20046FM	0.016	116	0.015	0.021
20046FN	0.015	18	0.014	0.019
20046FO	0.019	147	0.016	0.025
20046FP	0.020	7	0.017	0.034
20046FQ	0.013	175	0.012	0.037
20046FR	0.020	30	0.018	0.025

Station Name	Semi-Major Axis	Azimuth	Semi-Minor Axis	Vertical
20046FS	0.020	51	0.013	0.019
20046FT	0.016	15	0.014	0.021
20046FU	0.016	13	0.015	0.019
20046FV	0.018	135	0.015	0.023
20046FW	0.016	27	0.015	0.022
20046FX	0.015	155	0.015	0.024
20046FY	0.019	163	0.016	0.025
20046FZ	0.019	135	0.016	0.026
20046GA	0.017	71	0.016	0.022
20046GB	0.020	27	0.016	0.029
20046GC	0.017	9	0.015	0.023
20046GD	0.021	165	0.020	0.035
20046GE	0.021	13	0.016	0.027
20046GF	0.021	174	0.017	0.034
20046GG	0.020	22	0.015	0.026
20046GH	0.022	143	0.018	0.032
20046GI	0.017	162	0.016	0.029
20046GJ	0.021	16	0.016	0.026
20046GK	0.019	156	0.016	0.024
20046GL	0.019	160	0.016	0.026
20046GM	0.017	175	0.015	0.022
20046GN	0.014	14	0.014	0.016
20046GO	0.017	25	0.016	0.022
20046GP	0.018	3	0.015	0.028
20046GQ	0.019	149	0.015	0.026
20046GR	0.017	14	0.015	0.032
20046GS	0.023	23	0.016	0.034
20046GT	0.019	159	0.015	0.025
20046GU	0.017	178	0.015	0.031
20046GV	0.016	13	0.014	0.025
20046GW	0.019	30	0.016	0.028
20046GX	0.020	173	0.015	0.023
20046GY	0.021	8	0.017	0.025
20046GZ	0.019	36	0.014	0.023
20046HA	0.016	175	0.014	0.019
20046HB	0.016	157	0.015	0.022
20046HC	0.016	9	0.015	0.024
20046HD	0.013	163	0.011	0.023
20046HE	0.011	39	0.010	0.015
20046HF	0.013	26	0.011	0.020
20046HG	0.012	160	0.011	0.017
20046HH	0.012	4	0.011	0.018
20046HI	0.010	31	0.008	0.042
20046HJ	0.011	178	0.011	0.015
20046JZA	0.012	16	0.009	0.020
20046JZB	0.013	161	0.010	0.020
20046JZC	0.019	47	0.013	0.022
20046JZD	0.013	20	0.012	0.017
20046JZE	0.012	17	0.011	0.014
20046JZF	0.013	13	0.011	0.028
20046JZG	0.012	147	0.009	0.017
20046JZH	0.013	175	0.011	0.021
20046JZI	0.011	9	0.010	0.012
20046JZJ	0.017	28	0.014	0.020
20046JZK	0.014	0	0.012	0.023
20046JZL	0.008	171	0.007	0.035
20046JZM	0.011	30	0.010	0.017
20046JZN	0.011	12	0.010	0.015
20046JZO	0.014	162	0.011	0.018
20046JZP	0.010	133	0.010	0.013
20046JZQ	0.013	25	0.011	0.018
20046JZR	0.017	134	0.014	0.024
20046JZS	0.015	159	0.011	0.021
20046JZT	0.011	11	0.011	0.018

Station Name	Semi-Major Axis	Azimuth	Semi-Minor Axis	Vertical
20046JZU	0.006	18	0.005	0.016
20046JZV	0.014	5	0.011	0.029
20046JZW	0.012	7	0.011	0.020
20046WA	0.015	179	0.011	0.018
20046WB	0.013	160	0.011	0.017
20046WC	0.016	178	0.013	0.021
20046WD	0.016	155	0.014	0.026
20046WE	0.014	14	0.012	0.023
20046WF	0.015	4	0.014	0.034
20046WG	0.010	161	0.009	0.010
20046WH	0.011	146	0.011	0.016
20046WI	0.013	174	0.011	0.020
20046WJ	0.012	30	0.011	0.014
20046WK	0.015	163	0.012	0.025
20046WL	0.015	32	0.010	0.020
20046WM	0.017	179	0.015	0.025
20046WN	0.013	161	0.012	0.023
20046WO	0.012	151	0.011	0.016
20046WP	0.018	177	0.012	0.030
20046WQ	0.021	26	0.013	0.020
20046WR	0.018	12	0.011	0.032
20046WS	0.021	39	0.016	0.029
20046WT	0.014	115	0.012	0.019
20046WU	0.014	47	0.013	0.027
20046WV	0.014	156	0.012	0.021
20046WW	0.013	169	0.011	0.018
20046WX	0.013	25	0.012	0.018
20046WY	0.015	47	0.008	0.012
20046WZ	0.010	8	0.009	0.016
20046XA	0.016	180	0.012	0.025
20046XB	0.014	4	0.012	0.019
20046XC	0.016	18	0.012	0.022
20046XD	0.014	150	0.011	0.025
20046XE	0.015	28	0.011	0.022
20046XF	0.016	152	0.012	0.024
20046XG	0.019	177	0.014	0.030
20046XH	0.013	7	0.011	0.020
20046XI	0.013	154	0.012	0.022
20046XJ	0.016	31	0.011	0.023
20046XK	0.013	62	0.012	0.019

SUMMARY

A LiDAR ground control network was established in western Virginia in the northern portion of the Shenandoah Valley. The estimated accuracy of the control network is ± 0.03 m with respect to the NAD83 (2011) epoch 2010.0 reference frame and the NAVD88 vertical datum (using GEOID18).

