



Commonwealth of Virginia
Virginia Information Technologies Agency

DIGITAL ORTHOIMAGERY AND DIGITAL TERRAIN MODEL PRODUCTION SERVICES

Date: July 29, 2011

Contract #: VA-081223-SANB

Authorized Users: All public bodies, including VITA, as defined by §2.2-4301 and referenced by §2.2-4304 of the *Code of Virginia*

Contractor: Sanborn Map Company
1935 Jamboree Drive
Suite 100
Colorado Springs, CO 80920
Phone: 1-866-726-2676 (sanborn)

Contact: David Lewis, Sales
Phone: 703-481-9016

FIN: 13-3980333

Term: January 1, 2012 – December 22, 2012

Payment: Net 30 days

For Additional Information, Please Contact:

Virginia Information Technologies Agency
Supply Chain Management

Greg Searce
Phone: 804-416-6166
Fax: 804-416-6361
E-Mail: gregory.searce@vita.virginia.gov

NOTES: Individual Commonwealth of Virginia employees are not authorized to purchase products or services for their personal use from this Contract.

For updates, please visit our Website at <http://www.vita.virginia.gov/procurement/contracts.cfm>

VIRGINIA INFORMATION TECHNOLOGIES AGENCY (VITA): Prior review and approval by VITA for purchases in excess of \$100,000.00 is required for State Agencies and Institutions only.

**MODIFICATION #2
TO
CONTRACT NUMBER VA-081223-SANB
BETWEEN THE
COMMONWEALTH OF VIRGINIA
AND
SANBORN MAP COMPANY**

This MODIFICATION is an agreement between the Commonwealth of Virginia, hereinafter referred to as "State" or "Commonwealth" or "VITA" (Virginia Information Technologies Agency), and Sanborn Map Company, hereinafter referred to as "Contractor" relating to the modification of the above Contract. This Modification is hereby incorporated into and made an integral part of Contract VA-081223-SANB (the Agreement), as modified.

Modification #2 allows for an extension to the above referenced contract

**The term of the contract is extended under the same terms for the period beginning
January 1, 2012 through December 22, 2012.**

The foregoing is the complete and final expression of the parties' agreement to modify Contract VA-081223-SANB and cannot be modified, except by a writing signed by duly authorized representatives of both parties.

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED.

PERSONS SIGNING THIS CONTRACT ARE AUTHORIZED REPRESENTATIVES OF EACH PARTY TO THIS CONTRACT AND ACKNOWLEDGE THAT EACH PARTY AGREES TO BE BOUND BY THE TERMS AND CONDITIONS OF THE CONTRACT.

SANBORN MAP COMPANY

BY: *Amy Kappel*

NAME: *Amy Kappel*

TITLE: *Secretary / Dir. Corp. Contracts*

DATE: *7/21/2011*

COMMONWEALTH OF VIRGINIA

BY: *Dana Smith*

NAME: *Dana Smith*

TITLE: *Director, Finance & Administration*

DATE: *7-21-11*

**MODIFICATION #1
TO
CONTRACT NUMBER VA-081223-SANB
BETWEEN THE
COMMONWEALTH OF VIRGINIA
AND
SANBORN MAP COMPANY**

This MODIFICATION is an agreement between the Commonwealth of Virginia, hereinafter referred to as "State" or "Commonwealth" or "VITA" (Virginia Information Technologies Agency), and Sanborn Map Company, hereinafter referred to as "Contractor" relating to the modification of the above Contract. This Modification is hereby incorporated into and made an integral part of Contract VA-081223-SANB (the Agreement), as modified.

The purpose of this Modification is to replace Exhibit G with the following:

Exhibit G – Acceptance Criteria

VBMP 2009-2012 Orthophotography Project Acceptance Criteria for Associated Professional Services and Products

The final products for the Virginia Base Mapping Program (VBMP) 2009-2012 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 Contractor for review and/or correction or replacement. Results of all tests will be documented and shared with Contractor. 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.

Some of the criteria relate to subjective items such as radiometry and general aesthetics. Prior to the submission of a pilot dataset, Sanborn provided VGIN with multiple radiometry samples for review, evaluation and comment. VGIN, along with its project shareholders, selected a sample they determined would best suit the needs of the statewide initiative. Criterion 16 and 18 below will be tested relative to that VGIN selected sample.

NOTE:

1. Each tested characteristic has been numbered sequentially to aid in communication between Contractor 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

	Tested Characteristic	Measure of Acceptability
<u>Inventory / Spatial Domain / Metadata Criteria for All Scales (100 and 200)</u>		
1.	Media: DVD 2.0, 4.7 GB single sided (4.3 GB usable) USB External Drive, 300 GB	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.	Geographic Coverage Assessment	Verify extents of Geotiff header and tfw file against tile index to ensure no overlap of tiles or gaps between tiles.
7.	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
8.	Georeferencing	World file has correct coordinates expressed to at least 2 significant digits, and correct pixel size and pixel count

9.	Projection	Virginia State Plane Coordinate System
10.	Datum	NAD83/93 HARN (North and South Zones)
11.	Units	US Survey Feet
12.	32 bit (8 bits per channel) 4-band stacked image	256 levels of value for each band, 0=black, 255=white
13.	Image Compression	Check GeoTIFF header for evidence of image compression (JPEG Compression, Overviews, Tiling, etc...)
14.	Metadata	Conforms to FGDC Metadata Standard- Should run through the USGS Meta Parser tool without error.
Visual Inspection Criteria		
15.	Horizontal Displacement / Mis-Alignment (Relative Accuracy)	Horizontal displacement along an apparent seam line or along a tile boundary must be equal to or less than 2 pixels in a single direction on well defined ground features (roads, sidewalks, curbs).
16.	Tonal quality	Less than 2% of values at 0 or 255. Check entire block for tonal balancing across and between delivery blocks as well as between deliverables with differing resolutions.
17.	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).
18.	Image Appearance	Image contains no extreme color, tone, or contrast variations from approved sample.
19.	JPEG2000	The correct compression ratio 5:1 and reads in ESRI software

20.	Mosaic lines	<p>Mosaic lines through buildings and above ground transportation structures shall be avoided to the greatest extent practical.</p> <p>Mosaic line placement should not result in artificial clipping of features along tile boundaries or missing photo areas anywhere within the project area.</p> <p>As with buildings, other minor elevation structures such as pipelines, private footbridges or boardwalks, are not rectified in the same manner as elevated roadways. Distortion of these features is not grounds for rejection of the imagery.</p> <p>Seam lines should not be visible at the viewing scale for which the imagery is produced. Typically they should not be visible at 1.5 times the map scale. If viewing at more than 1.5 times the map scale, some radiometric inconsistency may be apparent.</p> <p>Because seamlines are run around buildings and other structures, the orientation of shadows associated with trees, poles, and buildings may fall in different directions on the imagery, or may in some cases result in multiple shadows for a feature. Seam lines will not be edited to reflect shadow orientation.</p>
21.	Smears	<p>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 DTM 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.</p>
22.	Wavy features	<p>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.</p>
23.	Hydrographic Bodies	<p>Visible seamlines are acceptable over large water bodies. Glint caused from the inherent characteristics of the Z/I DMC on water bodies is</p>

		unavoidable and shall not be grounds for rejection. The natural content of the digital image shall be maintained where possible, with the exception of radiometric adjustments that are inherent in the orthophoto production process.
1"=200'-scale only (1.0' GSD)		
24.	Ground Resolution	1.0 US Survey Feet
25.	RMSE of known ground points measured on the image <i>See ASPRS Class I Standards Page 8, Table 16, and NSSDA Part 3, Appendices 3-A and 3-D for explanation of formulas.</i>	RMSE _x = RMSE _y = 2' (2 pixels) and RMSE _r = 1.4142 *RMSE _x = 1.4142*RMSE _y
26.	Absolute accuracy	NSSDA accuracy (20+ points) such that 95% of the points tested shall meet the criteria of 1.73*RMSE _r <4.9'
27.	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
28.	Mismatch of features between 200 & 100 scale	Equal to or less than 3 feet as RMSE on well defined ground features (roads, sidewalks, curbs).
29.	Sheet size	5000 feet (5000 pixels) East-West by 5000 feet (5000 pixels) North-South
1"=100'-scale only (0.5' and 0.25' GSD)		
30.	Ground resolution	0.5 US Survey Feet
31.	RMSE of known ground points measured on the image <i>See ASPRS Class I Standards Page 8, Table 16, and NSSDA Part 3, Appendices 3-A and 3-D for explanation of formulas.</i>	RMSE _x = RMSE _y = 1' (2 pixels) and RMSE _r = 1.4142 *RMSE _x = 1.4142*RMSE _y
32.	Absolute accuracy	NSSDA accuracy (20+ points) such that 95% of the points tested shall meet the criteria of 1.73*RMSE _r 2.5'
33.	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
34.	Sheet Size	2500 feet (5000 pixels) East-West by 2500 feet (5000 pixels) North-South for 0.5' GSD; 1250 feet (5000 pixels) East-West by 1250 feet (5000 pixels) North-South for 0.25' GSD

Aerotriangulation Acceptance Criteria

	Tested Characteristic All Scales	Measure of Acceptability
35.	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 3b. and 6.c. page 19, in tabular form, number of control used, graphical output of residuals.
36.	Report Completeness	All information complete and readable
37.	Precision of Image Observations	Sigma (0) less than or equal to 5 microns is acceptable.
38.	Horizontal accuracy against ground control check points tested in accordance with 10+ points at NSSDA criteria	Horizontal RMSE is 1/10,000 th of the flying height. For 0.25' GSD imagery, RMSE _{xy} shall be 0.375'; for 0.5' GSD imagery, RMSE _{xy} shall be 0.49'; and for 1.0' GSD imagery, RMSE _{xy} shall be 0.92'.
39.	Vertical accuracy against ground control check points tested in accordance with 10+ points at NSSDA criteria	Vertical RMSE is 1/9,000 th of the flying height. For 0.25' GSD imagery, RMSE _z shall be 0.42'; for 0.5' GSD imagery, RMSE _z shall be 0.54'; and for 1.0' GSD imagery, RMSE _z shall be 1.02'.
40.	Accuracy against image coordinates	RMSE less than or equal to 5 microns is acceptable.
41.	Max. offsets [E, N] to any one blind QA point	3 * RMSE for that scale, which equates to the following maximum values: For 0.25' GSD imagery, Max _{xy} shall be 1.13' and Max _z shall be 1.25'; for 0.5' GSD imagery, Max _{xy} shall be 1.47' and Max _z shall be 1.63'; and for 1.0' GSD imagery, Max _{xy} shall be 2.76' and Max _z shall be 3.07'.
42.	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
43.	Report Format	Conforms to required convention
44.	Report Completeness	All information complete and readable
45.	Horizontal accuracy against HARN control	Will achieve 1 st Order accuracy (10 ppm +100,000) 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 5-7 cm.
46.	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
47.	Offsets [E, N] to any one blind QA point	2 * Standard deviation
48.	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

Digital Terrain Model QA Acceptance Criteria

	Tested Characteristic All Scales	Measure of Acceptability
49.	Media DVD 2.0, 4.7 GB single sided (4.3 GB usable) USB External Drive, 300 GB	Media is readable, all files accessible, no files corrupted
50.	File organization	Files written will be of a useable file size not to exceed 2 Gb per file.
51.	File name	Conforms to required convention
52.	Format	In Microstation DGN format Version 8, all features will have x, y, z values
53.	Georeferencing	Locates in proper tile grid cell
54.	Contours DTM break lines & mass point density	Sufficient to accurately build terrain to support contour production.
55.	Base Topo DTM points density	Sufficient to accurately build terrain to support ortho production. Sufficient to support accurate orthorectification, but not suitable for generating contours.
56.	Continuity	No spikes or holes, no gaps of sufficient size to affect orthorectification, regardless of perspective center.
57.	Attributes	Conform to DTM standard

Ancillary Data Acceptance Criteria

	Ancillary Data	Measure of Acceptability
58.	Ancillary Data	All items will be written to media and verified that they are readable (not corrupt)

ALL OTHER CONTRACT TERMS SHALL REMAIN UNCHANGED.

The foregoing is the complete and final expression of the parties' agreement to modify Contract VA-081223-SANB and cannot be modified, except by a writing signed by duly authorized representatives of both parties.

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED.

PERSONS SIGNING THIS CONTRACT ARE AUTHORIZED REPRESENTATIVES OF EACH PARTY TO THIS CONTRACT AND ACKNOWLEDGE THAT EACH PARTY AGREES TO BE BOUND BY THE TERMS AND CONDITIONS OF THE CONTRACT.

SANBORN MAP COMPANY

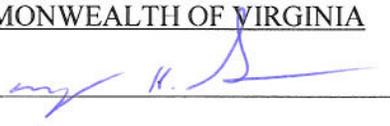
BY: 

NAME: John Capple

TITLE: CEO

DATE: 7/9/2009

COMMONWEALTH OF VIRGINIA

BY: 

NAME: GREGORY H. SCARCE

TITLE: STRATEGIC SOURCING SPECIALIST

DATE: 7-16-09



Information Technology Services Contract

between

The Virginia Information Technologies Agency

on behalf of

The Commonwealth of Virginia

and

SANBORN

**INFORMATION TECHNOLOGY SERVICES CONTRACT
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INFORMATION TECHNOLOGY SERVICES CONTRACT

THIS INFORMATION TECHNOLOGY SERVICES CONTRACT ("Contract") is entered into by and between the Virginia Information Technologies Agency (VITA) pursuant to §2.2-2012 of the Code of Virginia and on behalf of the Commonwealth of Virginia (hereinafter referred to as "VITA"), and THE SANBORN MAP COMPANY, INC. ("Supplier"), a corporation headquartered at 1935 Jamboree Drive, Suite 100, Colorado Springs, CO 80920-5358 to be effective as of Dec . 23, 2008("Effective Date").

1. PURPOSE AND SCOPE

This Contract sets forth the terms and conditions under which Supplier shall provide consistent statewide digital orthoimagery and a digital terrain model production services ("Services") to the Authorized Users.

2. DEFINITIONS

A. Acceptance

Successful performance of the Services at the location designated in the applicable Statement of Work, or completed and successful Acceptance testing in conformance with the Requirements as determined by the Authorized User in the applicable Statement of Work.

B. Agent

Any third party independent agent of any Authorized User.

C. Authorized Users

All public bodies, including VITA, as defined by §2.2-4301 and referenced by §2.2-4304 of the Code of Virginia.

D. Confidential Information

Any confidential or proprietary information of a Party that is disclosed in any manner, including oral or written, graphic, machine readable or other tangible form, to any other Party in connection with or as a result of discussions related to this Contract or any order or SOW issued hereunder, and which at the time of disclosure either (i) is marked as being "Confidential" or "Proprietary", (ii) is otherwise reasonably identifiable as the confidential or proprietary information of the disclosing Party, or (iii) under the circumstances of disclosure should reasonably be considered as confidential or proprietary information of the disclosing Party.

E. Deliverable

The tangible embodiment of the Services, including the development or creation of Work Product, performed or provided by Supplier as identified in the applicable Statement of Work.

F. Party

Supplier, VITA, or any Authorized User.

G. Primary Product

Product derived directly from raw data that is captured as a result of the flights. Primary products would include orthophotos and digital terrain models.

H. Requirements

The functional, performance, operational, compatibility, Acceptance testing criteria and other parameters and characteristics of the Service(s) and Deliverables as set forth in Exhibit A and the applicable Statement of Work and such other parameters, characteristics, or performance standards that may be agreed upon in writing by the Parties.

I. Secondary Product

Product that is derived from a primary product. Secondary products would include, but are not limited to, contours and planimetrics.

J. Service

Any work performed or service provided, including provision to the Authorized User of any Deliverable, by Supplier under this Contract. Service includes the discovery, creation, or development of Work Product, if any.

K. Statement of Work (SOW)

Any document in substantially the form of Exhibit B (describing the deliverables, due dates, assignment duration and payment obligations for a specific project, engagement, or assignment for which Supplier shall be providing Services to an Authorized User), which, upon signing by both Parties, shall be deemed a part of this Contract.

L. Supplier

Means the Supplier and any of its Affiliates (i.e., an entity that controls, is controlled by, or is under common control with Supplier).

M. Work Product

Inventions, combinations, machines, methods, formulae, techniques, processes, improvements, software designs, computer programs, strategies, specific computer-related know-how, data and original works of authorship (collectively, the "Work Product") discovered, created, or developed by Supplier, or jointly by Supplier and an Authorized User(s) in the performance of this Contract. Work Product shall not include configuration of software.

3. TERM AND TERMINATION

A. Contract Term

This Contract is effective and legally binding as of the Effective Date and, unless terminated as provided for in this section, shall continue to be effective and legally binding for the duration of the Project as detailed in the RFP and Exhibit A to this Contract. VITA may, at its sole discretion, extend this Contract for up to three (3) additional one-year periods after the completion and Acceptance of the original project. VITA will issue a written notification to the Supplier stating the proposed extension period, thirty (30) days prior to the expiration of any current term.

Performance of an order or SOW issued during the term of this Contract may survive the expiration of the term of this Contract, in which case all terms and conditions required for the operation of such order or SOW shall remain in full force and effect until Services pursuant to such order or SOW have met the final Acceptance criteria of the applicable Authorized User.

