

Exhibit G – Acceptance Criteria

REVISED for VBMP 2017 Orthophotography Project
Acceptance Criteria for Associated Services and Products

The final products for the Virginia Base Mapping Program (VBMP) 2017-2020 Orthophotography Project may be tested by VGIN to insure that they meet all or some of the following criteria prior to the final acceptance by VGIN. Quality assurance shall be performed at map scale except as necessary to make measurements or inspect anomalies. Products not passing the measure of acceptability will be returned to Supplier for review and/or correction or replacement. Results of all tests will be documented and shared with Supplier. These criteria represent guidelines and it is understood that variances and/or exceptions may be required. Exceptions shall be made by mutual consent and must be documented in writing.

NOTE:

1. Each tested characteristic has been numbered sequentially to aid in communication between Supplier and VGIN. Refer to the numeric ID when discussing a specific tested characteristic.
2. Rapid response projects are not covered by this document for the specific nature of the rapid response delivery.

Digital Orthophotography Acceptance Criteria

1.	2. Tested Characteristic	3. Measure of Acceptability
All Scales (100 and 200)		
1.	Media: USB External Drive	Media is readable, all files accessible, no files corrupted
2.	Media label	Conforms to VGIN specifications. VGIN will work with Contractor to ensure that the layout and design is compatible with Contractor's media writing tools.
3.	File organization	Files written in tile sheet order
4.	File name	All digital file naming conforms to required client convention
5.	GeoTiff & .tfw format	GeoTiff 6.0 compliant; reads in ESRI
6.	Pixel definition	GeoTiff reference will be the upper left corner of the upper left-most pixel World file reference will be the center of the pixel of the upper left-most pixel
7.	Georeferencing	World file has correct coordinates expressed to at least 2 significant digits, and correct pixel size and pixel count
8.	Projection	Virginia State Plane Coordinate System WKID: 2924 Authority: EPSG (North) WKID: 2925 Authority: EPSG (South)
9.	Datum	NAD83/93 HARN (North and South Zones)

10.	Units	US Survey Feet
11.	4-band, Red Green Blue Infrared, 8-bit per band	256 levels of value for each band, 0=black, 255=white
12.	Tonal quality	Less than 2% of values at 0 or 255 Conforms to the color balance, contrast and brightness of the radiometric target images specified by the Radiometric Review Panel.
13.	Image blemishes and artifacts	Generally acceptable within these limits: If 1 pixel wide, 100 pixels in length. If 2 pixels wide, 60 pixels in length. If 3 pixels wide, 20 pixels in length. If 4 - 12 pixels wide, 12 pixels in length. Artifacts exceeding these limits may be acceptable if ground feature detail is not obscured, or if the brightness value of the pixels in the artifact is under 170. Artifacts within these limits may be rejected if critical ground features are significantly impacted. Critical features shall be defined as features having County, State or National significance (i.e. Courthouses, Capitol Buildings, etc.). Clusters of artifacts that do not individually meet these criteria may be considered unacceptable if more than 12 are visible within a viewing screen at 1:1 zoom. (5 or more artifacts within a 200 pixel area preferred).
14.	Conformance of sheet to index grid	Sheet will match the client provided grid. There will be no gap or overlap between tiles.
15.	Mosaic lines	Mosaic lines through buildings and above ground transportation structures shall be avoided to the greatest extent practical.
16.	Metadata	Complies with FGDC standards and runs through the MP parser without returning any errors.
18.	Smears	See Image Blemishes and Artifacts Corrected by adding mass points or break lines to DEM as necessary to reflect actual terrain or by image processing where appropriate. Where DEM corrections or image processing will result in reduced horizontal accuracy or misrepresentation of the location or appearance of important features (buildings, roads, etc.), the smear will remain untreated.
19.	Wavy features	See Image Blemishes and Artifacts. 95% of distinct linear ground features (such as road markings, and curbs) shall be positionally correct and should not deviate from their apparent path by more than 5 pixels measured perpendicular to the feature within any 100 pixel distance measured along the feature length. On roads, measurements should be taken from centerline of