Adjusted Coordinates

Horizontal Datum: NAD83 (2011) epoch 2010.0

Vertical Datum: NAVD88=Ellipsoidal Height-GEOID18

UTM Zone: 17

Units: meters

Table 10 - Adjusted Coordinates

Station Name	GPSID	Latitude	Longitude	Ellip. Height	NAVD 1988	UTM Northing	UTM Easting
GCP01	20046AA	39°25'02.61393" N	78°18'47.38756" W	242.450	276.157	4366541.797	731301.392
GCP02	20046AB	39°18'32.23432" N	78°08'38.21892" W	209.419	243.316	4354952.357	746251.618
GCP03	20046AC	39°13'17.96577" N	78°00'28.40534" W	135.491	169.288	4345641.518	758305.455
GCP04	20046AD	39°06'55.73706" N	77°50'48.62060" W	296.492	329.619	4334327.235	772621.695
GCP05	20046AE	37°57'18.48653" N	79°12'47.68034" W	531.625	563.575	4202342.849	656974.135
GCP06	20046AF	39°05'10.10126" N	78°17'42.06900" W	221.741	255.320	4329819.107	733962.766
GCP07	20046AG	39°00'09.73738" N	78°10'17.59018" W	146.718	180.256	4320883.312	744931.763
GCP08	20046AH	38°56'00.89631" N	78°03'53.01911" W	519.649	552.791	4313503.764	754431.472
GCP09	20046AI	38°55'02.55370" N	78°34'16.48095" W	297.713	330.658	4310412.343	710567.986
GCP10	20046AJ	38°44'07.38917" N	78°46'18.16868" W	398.879	431.397	4289769.986	693678.561
GCP11	20046AK	38°39'54.83354" N	78°39'41.10770" W	275.279	307.990	4282223.076	703465.128
GCP12	20046AL	38°35'26.44091" N	78°33'27.52994" W	211.216	243.933	4274184.155	712715.142
GCP13	20046AM	38°30'59.27065" N	78°26'24.37569" W	1032.873	1065.168	4266226.298	723183.466
GCP14	20046AN	38°31'10.87043" N	79°07'39.37840" W	1055.894	1087.428	4265139.234	663230.989
GCP15	20046AO	38°26'49.18034" N	79°03'26.04147" W	385.742	417.766	4257199.479	669536.605
GCP16	20046AP	38°22'13.93519" N	78°56'05.35083" W	325.608	357.970	4248946.994	680410.253
GCP17	20046AQ	38°17'45.73842" N	78°48'43.42650" W	290.027	322.520	4240926.499	691331.139
GCP18	20046AR	38°15'43.38511" N	78°39'39.69275" W	836.201	868.568	4237478.218	704636.168
GCP19	20046AS	38°21'19.25416" N	79°08'59.70780" W	431.117	463.014	4246862.692	661651.788
GCP20	20046AT	38°16'46.30258" N	79°12'18.93213" W	460.739	492.607	4238353.421	656979.509
GCP21	20046AU	38°13'18.43850" N	79°06'25.25065" W	377.463	409.595	4232117.337	665704.456
GCP22	20046AV	38°04'43.20737" N	78°49'29.23757" W	442.782	475.009	4216777.696	690784.665
GCP23	20046AW	38°21'04.28230" N	78°34'38.51033" W	404.656	437.116	4247559.343	711697.280
GCP24	20046AX	37°53'12.66753" N	79°09'04.03224" W	874.004	905.817	4194872.377	662582.812
GCP25	20046AY	38°04'44.03630" N	79°10'32.19160" W	524.454	556.444	4216140.552	660011.447
GCP26	20046AZ	37°57'13.26333" N	78°57'45.83137" W	449.512	481.506	4202633.779	678988.492
GCP27	20046BA	38°06'32.13459" N	78°59'53.24125" W	393.044	425.258	4219793.411	675507.794
GCP28	20046BB	38°12'36.35928" N	78°55'45.49369" W	317.740	350.097	4231153.286	681291.053
GCP29	20046BC	38°27'59.48085" N	78°45'52.07133" W	393.705	426.159	4259946.253	695035.459
GCP30	20046BD	38°48'03.24267" N	78°35'43.69207" W	262.735	295.634	4297429.133	708808.027
GCP31	20046BE	38°44'18.00640" N	78°18'34.74250" W	712.185	744.912	4291176.829	733836.496
GCP32	20046BF	39°16'03.37970" N	78°19'21.23220" W	183.353	217.014	4349891.086	730984.870
GCP33	20046BG	39°09'51.78730" N	78°08'40.42419" W	180.473	214.218	4338903.080	746705.084
GCP34	20046BH	39°02'48.81661" N	78°00'30.11874" W	110.596	144.011	4326240.575	758904.244
GCP35	20046BI	38°17'27.77828" N	78°59'52.59277" W	361.254	393.530	4240004.323	675086.684
GCP36	20046BJ	38°40'31.25465" N	78°25'24.65678" W	252.340	285.160	4283901.046	724134.937
GCP37	20046BK	38°01'06.94447" N	79°04'18.15412" W	421.616	453.702	4209632.937	669263.785