B. Termination for Convenience

VITA may terminate this Contract, in whole or in part, or any order or SOW issued hereunder, in whole or in part, or an Authorized User may terminate an order or SOW, in whole or in part, upon not less than thirty (30) days prior written notice at any time for any reason.

C. Termination for Breach or Default

VITA shall have the right to terminate this Contract, in whole or in part, or any order or SOW issued hereunder, in whole or in part, or an Authorized User may terminate an order or SOW, in whole or in part, for breach and/or default of Supplier. Supplier shall be deemed in breach and/or default in the event that Supplier fails to meet any material obligation set forth in this Contract or in any order or SOW issued hereunder.

If VITA deems the Supplier to be in breach and/or default, VITA shall provide Supplier with notice of breach and/or default and allow Supplier fifteen (15) days to cure the breach and/or default. If Supplier fails to cure the breach as noted, VITA may immediately terminate this Contract or any order or SOW issued hereunder, in whole or in part. If an Authorized User deems the Supplier to

be in breach and/or default of an order or SOW, such Authorized User shall provide Supplier with notice of breach and/or default and allow Supplier fifteen (15) days to cure the breach and/or default. If Supplier fails to cure the breach and/or default as noted, such Authorized User may immediately terminate its order or SOW, in whole or in part. Any such termination shall be deemed a Termination for Breach or a Termination for Default. In addition, if Supplier is found by a court of competent jurisdiction to be in violation of or to have violated 31 USC 1352 or if Supplier becomes a party excluded from Federal Procurement and Nonprocurement Programs, VITA may immediately terminate this Contract, in whole or in part, for breach. VITA shall provide written notice to Supplier of such termination and Supplier shall provide written notice to VITA if Supplier is charged with violation of 31 USC 1352 or if federal debarment proceedings are instituted against Supplier.

D. Termination for Non-Appropriation of Funds

All payment obligations under this Contract are subject to the availability of legislative appropriations at the federal, state, or local level, for this purpose. In the event of non-appropriation of funds, irrespective of the source of funds, for the items under this Contract, VITA may terminate any order or SOW, in whole or in part, or an Authorized User may terminate its order or SOW, in whole or in part, for those goods or services for which funds have not been appropriated. Written notice will be provided to the Supplier as soon as possible after legislative action is completed.

[Termination by Supplier will not be considered.]

E. Effect of Termination

Upon termination, neither the Commonwealth, nor VITA, nor any Authorized User shall have any future liability except for Deliverables accepted by the Authorized User or Services rendered by Supplier and accepted by the Authorized User prior to the termination date.

In the event of a Termination for Breach or Termination for Default, Supplier shall accept return of any Deliverable that was not accepted by the Authorized User(s), and Supplier shall refund any monies paid by any Authorized User for such Deliverable, and all costs of de-installation and return of Deliverables shall be borne by Supplier.

F. Transition of Services

Prior to or upon expiration or termination of this Contract and at the request of VITA, Supplier shall provide all assistance as VITA or an Authorized User may reasonably require to transition Services to any other supplier with whom VITA or such Authorized User contracts for provision of services identical or similar to the Services provided by Supplier pursuant to this Contract. This obligation may extend beyond expiration or termination of the Contract for a period not to exceed six (6) months. In the event of a termination for breach and/or default of Supplier, Supplier shall provide such assistance at no charge or fee to VITA or any Authorized User; otherwise, Supplier shall provide such assistance at the hourly rate or a charge agreed upon by Supplier and VITA or an Authorized User.

G. Contract Kick-Off Meeting

Within 30 days of Contract award, Supplier may be required to attend a contract orientation meeting, along with the VITA contract manager/administrator, the VITA and/or other CoVa Agency project manager(s) or authorized representative(s), technical leads, VITA representatives for SWaM and Sales/IFA reporting, as applicable, and any other significant stakeholders who have a part in the successful performance of this Contract. The purpose of this meeting will be to review all contractual obligations for both parties, all administrative and reporting requirements, and to discuss any other relationship, responsibility, communication and performance criteria set forth in the Contract. The Supplier may be required to have its assigned project manager as specified in Section 6.0 and a representative from its contracts department in attendance. The time and location of this meeting will be coordinated with Supplier and other meeting participants by the VITA contract manager.

H. Contract Closeout

Prior to the contract's expiration date, Supplier may be provided contract close out documentation and shall complete, sign and return to VITA Supply Chain Management within 30 days of receipt. This documentation may include, but not be limited to: Patent/Royalty Certificate, Tangible Property/Asset Certificate, Escrow Certificate, SWaM Reports Completion Certificate, Sales Reports/IFA Payments Completion Certificate, and Final Payment Certificate. Supplier is required to process these as requested to ensure completion of close-out administration and to maintain a positive performance reputation with the Commonwealth of Virginia. Any closeout documentation not received within 30 days of Supplier's receipt of our request will be documented in the contract file as Supplier non-compliance. Supplier's non-compliance may affect any pending payments due the Supplier, including final payment, until the documentation is returned.

4. SERVICES

A. Nature of Services and Engagement

This Contract is optional use and non-exclusive and all Authorized Users may, at their sole discretion, receive benefits from third party suppliers of services similar to, or in competition with, services provided by Supplier.

B. Statement of Work (SOW)

All Services shall be performed at the times and locations set forth in the applicable SOW and at the rates set forth in Exhibit D herein. Unless VITA issues a written authorization for a time and materials type SOW, any SOW shall be of a fixed price type but may, with the written approval of VITA, contain a cost-reimbursable line item(s) for pre-approved travel expenses. For time and materials type SOWs, Supplier personnel shall maintain daily time records of hours and tasks performed, which shall be submitted or made available for inspection by the Authorized User upon forty-eight (48) hours advance written notice.

C. Change Orders

All changes to the Services to be provided pursuant to any given SOW must be described in a written change request (template provided as Exhibit B), which includes any appropriate adjustments to the SOW. Either Party to an SOW may issue a change request that will be subject to written approval of the other Party before it becomes part of this Contract. In no event shall any SOW or any modification thereto require the Supplier to perform any work beyond the scope of this Contract as such scope is defined in Exhibit A hereto.

D. Acceptance

Service(s) shall be deemed accepted when the Authorized User determines that such Service(s) meets the Requirements set forth in the applicable SOW. If applicable, Supplier shall be responsible for ensuring that any individual Deliverable functions properly with any other Deliverable provided pursuant to the SOW. Should a previously Accepted Deliverable require further modification in order to work properly with any other Deliverable, Supplier shall be responsible for all costs associated with such modification.

Authorized User shall commence Acceptance testing within thirty (30) days, or within such other period as set forth in the applicable SOW, after receipt of the Service. Acceptance testing will be no longer than thirty (30) days, or such longer period as may be agreed in writing between Authorized User and Supplier, for each Deliverable or for the first instance of each Service type set forth in Exhibit B. Supplier agrees to provide to the Authorized User such assistance and advice as the Authorized User may reasonably require, at no additional cost, during such Acceptance testing. Authorized User shall provide to Supplier written notice of Acceptance upon completion of installation and successful Acceptance testing. Should Authorized User fail to provide Supplier written notice of successful or unsuccessful Acceptance testing within five (5) days following the Acceptance testing period, the Service shall be deemed Accepted.

E. Cure Period

Supplier shall correct any non-conformities identified during Acceptance testing and re-submit such non-conforming Deliverables for inspection within thirty (30) calendar days of the appropriate Authorized User's written notice of non-conformance, or as otherwise agreed between such Authorized User and Supplier in the applicable SOW. Should Supplier fail to cure the non-conformity or deliver a Service which meets the Requirements, the Authorized User may, in its sole discretion: (i) reject the Service in its entirety, and any Service rendered unusable due to the non-conforming Service, and recover amounts previously paid hereunder for all such Services; (ii) issue a "partial Acceptance" of the Service with an equitable adjustment in the price to account for such deficiency; or (iii) conditionally accept the applicable Service while reserving its right to revoke Acceptance if timely correction is not forthcoming. Failure of a Service to meet, in all material respects, the Requirements after the second set of acceptance tests may constitute a default by Supplier. In the event of such default, the Authorized User may, at its sole discretion, terminate its order or SOW, in whole or in part, for the Services to be provided thereunder by Supplier.

F. Re-Flight

For any re-flights necessary for FY09, the areas shall be re-flown, processed and delivered to VITA within six (6) months of the re-flight. For any re-flights necessary for FY011, the areas will be re-flown, processed and delivered to VITA within six (6) months of the re-flight. Re-flights will be done at no charge to the Authorized Users.

G. Aviation Laws, Regulations, and Procedures

Supplier shall comply with all federal, state, and local aviation laws, regulations and ordinances, including those issued by the Federal Aviation Administration (FAA). If Supplier's performance of Services requires it to fly aircraft in international airspace, Supplier shall comply with all relevant international laws, regulations, and protocol. Supplier shall ensure that, in performing the Services, it does not violate Department of Defense (DoD) rules restricting flights over Military Operations Areas (MOAs). Supplier shall review and perform all Services in accordance with all current Notices to Airmen (NOTAMs).

Prior to each flyover, Supplier shall file a flight plan with the relevant Air Traffic Controller(s) and shall secure all necessary permissions.

Supplier shall ensure that aircraft used to perform Services under this Contract are airworthy and properly maintained and overhauled by licensed and qualified agents or personnel. All replacement parts shall be properly tagged or certified. Supplier shall perform all applicable maintenance directives from relevant regulatory authorities and manufacturers.

5. REMEDIES

Table 1 sets forth the milestone schedule by which Supplier shall deliver to VITA the final Primary Product. Individual orders by Authorized Users are not subject to this clause; however, Authorized Users may develop and include their own remedies per their individual orders/statements of work, if applicable.

Table 1 for 2009 & 2011

Milestone Number	Date	% of data delivered by month	% of data delivered (cumulative)
1	July 31, 2009	15	15
2	August 31, 2009	20	35
3	September 30, 2009	30	65

4	October 31, 2009	35	100
5	July 31, 2011	15	15
6	August 31, 2011	20	35
7	September 30, 2011	30	65
8	October 31, 2011	35	100

Supplier understands and agrees that it is critical to VITA that data be provided on or before the dates specified in Table 1. Should Supplier fail to deliver the cumulative percentages of acceptable data by the milestone dates 3, 4, 7 and 8 as specified in Table 1, VITA shall deduct, not as a penalty but as remedies, a charge of \$3,000 for each and every calendar day of delay beyond the date specified until Supplier has delivered the required cumulative percentage.

Data that is not accepted by VITA shall be returned to Supplier for correction. Supplier shall correct the data in accordance with the Cure Period. If Supplier fails to correct the non-conformity in accordance with the Cure Period, in addition to the remedies provided in the Cure Period section of delivered and shall adjust the percentage of data delivered accordingly. If such adjustment causes the cumulative percentage of data delivered to fall below the percentage required by milestone dates 3, 4, 7 and 8 in Table 1, remedies shall be immediately applied.

In no event shall remedies exceed ten percent (10%) of the value of the total price of all Deliverables subject to remedies.

An extension may be available only if Supplier has notified VITA in writing via phone or email within forty eight (48) hours after any occurrence justifying the extension. Supplier's notification shall include a description of the solution it plans to implement to resolve or mitigate the circumstances resulting in its request for an extension. Upon receipt of such notification and justification from the Supplier, a reasonable extension of time for provision of Deliverables specified herein may be granted. By signing this Contract, Supplier certifies its concurrence that the remedy amount specified is reasonable in light of the harm that is anticipated from late performance or delivery and the difficulty of proof of loss, and the Supplier hereby waives any claim that such remedies are void as penalties or not reasonably related to actual damages.

The remedies apply only to delivery of required products for areas that are covered by imagery data captured by the Supplier in the Spring of 2009, Spring 2011 or succeeding years, meeting project acquisition specifications.

Remedies will not be assessed if:

- the total cumulative delivery of products to VITA by September 30 (year of acquisition) equals sixty-five percent (65%) or greater of the total products subject to remedies, and while not exceeding delivery of more than thirty percent (30%) of the total product in September (year of acquisition).
- all products subject to remedies are delivered on or before October 31 (six months immediately following end of imagery capture).

Notwithstanding the foregoing, remedies shall be assessed if: (i) submitted product has been rejected by VITA reviews, (ii) Supplier or its agent have been provided thirty (30) days (from the notification of non-acceptance) to correct the non-conformities, and/or (iii) Supplier fails to correct the problem during the Cure Period. In such circumstances, Supplier shall be assessed remedies for every day over the thirty (30) day Cure Period in which product is not corrected.

6. RIGHTS TO WORK PRODUCT

If Authorized User is a state agency, board, commission, or other quasi-political entity of the Commonwealth of Virginia or other body referenced in Title 2.2 of the Code of Virginia, any license to

pre-existing work shall be held by, and all rights in, title to, and ownership of Work Product shall vest with the Commonwealth. If Authorized User is a locality, municipality, school, school system, college, university, local board, local commission, or local quasi-political entity, any license to pre-existing work shall be held by, and all rights in, title to, and ownership of Work Product shall vest with that public body.

A. Work Product

VITA and Supplier each acknowledge that performance of this Contract may result in Work Product. The Parties shall document all Work Product specifications and such specifications shall be made an incorporated exhibit to this Contract. Supplier agrees that it shall promptly and fully disclose to the Commonwealth or the Authorized User any and all Work Product generated, conceived, reduced to practice or learned by Supplier or any of its employees, either solely or jointly with others, during the term or performance of this Contract, which in any way relates to the business of the Commonwealth, VITA, or any Authorized User. Supplier further agrees that neither Supplier nor any of Supplier's employees, contractors, agents or subcontractors, nor any party claiming through Supplier or Supplier's employees, shall, other than in the performance of this Contract, make use of or disclose to others any proprietary information relating to the Work Product. All Services performed hereunder shall include delivery of all Work Product source code, object code, executables, and documentation. Supplier shall at no time deny access to the Work Product, regardless of form, by the Commonwealth or the Authorized User.

B. Ownership

Supplier agrees that, whether or not the Services are considered "works made for hire" or an employment to invent, all Work Product discovered, created or developed under this Contract shall be and shall remain the sole and exclusive property of the Commonwealth of Virginia and its assigns or the Authorized User and its assigns. Except as specifically set forth in writing and signed by both VITA and Supplier, or Authorized User and Supplier, Supplier agrees that the Commonwealth or the Authorized User shall have all rights with respect to any Work Product discovered, created or developed under this Contract without regard to the origin of the Work Product.

If and to the extent that Supplier may, under applicable law, be entitled to claim any ownership interest in the Work Product, Supplier hereby irrevocably transfers, grants, conveys, assigns and relinquishes exclusively to the Commonwealth or the Authorized User any and all right, title and interest it now has or may hereafter acquire in and to the Work Product under patent, copyright, trade secret and trademark law in perpetuity or for the longest period otherwise permitted by law. If any moral rights are created, Supplier waives such rights in the Work Product. Supplier further agrees as to the Work Product to assist the Commonwealth or the Authorized User in every reasonable way to obtain and, from time to time, enforce patents, copyrights, and other rights and protection, and in protecting trade secrets, with respect to such Work Product, and to that end, Supplier and its employees shall execute all documents for use in applying for and obtaining such patents, copyrights, and other rights and protection with respect to such Work Product, as the Commonwealth or the Authorized User may reasonably request, together with any assignments thereof to the Commonwealth or the Authorized User or entities designated by the Commonwealth or the Authorized User.

C. Pre-existing Work

If and to the extent that any pre-existing rights are embodied or reflected in the Service Deliverables, Supplier hereby grants to the Commonwealth or the Authorized User an irrevocable, perpetual, non-exclusive, worldwide, royalty-free right and license to (i) use, modify, transmit, execute, reproduce, display, perform, distribute copies of and prepare derivative works based upon such pre-existing rights and any derivative works thereof, and (ii) authorize others to do any or all of the foregoing. It is expressly understood that "perpetual" license rights shall commence upon delivery of the Service Deliverables and shall exist in perpetuity unless otherwise terminated in accordance with the applicable provisions of the Contract.

D. Return of Materials

Upon termination of this Contract, Supplier shall immediately return to VITA or the appropriate Authorized User all copies, in whatever form, of any and all Confidential Information, Work Product and other properties provided by VITA or such Authorized User, which are in Supplier's possession, custody or control.

7. SUPPLIER PERSONNEL

A. Selection and Management of Supplier Personnel

Supplier shall take such steps as may be necessary to ensure that all Supplier personnel performing Services under this Contract are competent and knowledgeable of the contractual arrangements and the applicable SOW between Authorized User and Supplier. Supplier shall be solely responsible for the conduct of its employees, agents, and subcontractors, including all acts and omissions of such employees, agents, and subcontractors, and shall ensure that such employees and subcontractors comply with the appropriate Authorized User's site security, information security and personnel conduct rules, as well as applicable federal, state and local laws, including export regulations. Authorized User reserves the right to require the immediate removal from such Authorized User's premises of any employee, subcontractor or agent of Supplier whom such Authorized User believes has failed to comply or whose conduct or behavior is unacceptable or unprofessional or results in a security or safety breach.

B. Supplier Personnel Supervision

Supplier acknowledges that Supplier or any of its agents, contractors, or subcontractors, is and shall be the employer of Supplier personnel, and shall have sole responsibility to supervise, counsel, discipline, review, evaluate, set the pay rates of and terminate the employment of Supplier personnel.