		road instead of road edges, shoulder and railings.
1"=200'-scale only		
20.	Ground Resolution	1.0 US Survey Feet
21.	RMSE of known ground points measured on the image <i>Reference ASPRS Positional Accuracy Standards Edition 1 Version 100 November 2014.pdf Section 7.3 and Annex B B.2</i>	RMSE _x = RMSE _y = 2' (2 pixels) and RMSE _r = 1.4142 *RMSE _x = 1.4142*RMSE _y
22.	Absolute accuracy	NSSDA accuracy (20+ points) such that 95% of the points tested shall meet the criteria of 1.73*RMSE _r <4.9'
23.	Mismatch of features along mosaic lines and production block boundaries of equal scale	Equal to or less than 2 pixels at 95 % on well-defined features (roads, sidewalk curbs) for mosaic lines
24.	Mismatch of features between 200 & 100 scale	Equal to or less than 3 feet as RMSE on well defined ground features (roads, sidewalks, curbs).
25.	Sheet size	5000 feet (5000 pixels) East-West by 5000 feet (5000 pixels) North-South
1"=100'-scale only		
26.	Ground resolution	0.5 US Survey Feet
27.	RMSE of known ground points measured on the image <i>Reference ASPRS Positional Accuracy Standards Edition 1 Version 100 November 2014.pdf Section 7.3 and Annex B B.2</i>	RMSE _x = RMSE _y = 1' (2 pixels) and RMSE _r = 1.4142 *RMSE _x = 1.4142*RMSE _y
28.	Absolute accuracy	NSSDA accuracy (20+ points) such that 95% of the points tested shall meet the criteria of 1.73*RMSE _r 2.5'
29.	Mismatch of features along mosaic lines and production block boundaries of equal scale	Equal to or less than 2 pixels at 95 % on well defined features (roads, sidewalk curbs) for mosaic lines
30.	Sheet Size	2500 feet (5000 pixels) East-West by 2500 feet (5000 pixels) North-South
1"=50'-scale only		
31.	Ground resolution	0.25 US Survey Feet
32.	RMSE of known ground points measured on the image <i>Reference ASPRS Positional Accuracy Standards Edition 1 Version 100 November 2014.pdf Section 7.3 and Annex B B.2</i>	RMSE _x = RMSE _y = 0.5' (2 pixels) and RMSE _r = 1.4142 *RMSE _x = 1.4142*RMSE _y
33.	Absolute accuracy	NSSDA accuracy (20+ points) such that 95% of the points tested shall meet the criteria of 1.73*RMSE _r 1.25'
34.	Mismatch of features along mosaic lines and production block boundaries of equal scale	Equal to or less than 2 pixels at 95 % on well-defined features (roads, sidewalk curbs) for mosaic lines
35.	Sheet Size	1250 feet (5000 pixels) East-West by 1250 feet (5000 pixels) North-South

Aerotriangulation Acceptance Criteria

	Tested Characteristic All Scales	Measure of Acceptability
36.	Report Format	Conforms to required convention (to be determined with VGIN in pilot phase). Each block of triangulation shall have a separate report. The contents shall include a narrative and analysis, list of control used and rejected, all statistics stated in RFP sections 3.a. and 6.c in tabular form, number of control used, graphical output of residuals,
37.	Report Completeness	All information complete and readable
38.	Precision of Image Observations	Sigma (0) less than or equal to 5 microns is acceptable.
39.	Horizontal accuracy against ground control control check points tested in accordance with 10+ points at NSSDA criteria	<i>Reference ASPRS Positional Accuracy Standards Edition 1 Version 100 November 2014.pdf Section 7.7</i>
40.	Vertical accuracy against ground control check points tested in accordance with 10+ points at NSSDA criteria	Reference ASPRS Positional Accuracy Standards Edition 1 Version 100 November 2014.pdf Section 7.7
41.	Accuracy against image coordinates	RMSE less than or equal to 5 microns is acceptable.
42.	Max. offsets [E, N] to any one blind QA point	3 * RMSE for that scale
43.	RMSE at GPS residuals and other RFP specified AT statistical data	RMSE at GPS residuals generally less than 10 cm. Provide theoretical accuracy data

Ground Control Acceptance Criteria

	Tested Characteristic All Scales	Measure of Acceptability
44.	Report Format	Conforms to required convention
45.	Report Completeness	All information complete and readable
46.	Horizontal accuracy against HARN control	<i>Reference ASPRS Positional Accuracy Standards Edition 1 Version 100 November 2014.pdf Section 7.8</i>
47.	Vertical accuracy against HARN control	Will achieve 3 rd Order Class 1 (100 ppm + 1:10,000) as per <i>Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning techniques</i> , by Federal Geodetic Control Committee, August 1989. Generally, standard deviation to existing HARN control within 7-9 cm
48.	Offsets [E, N] to any one blind QA point	2 * Standard deviation
49.	NSSDA analysis [E, N] of 10+ QA points	95% within 1/10,000 th of the flying height. 1.73 * RMSE _r or 2.447 * RMSE _x for that scale for that scale
50.	GPS BASE Station Accuracy	A minimum of 2 base stations will operating during collection – all data will be submitted for OPUS

		processing with final results overall RMS <3cm – http://www.ngs.noaa.gov/OPUS/Using_OPUS.htm
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Digital Elevation Model QA Acceptance Criteria

	Tested Characteristic All Scales	Measure of Acceptability
51.	Media:USB External Drive, 300 GB	Media is readable, all files accessible, no files corrupted
52.	File organization	Files written will be of a useable file size not to exceed 2 Gb per file.
53.	File name	Conforms to required convention
54.	Format	In Microstation DGN format Version 8, all features will have x, y, z values
55.	Georeferencing	Locates in proper tile grid cell
56.	Contours DTM break lines & mass point density	Sufficient to accurately build terrain to support contour production.
57.	Base Topo DEM points density	Sufficient to accurately build terrain to support ortho production. Sufficient to support accurate orthorectification, but not suitable for generating contours.
58.	Continuity	No spikes or holes, no gaps of sufficient size to affect orthorectification, regardless of perspective center.
59.	Attributes	Conform to DEM standard

Ancillary Data Acceptance Criteria

	Ancillary Data	Measure of Acceptability
60.	Ancillary Data	All items will be written to media and verified that they are readable (not corrupt)
61.	Flight line trajectory shapefiles/feature classes	For each resolution a shapefile or feature class of photo center represented as points. Each point should be attributed with exposure identification, and the date and time of acquisition.
62.	Seamline shapefiles/feature classes	For each resolution a shapefile or feature class of mosaic seamlines represented as polygons for each exposure chip used in the mosaicked image. The polygons should have no gaps, overlaps or multi-part features. Each polygon should be attributed with exposure identification, and the date and time of acquisition.