Station Name	GPSID	Latitude	Longitude	Ellip. Height	NAVD 1988	UTM Northing	UTM Easting
GCP38	20046BL	38°33'31.77792" N	78°55'02.69248" W	459.772	491.978	4269877.114	681458.226
GCP39	20046BM	38°52'05.07472" N	78°15'03.27415" W	137.944	171.174	4305729.249	738509.622
GCP40	20046BN	38°57'36.48066" N	78°25'05.37899" W	211.350	244.646	4315523.007	723707.394
NVA01	20046BO	39°24'03.04520" N	78°18'36.66749" W	333.099	366.809	4364712.691	731612.561
NVA02	20046BP	39°18'32.93046" N	78°08'41.63452" W	208.204	242.100	4354971.237	746169.122
NVA03	20046BQ	39°13'18.20866" N	78°00'28.45975" W	135.386	169.184	4345648.964	758303.902
NVA04	20046BR	39°07'33.37452" N	77°53'37.49643" W	91.552	124.898	4335347.858	768525.308
NVA05	20046BS	39°15'57.93093" N	78°19'38.12825" W	191.938	225.587	4349711.106	730584.875
NVA06	20046BT	39°09'47.33164" N	78°08'41.02801" W	180.032	213.775	4338765.238	746694.918
NVA07	20046BU	39°03'16.14056" N	78°01'47.91110" W	131.899	165.385	4327021.730	757006.253
NVA08	20046BV	39°05'13.22219" N	78°17'40.08774" W	222.885	256.465	4329916.753	734007.508
NVA09	20046BW	38°59'52.03051" N	78°10'10.95638" W	138.005	171.535	4320342.317	745108.349
NVA10	20046BX	38°55'59.29022" N	78°04'12.39977" W	514.361	547.517	4313439.218	753966.332
NVA11	20046BY	38°58'00.55304" N	78°26'21.84455" W	238.737	271.997	4316213.224	721845.853
NVA12	20046BZ	38°52'33.66443" N	78°31'53.01408" W	241.160	274.204	4305914.789	714147.780
NVA13	20046CA	38°51'57.85110" N	78°15'11.96295" W	155.676	188.901	4305500.221	738306.894
NVA14	20046CB	38°45'15.32668" N	78°24'02.02693" W	228.441	261.409	4292715.610	725883.265
NVA15	20046CC	38°40'30.81687" N	78°25'19.57545" W	250.634	283.452	4283891.004	724258.123
NVA16	20046CD	38°48'47.44387" N	78°35'08.48989" W	251.746	284.671	4298814.256	709621.277
NVA17	20046CE	38°42'53.33306" N	78°43'20.13212" W	295.242	327.909	4287592.728	698034.364
NVA18	20046CF	38°34'43.36744" N	78°30'44.53069" W	298.721	331.408	4272962.120	716695.094
NVA19	20046CG	38°39'21.66605" N	78°39'54.92558" W	278.639	311.338	4281192.035	703157.184
NVA20	20046CH	38°35'20.07893" N	78°33'45.33631" W	215.921	248.635	4273976.568	712289.504
NVA21	20046CI	38°20'13.07316" N	78°37'17.05596" W	373.737	406.210	4245880.547	707889.056
NVA22	20046CJ	38°27'07.53745" N	78°50'03.52362" W	389.554	421.960	4258199.290	688978.693
NVA23	20046CK	38°33'07.18058" N	78°54'53.15663" W	452.931	485.150	4269124.074	681706.254
NVA24	20046CL	38°29'42.88100" N	79°02'15.96197" W	458.147	490.111	4262590.097	671121.384
NVA25	20046CM	38°25'55.34183" N	79°02'20.40867" W	374.855	406.964	4255573.544	671163.042
NVA26	20046CN	38°22'21.44955" N	78°56'09.30953" W	325.875	358.234	4249176.486	680308.999
NVA27	20046CO	38°17'31.40364" N	78°48'29.20922" W	296.431	328.922	4240492.788	691687.014
NVA28	20046CP	38°15'42.82416" N	78°49'19.88553" W	311.005	343.463	4237116.533	690534.670
NVA29	20046CQ	38°12'17.21356" N	78°54'59.10180" W	326.280	358.643	4230588.415	682432.686
NVA30	20046CR	38°15'23.36990" N	79°03'06.40037" W	402.476	434.678	4236068.734	670458.966
NVA31	20046CS	38°21'21.68895" N	79°08'51.87506" W	429.652	461.556	4246941.559	661840.406
NVA32	20046CT	38°16'28.33543" N	79°11'55.69882" W	453.071	484.969	4237810.561	657554.823
NVA33	20046CU	38°13'19.72794" N	79°06'23.78439" W	378.047	410.180	4232157.813	665739.299
NVA34	20046CV	38°06'34.75979" N	79°00'00.17240" W	393.291	425.504	4219870.693	675337.238
NVA35	20046CW	38°04'44.70327" N	78°49'28.31268" W	442.799	475.026	4216824.336	690806.121
NVA36	20046CX	38°04'05.38420" N	79°11'03.33111" W	572.254	604.229	4214934.264	659276.026
NVA37	20046CY	37°57'27.09306" N	79°12'59.62871" W	547.994	579.943	4202602.542	656677.444
NVA38	20046CZ	38°01'02.08050" N	79°03'55.85831" W	410.781	442.870	4209494.300	669810.595
NVA39	20046DA	37°57'27.73611" N	78°57'42.21527" W	443.835	475.841	4203081.828	679066.986
NVA40	20046DB	37°52'08.90333" N	79°08'54.19910" W	874.758	906.551	4192911.714	662862.035
NVA41	20046DC	38°29'46.71667" N	78°37'19.21196" W	266.026	298.637	4263563.664	707380.369
NVA42	20046DD	38°35'10.97014" N	78°46'14.82554" W	357.664	390.207	4273234.863	694161.436
NVA43	20046DE	38°40'23.13145" N	78°30'54.39319" W	227.210	260.030	4283430.506	716172.656

Station Name	GPSID	Latitude	Longitude	Ellip. Height	NAVD 1988	UTM Northing	UTM Easting
NVA44	20046DF	38°44'49.36966" N	78°38'34.46983" W	245.330	278.131	4291344.731	704842.082
NVA45	20046DG	38°49'57.27713" N	78°18'56.94129" W	195.404	228.554	4301621.315	732993.263
NVA46	20046DH	38°51'17.88083" N	78°31'36.18420" W	218.508	251.542	4303589.309	714616.707
NVA47	20046DI	38°57'49.74054" N	78°17'23.99074" W	150.355	183.804	4316254.576	734801.847
NVA48	20046DJ	39°03'37.97796" N	78°08'25.29235" W	177.052	210.664	4327388.566	747431.508
NVA49	20046DK	39°05'35.15560" N	78°03'36.11052" W	147.272	180.892	4331223.530	754266.223
NVA50	20046DL	39°15'38.07138" N	78°13'23.59577" W	230.756	264.554	4349369.162	739580.599
NVA51	20046DM	39°11'24.21060" N	78°19'50.78143" W	232.750	266.316	4341262.459	730530.433
NVA52	20046DN	38°25'02.85842" N	78°37'11.32052" W	258.055	290.652	4254817.683	707797.781
NVA53	20046DO	38°20'36.60380" N	78°42'20.11678" W	277.594	310.133	4246419.700	700512.459
NVA54	20046DP	38°27'17.04978" N	78°54'07.93026" W	406.505	438.836	4258355.383	683047.228
NVA55	20046DQ	38°23'28.18393" N	79°04'50.91692" W	378.455	410.527	4250960.388	667608.027
NVA56	20046DR	38°19'51.01556" N	78°59'16.08105" W	359.427	391.715	4244439.033	675877.563
NVA57	20046DS	38°09'15.91719" N	78°50'27.54374" W	370.047	402.381	4225151.062	689168.334
NVA58	20046DT	38°11'37.98498" N	79°01'05.22989" W	375.509	407.748	4229183.685	673552.934
NVA59	20046DU	38°02'00.90513" N	78°55'22.47582" W	400.811	432.988	4211577.618	682289.469
NVA60	20046DV	38°04'42.50795" N	79°05'24.74930" W	440.153	472.253	4216244.045	667503.285
NVA61	20046DW	37°58'43.92102" N	79°08'06.83036" W	494.242	526.225	4205110.653	663775.825
NVA62	20046DX	37°57'03.49268" N	79°08'59.50487" W	528.783	560.724	4201989.425	662552.172
NVA63	20046DY	38°00'35.41844" N	79°09'46.25814" W	456.070	488.067	4208499.192	661282.100
NVA64	20046DZ	38°04'45.95503" N	78°53'23.87567" W	369.637	401.889	4216730.472	685065.504
NVA65	20046EA	38°35'10.58995" N	78°25'34.70228" W	350.118	382.662	4274008.044	724169.583
NVA66	20046EB	38°37'59.50321" N	78°50'37.80366" W	292.742	325.132	4278278.465	687676.182
NVA67	20046EC	39°13'09.78694" N	78°08'06.67320" W	178.387	212.201	4345033.793	747322.168
NVA68	20046ED	38°19'23.26050" N	79°03'51.35583" W	394.125	426.286	4243440.582	669211.402
NVA69	20046EE	39°00'47.88856" N	78°21'46.53081" W	192.594	226.035	4321561.686	728323.065
NVA70	20046EF	38°55'05.92942" N	78°11'29.01034" W	136.322	169.673	4311462.788	743502.462
NVA71	20046EG	38°52'29.97884" N	78°23'15.28422" W	215.130	248.331	4306148.628	726628.459
NVA72	20046EH	38°48'47.12436" N	78°26'53.85081" W	239.238	272.277	4299128.698	721552.885
NVA73	20046EI	39°12'14.83188" N	78°25'58.73486" W	383.872	417.249	4342568.146	721657.579
NVA74	20046EJ	39°09'39.43564" N	77°59'06.14471" W	155.393	189.044	4338968.604	760502.723
NVA75	20046EK	39°20'25.31308" N	78°18'22.55794" W	219.309	253.035	4358009.216	732150.457
NVA76	20046EL	38°32'39.98819" N	78°36'33.57060" W	263.772	296.415	4268934.084	708347.258
NVA77	20046EM	38°31'29.41167" N	78°48'54.57225" W	355.059	387.509	4266311.750	690458.506
NVA78	20046EN	38°23'41.75722" N	78°51'03.96134" W	398.923	431.337	4251821.334	687661.516
NVA79	20046EO	38°24'20.36752" N	78°42'54.32603" W	341.511	374.021	4253297.212	699511.043
NVA80	20046EP	38°17'54.33753" N	78°54'03.50505" W	320.350	352.777	4241011.214	683549.206
NVA81	20046EQ	38°13'22.70486" N	78°49'55.18932" W	316.845	349.251	4232776.984	689777.819
NVA82	20046ER	38°09'05.66340" N	79°06'57.51740" W	484.004	516.108	4224309.545	665078.259
NVA83	20046ES	39°07'44.65315" N	78°13'46.39356" W	203.799	237.463	4334755.193	739480.529
NVA84	20046ET	38°48'21.08440" N	78°39'44.14705" W	285.652	318.459	4297828.673	702992.977
NVA85	20046EU	38°18'22.66635" N	79°10'34.26715" W	466.787	498.692	4241373.623	659464.059
VVAF01	20046EV	39°24'03.59383" N	78°18'37.61399" W	330.604	365.272	4364728.933	731589.414
VVAF02	20046EW	39°18'25.40571" N	78°08'20.15500" W	227.059	261.224	4354755.488	746690.992
VVAF03	20046EX	39°12'31.12812" N	78°00'05.04226" W	147.940	181.581	4344215.820	758913.642
VVAF04	20046EY	39°06'54.45945" N	77°50'50.10627" W	300.316	331.938	4334286.599	772587.376