C. Key Personnel

An SOW may designate certain of Supplier's personnel as Key Personnel or Project Managers. Supplier's obligations with respect to Key Personnel and Project Managers shall be described in the applicable SOW. Failure of Supplier to perform in accordance with such obligations may be deemed a default of this Contract or of the applicable SOW. Any key personnel changes by Supplier must be submitted in writing and approved by Authorized User.

D. Subcontractors

Supplier shall not use subcontractors to perform the Services unless specifically authorized in writing to do so by the Authorized User. If an order or SOW issued pursuant to this Contract is supported in whole or in part with federal funds, Supplier shall not subcontract any Services pursuant to such order or SOW to any subcontractor that is a party excluded from Federal Procurement and Nonprocurement Programs. In no event shall Supplier subcontract any Services to any subcontractor which is debarred by the Commonwealth of Virginia or which owes back taxes to the Commonwealth and has not made arrangements with the Commonwealth for payment of such back taxes.

8. GENERAL WARRANTY

With respect to the Services provided by Supplier, Supplier represents and warrants the following:

A. Ownership

Supplier has the right to provide the Services, including Deliverables, without violating or infringing any law, rule, regulation, copyright, patent, trade secret or other proprietary right of any third party.

B. Supplier's Viability

Supplier warrants that it has the financial capacity to perform and continue to perform its obligations under this Contract; that Supplier has no constructive or actual knowledge of an actual

or potential legal proceeding being brought against Supplier that could materially adversely affect performance of this Contract; and that entering into this Contract is not prohibited by any contract, or order by any court of competent jurisdiction.

C. Supplier's Past Experience

Supplier warrants that the Services have been successfully performed for a non-related third-party without significant problems due to the Services or Supplier.

D. Performance

- i). All Services shall be performed with care, skill and diligence, consistent with or above applicable professional standards currently recognized in its profession, and Supplier shall be responsible for the professional quality, technical accuracy, completeness and coordination of all plans, information, specifications, Deliverables and Services furnished under this Contract;
- ii). Services pursuant to a particular Request for Proposal ("RFP"), quote, or Request for Quote (RFQ), and any associated Deliverables shall be fit for the particular purposes specified by VITA in the RFP and in this Contract and, if applicable, by the Authorized User requesting such quote or issuing such RFQ, and Supplier is possessed of superior knowledge with respect to the Services and Deliverables and is aware that all Authorized Users are relying on Supplier's skill and judgment in providing the Services and Deliverables;
- iii). The documentation which Supplier is required to provide under this Contract shall be sufficient in detail and content to allow a user to understand and fully utilize the Deliverables without reference to any other materials or information.

E. Malicious Code

Supplier has used its best efforts through quality assurance procedures to ensure that there are no computer viruses or undocumented features in any of the media or means used to deliver the Services. Supplier has used the best available means to scan any media on which Deliverables are provided to the Authorized User.

F. Limited Warranty Period and Remedy

After acceptance by Authorized User, the warranty period will be for one year, or as specified in the applicable SOW. Supplier warrants that the Services shall meet or exceed the Requirements as stated in Section 5 of the RFP. Supplier shall correct, at no additional cost to any Authorized User, all errors identified during the warranty period that result in a failure of the Services to meet the Requirements. If Supplier is unable to make the Service/Deliverable conform, in all material respects, to the Requirements within ten (10) days following written notification by an Authorized User, Supplier shall, at such Authorized User's request, accept return of such Deliverable and any other related Deliverable(s) rendered unusable, and return all monies paid by such Authorized User for the non-conforming Services and Deliverable and such other related Deliverable(s) rendered unusable.

THE OBLIGATIONS OF SUPPLIER UNDER THIS GENERAL WARRANTY SECTION ARE MATERIAL. SUPPLIER MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY CONCERNING MERCHANTABILITY OR FITNESS FOR ANY OTHER PARTICULAR PURPOSE.

9. TRAINING AND DOCUMENTATION

Any training or documentation necessary for an Authorized User to have full benefit of the Service shall be deemed included in the scope of the applicable SOW unless expressly excluded.

10. ORDERS AND COMPENSATION

A. Request for Quote

Authorized Users of this Contract, depending on the complexity of services required and/or each supplier's available resources, have the option to select one or more suppliers to provide services. In addition, an Authorized User may determine that a competitive process is required to ensure it receives the best value. In either or both of such circumstances, the Authorized User may, at its sole discretion, use a Request for Quote (RFQ) process to obtain services identical or similar to those provided by Supplier pursuant to this Contract.

Supplier shall respond to the RFQ by providing a quote, including an estimated total price, and, if requested by the Authorized User, a proposal and documentation of the qualifications of the individual(s) proposed for providing services to the Authorized User. In no event shall Supplier's quote exceed Supplier's Contract pricing. Should Supplier be unable to respond to the RFQ due, for example, to resource constraints, Supplier shall notify Authorized User in writing of its inability to perform the work requested by such Authorized User, and provide the reasons for such inability to perform, prior to the due date for the submission of quotes in response to the RFQ. Supplier's repeated failure to provide a quote in response to an RFQ may be grounds for termination of this Contract.

B. Order

Supplier is required to accept any order placed by an Authorized User through the eVA electronic procurement website portal ([eVA Home Page](#)). eVA is the Commonwealth of Virginia's e-procurement system. State agencies, as defined in §2.2-2006 of the Code of Virginia, shall order through eVA. All other Authorized Users are encouraged to order through eVA, but may order through the following means:

- i). Purchase Order (PO): An official PO form issued by an Authorized User.
- ii). Any other order/payment charge or credit card process, such as AMEX, MASTERCARD, or VISA under contract for use by an Authorized User.

This ordering authority is limited to issuing orders for the Services available under this Contract. Under no circumstances shall any Authorized User have the authority to modify this Contract. An order from an Authorized User may contain additional terms and conditions; however, to the extent that the terms and conditions of the Authorized User's order are inconsistent with the terms and conditions of this Contract, the terms of this Contract shall supersede.

Notwithstanding the foregoing, Supplier shall not accept any order from an Authorized User if such order is to be funded, in whole or in part, by federal funds and if, at the time the order is placed, Supplier is not eligible to be the recipient of federal funds as may be noted on any of the Lists of Parties Excluded from Federal Procurement and Nonprocurement Programs.

ALL CONTRACTUAL OBLIGATIONS UNDER THIS CONTRACT IN CONNECTION WITH AN ORDER PLACED BY ANY AUTHORIZED USER ARE THE SOLE OBLIGATION OF SUCH AUTHORIZED USER AND NOT THE RESPONSIBILITY OF VITA UNLESS SUCH AUTHORIZED USER IS VITA.

C. Purchase Price and Price Protection

Exhibit D sets forth the fees and the appropriate Commonwealth discounts. Fees shall not increase and discounts shall not decrease for a period of not less than two (2) years from the Effective Date. No such increase shall exceed the lesser of three percent (3%) or the annual increase in the Consumer Price Index for All Urban Consumers (CPI-U), U.S. City Average, All Items, not seasonally adjusted, as published by the Bureau of Labor Statistics of the Department of Labor (<http://www.bls.gov/cpi/home.htm>), for the effective date of the increase compared with the same index one (1) year prior. Any such change in price shall be submitted in writing in accordance with the above and shall not become effective for sixty (60) days thereafter. Supplier agrees to offer price reductions to ensure compliance with the Competitive Pricing Section.

D. Invoice Procedure for Primary Product

Supplier shall submit invoices to VITA in accordance with the milestone payment schedule set forth below. Invoiced Deliverables may reflect partial completion of a Phase. Except for final Primary Product, payment will be made to Supplier by VITA within thirty (30) days of receipt of each invoice, and payment will not be subject to product review and approval by VITA. However, delivered interim product found to be unacceptable during Acceptance Testing and not corrected during the Cure Period will be credited against the next Supplier invoice, until corrected. Payment for final Primary Product shall not be made until thirty (30) days after Acceptance.

The milestone payment schedule is as follows:

Milestone	Percentage of Primary Product Price (prior to retainage)
Project planning and setup	2%
Imagery collection phase of the Contract Services. Invoices will be submitted monthly based on the percentage of area of the Commonwealth successfully collected, as evidenced by submittal of a detailed monthly data acquisition report specifying the amount of acceptable airborne data obtained and quality assured in a given month, which are certified by Supplier to be of sufficient quality and clarity to support the digital orthoimagery development for the project. The final certification and true-up will occur at the post flight meeting.	30%
Control phase. Invoices will be submitted monthly based on the percentage completion of control as evidenced by submission of the individual sub production control reports. These reports may be preliminary if adjacent network ties have not yet been performed. Final certification will be based on acceptance of the final control report.	8%
Aerial Triangulation, Invoices will be submitted based on delivery of individual aerial triangulation reports.	10%
Digital Terrain Model and Digital Orthoimage rectification phase. Invoices will be submitted monthly based on the percentage completion as evidenced by submission of digital orthoimagery tiles and accompanying Digital Terrain Model tiles. (These deliverables can be submitted and payments made in incremental stages over the term of the contract based on a negotiated delivery schedule)	30%
County Digital Orthoimagery phase. Invoices will be submitted monthly based on the percentage completion of County Digital Orthoimagery as evidenced by delivery of the individual County Digital Orthoimagery data sets of the digital orthoimagery, DTM tiles, and ancillary data, including all resolutions of digital orthoimagery involved, for an individual County or City. (The	20%

amount per tile will be based the fee per tile in accordance with Attachment B (Fees and Pricing) (These deliverables can be submitted and payments made in incremental stages over the term of the contract based on a negotiated delivery schedule.)	
Total	100%

Supplier's invoice shall show retainage of ten (10%) for Services and Deliverables. Following Acceptance of each jurisdiction Deliverables, Supplier shall submit a final invoice to VITA, for the total amount retained by VITA.

No invoice shall include any costs other than those identified in Exhibit B. Without limiting the foregoing, all shipping costs are the Supplier's responsibility except to the extent such charges are identified in Exhibit B. Invoices issued by the Supplier shall identify at a minimum:

- i. Service type and description
- ii. Quantity, charge and extended pricing for each Service item
- iii. This Contract number
- iv. Supplier's Federal Employer Identification Number (EIN)

E. Invoice Procedure for Secondary Product

Supplier shall remit each invoice to VITA upon delivery of Secondary Product to VITA. Payment to Supplier shall be due thirty (30) days after Acceptance of Secondary Product. Supplier's invoice shall include the same information as requested for Primary Product.

F. Invoice Procedures for Task Order

Supplier shall remit each invoice to the "bill to" address provided with the Task Order promptly after all Deliverables have been accepted, unless otherwise negotiated with the consent of both parties. No invoice shall include any costs other than those identified in Exhibit B or the executed Task Order referencing this Contract. Without limiting the foregoing, all shipping costs are the Supplier's responsibility except to the extent such charges are identified in Exhibit B, or as noted in any executed Task Order referencing this Contract. Invoices issued by the Supplier shall identify at a minimum:

- i. Service type and description
- ii. Quantity, charge and extended pricing for each Service item
- iii. Applicable Task Order date
- iv. This Contract number and the applicable order number
- v. Supplier's Federal Employer Identification Number (EIN)

Payment terms are net thirty (30) days from Acceptance and receipt of a valid invoice.

ALL CONTRACTUAL OBLIGATIONS UNDER THIS CONTRACT IN CONNECTION WITH AN ORDER PLACED BY ANY PUBLIC BODY (as that term is defined in §2.2-4301 of the Code of Virginia) OF ANY COUNTY, CITY OR TOWN LOCATED WITHIN THE COMMONWEALTH OF VIRGINIA ARE THE SOLE OBLIGATION OF THE COUNTY CITY OR TOWN PLACING THE ORDER AND NOT THE RESPONSIBILITY OF VITA.

G. Purchase Payment Terms

Supplier is responsible for the accuracy of its billing information. Supplier agrees not to issue invoices hereunder until Services have been performed or milestones have met Acceptance criteria. Charges for Services accepted more than ninety (90) days prior to receipt of a valid invoice may not be paid, except in accordance with a milestone payment schedule. Should

Supplier repeatedly over bill Authorized User, Authorized User may assess a one percent (1%) charge for the amount over billed for each month that such over billing continues.

If there are any disputed items, the appropriate Authorized User shall pay all undisputed charges and promptly notify Supplier in writing of any disputed amount. Supplier shall thereupon review its records, and, if it does not concur with such Authorized User, provide such Authorized User with documentation to support the charge. If such charges remain in dispute, such dispute shall be resolved in accordance with the Dispute Resolution section of this Contract. In the absence of the Supplier's written evidence identifying the merit of the disputed amounts, Authorized User may not pay the disputed amounts and may consider the matter concerning the specific identified amounts closed. All payment terms are net 30 days after Acceptance, except as specified elsewhere in this Agreement.

H. Reimbursement of Expenses

If allowable pursuant to an Authorized User's SOW, such Authorized User shall pay, or reimburse Supplier, for all reasonable and actual travel-related expenses for greater than thirty (30) miles from portal to portal incurred by Supplier during the relevant period; provided, however, that such Authorized User shall only be liable to pay for Supplier's travel-related expenses, including transportation, meals, lodging and incidental expenses, that have been authorized by such Authorized User in advance and which will be reimbursable by such Authorized User at the then-current per diem amounts as published by the Virginia Department of Accounts (http://www.doa.virginia.gov/Admin_Services/CAPP/CAPP_Topics/20335_Meals_Lodging_102007.pdf, or a successor URL(s)).

All reimbursed expenses will be billed to the Authorized User on a pass-through basis without any markup by Supplier. At Authorized User's request, Supplier shall provide copies of receipts for all travel expenses over US\$30.00.

11. REPORTING

A. Supplier's Report of Sales and Industrial Funding Adjustment

By the 10th day of every month, the Supplier shall submit the "Supplier Monthly Report of Sales". A template showing the format in which the report is to be submitted and contact information for submission is available at [VITA:Supplier / Vendor Reporting Requirements](#). The report shall be submitted via electronic mail to the VITA IFA Coordinator and shall report total sales (defined for purposes of this report as all invoiced payments received by Supplier from all Authorized Users) for this Contract during the preceding month. Supplier shall be responsible for submitting the monthly report of sales even if Supplier has had no sales (i.e., a \$0.00 total sales value) for the reporting period.

The Supplier shall submit the Industrial Funding Adjustment (IFA) payment for the period covered by such "Supplier Monthly Report of Sales" within thirty (30) days after submitting the "Supplier Monthly Report of Sales". The IFA payment is equal to two percent (2%) of total sales reported during the relevant month.

The IFA payment shall be submitted to VITA, Attention VITA Controller in the form of a check or electronic payment, made payable to the Treasurer of Virginia. The IFA payment shall reference this Contract number, "report amounts", and "report period" and shall be accompanied by a copy of the relevant "Supplier Monthly Report of Sales". Contact information for submission of IFA payments is available at [VITA:Supplier / Vendor Reporting Requirements](#).

Failure to comply with reporting, payment and distribution requirements of this section may result in default of the Contract.

B. Small Business Participation

Supplier and VITA agree to meet promptly after the Effective Date of this Contract to discuss the participation of Virginia Department of Minority Business Enterprise (DMBE)-certified Small Businesses as subcontractors and second-tier suppliers under this Contract.

Supplier and VITA agree to meet annually thereafter to review small business subcontracting reports and discuss further action with respect to small business subcontracting and spend.

In addition, by the 10th day of every month, Supplier shall submit to VITA the Small Business Subcontracting Monthly Report (template to be provided). Supplier's report should include spend on all Supplier's contracts with second-tier suppliers which provide products or services under this Contract. The report should specify the amount of such spend provided to small businesses. Supplier shall submit the report to SWaM@vita.virginia.gov.

12. COMPETITIVE PRICING

Supplier warrants and agrees that each of the charges, economic or product terms or warranties granted pursuant to this Contract are comparable to or better than the equivalent charge, economic or product term or warranty being offered to any commercial or government customer of Supplier. If Supplier enters into any arrangements with another customer of Supplier to provide Services under more favorable prices, as the prices may be indicated on Supplier's current U.S. and International price list or comparable document, then this Contract shall be deemed amended as of the date of such other arrangements to incorporate those more favorable prices, and Supplier shall immediately notify VITA of such change.

13. CONFIDENTIALITY

C. Treatment and Protection

Each Party shall (i) hold in strict confidence all Confidential Information of any other Party, (ii) use the Confidential Information solely to perform or to exercise its rights under this Contract, and (iii) not transfer, display, convey or otherwise disclose or make available all or any part of such Confidential Information to any third-party. However, an Authorized User may disclose the Confidential Information as delivered by Supplier to subcontractors, contractors or agents of such Authorized User that are bound by non-disclosure contracts with such Authorized User. Each Party shall take the same measures to protect against the disclosure or use of the Confidential Information as it takes to protect its own proprietary or confidential information (but in no event shall such measures be less than reasonable care).

D. Exclusions

The term "Confidential Information" shall not include information that is:

- i). in the public domain through no fault of the receiving Party or of any other person or entity that is similarly contractually or otherwise obligated;
- ii). obtained independently from a third-party without an obligation of confidentiality to the disclosing Party and without breach of this Contract;
- iii). developed independently by the receiving Party without reference to the Confidential Information of the other Party; or
- iv). required to be disclosed under The Virginia Freedom of Information Act (§§2.2-3700 et seq. of the Code of Virginia) or similar laws or pursuant to a court order.

E. Return or Destruction

Upon the termination or expiration of this Contract or upon the earlier request of the disclosing Authorized User, Supplier shall (i) at its own expense, (a) promptly return to the disclosing Authorized User all tangible Confidential Information (and all copies thereof except the record required by law) of the disclosing Authorized User, or (b) upon written request from the disclosing Authorized User, destroy such Confidential Information and provide the disclosing Authorized User with written certification of such destruction, and (ii) cease all further use of the Authorized User's Confidential Information, whether in tangible or intangible form.

VITA or the Authorized User shall retain and dispose of Supplier's Confidential Information in accordance with the Commonwealth of Virginia's records retention policies or, if Authorized User

is not subject to such policies, in accordance with such Authorized User's own records retention policies.

F. Confidentiality Statement

All Supplier personnel, contractors, agents, and subcontractors performing Services pursuant to this Contract shall be required to sign a confidentiality statement or non-disclosure agreement.

Any violation of such statement or agreement shall be deemed a breach of this Contract and may result in termination of the Contract or any order or SOW issued hereunder.

14. INDEMNIFICATION AND LIABILITY

A. Indemnification

Supplier agrees to indemnify, defend and hold harmless the Commonwealth, VITA, or any Authorized User, their officers, directors, agents and employees (collectively, "Commonwealth's Indemnified Parties") from and against any and all third party claims, demands, proceedings, suits and actions, including any related liabilities, obligations, losses, damages, assessments, fines, penalties (whether criminal or civil), judgments, settlements, expenses (including attorneys' and accountants' fees and disbursements) and costs (each, a "Claim" and collectively, "Claims"), incurred by, borne by or asserted against any of Commonwealth's Indemnified Parties to the extent such Claims in any way relate to, arise out of or result from: (i) any intentional or willful misconduct or negligence of any employee, agent, or subcontractor of Supplier, (ii) any act or omission of any employee, agent, or subcontractor of Supplier, (iii) breach of any representation, warranty or covenant of Supplier contained herein, (iv) any defect in the Services or Deliverables provided by Supplier, or (v) any actual or alleged infringement or misappropriation of any third party's intellectual property rights by any of the Services or Deliverables. Selection and approval of counsel and approval of any settlement shall be accomplished in accordance with all applicable laws, rules and regulations. For state agencies the applicable laws include §§ 2.2-510 and 2.2-514 of the Code of Virginia. In all cases the selection and approval of counsel and approval of any settlement shall be satisfactory to VITA or the Authorized User against whom the claim has been asserted.

In the event that a Claim is commenced against any of Commonwealth's Indemnified Parties alleging that use of any Deliverable or that the provision of Services under this Contract infringes any third party's intellectual property rights and Supplier is of the opinion that the allegations in such Claim in whole or in part are not covered by this indemnification provision, Supplier shall immediately notify VITA and the affected Authorized User(s) in writing, via certified mail, specifying to what extent Supplier believes it is obligated to defend and indemnify under the terms and conditions of this Contract. Supplier shall in such event protect the interests of the Commonwealth's Indemnified Parties and secure a continuance to permit VITA and the affected Authorized User(s) to appear and defend their interests in cooperation with Supplier as is appropriate, including any jurisdictional defenses VITA or the affected Authorized User(s) may have.

In the event of a Claim pursuant to any actual or alleged infringement or misappropriation of any third party's intellectual property rights by any of the Services or Deliverables, and in addition to all other obligations of Supplier in this Section, Supplier shall at its expense, either (a) procure for all Authorized Users the right to continue use of such infringing Services or Deliverables, or any component thereof; or (b) replace or modify such infringing Services or Deliverables, or any component thereof, with non-infringing products or services satisfactory to VITA. And in addition, Supplier shall provide any Authorized User with comparable temporary replacement deliverables and services, or reimburse VITA or any Authorized User for the reasonable costs incurred by VITA or such Authorized User in obtaining alternative products and services in the event such Authorized User cannot use the affected Deliverable or benefit from the affected Services. If Supplier cannot accomplish any of the foregoing within a reasonable time and at commercially reasonable rates, then Supplier shall accept the return of the infringing component of the Services or Deliverable, along with any other components of any products rendered unusable by

any Authorized User as a result of the infringing component, and refund the price paid to Supplier for such components.

B. Liability

Supplier shall have unlimited liability with respect to (i) any intentional or willful misconduct or negligence of any employee, agent, or subcontractor of Supplier, (ii) any act or omission of any employee, agent, or subcontractor of Supplier, (iii) claims for bodily injury, including death, and real and tangible property damage, (iv) Supplier's indemnification obligations, (v) Supplier's confidentiality obligations, and (vi) Supplier's security compliance obligations. Supplier agrees that it is fully responsible for all acts and omissions of its employees, agents, and subcontractors, including their gross negligence or willful misconduct.

FOR ALL OTHER CONTRACTUAL CLAIMS, IN NO EVENT WILL ANY PARTY BE LIABLE TO ANY OTHER PARTY FOR ANY INDIRECT, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, INCLUDING (WITHOUT LIMITATION) LOSS OF PROFIT, INCOME OR SAVINGS, EVEN IF ADVISED OF THE POSSIBILITY THEREOF, EXCEPT WHEN SUCH DAMAGES ARE CAUSED BY THE GROSS NEGLIGENCE OR WILLFUL MISCONDUCT OF THE PARTY, ITS EMPLOYEES, AGENTS OR SUBCONTRACTORS.

15. LICENSES, REGISTRATIONS, AND CERTIFICATES

A. Corporate

At all times during the data collection period of the Contract, Supplier shall maintain a current commercial aviation license. Upon VITA's request, the Supplier shall provide a current copy of its Federal Aviation Regulation Certificate, Part 91.

B. Personnel

Upon request, Supplier shall provide to VITA copies of the following with respect to the pilots performing Services under this Contract: (i) commercial pilot certificate, (ii) FAA certification, and (iii) aircraft logs.

C. Aircraft

Upon request, Supplier shall provide to VITA the following with request to such aircraft: (i) Type Certificate Data Sheet (TCDS), (ii) FAA aircraft registration, and (iii) airworthiness certificate.

16. INSURANCE

In addition to the insurance coverage required by law as specified in the URL identified in the Incorporated Contractual Provisions section of this Contract, Supplier shall carry errors and omissions insurance coverage in the amount of \$1,000,000 per occurrence.

Supplier shall maintain aviation liability insurance with a "A" rated insurance carrier covering the aircraft to be used in performing the Services with a \$10,000,000 limit liability for each event, to include coverage for passengers and third parties on the surface. The Commonwealth of Virginia must be named as an additional insured and so endorsed on the policy. Supplier shall notify VITA immediately if its insurance coverages are modified or terminated.

17. SECURITY COMPLIANCE

Supplier agrees to comply with all provisions of the then-current Commonwealth of Virginia security procedures, published by the Virginia Information Technologies Agency (VITA) and which may be found at (<http://www.vita.virginia.gov/library/default.aspx?id=537#securityPSGs>) or a successor URL(s), as are pertinent to Supplier's operation. Supplier further agrees to comply with all provisions of the relevant Authorized User's then-current security procedures as are pertinent to Supplier's operation and which have been supplied to Supplier by such Authorized User. Supplier shall also comply with all applicable federal, state and local laws and regulations. For any individual Authorized User location, security procedures may include but not be limited to: background checks, records verification, photographing, and fingerprinting of Supplier's employees or agents. Supplier may, at

any time, be required to execute and complete, for each individual Supplier employee or agent, additional forms which may include non-disclosure agreements to be signed by Supplier's employees or agents acknowledging that all Authorized User information with which such employees and agents come into contact while at the Authorized User site is confidential and proprietary. Any unauthorized release of proprietary information by the Supplier or an employee or agent of Supplier shall constitute a breach of this Contract.

Supplier shall indemnify, defend, and hold the Commonwealth, VITA, the Authorized User, their officers, directors, employees and agents harmless from and against any and all fines, penalties (whether criminal or civil), judgments, damages and assessments, including reasonable expenses suffered by, accrued against, or charged to or recoverable from the Commonwealth, VITA, the Authorized User, their officers, directors, agents or employees, on account of the failure of Supplier to perform its obligations pursuant this Section.

18. IMPORT/EXPORT

In addition to compliance by Supplier with all export laws and regulations, VITA requires that any data deemed "restricted" or "sensitive" by either federal or state authorities, must only be collected, developed, analyzed, or otherwise used or obtained by persons or entities working within the boundaries of the United States.

19. PERFORMANCE AND PAYMENT BONDS

The successful Offeror shall deliver to the VITA's Supply Chain Management Division, (or SPOC) a fully office executed Commonwealth of Virginia Standard Performance and Payment bond in the sum of the contract amount for FY09 (eastern half of the state project), with the Commonwealth of Virginia as obligee. Another Performance and Payment bond is due before work begins for FY11 (western half of the state) in the sum of the contract amount for FY11, again with the Commonwealth of Virginia as obligee. The surety shall be a surety company or companies approved by the State Corporation Commission to transact business in the Commonwealth of Virginia. No payment shall be due and payable to the contractor, even if the contract has been performed in whole or in part, until the bonds have been delivered to and approved by the purchasing office. Standard bond forms will be provided by VITA's Supply Chain Management Division prior to or at the time of award.

20. GENERAL PROVISIONS

A. Relationship Between VITA and Authorized User and Supplier

Supplier has no authority to contract for VITA or any Authorized User or in any way to bind, to commit VITA or any Authorized User to any agreement of any kind, or to assume any liabilities of any nature in the name of or on behalf of VITA or any Authorized User. Under no circumstances shall Supplier, or any of its employees, hold itself out as or be considered an agent or an employee of VITA or any Authorized User, and neither VITA nor any Authorized User shall have any duty to provide or maintain any insurance or other employee benefits on behalf of Supplier or its employees. Supplier represents and warrants that it is an independent contractor for purposes of federal, state and local employment taxes and agrees that neither VITA nor any Authorized User is responsible to collect or withhold any federal, state or local employment taxes, including, but not limited to, income tax withholding and social security contributions, for Supplier. Any and all taxes, interest or penalties, including, but not limited to, any federal, state or local withholding or employment taxes, imposed, assessed or levied as a result of this Contract shall be paid or withheld by Supplier or, if assessed against and paid by VITA or any Authorized User, shall be reimbursed by Supplier upon demand by VITA or such Authorized User.

B. Incorporated Contractual Provisions

The then-current contractual provisions at the following URL are mandatory contractual provisions, required by law or by VITA, and that are hereby incorporated by reference: <http://www.vita.virginia.gov/uploadedFiles/SCM/StatutorilyMandatedTsandCs.pdf>

The contractual claims provision §2.2-4363 of the Code of Virginia and the required eVA provisions at <http://www.vita.virginia.gov/uploadedFiles/SCM/eVATsandCs.pdf> are also incorporated by reference.

The then-current terms and conditions in documents posted to the aforementioned URLs are subject to change pursuant to action by the legislature of the Commonwealth of Virginia, change in VITA policy, or the adoption of revised eVA business requirements. If a change is made to the terms and conditions, a new effective date will be noted in the document title. Supplier is advised to check the URLs periodically.

C. Compliance with the Federal Lobbying Act

Supplier's signed certification of compliance with 31 USC 1352 (entitled "Limitation on use of appropriated funds to influence certain Federal Contracting and financial transactions") or by the regulations issued from time to time thereunder (together, the "Lobbying Act") is incorporated as Exhibit E hereto.

D. Governing Law

This Contract shall be governed by and construed in accordance with the laws of the Commonwealth of Virginia without regard to that body of law controlling choice of law. Any and all litigation shall be brought in the circuit courts of the Commonwealth of Virginia. The English language version of this Contract prevails when interpreting this Contract. The United Nations Convention on Contracts for the International Sale of Goods and all other laws and international treaties or conventions relating to the sale of goods are expressly disclaimed. UCITA shall apply to this Contract only to the extent required by §59.1-501.15 of the Code of Virginia.

E. Dispute Resolution

In accordance with §2.2-4363 of the Code of Virginia, Contractual claims, whether for money or other relief, shall be submitted in writing to the public body from whom the relief is sought no later than sixty (60) days after final payment; however, written notice of the Supplier's intention to file such claim must be given to such public body at the time of the occurrence or beginning of the work upon which the claim is based. Pendency of claims shall not delay payment of amounts agreed due in the final payment. The relevant public body shall render a final decision in writing within thirty (30) days after its receipt of the Supplier's written claim.

The Supplier may not invoke any available administrative procedure under §2.2-4365 of the Code of Virginia nor institute legal action prior to receipt of the decision of the relevant public body on the claim, unless that public body fails to render its decision within thirty (30) days. The decision of the relevant public body shall be final and conclusive unless the Supplier, within six (6) months of the date of the final decision on the claim, invokes appropriate action under §2.2-4364, Code of Virginia or the administrative procedure authorized by §2.2-4365, Code of Virginia.

Upon request from the public body from whom the relief is sought, Supplier agrees to submit any and all contractual disputes arising from this Contract to such public body's alternative dispute resolution (ADR) procedures, if any. Supplier may invoke such public body's ADR procedures at any time and concurrently with any other statutory remedies prescribed by the Code of Virginia.

In the event of any breach by a public body, Supplier's remedies shall be limited to claims for damages and Prompt Payment Act interest and, if available and warranted, equitable relief, all such claims to be processed pursuant to this Section. In no event shall Supplier's remedies include the right to terminate any license or support services hereunder.

F. Advertising and Use of Proprietary Marks

Supplier shall not use the name of VITA or any Authorized User's name or refer to VITA or any Authorized User, directly or indirectly, in any press release or formal advertisement without receiving prior written consent of VITA or such Authorized User. In no event may Supplier use a proprietary mark of VITA or an Authorized User without receiving the prior written consent of VITA or the Authorized User.

G. Notices

Any notice required or permitted to be given under this Contract shall be in writing and shall be deemed to have been sufficiently given if delivered in person, or if deposited in the US mails, postage prepaid, for mailing by registered, certified mail, or overnight courier service addressed to the addresses shown on the signature page. VITA or Supplier may change its address for notice purposes by giving the other Party notice of such change in accordance with this Section.

H. No Waiver

Any failure to enforce any terms of this Contract shall not constitute a waiver.

I. Assignment

This Contract shall be binding upon and shall inure to the benefit of the permitted successors and assigns of VITA and Supplier. Supplier may not assign, subcontract, delegate or otherwise convey this Contract, or any of its rights and obligations hereunder, to any entity without the prior written consent of VITA, and any such attempted assignment or subcontracting without consent shall be void. VITA may assign this Contract to any entity, so long as the assignee agrees in writing to be bound by the all the terms and conditions of this Contract.

If any law limits the right of VITA or Supplier to prohibit assignment or nonconsensual assignments, the effective date of the assignment shall be thirty (30) days after the Supplier gives VITA prompt written notice of the assignment, signed by authorized representatives of both the Supplier and the assignee. Any payments made prior to receipt of such notification shall not be covered by this assignment.

J. Captions

The captions are for convenience and in no way define, limit or enlarge the scope of this Contract or any of its Sections.

K. Severability

Invalidity of any term of this Contract, in whole or in part, shall not affect the validity of any other term. VITA and Supplier further agree that in the event such provision is an essential part of this Contract, they shall immediately begin negotiations for a suitable replacement provision.

L. Survival

The provisions of this Contract regarding License, Rights To Work Products, Warranty, Confidentiality, Liability and Indemnification, and the General Provisions shall survive the expiration or termination of this Contract.

M. Force Majeure

No Party shall be responsible for failure to meet its obligations under this Contract if the failure arises from causes beyond the control and without the fault or negligence of the non-performing Party. If any performance date under this Contract is postponed or extended pursuant to this section for longer than thirty (30) calendar days, VITA, by written notice given during the postponement or extension, may terminate Supplier's right to render further performance after the effective date of termination without liability for that termination, and in addition an Authorized User may terminate any order or SOW affected by such postponement or delay.

N. Remedies

The remedies set forth in this Contract are intended to be cumulative. In addition to any specific remedy, VITA and all Authorized Users reserve any and all other remedies that may be available at law or in equity.

O. Right to Audit

VITA reserves the right to audit those Supplier records that relate to the Services rendered or the amounts due Supplier for such Services under this Contract. VITA's right to audit shall be limited as follows:

- i). Three (3) years from Service performance date;
- ii). Performed at Supplier's premises, during normal business hours at mutually agreed upon times; and
- iii). Excludes access to Supplier cost information.

The Supplier shall not have the right to audit, or require to have audited, VITA or any Authorized User.

P. Offers of Employment

During the first twelve (12) months of the Contract, should Supplier hire an employee of an Authorized User who has substantially worked on any project covered by this Contract without prior written consent, the Supplier shall be billed for fifty percent (50%) of the employee's annual salary in effect at the time of termination.

Q. Contract Administration

Supplier agrees that at all times during the term of this Contract an account executive, at Supplier's senior management level, shall be assigned and available to VITA. Supplier reserves the right to change such account executive upon reasonable advance written notice to VITA.