Station Name	GPSID	Latitude	Longitude	Ellip. Height	NAVD 1988	UTM Northing	UTM Easting
VVAF05	20046EZ	39°16'50.14496" N	78°21'52.71279" W	301.445	335.293	4351226.396	727312.234
VVAF06	20046FA	39°09'28.64083" N	78°08'42.21213" W	170.052	203.626	4338188.031	746684.644
VVAF07	20046FB	39°02'48.12390" N	78°00'21.69839" W	106.602	140.397	4326225.884	759107.408
VVAF08	20046FC	39°03'21.92094" N	78°21'58.82584" W	208.438	242.007	4326302.286	727889.738
VVAF09	20046FD	38°59'52.78288" N	78°10'10.17141" W	138.027	170.396	4320366.103	745126.513
VVAF10	20046FE	38°55'55.18479" N	78°04'00.90992" W	498.484	529.663	4313321.537	754247.113
VVAF11	20046FF	38°57'49.79070" N	78°26'06.34178" W	225.509	260.642	4315891.906	722228.346
VVAF12	20046FG	38°49'34.60844" N	78°19'33.49874" W	185.189	218.322	4300896.534	732132.127
VVAF13	20046FH	38°54'42.57942" N	78°33'40.83987" W	300.453	334.021	4309819.441	711442.906
VVAF14	20046FI	38°44'18.71742" N	78°18'38.17769" W	711.093	743.823	4291196.312	733752.901
VVAF15	20046FJ	38°46'54.23642" N	78°36'01.56456" W	213.543	250.184	4295290.332	708432.703
VVAF16	20046FK	38°44'06.38257" N	78°24'45.96293" W	221.027	253.959	4290559.933	724882.690
VVAF17	20046FL	38°42'13.08475" N	78°48'36.80287" W	470.746	503.163	4286165.324	690415.310
VVAF18	20046FM	38°39'59.15313" N	78°39'40.94114" W	277.616	312.751	4282356.348	703465.755
VVAF19	20046FN	38°40'32.78828" N	78°26'10.52622" W	235.822	268.654	4283917.233	723025.033
VVAF20	20046FO	38°35'26.92468" N	78°33'26.57640" W	211.627	244.345	4274199.683	712737.818
VVAF21	20046FP	38°31'02.78578" N	78°26'24.71752" W	1029.344	61.641	4266334.438	723172.169
VVAF22	20046FQ	38°20'44.54911" N	78°34'35.21600" W	442.479	474.924	4246953.103	711793.230
VVAF23	20046FR	38°27'59.77383" N	78°45'56.03782" W	388.004	420.458	4259952.951	694939.104
VVAF24	20046FS	38°33'35.55280" N	78°56'06.85620" W	507.610	539.759	4269958.431	679902.496
VVAF25	20046FT	38°29'44.63016" N	79°01'07.82622" W	435.131	467.155	4262679.390	672770.913
VVAF26	20046FU	38°22'21.98345" N	78°56'01.91686" W	322.737	355.099	4249196.960	680488.035
VVAF27	20046FV	38°17'41.96414" N	78°48'30.15216" W	286.417	318.910	4240817.792	691656.385
VVAF28	20046FW	38°17'16.40650" N	79°00'21.75574" W	377.479	409.741	4239638.462	674385.735
VVAF29	20046FX	38°21'17.52036" N	79°09'05.25686" W	432.156	464.047	4246806.548	661518.167
VVAF30	20046FY	38°16'51.82178" N	79°12'57.73462" W	471.022	502.854	4238505.304	656033.401
VVAF31	20046FZ	38°13'23.21953" N	79°06'21.65857" W	374.947	407.081	4232266.500	665788.791
VVAF32	20046GA	38°12'53.39684" N	78°55'58.89790" W	311.914	344.271	4231671.199	680953.308
VVAF33	20046GB	38°05'55.08986" N	78°49'03.06427" W	414.584	446.832	4219008.502	691370.319
VVAF34	20046GC	38°06'24.57726" N	78°59'54.82779" W	386.391	418.603	4219559.622	675474.177
VVAF35	20046GD	38°04'05.94405" N	79°11'03.89939" W	571.454	603.428	4214951.250	659261.840
VVAF36	20046GE	38°01'02.88299" N	79°03'55.03330" W	409.825	441.914	4209519.455	669830.199
VVAF37	20046GF	37°57'13.95618" N	78°57'47.57963" W	452.423	484.416	4202654.203	678945.355
VVAF38	20046GG	37°57'03.46843" N	79°13'12.94734" W	528.153	560.103	4201868.131	656366.317
VVAF39	20046GH	37°53'14.93082" N	79°09'05.59103" W	882.633	914.448	4194941.385	662543.351
VVAF40	20046GI	37°58'45.03900" N	79°08'06.14638" W	494.437	526.422	4205145.448	663791.822
VVAF41	20046GJ	38°04'42.04342" N	79°05'54.41311" W	469.764	501.852	4216214.895	666780.808
VVAF42	20046GK	38°09'17.39133" N	78°50'25.51911" W	366.407	398.740	4225197.652	689216.557
VVAF43	20046GL	38°02'01.21316" N	78°55'25.16623" W	399.717	431.895	4211585.648	682223.662
VVAF44	20046GM	38°19'58.16333" N	78°43'02.66008" W	280.223	312.754	4245209.069	699508.873
VVAF45	20046GN	38°23'14.42190" N	78°48'09.35083" W	336.921	369.376	4251078.498	691917.788
VVAF46	20046GO	38°38'12.78338" N	78°51'01.72484" W	291.655	324.027	4278674.293	687088.155
VVAF47	20046GP	38°26'49.49446" N	78°33'33.34339" W	293.405	325.951	4258243.426	712997.536
VVAF48	20046GQ	38°35'21.10508" N	78°25'24.21785" W	349.836	382.382	4274339.343	724414.189
VVAF49	20046GR	38°39'29.67040" N	78°30'40.14655" W	207.109	239.922	4281791.648	716561.737
VVAF50	20046GS	38°45'02.06073" N	78°45'30.04770" W	369.060	402.893	4291483.837	694799.230