R. Entire Contract

The following Exhibits, including all subparts thereof, are attached to this Contract and are made a part of this Contract for all purposes:

- i). Exhibit A Service Requirements
- ii). Exhibit B Statement of Work (SOW) Template
- iii). Exhibit C N/A
- iv). Exhibit D Service Fees
- v). Exhibit E Certification Regarding Lobbying
- vi). Exhibit F Clarification of Questions and Answers
- vii). Exhibit G Acceptance Criteria

This Contract, its Exhibits, and any prior non-disclosure agreement constitute the entire agreement between VITA and Supplier and supersede any and all previous representations, understandings, discussions or agreements between VITA and Supplier as to the subject matter hereof. Any and all terms and conditions contained in, incorporated into, or referenced by the Supplier's Proposal shall be deemed invalid. The provisions of the Virginia Department of General Services, Division of Purchases and Supply Vendor's Manual shall not apply to this Contract or any order or SOW issued hereunder. This Contract may only be amended by an instrument in writing signed by VITA and Supplier. In the event of a conflict, the following order of precedence shall apply: this Contract document, Exhibit F, Exhibit A, any individual SOW, Exhibit D, Exhibit G.

Any modification to an order/SOW that extends the period of performance beyond one (1) year or increases the value of such order/SOW above US\$100,000 shall, absent the prior written approval of VITA, be voidable by VITA, in its sole discretion. If an order/SOW is voided by VITA, such order/SOW shall no longer be binding on either Party and all obligations with respect to such order/SOW shall expire, except as provided for in the Termination for Convenience and Effect of Termination clauses of this Contract.

An Authorized User and Supplier may enter into an ordering agreement pursuant to this Contract. To the extent that such ordering agreement, or any order or SOW issued hereunder, include any terms and conditions inconsistent with the terms and conditions of this Contract, such terms and conditions shall be of no force and effect.

VITA and Supplier each acknowledge that it has had the opportunity to review this Contract and to obtain appropriate legal review if it so chose.

Executed as of the last date set forth below by the undersigned authorized representatives of VITA and Supplier.

Supplier

By

John R. Copple
(Signature)

Name: John R. Copple

(Print)

Title: President & CEO

Date: 12/23/2008

Address for Notice:

1935 Jamboree Drive, Suite 100

Colorado Springs, Colorado 80920-5358

Attention: Vice President, Corporate
Contracts

VITA

By

James T. Roberts
(Signature)

Name: JAMES T. Roberts

(Print)

Title: Director Finance & Administration

Date: 12/23/2008

Address for Notice:

11751 Meadowville Lane

Chester, Virginia 23836

Attention: Contract Administrator

EXHIBIT A

SERVICE REQUIREMENTS

Section 3 Detailed Description of Proposed Solution

Sanborn Quality Policy

“Sanborn’s commitment is to consistently provide the highest value to our customers with quality products, information, and services.”
– John R. Copple, Sanborn CEO

With a rich tradition of mapping dating back to 1866, Sanborn offers end-to-end geospatial solutions backed by the latest in technology and superior customer support. Sanborn is uniquely positioned to offer local presence, extensive resources, quick responses, and exceptional value. For more than a century, we have been a leader in the rapidly growing geospatial industry. Partnering with Sanborn provides VGIN the following benefits in furthering the mission and vision of Virginia Information Technology Agency (VITA):

- ◆ Fulfill VGIN’s charge of maintaining the statewide orthophotography base map, which is essential to the success of VITA’s Integrated Services Program, and is critical to support public safety.
- ◆ Support coordination of statewide GIS at all levels of government by hosting seminars throughout the Commonwealth to inform, educate and encourage participation in the 2009-2012 VBMP update project.
- ◆ Develop enterprise geospatial service for the Commonwealth by producing multiple, consistent, high-quality datasets that go beyond just photogrammetry.

Scope of Work

Sanborn will meet the specifications as required by RFP 2009-03 Section 5. This section presents our strategy and approach specifically designed to achieve the best quality digital orthoimagery and optional products for the Virginia Base Mapping Program (VBMP), and to provide the capability to support additional (post project) data development by Sanborn or third-party suppliers. Sanborn understands the program focus is product quality and not the processing method. Therefore, the objective of our technical response is to provide straight-forward, concise production descriptions of our innovative project solution in order for VGIN to gain a comprehensive view of how Sanborn intends to leverage our successful statewide project experience to produce high-quality products to VGIN’s satisfaction.

Sanborn understands VGIN is taking a multi-year approach with the VBMP update project. The Commonwealth is divided into two collection phases: the Eastern half for Spring 2009 and the Western half for Spring 2011 with a 1,000’ buffer to the state boundary. VGIN will select products from two primary options: (1) 1-foot resolution statewide orthoimagery with an option to update to 6-inch resolution tiles, (2) 2-foot resolution statewide orthoimagery with an option to upgrade to 1-foot resolution tiles and/or 6-inch resolution tiles. VGIN expects delivery of the 40,000 to 43,000 square-mile project and acceptance of all final products within six months of successful acquisition. Sanborn also understands the need for flexibility in order to allow individual jurisdictions the ability to fly out of sequence, or even in off years.

Sanborn analyzed the best approach for acquisition and control to support the 2009-2012 VBMP update and determined that local experience, added extra capacity, and use of Sanborn’s GeoServe Online QA tool to facilitate data deliveries are needed to assure minimal risk and improved schedule. Sanborn is partnered with Geometrics GPS, of Fredericksburg, Virginia to provide all necessary survey activities throughout the Commonwealth, and with 3001 Inc. in Fairfax, Virginia to provide additional digital cameras and turbine aircraft, as well as three other flying partners to support the project. Sanborn’s GeoServe Online QA tool facilitates web-based quality checking of the orthoimagery products as they are being processed. This streamlined process expedites project delivery with the highest quality possible, shortening the review-edit-correction cycle. This tool can be used by VGIN staff, a third-party QC company, or both.

Our approach outlines the steps of digital imagery acquisition, ground control collection, aerial triangulation, digital elevation and terrain modeling, contour development, structure capture, and the digital orthoimagery rectification processes. Sanborn has proposed using the very latest in distribution production technology with custom mosaicking and color balancing to provide the highest quality product. In the information below, each upgrade option is discussed.

As a company with ISO 9001:2000-certified quality control procedures, Sanborn will ensure that products provided to VGIN will adhere to high quality and accuracy standards, including FGDC, ASPRS, NSSDA, Virginia Map Accuracy Standards 1996 and OGC. Each step within the production process includes details regarding Sanborn's robust quality assurance/quality control program. All digital orthoimagery will conform to the Model Virginia Map Accuracy Standards (1992).

Sanborn has leveraged the best practices of the 2006/2007 Virginia Base Mapping Program experience to ensure our project approach exceeds VGIN's expectations for product accuracy, imagery specifications, and an aggressive delivery timeline. We have the capability and capacity to perform all services identified within the scope of work, while maintaining our ability to meet the aggressive schedule. Most importantly, VGIN's partnership with Sanborn will provide the Commonwealth of Virginia and its partners with a total geospatial solution.

Aerial Image Collection Requirements (RFP 5.1)

Sanborn will meet the specifications as required by RFP 2009-03 Section 5.1.

a. Imagery Type

Sanborn recognizes one of the most critical phases of this project is the acquisition of high-resolution digital aerial photography that provides the requested 4-band imagery type of true color (24 bit), and near infrared. Therefore, we have selected the Z/I Imaging Digital Mapping Camera (DMC) for collecting imagery in the 2009-2012 VBMP.

Sanborn owns and operates a total of four (4) aircraft fitted with DMCs. In addition, we are partnering with four (4) additional flying vendors with the following DMC resources: 3001 – 3, Richard Crouse & Associates – 1, ASI – 1, and The Atlantic Group – 1. We have worked on many successful projects with all four companies.

Overall, the Sanborn team offers 10 cameras and planes to this project, and we will commit five cameras in-state to execute the program, with an additional five cameras in reserve in the event of a camera system failure during the flight season. We have the ability to direct all resources and establish acquisition priorities because our strategic partners have made VBMP a priority project by dedicating aircraft and sensors to Sanborn for this initiative.

Our aerial team provides the following benefits to VGIN:

- ◆ Extensive aircraft and camera resources to ensure collection within the windows of opportunity.
- ◆ High-performance aircraft.
- ◆ Prior acquisition experience throughout the Commonwealth of Virginia.
- ◆ Local knowledge of weather patterns, restricted areas, ATC personnel, terrain conditions, and post-9/11 restrictions over sensitive areas.
- ◆ Extra capacity to support on-schedule collection in the event of any unforeseen circumstances.

Z/I Imaging DMC System

The DMC frame-based camera is the latest in digital imaging technology, has a proven aerial mapping track record, and has been in use for more than three years. The DMC is the camera of choice for state departments of transportation. The New York DOT and Pennsylvania DOT have both performed independent assessments of the DMC camera. Their findings included accuracy better than negative film, single A9 solution for all 4-color bands, better edge definition, faster processing and improved orthoimages (the ability to zoom into 4:1). The most significant finding was the improved horizontal accuracy that came from the Pennsylvania DOT test. Sanborn has successfully completed major acquisition projects with these cameras, including, the Commonwealth of Virginia for

NAIP 2008. The DMCs have factory calibration reports, which can be provided upon request, and Intergraph sensor production facility and processes have been certified by the USGS.

DMC Specifications	
4 high-resolution 7K x 4K Panchromatic camera:	Final output image is 7,680 x 13,824 pixels
Spectral sensitivity:	Blue: 400-580 nm Green: 500-650 nm Red: 590-675 nm Near infrared: 675-850 nm
Final output image pan-sharpened RGB or CIR:	7,680 x13,824 pixels
Lens system:	4: x f = 25mm/f: 4.0 Shutters and f-stop: continuously variable 1/50 – 1/300 sec f/4-f/22
On-board storage capacity FDS:	1.7 TB (>4,400images)
Maximum frame rate:	2 sec/image
Radiometric resolution:	12 bit (all cameras)
Operation envelope:	up to 26,000 feet (non-pressurized aircraft)
Imagery Type	True Color (24 bit) and Near-Infrared

The DMC digital collection presents significant advantages over film collection, including:

- ◆ A higher quality product free of scratches, lint, and other artifacts
- ◆ Ability to acquire black and white, color, and CIR imagery within a single pass
- ◆ Faster delivery of images as less risk compared to film processing and scanning



- ◆ Additional datasets can be produced using semi automated remote sensing techniques, at relatively little extra cost. Example datasets include CIR images (above), land cover, impervious surfaces, forestry, and wetlands.
- ◆ 12-bit color provides vastly superior image quality to film. It allows for increased accuracy throughout the AT and compilation processes and will result in improved color balancing to produce a higher quality product. Additional detail will be visible in the imagery, including details in shadow areas.

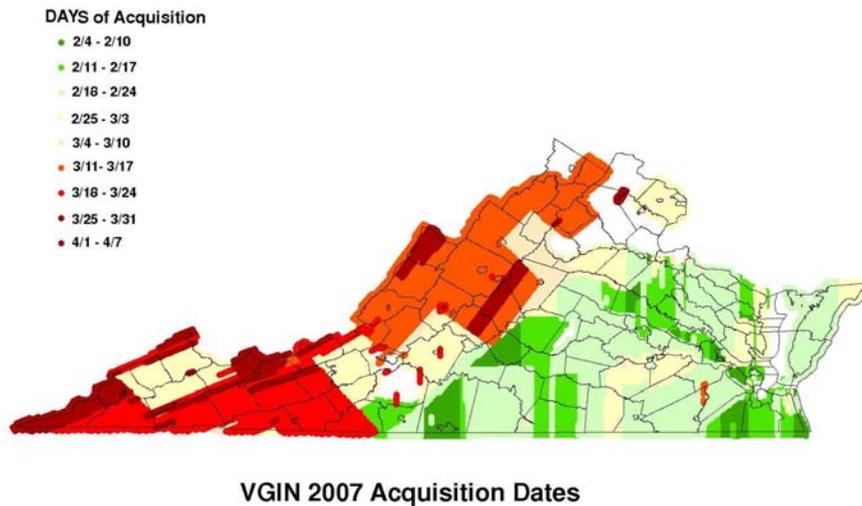
The DMC camera also presents advantages over other digital cameras.

- ◆ The DMC imagery is “frame-based”, similar to film photography. In comparison, the Leica ADS-40 is “push-broom based”, and therefore completely reliant on the GPS/IMU technology. If there is an AGPS/IMU failure, the ADS-40 imagery is unusable. In the case of the DMC, normal photogrammetric solutions can be applied to keep the photography usable in the event of a GPS/IMU malfunction.

- ◆ The DMC realized sensor size of 7680 x 13,824 pixels is one of the larger frame-based sensors. A larger sensor size reduces the amount of flying and processing time to complete the project.
- ◆ Reliable positional accuracy even with GPS/IMU dropouts.
- ◆ Engineering grade accuracy-true ASPRS Class 1 six inch or better.
- ◆ Co-registered four-band multi-spectral imagery.

b. Temporal Requirements

From previous VBMP experience, seasonal and geographic-specific weather history, sun angle, and collection efficiencies, Sanborn determined the number of aircraft required to meet the acquisition schedule requirements. Based on experience, Sanborn compared the specific acquisition dates for each half of the Commonwealth project areas from 2006/2007 to the requested spring flying window (see graphic below).



Typically in Virginia, the early leaf-out begins the last week of March and leaf-out completes by the end of April. Major schedule constraints include snow coverage driving early collection and earliest leaf-on driving latest planned collection. The majority of the 2007 project geography that is coincident with the 2009 Eastern half was collected from February 4 to March 3.

For the 2009 Eastern half, Sanborn anticipates acquisition will progress in the same pattern from the southeast corner of the Commonwealth to the northwest corner given the foliage type, weather patterns, and latitude. Sanborn’s acquisition plan insures sufficient aircraft resources are dedicated and onsite in the project area no later than February 1, and these aircraft will remain committed to the project throughout this critical time period. Sanborn has determined it will take four to five cameras to complete the 2009 collection, depending on which option is selected. Sanborn plans to complete acquisition by March 15 for 2009. If there are significant upgrade areas, the number of aircraft will increase which is why Sanborn has five digital cameras and planes in reserve on our acquisition team. We also recognize the need to fly Assateague and Chincoteague by mid-February.

2009 Acquisition	
Option 1	
1-foot resolution statewide	Sanborn requires four (4) aircraft to complete.
Anticipated 6-inch upgrade option	Sanborn requires one (1) aircraft to complete.
Option 2	
2-foot resolution statewide	Sanborn requires two (2) aircraft to complete.
Anticipated 1-foot upgrade option	Sanborn requires 0.5 aircraft to complete.
Anticipated 6-inch upgrade option	Sanborn requires one (1) aircraft to complete.

The key difference between the 2009 Eastern half acquisition and the 2011 Western half acquisition are the dates when the snow cover has melted from the ground and the timing of the leaf-on conditions. Typically in the flat lands, the snow melts quickly across the entire area with a trend from the South to the North. In the western highlands, snow cover and leaf-on conditions are more dependent on ground elevation. In 2011, Sanborn will work from the South to the North, but even more predominantly, collection will start in the lower elevations and work to the higher elevations. The actual flight window also shifts a month later, which allows for longer daily flight times, but the clouds tend to be more persistent over the mountains which reduce the acquisition days available in the flight season. For the 2011 Western half, Sanborn has determined it will take four (4) total cameras to complete the collection based on planned exposure counts. Sanborn plans to complete acquisition no later than April 10 for 2011. If there are significant upgrade areas, the number of aircraft will increase, which is why Sanborn has five (5) digital cameras and planes in reserve on our acquisition team.

Aerial Photography Details		
Acquisition Area	2009 – Eastern half	2011 – Western half
Time Frame	Spring: February – March	
Ground Condition	Snow free, leaf off, no clouds, cloud shadows, or other ground obscuring condition	
AGPS/INS	Novatel GL4 and Applanix POS INS	
Base Stations	Minimum of one base station occupied	
Sun Angle	Sun angle is 30 degrees or greater	
Time of Day	Between 10:00 a.m. and 3:00 p.m.	
End Overlap	60 percent	
Side Overlap	30 percent	
Pixel resolution	2-foot pixel resolution 1-foot pixel resolution 6-inch pixel resolution	

c. Image Quality and Tile Size by Resolution/Scale

Initial Imagery Post-Processing

Once the images are acquired and the photo flight is complete, the imagery and actual mission parameters are downloaded from the on-board file disk storage (FDS). The DMC post-processing system outputs images from the raw image data that is stored on the FDS. Imagery is initially reviewed “onsite” to insure complete collection. The FDS Viewer software is used to preview actual post-flight image data, particularly for multi-day missions unable to return to home base. Post-processing is completed in two steps: radiometric processing and geometric processing. Through the DMC post-processing software interface, the user enters parameters that specify the processing step options. First, the raw image data from the FDS is radiometrically processed to compensate for the effects of vignetting, aperture, and other radiometric factors. The intermediate images, generated from radiometric processing, are written to RAID storage. Once this step is complete, the FDS may be removed and returned to the camera. The intermediate images are then geometrically corrected for lens distortion and tilt, and combined by a mosaicking module. The post-processing software can produce several different types of output files from the set of raw images stored on the FDS.