Station Name	GPSID	Latitude	Longitude	Ellip. Height	NAVD 1988	UTM Northing	UTM Easting
VVAF51	20046GT	38°50'54.41575" N	78°31'50.17472" W	199.157	236.777	4302856.733	714299.008
VVAF52	20046GU	38°54'25.51227" N	78°13'28.96395" W	153.185	186.525	4310128.106	740651.087
VVAF53	20046GV	38°58'21.90780" N	78°19'07.69581" W	141.060	174.491	4317172.458	732276.339
VVAF54	20046GW	39°11'27.21842" N	78°19'57.25509" W	226.826	264.883	4341350.625	730372.373
VVAF55	20046GX	39°04'59.20975" N	78°09'17.71528" W	181.856	213.125	4329853.666	746092.861
VVAF56	20046GY	39°07'26.86288" N	78°02'34.17886" W	156.582	186.116	4334716.284	755642.096
VVAF57	20046GZ	39°20'28.33089" N	78°16'54.15881" W	246.381	280.801	4358165.682	734264.188
VVAF58	20046HA	39°14'10.27724" N	78°13'32.44517" W	249.187	282.152	4346655.619	739451.471
VVAF59	20046HB	38°33'21.65174" N	78°43'33.88221" W	321.309	353.872	4269960.240	698139.197
VVAF60	20046HC	38°25'12.30401" N	79°04'07.68236" W	395.166	427.218	4254191.909	668589.717
VVANF01	20046HD	38°03'04.96568" N	78°57'55.90968" W	390.917	423.097	4213469.549	678505.396
VVANF02	20046HE	38°30'31.67746" N	78°52'15.41133" W	336.893	369.254	4264417.846	685635.952
VVANF03	20046HF	38°52'33.01496" N	78°37'36.20495" W	251.437	284.292	4305675.293	705877.471
VVANF04	20046HG	39°01'39.52587" N	78°13'10.84445" W	176.019	209.591	4323523.256	740678.906
VVANF05	20046HH	39°11'17.45953" N	77°55'35.33913" W	122.863	156.475	4342161.152	765460.715
GCP14A	20046HI	38°28'20.63416" N	79°08'41.69297" W	580.125	611.731	4259860.895	661827.657
GCP14B	20046HJ	38°28'55.84625" N	79°13'15.95192" W	1096.734	1128.090	4260815.167	655160.386
BCC2	BCC2	39°09'57.34381" N	78°10'26.17634" W	189.866	223.601	4338994.859	744161.317
WVKE	WVKE	39°20'12.87298" N	77°54'55.17704" W	139.148	173.062	4358703.738	765861.384
MAS2	MAS2	39°08'53.40285" N	77°38'10.05060" W	127.472	160.138	4338610.209	790709.548
KP13	KP13	38°31'05.25652" N	78°04'39.16965" W	141.786	174.319	4267353.508	754792.825
JMU1	JMU1	38°26'02.93678" N	78°51'29.33617" W	436.799	469.187	4256159.176	686944.768
WVME	WVME	39°04'32.34432" N	78°55'56.99811" W	313.550	345.857	4327206.222	678845.754
DP02	DP02	37°21'29.56915" N	79°10'25.47312" W	267.290	299.035	4136175.752	661735.050
DP01	DP01	38°05'07.46510" N	78°28'44.19821" W	139.618	172.263	4218292.754	721102.257

Horizontal Datum: NAD83 (2011) epoch 2010.0
 Vertical Datum: NAVD88=Ellipsoidal Height-GEOID18
 SPC Zone: Virginia North
 Units: Meters & US Survey Feet