Aerial Imagery QA/QC

Aerial imagery forms the basis of all photogrammetric mapping. Sanborn takes every step to verify that weather conditions, flight planning, precision aerial cameras, and image processing all work together to ensure the acquisition of high quality, error-free imagery. Sanborn has the latest GPS technology and weather radar systems in all aircraft. Sanborn also subscribes to multiple weather and aircraft monitoring sites to insure the latest information is used. Sanborn uses the following procedures to review the processed aerial imagery:

- ◆ The imagery will be reviewed for density, contrast, hot spots, clarity, shadow and highlight detail, and overall quality.
- ◆ Each line of imagery will be checked for:
 - ❖ Adherence to the flight plan—the editor will review the imagery to ensure that the specified flight plan has been successfully executed.
 - ❖ GSD—the editor will confirm that the specified GSD has been achieved.
 - ❖ Tilt—the average tilt over the entire project area will not exceed 1 degree. Tilt problems are rare. They normally occur when the camera begins shooting before the pilot has completed a turn for the next line or if the camera continues shooting after the completion of a line. The tilt will be less than 3 degrees for any single exposure, less than 4 degrees between any two consecutive exposures (relative tilt), and less than 1 degree overall average.
 - ❖ Forward overlap—the forward overlap will be examined to ensure that it falls in the appropriate range for each scale of photography.
 - ❖ Side overlap—the side overlap will be examined to ensure that it falls in the correct percent range.
 - ❖ Anomalies—any other anomalies that could affect the final product will be examined, such as exposures settings, pixel drop-out, etc.

Reflights

Any imagery that does not meet the VBMP project specifications will be corrected at no cost to VGIN. All re-flights must meet the accepted specifications and flight plans. Sanborn will use the same camera/sensors for all re-flights under the similar or the same environmental conditions.

Daily Status Reporting

For all projects, we require flight crews to submit a daily status report by fax or email to our office immediately after that day's operations. The report states what occurred during the day. If the crew didn't fly, they report why. If they did fly, they report what was flown, the weather and ground conditions, the expected image quality, and they also include the unprocessed AGPS/IMU data. In both cases, they also provide a prediction for the following day's operations. After receiving the reports from the field, the Sanborn office will compile the results into one daily status report to send to VGIN.

On the following day, the office does a preliminary, quick processing of the AGPS/IMU data to ensure it is complete. The processed photo centers are then converted into an ArcGIS shapefile and a Google .kml file with appropriate attributes. This file will then be forwarded to VGIN in order to provide a status map of the acquisition progress within the project area.

In the past, this simple reporting system has proven highly effective. It is simple enough to not burden the flight crews, robust enough to handle field contingencies, and effective enough to communicate the essential details to any customer.

Tile Size with Resolution and Scale

Sanborn understands VGIN will tile the VBMP products using the previously established grid system.

Resolution of Final Digital Orthoimage	Target Map Scale	Digital Ortho Tile Size
2 foot GSD	1:4,800 (1"=400')	10,000'x10,000'
1 foot GSD	1:2,400 (1"=200')	5,000'x5,000'
6 inch GSD	1:1,200 (1"=100')	2,500'x2,500'

d. Extent and Distribution of Imagery Resolution

Sanborn understands the upgraded tile percentages listed do not indicate a guarantee of a minimum upgrade percentage. Participation by local jurisdictions and other entities in the upgrade process increased in the 2006/2007 project, and the trend is expected to continue for the 2009-2012 project. For planning purposes, we have included a representative project plan for a 6-inch upgrade area using Fairfax County as our example. The flight plan, control plan, DAT block layout, and base station layout is included in Section 4 Appendix. This representative plan illustrates Sanborn's project approach for handling upgraded areas. Our production quality system automatically prevents "no data" areas through the selection of multiple overlapped images.

Sanborn's pricing submittal is calculated using VGIN's estimate of tiles per image resolution as shown below.

Option 1: Resolution – One Foot Statewide	Extent in # of tiles
1 foot resolution – 5,000' x 5,000' tiles	43,417 (90% of area)
Six inch resolution – 2,500' x 2,500' tiles (upgrade option)	19,300 (10% of area)

Option 2: Resolution – Two Foot Statewide	Extent in # of tiles
2 foot resolution – 10,000' x 10,000' tiles	8,510 (65% of area)
1 foot resolution – 5,000' x 5,000' tiles (upgrade option)	15,712 (30% of area)
Six inch resolution – 2,500' x 2,500' tiles (upgrade option)	10,480 (5% area)

Sanborn uses the very latest flight planning software to ensure the imagery is collected to the overlap and resolution specification. Shapefiles will be provided to VGIN.

e. Orientation and Units

All imagery produced for VBMP will be referenced to the NAD 83 horizontal datum and NAVD 88 vertical datum with the latest published NGS Geoid model used in derivation of orthometric heights. Imagery shall be oriented to the Virginia State Plane North and South zones using U.S. Survey Feet.

f. Pin-Point Aerial Photography Blocks

Design of a suitable acquisition plan for large-scale projects begins with defining resource requirements and assuring sufficient capacity availability to complete the acquisition within the required timeframe. Sanborn designed each flight block based upon 60 mile flight line lengths in order to minimize IMU drift. In the 2009 Eastern half acquisition, four (4) primary flight blocks will cover the 1-foot product, and four (4) primary flight blocks will cover the 2-foot product. The table below shows the number of exposures required for each orthoimagery product option and aircraft commitment. These totals include exposures from the primary flight lines and cross strips.

Option	Description	Exposure Count		Aircraft Commitment	
		2009	2011	2009	2011
1	1-foot resolution statewide	28,050	26,943	4	3
1-upgrade*	6-inch ortho upgrade	2,469	2,469	1	1
2	2-foot resolution statewide	7,588	7,041	2	2
2-upgrade*	1-foot ortho upgrade	17,598	17,598	0.5	0.5
2-upgrade*	6-inch ortho upgrade	2,469	2,469	1	1

*All upgrade options have exposure counts based on percentages of area presented in RFP Section 5.1 (d) and Sanborn's 6-in. representative sample.

Turbine aircraft will be assigned to the 2-foot resolution product areas. At any given time, each aircraft will be assigned three different areas within the acquisition blocks in order to maximize opportunity for collection throughout the project area and at various altitudes. The central base of operations for all acquisition field activities will be Richmond, Virginia. Local flyers like Richard Crouse will use their home base, in Frederick, Maryland. As we fly out of different areas of the state, we will forward deploy to airfields in the acquisition region. Probable secondary bases include: Southeast – Norfolk and Williamsburg, East – Accomack, North – Manassas, West – Charlottesville, Danville, and Lynchburg, South – Durham/Raleigh.

For 2009, there are six areas which have flight restrictions that may impact collection. Most areas will be accessible if we have a letter from the Commonwealth and schedule time in the area well in advance of the intended acquisition date. The largest and most difficult area is around the Washington D.C. border. This section encompasses Federal flight restrictions, and other restrictions due to airports, including Dulles and Reagan National. However, having experience in operating flight crews in this region and having recently acquired imagery over Washington D.C., we are confident access will be granted. For the 2011 collect, there are no areas with flight restrictions that are currently identifiable. For both collection years, Sanborn will prioritize aircraft to capture low-altitude upgrade areas for 6-inch orthos and jurisdictions that select priority processing and delivery. Sanborn's flight plans and control plans have been included in Section 4 Appendix. Any imagery that does not meet the VBMP project specifications will be corrected at no cost to VGIN. All re-flights will meet the accepted specifications and flight plans. Sanborn will use the same camera/sensors for all re-flights under similar or the same environmental conditions.

g. Alternate Sensor Considerations

Sanborn's DMC camera is a proven sensor solution that will meet the final and intermediate deliverable performance criteria for the required products as specified in the RFP. Sanborn will not employ an alternate sensor.

h. Restricted Areas

Sanborn is familiar with mapping restricted and sensitive sites for the Commonwealth. All production work performed on the restricted areas will be completed within the borders of the United States.

i. Spatial Data

Sanborn currently has all existing VBMP 2006/2007 data on archive. The spatial data layers for 2009-2012 VBMP were reviewed to provide input into this bid submission. Sanborn will incorporate and utilize any new information provided.

j. Digital Orthoimagery

Sanborn will meet the specifications as required in RFP 2009-03 Section 5.1(j). Sanborn's creative solution for delivering intermediate products in a compressed timeframe will appeal to many jurisdictions that have a need to utilize the data in late summer. Sanborn proposes to deliver compressed geo-referenced countywide mosaics within 60 days from the final date of acquisition. This intermediate product will meet ASPRS Class 2 accuracy standards, and will be mosaicked and clipped into the VGIN tiling system. As the product is "intermediate", seam lines and color balancing will be more generalized than in the final product. Tiles will be aligned with the Virginia State Plane

Coordinate System grid, using their respective North or South zone depending on the count in the area of coverage by each orthoimage.

a. Tile Configuration	2-foot resolution 10,000'x10,000' 1-foot resolution 5,000'x5,000' 6-inch resolution 2,500'x2,500'
b. Content	Neat line to tile grid.
c. Orientation	To Existing VBMP Ortho Grid from 2006/07 (Virginia State Plane Grid North and South).
d. Format	Sanborn will deliver each final orthoimage tile in GeoTIFF file format and a MrSID or JPG2000 compressed format. The exact compression parameters will be finalized in consultation between VGIN and Sanborn. Sanborn understands the jurisdiction delivery requirements and will provide all deliverables as stated in the RFP. We will provide the jurisdiction data in packets that are labeled on a county basis and will be formatted and ship to facilitate ease in distribution.

Project Ground Control and Orientation (RFP 5.2)

Sanborn will meet the specifications as required by RFP 2009-03 Section 5.2.

Sanborn has engaged the services of Geometrics GPS, of Fredericksburg, Virginia which will perform all necessary survey activities on the 2009-2012 VBMP update project. Geometrics GPS was selected due to their outstanding work on the 2006/2007 VBMP project.

a. Project Ground Control

Strategically placed ground control points will be necessary to support the aerial triangulation process. Sanborn's project design leverages VGIN's ground control investment from the 2006/2007 VBMP. Details regarding the 2006/2007 VBMP Statewide Network Survey are located in Section 4 Appendix. There are more than 2,000 surveyed ground control points that were established and utilized in the 2006/2007 program. Sanborn will use as many of these points as necessary to complete the digital aerial triangulation solution (DAT) to the specifications required. It is not anticipated any new control will need to be established for the program, even in the event a point has been destroyed or is unrecoverable. The existing ground control points are either photo-identifiable or recoverable using the associated field descriptions. Paneling will only be required on existing points that will be used for horizontal checks within the DAT blocks. Any new ground control that may be required will be established in accordance with specifications as required by RFP 2009-03 Section 5.2 (a) and (b). Sanborn's control plan and DAT block layout has been included in Section 4 Appendix.

Sanborn will use a combination of conventional ground control augmented by airborne GPS (AGPS)/IMU data in the aerial triangulation (AT) adjustment. The accuracy achievable utilizing the DMC sensor equipped with AGPS/IMU, and the substantial amount of existing ground control, provides the redundancy required to meet and potentially exceed the accuracy specifications for the DAT solution.

The only true measure of accuracy is to use independent checkpoints (specifically, points withheld from the AT and used as checks after adjustment). To meet statistical criteria (via a sufficiently large sample), Sanborn will withhold a minimum of 25% of the control points to be used as checkpoints to verify the quality of the DAT adjustment. A final DAT adjustment will then be made using all the independent checkpoints as control for the best possible coordinates for subsequent mapping.

b. Ground Control Requirements

The existing VGIN ground control survey will be utilized for the 2009 and 2011 acquisitions. Based upon the knowledge and experience Sanborn has with the VGIN source data, we know that the ground survey meets the accuracy requirements for the program. All GPS control established for use in the project has been secured in accordance with the National Geodetic Survey (NGS) standards, and all coordinates and data are of acceptable quality meeting First Order precision. The horizontal control adjustment is in NAD 83/93 (HARN) reference datum.

The vertical control will meet at a minimum the third order vertical accuracy specifications. The vertical control is in NAVD 88 reference datum maintained by the NGS in U.S. Survey Feet.

Sanborn's survey partner, Geometrics GPS, will perform the paneling of strategically selected existing ground control. All surveying activities will be overseen by Mr. Douglas A. Richmond, Land Surveyor, licensed to practice land surveying in the Commonwealth, VA License #1718. Targets will consist of suitable plastic material laid out in a "V" or "X" shape. The legs of the target are of suitable length and width so as to be easily identified from the photography. For the 2-foot imagery, the panels will be at least 18" wide and 9' long; for the 1-foot imagery the panels will be at least 12" wide and 6' long and for six-inch, the panels will be at least 9" wide and 4' long. Similar to the previous VBMP, Sanborn will offer Virginia universities, Old Dominion, Virginia Tech, and George Mason, the opportunity to have geography students assist with target removal. In the previous program Virginia Tech students enjoyed this opportunity. All plastic targets will be removed immediately following the successful completion of all photography, and no later than June 1.

Ground Survey QA/QC

The objective of the ground control survey is to provide an accurate horizontal and vertical (3-D) coordinate system to reference the photography and mapping to that system. All field control is supplemented using airborne GPS for both horizontal and vertical control. The control survey will be characterized by extensive quality control mechanisms, including:

- ◆ Dual-instrument height measurements using different units of measure
- ◆ Use of redundant, quasi-independent GPS baseline in all loops and loop misclosures
- ◆ Least squares adjustments and statistical evaluations
- ◆ Double-run or closed-loop leveling lines
- ◆ Use of multiple, well-distributed existing horizontal and vertical control points as the basis for the new network(s)
- ◆ Independent review and checking of all computations

Quality assurance is provided by full reporting of all results and the inclusion of all computations, field logs, and solution printouts.

c. Airborne GPS

Based upon the technology Sanborn employs, (POSPac Air v5), base station distances are not limited to 55km baselines. During the flight missions, multiple (up to 15) National Geodetic Survey Continually Operating Reference Stations (NGS CORS) will be logging 1-second data 55 to 200 kilometers from an acquisition area. At a minimum, one (1) reference ground station and potentially up to seven (7) reference ground stations will be within a DAT block, although this is not required to achieve 10cm RMSE accuracy on the photo centers within the block because of the sophistication of the POSPac Air v5 processing technology. These baselines will then be processed simultaneously and combined for a given flight mission using POSPac Air v5. The forward and reverse solutions for each base station-airplane baseline will be processed, analyzed, and then re-processed if necessary to obtain the best solution. The multiple baselines will then be combined and analyzed to ensure the best possible solution for GPS coordinates at the exposure. Once a final solution is achieved, the final photo centers will be exported horizontally on the NAD 83 horizontal datum, in Virginia State Plane North and South Zones, and orthometric heights will be exported on the NAVD 88 vertical datum, using the NGS Geoid 2003 model. The expected RMSE for the final exposure centers will be 10cm or better.

Airborne GPS QA/QC

In addition to using dual frequency GPS receivers collecting P-code pseudo range and L1/L2 carrier signals at a sampling rate of 1 per second, Sanborn will perform a number of checks prior to the actual AGPS photography missions. Sanborn will check the AGPS system installation. This involves:

- ◆ Checking the GPS antenna location on the aircraft

- ◆ Checking the GPS receiver to aerial camera connections
- ◆ Re-measuring the offset vector from the antenna to the camera front lens node

Sanborn rigorously checks the quality of the processed airborne GPS and INS data before implementing it into the bundle block adjustment. Within POSPac Air v5 the kinematic data is processed simultaneously from a selection of all available ground stations within a 200km distance of the camera and airplane during acquisition. The results of the solution are graphed and analyzed in order to validate the 10cm accuracy has been achieved. This procedure verifies the integrity of the base station coordinates and elevations. Each processing session is computed in forward and reverse temporal directions. The comparison of these solutions provides insight into the quality of the kinematic ambiguity resolution. Sanborn also insures at least one of the GPS station is in the DAT block area.

Processing (RFP 5.3)

Sanborn will meet the specifications as required by RFP 2009-03 Section 5.3.

a. Analytical Aerial Triangulation

Before compilation and orthoimagery production commence, Sanborn will complete the fully digital aerial triangulation (DAT) in a completely digital environment. The DAT solution will form the basis for the accuracy of all products to be derived for VBMP. Each DAT block is designed to include approximately 5,000 exposures and will utilize the post processed AGPS/IMU data for each exposure and 50-100 ground control points. This block design ensures efficiency of data processing and management.

Sanborn will use Z/I Imaging Image Station Automatic Triangulation (ISAT) software. This software has a proven track record on projects of similar magnitude and scope, including photo scale and accuracy requirements. The graphical display of the adjustment statistics is a valuable aid for quality control purposes. Sanborn will automatically measure up to seven (7) or more tie points and pass points in each of the standard Von Gruber locations. The automation of manual point observation within the AT process introduces cost-effectiveness when adjusting large contiguous blocks. Verification of results and measuring of ground control and checkpoints will be performed using the ISAT module. Photo-T will be used to finalize the DAT adjustment for both the control and checkpoint solutions.

The tables below show the results that Sanborn anticipates for the DAT solutions. The resulting accuracy of the final bundle block adjustments will meet the following criteria:

- ◆ The RMSE of all control point residuals (X, Y, or Z) in the final block adjustment shall not exceed 1 part in 10,000 of the flying height (AMT).
- ◆ The algebraic sum of all checkpoint discrepancies (X, Y or Z) shall not exceed 1:20,000 of the flying height (AMT). This criterion accommodates systematic effects that are not represented by RMSE statistics.