Table 11 - State Plane Coordinates

Station Name	GPSID	Northing meters	Easting meters	NAVD 1988 meters	Northing US FT	Easting US FT	NAVD 1988 US FT
GCP01	20046AA	2194356.494	3516090.204	276.157	7199317.932	11535705.944	906.025
GCP02	20046AB	2182360.138	3530709.347	243.316	7159959.885	11583668.914	798.279
GCP03	20046AC	2172722.626	3542496.323	169.288	7128340.817	11622340.019	555.406
GCP04	20046AD	2161022.367	3556487.632	329.619	7089954.217	11668243.171	1081.425
GCP05	20046AE	2032262.991	3437315.538	563.575	6667516.163	11277259.395	1848.996
GCP06	20046AF	2157583.654	3517734.864	255.320	7078672.372	11541101.800	837.662
GCP07	20046AG	2148352.387	3528450.227	180.256	7048386.123	11576257.118	591.390
GCP08	20046AH	2140717.587	3537739.798	552.791	7023337.618	11606734.655	1813.615
GCP09	20046AI	2138831.457	3493821.391	330.658	7017149.539	11462645.680	1084.834
GCP10	20046AJ	2118661.799	3476376.220	431.397	6950976.253	11405410.981	1415.342
GCP11	20046AK	2110851.765	3485951.945	307.990	6925352.834	11436827.340	1010.464
GCP12	20046AL	2102565.353	3494977.845	243.933	6898166.496	11466439.812	800.304
GCP13	20046AM	2094327.632	3505223.411	1065.168	6871139.907	11500053.808	3494.639
GCP14	20046AN	2094870.670	3445270.347	1087.428	6872921.522	11303357.795	3567.670
GCP15	20046AO	2086762.423	3451357.952	417.766	6846319.717	11323330.215	1370.621
GCP16	20046AP	2078218.114	3462003.433	357.970	6818287.263	11358256.264	1174.440
GCP17	20046AQ	2069905.242	3472702.331	322.520	6791014.116	11393357.565	1058.134
GCP18	20046AR	2066098.714	3485907.652	868.568	6778525.532	11436682.023	2849.627
GCP19	20046AS	2076643.226	3443195.394	463.014	6813120.316	11296550.222	1519.072
GCP20	20046AT	2068263.298	3438293.964	492.607	6785627.169	11280469.447	1616.161
GCP21	20046AU	2061792.988	3446847.302	409.595	6764399.161	11308531.525	1343.813
GCP22	20046AV	2045781.764	3471503.832	475.009	6711869.002	11389425.488	1558.425
GCP23	20046AW	2075983.373	3493237.741	437.116	6810955.451	11460730.822	1434.105
GCP24	20046AX	2024643.368	3442721.580	905.817	6642517.449	11294995.716	2971.835
GCP25	20046AY	2045975.030	3440724.244	556.444	6712503.077	11288442.792	1825.600
GCP26	20046AZ	2031960.933	3459331.217	481.506	6666525.161	11349489.167	1579.741
GCP27	20046BA	2049208.378	3456314.222	425.258	6723111.152	11339590.909	1395.201
GCP28	20046BB	2060407.757	3462402.155	350.097	6759854.450	11359564.402	1148.610
GCP29	20046BC	2088815.636	3476920.521	426.159	6853055.966	11407196.741	1398.157
GCP30	20046BD	2125903.675	3491707.035	295.634	6974735.641	11455708.832	969.926
GCP31	20046BE	2118971.375	3516549.007	744.912	6951991.919	11537211.201	2443.932
GCP32	20046BF	2177724.754	3515312.718	217.014	7144751.965	11533155.141	711.987
GCP33	20046BG	2166309.933	3530718.654	214.218	7107301.839	11583699.451	702.814
GCP34	20046BH	2153320.971	3542559.125	144.011	7064687.219	11622546.062	472.476
GCP35	20046BI	2069423.222	3456439.667	393.530	6789432.686	11340002.474	1291.106
GCP36	20046BJ	2111965.207	3506655.383	285.160	6929005.851	11504751.870	935.562
GCP37	20046BK	2039219.741	3449798.224	453.702	6690340.101	11318213.008	1488.521
GCP38	20046BL	2099110.989	3463619.391	491.978	6886833.304	11363557.951	1614.098
GCP39	20046BM	2133385.675	3521616.891	171.174	6999282.835	11553838.084	561.593

Station Name	GPSID	Northing meters	Easting meters	NAVD 1988 meters	Northing US FT	Easting US FT	NAVD 1988 US FT
GCP40	20046BN	2143578.744	3507093.169	244.646	7032724.596	11506188.172	802.643
NVA01	20046BO	2192519.856	3516350.447	366.809	7193292.227	11536559.758	1203.439
NVA02	20046BP	2182381.289	3530627.432	242.100	7160029.280	11583400.166	794.290
NVA03	20046BQ	2172730.110	3542494.977	169.184	7128365.369	11622335.605	555.065
NVA04	20046BR	2162155.173	3552423.092	124.898	7093670.764	11654908.094	409.770
NVA05	20046BS	2177555.945	3514907.997	225.587	7144198.130	11531827.321	740.113
NVA06	20046BT	2166172.473	3530704.690	213.775	7106850.855	11583653.637	701.360
NVA07	20046BU	2154153.756	3540684.208	165.385	7067419.448	11616394.771	542.601
NVA08	20046BV	2157680.002	3517782.265	256.465	7078988.474	11541257.314	841.419
NVA09	20046BW	2147806.941	3528611.808	171.535	7046596.607	11576787.239	562.778
NVA10	20046BX	2140665.863	3537273.262	547.517	7023167.918	11605204.027	1796.312
NVA11	20046BY	2144319.622	3505251.727	271.997	7035155.292	11500146.709	892.377
NVA12	20046BZ	2134238.397	3497275.928	274.204	7002080.473	11473979.441	899.618
NVA13	20046CA	2133162.365	3521408.034	188.901	6998550.193	11553152.858	619.753
NVA14	20046CB	2120726.357	3508643.160	261.409	6957749.723	11511273.434	857.639
NVA15	20046CC	2111951.812	3506778.217	283.452	6928961.903	11505154.866	929.959
NVA16	20046CD	2127265.789	3492557.703	284.671	6979204.509	11458499.729	933.958
NVA17	20046CE	2116366.744	3480670.448	327.909	6943446.560	11419499.629	1075.815
NVA18	20046CF	2101235.728	3498922.193	331.408	6893804.218	11479380.562	1087.294
NVA19	20046CG	2109829.667	3485616.063	311.338	6921999.498	11435725.365	1021.448
NVA20	20046CH	2102369.471	3494546.803	248.635	6897523.839	11465025.636	815.730
NVA21	20046CI	2074408.615	3489386.151	406.210	6805788.930	11448094.397	1332.707
NVA22	20046CJ	2087233.939	3470819.173	421.960	6847866.682	11387179.238	1384.380
NVA23	20046CK	2098351.524	3463846.828	485.150	6884341.624	11364304.136	1591.696
NVA24	20046CL	2092107.970	3453088.578	490.111	6863857.564	11329008.109	1607.973
NVA25	20046CM	2085092.935	3452939.637	406.964	6840842.404	11328519.459	1335.181
NVA26	20046CN	2078450.258	3461908.443	358.234	6819048.886	11357944.615	1175.306
NVA27	20046CO	2069462.097	3473046.306	328.922	6789560.228	11394486.090	1079.138
NVA28	20046CP	2066118.539	3471803.132	343.463	6778590.574	11390407.441	1126.845
NVA29	20046CQ	2059812.252	3463528.063	358.643	6757900.696	11363258.321	1176.648
NVA30	20046CR	2065614.363	3451707.106	434.678	6776936.457	11324475.729	1426.106
NVA31	20046CS	2076716.952	3443386.088	461.556	6813362.199	11297175.857	1514.288
NVA32	20046CT	2067705.019	3438854.397	484.969	6783795.549	11282308.134	1591.102
NVA33	20046CU	2061832.508	3446883.229	410.180	6764528.820	11308649.394	1345.732
NVA34	20046CV	2049290.236	3456145.812	425.504	6723379.716	11339038.385	1396.008
NVA35	20046CW	2045827.806	3471526.536	475.026	6712020.060	11389499.975	1558.481
NVA36	20046CX	2044788.942	3439956.464	604.229	6708611.719	11285923.833	1982.375
NVA37	20046CY	2032530.616	3437025.921	579.943	6668394.195	11276309.210	1902.696
NVA38	20046CZ	2039066.407	3450341.125	442.870	6689837.038	11319994.175	1452.983
NVA39	20046DA	2032406.716	3459421.742	475.841	6667987.700	11349786.165	1561.155
NVA40	20046DB	2022675.695	3442947.971	906.551	6636061.844	11295738.469	2974.243
NVA41	20046DC	2092095.908	3489357.299	298.637	6863817.991	11447999.737	979.778
NVA42	20046DD	2102121.546	3476408.173	390.207	6896710.440	11405515.813	1280.204
NVA43	20046DE	2111712.070	3498685.209	260.030	6928175.348	11478603.055	853.115
NVA44	20046DF	2119930.966	3487577.026	278.131	6955140.177	11442158.960	912.501
NVA45	20046DG	2129431.687	3515991.917	228.554	6986310.461	11535383.482	749.848