Expected DAT Accuracy for 1' DAT Blocks	
RMSE (control points—X, Y, or Z)	0.65'
RMSE (checkpoints—X or Y)	1.10'
RMSE (checkpoints—Z)	1.20'

Expected DAT Accuracy for 2' DAT Blocks	
RMSE (control points—X, Y, or Z— 1:10,000 of the flying height (AMT))	1.30'
RMSE (checkpoints—X or Y)	2.20'
RMSE (checkpoints—Z)	2.40'

Digital Aerial Triangulation QA/QC

The quality of the DAT solution is proven by the low values of the error residuals in the least squares adjustment. Very low values in the residuals indicate that the ground control is free of survey errors because it fits the photogrammetric measurements. As a final quality control measure and, ultimately, the best verification of the DAT, a selected number of checkpoints are used and adjusted in the solution as ordinary pass points. The checkpoints are actually field control points with their known values withheld during the solution and then compared with adjusted values determined by the adjustment program.

The following quality control steps will be performed to ensure the highest quality adjustment. Quality assurance is guaranteed via full documentation of all procedures and results:

- ◆ Use and evaluation of independent checkpoints.
- ◆ Intermediate triangulation results will be thoroughly reviewed by the lead technician and aerial triangulation department supervisor.
- ◆ Final triangulation results will be reviewed thoroughly by a certified photogrammetrist (CP).
- ◆ The complete documentation of the quality control procedures and results are presented in the Final DAT Report to provide the requisite quality assurance.

DAT Report

Upon completion of all AT adjustments, Sanborn will submit a Final DAT Report. This fully-indexed bound report will be signed by Mr. Doug Zehr, an ASPRS-Certified Photogrammetrist. It will provide a narrative description of all aspects of the DAT phase, tabular information for ground control and checkpoint results, and appendices including full DAT solution printouts where appropriate. The Final DAT Report will include the following information and data:

- ◆ An executive summary of the digital aerial triangulation (DAT) and its results
- ◆ A narrative description of all aspects of the DAT and DAT bundle block adjustments
- ◆ A basic description of the project including ground control, flight planning, aerial photography, and the airborne GPS observations and results
- ◆ Equipment and software details
- ◆ A description of the DAT procedures and results
- ◆ Results of the preliminary checkpoint adjustment, the constrained bundle block adjustment, and the formal classification of the DAT in terms of its accuracy
- ◆ Final coordinate listings
- ◆ Mapping accuracy that can be achieved with the photography and control
- ◆ Digital copies of all aerial triangulation block adjustments

b. Radiometric and Geometric Quality

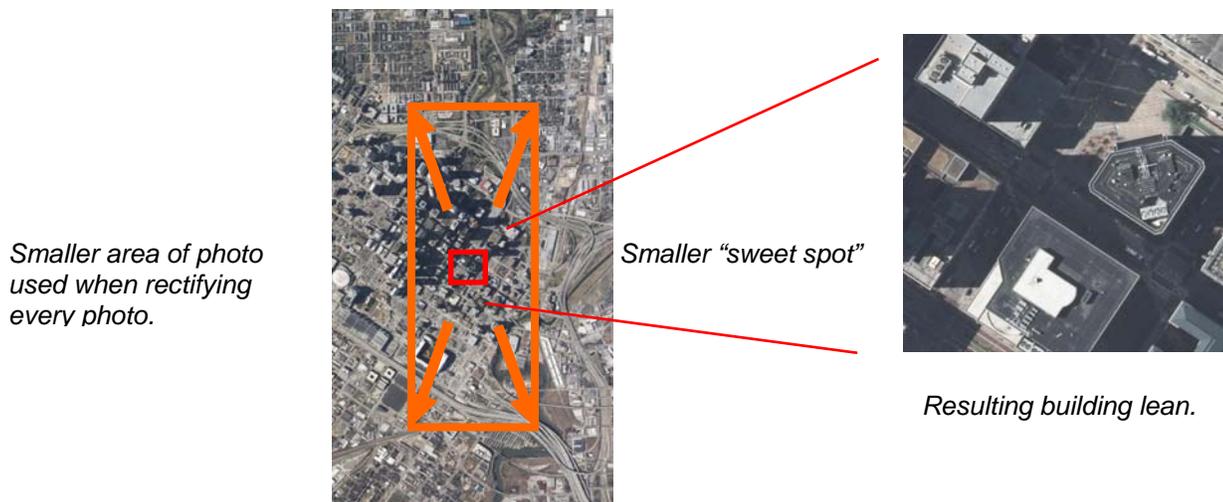
Digital Orthoimagery Geometric Accuracy

Sanborn will create color digital orthoimagery utilizing the raw images from the DMC camera, DTM data, and digital aerial triangulation results. The geometric accuracy of the digital orthoimagery within each state plane coordinate zone will meet the Virginia Base Mapping standards for 1"=100' and 1"=200' scale mapping and reported according to the NSSDA standard at 95% confidence level. Thus, the limiting RMSE in x, y coordinates is 2' and 1' for 1"=200' scale and 1"=100' scale mapping, respectively.

Sanborn proposes to provide 4-band orthoimage files (RGB, NIR). This will enable the NIR band to be reviewed and displayed and will support future image processing applications. All images are compatible and readable with ESRI software.

Sanborn uses a highly sophisticated custom software package, METRO (Method for the Elimination of Tilt and Relief Displacement in Orthophotography) for orthophoto creation. The METRO software draws upon the digital terrain model, camera information, the raw imagery, and aerial triangulation data to rectify each digital orthophoto. Moreover, the DTM input is in the form of a triangulated irregular network that provides a more accurate representation of the terrain surface. METRO uses the cubic convolution re-sampling technique, which yields high accuracy and excellent aesthetic quality.

Sanborn produces orthophotos by using the inner area, or so-called “sweet spot,” of every available photograph. This minimizes radial displacement, which increases toward the outer area of a photograph. It also increases the quality of the color balancing between photos.



Sanborn uses a unique mosaicking process that performs pixel matching along a seam line. This process minimizes but does not entirely eliminate image distortions caused by above ground features mosaicked from two adjacent photographs. The seaming process typically avoids elevated structures so that buildings are viewed from only one source photograph. Experienced imagery technicians review the seams between orthophotos in an effort to minimize mosaicking problems.



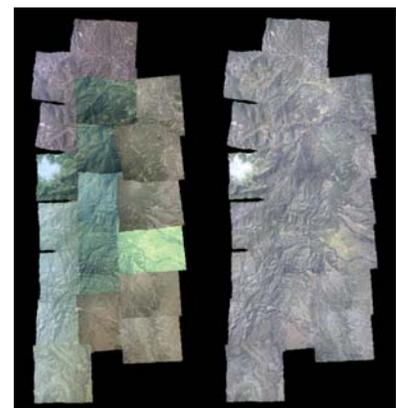
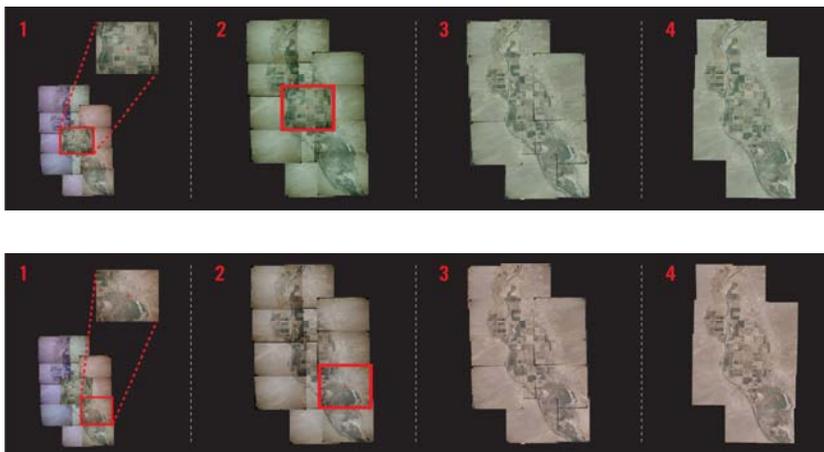
Orthophoto without intelligent seams.



Orthophoto mosaic with intelligent seams.

Image Radiometry

Because of the subjectivity of image aesthetics, Sanborn will, as in the previous project, provide multiple samples over the different land types (coastal, piedmont, mountain, rural and urban) in order to establish the signature areas for the image radiometry in the project area. This will ensure that users in, for example, the Commonwealth’s forestry group, have input for their particular area of interest. Sanborn will capture imagery that is representative of the ground by using the maximum spectrum for image detail that spans 256 levels (for 8-bit delivery). Furthermore, no individual pixel will have RGB values of 0,0,0. Sanborn will tone balance to darken bright areas and lighten dark areas caused by uneven lighting conditions to bring out detail in the image. Sanborn’s procedures enable us to compute average intensity value of the input image to ensure the output image retains the same average intensity and correct for common photographic problems such as vignetting and other uneven exposure problems. Sanborn enhances the color balancing of the imagery using a proprietary color balancing tool called SPICE (Sanborn’s Proprietary Interactive Color Editor). This sophisticated tool is an intuitive and interactive method to specify the radiometric target characteristics of the final product. SPICE allows for the user to specify the radiometric properties of the final orthoimagery in a “what you see is what you get” method and also to match easily to client specified target characteristics. The second function of SPICE is to automatically adjust artifacts that typically lead to radiometrically inhomogeneous orthoimagery. This process is particularly important in regional areas with high reflectants such as water or snow. After selecting mosaic boundaries automatically or manually and defining blend types either by default or individually, the mosaicking process runs in a batch mode. During the process, the final photos are tone balanced for optimal viewing and seamless mosaicking. The following images show how this process can provide different radiometric values from the same source imagery based on the selection of different color targets. It is this process that will allow Sanborn to auto-match the radiometry of the prototype signature areas provided by VGIN. Sanborn will ingest VGIN’s approved prototypes in stage one of this process to produce the final orthoimagery with similar characteristics.



Sanborn will use advanced color balancing techniques to create a seamless dataset of orthoimagery. The result is a seamless image with no discernible differences between adjacent images. All radiometric correction will result in minimal measurable radiometric seams within or between flight lines, stereo models, or tiles. Radiometric adjustment shall include color balancing, overall tone adjustment, and brightness and contrast enhancement of the imagery over the entire project. There will be no null pixels within tiles.

Orthoimagery QA/QC

Sanborn puts most of the effort of creating orthophotos into controlling the quality of the imagery. When a seamless database of imagery is created, *each and every portion* of every image undergoes visual inspection by an experienced imaging technician. Any artifacts in the imagery will be corrected prior to submission.

A variety of quality control steps will be performed in the orthoimagery production process. QA/QC steps will be conducted iteratively and will include the following:

- ◆ Visual inspection of geometry—Evaluate final geometric fit for compliance to specifications and/or published data quality statistics
 - ❖ Obvious seams
 - ❖ Edge matching (roads, buildings)
 - ❖ Bridge warping
 - ❖ Excessive radial displacement in buildings
- ◆ Visual QC of mosaic—Evaluate product quality and modify as needed to meet project specifications
 - ❖ Blurred imagery
 - ❖ Inconsistencies of color balancing
 - ❖ Artifacts removed
 - ❖ Shadow detail
- ◆ Product packaging—Final review of product with regard to content, format, labeling, etc.

Orthoimagery is a highly subjective product. Factors including horizontal accuracy and edgematching between tiles may appear straightforward while radiometric discrepancies and differences in contrast and brightness are often a matter of personal preference. What appears to be acceptable, or even desirable, to one viewer may be far from acceptable to another.

To quantify and define the aesthetic quality of the imagery, Sanborn has developed a comprehensive Digital Orthophotography Acceptance Criteria for digital imagery. This document identifies specific standards to determine acceptance values, including the following:

- ◆ Horizontal image accuracy
- ◆ Image quality—Includes mosaicking, edgematching, foreign artifacts, scratches, brightness, shadows, and contrast
- ◆ Other issues—Radial displacement, water reflections, and system anomalies

During contract negotiations, the Digital Orthophotography Acceptance Criteria will be mutually agreed upon.

c. Photo Tiles and Processing

Edge displacement shall be corrected in all cases. A seamless database of imagery will be created, and the tiles “cookie-cut” out of it. This results in deliverable digital ortho files that match at the neat line with no overlap or gap. The tiles will be cut to match VGIN’s tile scheme and naming convention. Tiles shall be aligned with the Virginia State Plane Coordinate System grid, using either the North or South zone depending on the county in the area of coverage by each orthoimage. Each 5,000 ft x 5,000 ft tile shall contain four nested 2,500 ft x 2,500 ft tiles (if required). The grid tiles to be used were developed using the Virginia State Plane Coordinate System, NAD83, using the origin point for the Virginia State Plane Coordinate system (0, 0).

GeoServe Online QA Tool

VGIN has an established statewide mapping program with an existing and comprehensive QA/QC program for reviewing orthoimagery through an independent QC vendor relationship. Sanborn has experience in working with third-party vendors, including Dewberry, Infotech and Applied Geographics, conducting QC on behalf of existing clients, and can fully work with the existing QC operation.

However, due to the requested aggressive schedule, Sanborn recommends utilizing an online QA/QC tool developed by Sanborn to support the QC effort.

Currently, Sanborn makes available to its clients an optional service for web-based quality checking of orthoimagery and, in the near future, other types of GIS data. The GeoServe Online QA tool was developed using ESRI software, including ArcGIS Server v9.2 and Image Server v9.2. Data is served from a central data server to the client-side computer and uses a mapping interface from within a standard web browser.

The GeoServe Online QA tool removes the need for the physical transport of initial data to the client site and allows for data to be reviewed and flagged for correction remotely. Edit flags are stored in a centralized location where they are immediately available for review by others in the organization.

Client-level login security has been implemented in conjunction with strict firewall functions and policies to help keep unauthorized users from accessing restricted data. Users are able to view available data and add digital issue points to areas which may have perceived problems or errors. These points are submitted directly to a secure centralized ArcSDE database where they are immediately available for others to review. Benefits of this process include:

- ◆ Online quality assurance process helps reduce the time needed for review as data can be corrected incrementally with edit calls, often speeding the review schedule.
- ◆ Provides ease and standard documentation for data quality review needed for contract monitoring and compliance.
- ◆ Facilitates coordination between many data reviewers, even when geographically separated.

As a final step before deliveries are made, the media written with the final approved data will be reviewed to ensure the data were written properly and that the packaging is correct.

d. Onboard Sensors

Sanborn's digital sensor, Z/I Imaging DMC, bundled with our AGPS/IMU, is a proven sensor solution that will meet the final and intermediate deliverable performance criteria for the required products as specified in the RFP.

Digital Terrain Model (DTM) (RFP 5.4)

Sanborn will meet the specifications as required by RFP 2009-03 Section 5.4.

Sanborn's familiarity with the existing 2006/2007 DTM dataset provides an advantage over the competition. We are confident in the existing DTM data quality and intend to use the same high-quality photogrammetric staff to update the terrain in areas of change for the 2009-2012 VBMP update project. As a result, our project approach and respective pricing already include cost savings for the Commonwealth.

Bridge Correction

Sanborn corrects the distortion of bridges and overpasses as a standard practice. Bridge distortion is caused by the DTM representing the terrain, but not elevated features such as bridges. Sanborn captures the elevations of bridges and elevated highways in the DTM. When rectified in the ortho process, the bridge displacement will be corrected automatically with the bridge being restored to its true location.

True ortho corrected bridge. Note that planimetric road edges on the uncorrected bridge (left) do not line up with the elevated imagery.



bridge distortion

Sanborn's standard bridge correction.

Sanborn will deliver a separate bridge DTM file containing all important bridges and flyovers. Spot heights at the beginning and end points of bridge decks will be collected as well as a maximum bridge elevation point.

a. Base Topo DTM

The base DTM data shall include those breaklines and points which, at minimum, are essential to develop orthoimagery of the required geometric and radiometric quality standards specified in this project. The data collected will result in RMSEZ accuracies of 0.5' and 1' from the photography scales of 1"=600' and 1"=1,200', respectively. It is also understood that contours may be generated from this data at intervals of 2' and 4' (respectively).

The base topo DTM will be developed by collecting masspoints and major breaklines throughout each stereo model. Masspoints are essentially individual spot elevations and will be collected a general grid format at an approximate spacing of 75' for 1"=600' imagery and 150' for 1"=1200' imagery. Additional masspoints will be collected on high/low points, such as toe and crests, saddles, buttes, and other operator -defined locations that are necessary to ensure the final horizontal accuracy of the orthoimagery. Breaklines are collected along extreme changes in the terrain, such as major drainages, and steep ridgelines. Checks are made into adjacent tie stereo models to guarantee that breaklines are continuous.

The existing VGIN bridge decks and flyover features will be incorporated in the update effort to ensure accurate orthorectification. These features would be modified only as necessary.

The data collected for the base topo DTM will allow for the production of contour databases that could be used as terrain relief maps. Although the DTM breaklines and masspoints themselves will meet the vertical accuracies as described above, the limitations of any contours developed from this DTM will generally be as described in the RFP. The resultant DTM will be sufficient to develop general topographic maps at 2' and 4' contour intervals. Generally speaking, the accuracy of the contours in open, flat areas, would meet FEMA accuracy standards.

b. Hydro-Enforced DTM

The data collected for the hydro-enforced DTM will result in RMSEZ accuracies of 0.5' and 1' from the photography scales of 1"=600' and 1"=1,200' respectively. It is also understood that contours may be generated from this data at intervals of 2' and 4' (respectively).