Station Name	GPSID	Northing meters	Easting meters	NAVD 1988 meters	Northing US FT	Easting US FT	NAVD 1988 US FT
NVA46	20046DH	2131901.434	3497680.913	251.542	6994413.289	11475308.127	825.267
NVA47	20046DI	2144005.287	3518200.406	183.804	7034124.011	11542629.165	603.030
NVA48	20046DJ	2154783.982	3531127.080	210.664	7069487.114	11585039.428	691.153
NVA49	20046DK	2158427.677	3538062.161	180.892	7081441.470	11607792.272	593.477
NVA50	20046DL	2176965.474	3523888.408	264.554	7142260.891	11561290.553	867.958
NVA51	20046DM	2169114.132	3514620.226	266.316	7116501.949	11530883.192	873.738
NVA52	20046DN	2083343.379	3489537.096	290.652	6835102.403	11448589.623	953.581
NVA53	20046DO	2075147.238	3482027.992	310.133	6808212.231	11423953.502	1017.495
NVA54	20046DP	2087551.004	3464894.570	438.836	6848906.919	11367741.603	1439.748
NVA55	20046DQ	2080577.950	3449260.730	410.527	6826029.491	11316449.577	1346.871
NVA56	20046DR	2073834.808	3457350.367	391.715	6803906.365	11342990.329	1285.152
NVA57	20046DS	2054195.197	3470114.056	402.381	6739472.076	11384865.864	1320.145
NVA58	20046DT	2058648.090	3454613.721	407.748	6754081.274	11334011.851	1337.753
NVA59	20046DU	2040812.686	3462871.858	432.988	6695566.289	11361105.420	1420.561
NVA60	20046DV	2045876.251	3448216.610	472.253	6712179.000	11313023.994	1549.383
NVA61	20046DW	2034846.736	3444190.005	526.225	6675993.000	11299813.374	1726.457
NVA62	20046DX	2031759.348	3442882.588	560.724	6665863.794	11295523.956	1839.642
NVA63	20046DY	2038301.551	3441788.337	488.067	6687327.672	11291933.903	1601.266
NVA64	20046DZ	2045888.741	3465785.721	401.889	6712219.979	11370665.321	1318.531
NVA65	20046EA	2102077.607	3506420.508	382.662	6896566.282	11503981.285	1255.450
NVA66	20046EB	2107339.360	3470063.309	325.132	6913829.215	11384699.372	1066.704
NVA67	20046EC	2172419.097	3531504.642	212.201	7127344.987	11586278.147	696.196
NVA68	20046ED	2073017.364	3450659.635	426.286	6801224.468	11321039.152	1398.573
NVA69	20046EE	2149486.817	3511871.737	226.035	7052107.997	11521865.856	741.583
NVA70	20046EF	2138978.138	3526763.270	169.673	7017630.774	11570722.494	556.669
NVA71	20046EG	2134130.256	3509755.336	248.331	7001725.683	11514922.299	814.733
NVA72	20046EH	2127253.728	3504490.842	272.277	6979164.939	11497650.372	893.295
NVA73	20046EI	2170663.863	3505788.823	417.249	7121586.356	11501908.829	1368.924
NVA74	20046EJ	2165994.392	3544507.341	189.044	7106266.600	11628937.835	620.222
NVA75	20046EK	2185805.571	3516702.224	253.035	7171263.777	11537713.879	830.166
NVA76	20046EL	2097437.087	3490469.612	296.415	6881341.509	11451649.053	972.488
NVA77	20046EM	2095302.455	3472518.692	387.509	6874338.137	11392755.076	1271.352
NVA78	20046EN	2080894.599	3469329.532	431.337	6827068.364	11382291.972	1415.145
NVA79	20046EO	2082048.432	3481213.466	374.021	6830853.898	11421281.180	1227.101
NVA80	20046EP	2070200.578	3464926.079	352.777	6791983.064	11367844.977	1157.403
NVA81	20046EQ	2061801.370	3470929.275	349.251	6764426.660	11387540.462	1145.834
NVA82	20046ER	2054004.674	3446010.184	516.108	6738847.002	11305785.078	1693.264
NVA83	20046ES	2162364.331	3523384.851	237.463	7094356.976	11559638.465	779.077
NVA84	20046ET	2126461.971	3485906.061	318.459	6976567.318	11436676.802	1044.811
NVA85	20046EU	2071215.242	3440859.572	498.692	6795312.007	11288886.779	1636.125
VVAF01	20046EV	2192536.729	3516327.765	365.272	7193347.586	11536485.341	1198.397
VVAF02	20046EW	2182151.236	3531142.954	261.224	7159274.513	11585091.509	857.032
VVAF03	20046EX	2171281.252	3543064.587	181.581	7123611.908	11624204.398	595.737
VVAF04	20046EY	2160982.716	3556452.222	331.938	7089824.127	11668126.997	1089.033
VVAF05	20046EZ	2179160.785	3511679.260	335.293	7149463.340	11521234.371	1100.040
VVAF06	20046FA	2165595.975	3530678.491	203.626	7104959.461	11583567.683	668.063

Station Name	GPSID	Northing meters	Easting meters	NAVD 1988 meters	Northing US FT	Easting US FT	NAVD 1988 US FT
VVAF07	20046FB	2153300.697	3542761.716	140.397	7064620.703	11623210.730	460.619
VVAF08	20046FC	2154236.279	3511569.031	242.007	7067690.190	11520872.729	793.985
VVAF09	20046FD	2147830.210	3528630.613	170.396	7046672.947	11576848.935	559.041
VVAF10	20046FE	2140540.569	3537550.585	529.663	7022756.851	11606113.878	1737.736
VVAF11	20046FF	2143988.005	3505625.165	260.642	7034067.312	11501371.896	855.123
VVAF12	20046FG	2128730.971	3515111.536	218.322	6984011.529	11532495.098	716.278
VVAF13	20046FH	2138214.910	3494679.570	334.021	7015126.752	11465461.224	1095.867
VVAF14	20046FI	2118993.127	3516466.002	743.823	6952063.285	11536938.875	2440.359
VVAF15	20046FJ	2123776.324	3491273.461	250.184	6967756.155	11454286.347	820.812
VVAF16	20046FK	2118599.404	3507584.358	253.959	6950771.545	11507799.681	833.197
VVAF17	20046FL	2115147.900	3473016.163	503.163	6939447.734	11394387.195	1650.794
VVAF18	20046FM	2110984.950	3485956.206	312.751	6925789.789	11436841.318	1026.084
VVAF19	20046FN	2112011.649	3505546.630	268.654	6929158.218	11501114.236	881.409
VVAF20	20046FO	2102580.255	3495000.929	244.345	6898215.387	11466515.549	801.655
VVAF21	20046FP	2094436.011	3505215.060	61.641	6871495.479	11500026.408	202.234
VVAF22	20046FQ	2075374.874	3493317.221	474.924	6808959.067	11460991.583	1558.146
VVAF23	20046FR	2088824.947	3476824.394	420.458	6853086.514	11406881.366	1379.453
VVAF24	20046FS	2099234.596	3462066.532	539.759	6887238.836	11358463.281	1770.859
VVAF25	20046FT	2092152.400	3454739.902	467.155	6864003.332	11334425.828	1532.658
VVAF26	20046FU	2078465.869	3462087.960	355.099	6819100.105	11358533.582	1165.021
VVAF27	20046FV	2069787.781	3473024.487	318.910	6790628.746	11394414.503	1046.291
VVAF28	20046FW	2069076.478	3455729.076	409.741	6788295.079	11337671.143	1344.292
VVAF29	20046FX	2076590.724	3443060.294	464.047	6812948.066	11296106.982	1522.461
VVAF30	20046FY	2068440.765	3437352.257	502.854	6786209.410	11277379.864	1649.780
VVAF31	20046FZ	2061939.819	3446935.646	407.081	6764880.890	11308821.365	1335.565
VVAF32	20046GA	2060934.596	3462078.545	344.271	6761582.920	11358502.694	1129.496
VVAF33	20046GB	2047995.838	3472149.379	446.832	6719133.012	11391543.422	1465.981
VVAF34	20046GC	2048975.579	3456274.306	418.603	6722347.379	11339459.953	1373.367
VVAF35	20046GD	2044806.306	3439942.741	603.428	6708668.689	11285878.811	1979.747
VVAF36	20046GE	2039091.026	3450361.401	441.914	6689917.806	11320060.697	1449.846
VVAF37	20046GF	2031982.510	3459288.644	484.416	6666595.952	11349349.492	1589.288
VVAF38	20046GG	2031804.774	3436695.078	560.103	6666012.831	11275223.768	1837.605
VVAF39	20046GH	2024713.419	3442683.985	914.448	6642747.277	11294872.375	3000.151
VVAF40	20046GI	2034881.090	3444206.936	526.422	6676105.709	11299868.921	1727.103
VVAF41	20046GJ	2045866.609	3447493.574	501.852	6712147.366	11310651.835	1646.493
VVAF42	20046GK	2054240.465	3470163.516	398.740	6739620.594	11385028.134	1308.199
VVAF43	20046GL	2040822.486	3462806.292	431.895	6695598.440	11360890.310	1416.976
VVAF44	20046GM	2073964.390	3480992.122	312.754	6804331.504	11420554.986	1026.094
VVAF45	20046GN	2080036.687	3473563.723	369.376	6824253.697	11396183.647	1211.861
VVAF46	20046GO	2107751.027	3469486.333	324.027	6915179.826	11382806.411	1063.079
VVAF47	20046GP	2086626.152	3494826.872	325.951	6845872.633	11465944.495	1069.391
VVAF48	20046GQ	2102402.037	3506673.973	382.382	6897630.682	11504812.860	1254.532
VVAF49	20046GR	2110063.587	3499029.378	239.922	6922766.952	11479732.217	787.144
VVAF50	20046GS	2120344.222	3477543.132	402.893	6956496.000	11409239.425	1321.825
VVAF51	20046GT	2131177.982	3497343.347	236.777	6992039.762	11474200.632	776.826
VVAF52	20046GU	2137722.651	3523877.385	186.525	7013511.731	11561254.386	611.957

Station Name	GPSID	Northing meters	Easting meters	NAVD 1988 meters	Northing US FT	Easting US FT	NAVD 1988 US FT
VVAF53	20046GV	2144991.889	3515701.823	174.491	7037360.890	11534431.731	572.476
VVAF54	20046GW	2169206.604	3514464.700	264.883	7116805.334	11530372.937	869.037
VVAF55	20046GX	2157284.103	3529857.329	213.125	7077689.595	11580873.588	699.228
VVAF56	20046GY	2161879.707	3539533.262	186.116	7092767.006	11612618.711	610.616
VVAF57	20046GZ	2185903.391	3518818.966	280.801	7171584.710	11544658.558	921.261
VVAF58	20046HA	2174257.345	3523684.338	282.152	7133375.974	11560621.033	925.694
VVAF59	20046HB	2098740.316	3480294.865	353.872	6885617.187	11418267.403	1160.995
VVAF60	20046HC	2083781.665	3450329.759	427.218	6836540.347	11319956.884	1401.631
VVANF01	20046HD	2042805.916	3459140.161	423.097	6702105.741	11348862.344	1388.111
VVANF02	20046HE	2093540.498	3467646.853	369.254	6868557.451	11376771.383	1211.461
VVANF03	20046HF	2134225.494	3489003.690	284.292	7002038.141	11446839.607	932.715
VVANF04	20046HG	2151107.348	3524273.076	209.591	7057424.690	11562552.585	687.633
VVANF05	20046HH	2169047.238	3549549.412	156.475	7116282.481	11645480.030	513.368
GCP14A	20046HI	2089632.290	3443724.031	611.731	6855735.271	11298284.593	2006.987
GCP14B	20046HJ	2090767.423	3437084.873	1128.090	6859459.454	11276502.620	3701.075
BCC2	BCC2	2166471.862	3528179.275	223.601	7107833.101	11575368.171	733.598
WVKE	WVKE	2185564.811	3550408.082	173.062	7170473.884	11648297.183	567.788
MAS2	MAS2	2164801.351	3574676.285	160.138	7102352.432	11727917.111	525.386
KP13	KP13	2094595.259	3536840.519	174.319	6872017.947	11603784.268	571.912
JMU1	JMU1	2085249.953	3468730.788	469.187	6841357.555	11380327.593	1539.324
WVMF	WVMF	2156487.684	3462574.931	345.857	7075076.677	11360131.252	1134.699
DP02	DP02	1965980.127	3440300.894	299.035	6450053.132	11287053.850	981.084
DP01	DP01	2046479.494	3501847.242	172.263	6714158.141	11488977.159	565.166