The hydro-enforced DTM will meet all the specifications as defined for the base topo DTM. In addition, pertinent additional masspoints and breaklines will be collected for all hydrological features, including streams, ponds, lakes and river banks. The resultant DTM may be used by VGIN to generate hydro-enforced contours. All hydro-enforced data will conform to FEMA Appendix A – April 2003 Specifications and Guidelines Section A4.10 "...breaklines are necessary to depict the true three-dimensional shape of the terrain, especially drainage features used for hydrologic and hydraulic modeling. A hydro-enforced TIN uses drainage system breaklines to form triangle edges in the TIN data structure. A hydro-enforced DEM uses breaklines to lower selected DEM cells to enforce natural

drainage in the Digital Terrain Model (DTM). The horizontal locations of these breaklines are determined from hydrographic vector data or from imagery...” Hydro-enforced TINs, DEMs, or contours ensure that top surfaces of bridges and culverts are cut by stream breaklines so that computer models will accurately represent drainage flow. Hydro-enforcement normally requires human intervention to “cut” breaklines so that TIN/DEM elevations and contours will correctly follow drainage patterns, rather than erroneously model the terrain to depict dams or puddles that do not actually exist. *Section A.4 A -21 Guidelines and Specifications for Flood Hazard Mapping Partners [April 2003]*

The data collected for the hydro-enforced DTM provided by Sanborn will allow for the production of contour databases that could be used as terrain relief maps. Although the DTM breaklines and masspoints themselves will meet the vertical accuracies as described above, the limitations of any contours developed from this DTM will be relative to the areas bounded by the hydro enforce breaklines and masspoints. Within the boundaries of the hydro-enforced breaklines, 2’ and 4’ contours generated from their respective photo scales will meet NSSDA AccuracyZ requirements of 2-2.4’ (4’ contours) and 1-1.2’ (2’ contours). Contours in areas outside the bounds of the hydro enforced breaklines will meet the accuracies as described above for contours generated from the base topo DTM.

DTM QA/QC

The following quality control measures ensure the accuracy and consistency of the final DTM/DEM products:

- ◆ The project coordinator validates final ground control files from the aerotriangulation adjustment.
- ◆ The project manager chairs a start-up meeting to ensure that feature capture specifications are understood. Project coordinators and map editors also attend these meetings to assure consistency across the entire production process. Subsequent follow-up meetings are held on a regular basis or as necessary to review progress and adherence to specifications.
- ◆ The technician ensures compliance with final accuracy requirements and reviews all model setups.

Upgrade Options (RFP 5.5)

Sanborn will meet the specifications as required by RFP 2009-03 Section 5.5.

Sanborn offers end-to-end geospatial solutions. We go far beyond photogrammetry and can provide full service collection, production and support of the following requested and additional suggested options.

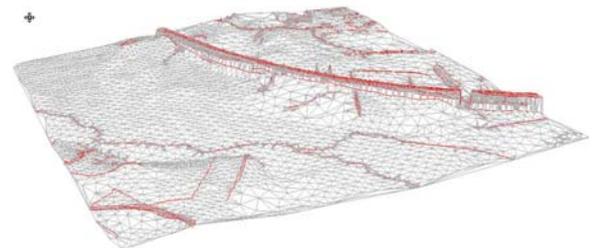
Option – Resolution Upgrades

Sanborn has previously described the process for creating orthoimagery. Sanborn has provided pricing to include the option to upgrade from 1-foot to 6-inch digital orthoimagery resolution with a DTM appropriate to support the 6-inch resolution and pricing to upgrade from 2-feet to 1-foot digital orthoimagery resolution with a DTM appropriate to support the 1-foot resolution. All standard procedures used to support these products will be followed.

Option – Contours

Contour lines will be developed in accordance with the contour guidelines for 2-foot or 4-foot topographic maps. Every fifth contour line is an index contour and is distinguished using a heavier line style to enhance identification. All contour lines are solid and unbroken except where passing through dense ground cover, buildings, and under bridges. In these instances, the contour lines are still continuous, but they are attributed and displayed as broken/dashed lines.

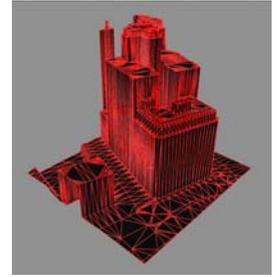
For validation purposes, Sanborn workstation operators will view DTM points (masspoints and planimetric feature breaklines) draped on the stereo image in the softcopy environment and will vertically relocate individual points or groups of points to their true ground position as necessary. Breaklines will also be added in additional critical areas to properly form the DTM for contour generation. Operators will also generate contours “on-the-fly” at various stages of the stereocompilation editing process to ensure that any final,



generated contours will be “on the ground” and within accuracy specifications. Contour data will be delivered in ESRI geodatabase format.

Option – Structures

Sanborn understands VGIN may request that planimetric structures be captured and delivered as part of this project. Sanborn will offer all services to photogrammetrically compile buildings outlines of a certain size (100 square feet for 1”=100’ map scale, and 200 square feet for 1”=200 map scale). Buildings smaller than the minimum square size will be collected as points. The final deliverable will be in an agreed upon format that will meet the needs of VGIN.



Please note buildings meeting the minimum size requirement will be delineated by tracing the apparent edge of the roof line for dwellings, businesses, houses, house trailers, garages, barns, and accessory structures. Where appropriate, buildings will be squared at corners so that the corners are orthogonal.

In addition to the building structure outlines, a database of polygons for these structures will be created and attributed with the elevation of the structure’s roofline. This will allow “pseudo” 3-D viewing and visualization.

Option – Other Planimetric Data

Planimetric data is collected photogrammetrically from the imagery in a softcopy stereo environment. However, there are limitations that impact the capture of some features, including shadows and dense vegetation cover, as well as the photography scale. Visual review of the data is performed to ensure that all data was compiled correctly and completely. The interactive graphic editing phase begins after the files are finalized, where additional QC steps take place. Sanborn can provide planimetric data for all visible features including, but not limited to:



- ◆ Roads, paved/unpaved
- ◆ Disturbed Areas
- ◆ Railroads
- ◆ Landmarks
- ◆ Structures
- ◆ Vegetation
- ◆ Airport
- ◆ Street Hardware
- ◆ Utilities
- ◆ Water Structures

Option – True Orthophotography



Sanborn’s true orthoimagery approach is unique in the industry. Our method relies on the perspective and proximity of each building to the nadir, or center, of the photograph. Sanborn’s METRO software was designed to readily accept DTMs containing building elevation information.

The investment in creating true orthoimagery imagery resides largely in the time required for a photogrammetrist to accurately capture building height information (3-D outlines) using stereo workstations. The building outline is converted to a triangulated irregular network (TIN) prior to use in the orthorectification process. When the DTM is complete, our METRO software employs the DTM using the same orthoimagery rectification process used in producing standard METRO products. The sample image illustrates a true orthoimagery area.

Option – Priority Processing and Delivery

Sanborn can provide priority processing and delivery for any jurisdiction in the Commonwealth. Should VGIN partners choose the priority option, the estimated delivery timeframe from time of acquisition for a jurisdiction is four (4) months for initial delivery, and five (5) months for final products, resulting in a 30 day time savings in the required VBMP six (6) month project schedule.

Option – Additional “Off Year” Flights

Sanborn agrees to offer “off year” flights for any jurisdiction interested in having specific areas flown in any year during the 2009-2012 cycle other than the designated VGIN core flight year.

Option – Extended Upgrade Selection Period

Sanborn agrees to offer the agreed-upon requirements for: (a) digital orthophotography and DTM, (b) contours, and (c) planimetrics, as a state contracting option for three years following the 2009 and 2011 flights.

Additional Options

Option – Statewide Accelerated Delivery

Sanborn is pleased to offer an entire VBMP schedule upgrade of 30 days where the entire VBMP project schedule will complete within five (5) months instead of the required six (6) month schedule. This additional option and the priority processing and delivery option are mutually exclusive.

Option – 3D Buildings

A benefit of true orthoimagery building correction is the use of the DTM for 3-D visualization applications. The DTM can be integrated with GIS feature layers and/or imagery to produce highly effective tools for a variety of applications. The adjacent figure is an example of a 3-D model of Manhattan produced by Sanborn using the DTM captured for true orthoimagery correction. The 3-D buildings were integrated with true orthoimagery imagery to produce a photo-realistic model and fly-through sequence.



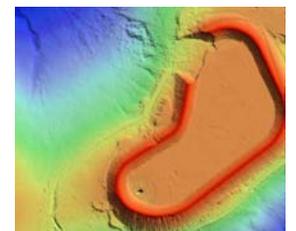
3-D Model of Manhattan

Option – Google Earth Enterprise (GEE)

With more than 400 million downloads, Google Earth is the leading application for geospatial discovery on the web. The simple user interface and OGC-standard KML data interface enables rapid search, viewing, and analysis of almost any spatial and non-spatial information through a web browser. Google Earth is now available for VGIN use as an internally controlled and managed enterprise system. With Google Earth Enterprise (GEE), VGIN can host and distribute its orthoimagery and other source data to users defined by VGIN. Sanborn is a Google-designated System Integrator of GEE, and can provide the GEE software, integration, and set-up working with VGIN IT personnel as needed.

Option – Rapid Response

Sanborn is skilled at providing rapid response services. These requests involve limited areas, short notice, and rapid delivery of the deliverables. They are typically requested to support planning or emergency response activities related to natural or cultural events/disasters. Sanborn has the technology and experience to provide top-quality rapid response data acquisition and orthoimagery/LiDAR production services. Sanborn will mobilize to the project site within 24 hours of receiving the .shp file for the area of



LiDAR surface model – Rapid response effort for Taum Sauk Dam break (Missouri)

interest. Delivery of orthoimagery and LiDAR products begin within 72 hours of acquisition completion.

Option – Additional Geospatial Products and Services

- ◆ Land Cover Mapping
- ◆ LiDAR
- ◆ Ground-Based LiDAR
- ◆ Forestry Applications
- ◆ Sanborn Online-Direct Access to Premium Data Distribution System
- ◆ Forestry Applications
- ◆ Oblique Imagery

Due to the page limit restriction for this section, details about additional geospatial products listed above can be found in Section 4 Appendix.

Project Management Requirements (RFP 5.6)

Sanborn will meet the specifications as required by RFP 2009-03 Section 5.6.

The success of any project of this size and complexity sits firmly in the hands of the project management team and the project management philosophy of the successful vendor. The following are the keys to Sanborn's approach to this critical function for VGIN:

- ◆ Integrated best practices from the 2006/2007 VBMP into the current project approach to mitigate project risk.
- ◆ Sanborn's selected project manager, Ms. Llana Hines, has been involved with the VBMP program each mapping year since 2001.
- ◆ A completely dedicated project manager with the appropriate communication and technical qualifications.
- ◆ Weekly conference calls, monthly face-to-face meetings and 24/7 availability to the VGIN project manager.

a. On-Call Point of Contact

The accountability for this program rests with Sanborn and Ms. Llana Hines. It is Sanborn's philosophy that an individual be delegated to be the single point of contact for the program and be thoroughly familiar with all specifications and requirements to successfully execute the program. Ms. Hines will be the single point of contact for the Commonwealth and will be aware of and involved in every single aspect of the program. As General Manager of Sanborn's Imagery Services West Division, she will have direct control over all the resources needed to complete this project successfully. Her previous project management experience includes the first VGIN program and the first State of New York program. For the first VGIN program, she managed dozens of subcontractors and achieved mapping of the entire Commonwealth in twelve months, which was unprecedented at that time.

We have taken this approach specifically to offer VGIN the most senior project manager we have and we commit that this project will be the only project management responsibility Ms. Hines will have during the course of this project.

Working closely with Ms. Hines will be three key staff members with specific roles and responsibilities. Assisting Ms. Hines will be Mr. George Halley, who as full time acquisition manager, will be responsible for managing our aircraft and camera resources, as well as our survey partner. He will be responsible for managing all acquisition field activities and supporting Ms. Hines with daily flight updates on collection and weather in the project area. He has intimate knowledge of the VBMP program. As the project manager for the previous project, he was a key part of the acquisition team in 2007. He understands the anomalies of this program, including the need to fly Assateague and

Chincoteague early in the season, and the complexities of the approvals needed to fly over the restricted areas in northern Virginia.

Mr. Shawn Benham, PMP, is a Sanborn senior project manager for Sanborn based in Herndon, Virginia. He currently manages our Prince William County and Loudoun County projects. Mr. Benham will act as assistant project manager and local support to Ms. Hines. He has been designated as our local jurisdiction project manager, and will oversee any non-standard upgrade options for your partners throughout the Commonwealth. It is likely, given the multiple geospatial product options Sanborn has provided VGIN, there will be a significant need for local project management and he is ideally suited for the role. While Ms. Hines will be the sole point of contact, Mr. Benham will attend all project meetings and will be copied on all correspondence and will, at all times, be fully fluent in all aspects of the project.

Mr. Dave Lewis will act as project liaison, working closely with VBMP team. He is a regional vice president and senior staff member at Sanborn with 25 years of industry management experience. He has spent most of his time in the industry fulfilling this role for major clients and brings a strong sense of urgency and a deep commitment to customer satisfaction to the project team. He will attend all meetings and be current on all aspects of the project. Mr. Lewis is based in Loudoun County, Virginia, and will be available to VGIN on short notice.

b. Project Initiation Meeting and Project Plan

Within thirty (30) days of notice of award, a meeting will be convened where Ms. Hines and appropriate Sanborn production staff members will meet with appropriate VGIN staff to:

- ◆ Review the project plan, including reviewing the flight plan and control survey plan.
- ◆ Review deliverables for the project.
- ◆ The project schedule will be presented prior to the meeting for final approval by VGIN. Review the schedule requirements by specific work tasks and the interdependencies of the sources of information to be supplied by VGIN and Sanborn's production processes and resource applications.
- ◆ Review the project acceptance procedures, methods and criteria that will be used by VGIN to determine deliverable conformance with technical specifications.
- ◆ Define the parameters of radiometry prototype areas.
- ◆ Define all communication protocols and procedures that are necessary for effectively ensuring that both parties to the contract are informed about the production departments' progress on each project task.

c. Post-Flying Evaluation Meeting

Sanborn will meet with VGIN immediately following the spring flying season in order to evaluate the success of the spring flight.

d. Status Meeting

Ms. Hines and appropriate Sanborn technical personnel will conduct status meetings on a regular basis. At certain critical times of the project, we anticipate a monthly meeting will be needed. Meetings will be held in Chester, Virginia and scheduled during agreed upon intervals and dates.

e. Status Reports

Ms. Hines will provide weekly status reports to VGIN, updating and documenting the status of the project in relation to the project schedule and identifying any issues or concerns.

The Project Status Report provides project team members with periodic documentation on the project status at specified time intervals. The report summarizes project activities completed over the past reporting period and those planned over the next similar time period.

Quarterly Executive Review

Once every quarter we recommend an executive meeting involving John Copple, Sanborn CEO and key executives from the Commonwealth to review project performance.

Project Portal

Sanborn will also establish a project web site. Our recommendation is to use web-based Sharepoint for the project portal. Our proposal assumes we will develop a project web site to be accessible through our internal Intranet as well as the Internet. This tool will facilitate communication, document control, and standardization of procedures for both internal and external project /task management. This web site will be designed specifically for the VBMP project, and confidentially secured by user login and password.

Project home pages provide hyperlinks to project reference documents, specifications, productivity and quality data, project status reports, technical support requests, and can be the primary mechanism for distributing status reports.

This technology will benefit this project and VGIN's project manager by:

- ◆ Providing easy distribution of project updates, alleviating total reliance on email, faxes, etc.
- ◆ Providing summary and detailed level reporting, as well as sorting information by category.
- ◆ Other tools such as MS Project and Excel will also be incorporated into the status reporting components of the web site as appropriate.
- ◆ Access to VGIN-approved partners which will relieve VGIN's project manager from answering regular calls from partners to status reports.

f. Quality Control

Sanborn's Colorado office earned an ISO 9001:2000 certification and is registered with Platinum Registration. ISO 9000, a Quality System Standard, is a series of five international standards that provide guidance in the development and implementation of a specific Quality Management System. The quality control processes specific for each production phase have been included in the appropriate technical sections on the previous pages.

Sanborn's Quality Management System has been developed to ensure that adequate and continuous control is in operation for all activities affecting product quality. Where specific regulatory requirements affect our processes, our procedures and instructions will be designed or revised to meet such requirements. Sanborn employs methods and techniques that foster continuous improvement and good business practice. Sanborn's complete Quality Manual can be found in the Supplier Profile section.

g. Data Deliverables

Sanborn understands all data products related to the VBMP are required deliverables, including all intermittent data components as specified in the RFP. All final products are to be delivered and accepted by VGIN within six months from end of acquisition. A detailed project schedule (Gantt chart) has been included in Section 4 Appendix.

Note: All deliverables in the table below will conform to the required data deliverables specifications listed in the RFP.

Deliverable	Description	Sanborn Compliance																																				
a. Project Control	Sanborn will submit a comprehensive control report (hard copy and electronic) documenting all recoverable ground control, a detailed network diagram, observation forms and, all horizontal and vertical control points as ESRI ArcView point feature shapefiles.	Yes																																				
b. Production Files	Sanborn will deliver stereo pairs, TINs, digital surface models, and all other data files used in the production of the final products.	Yes																																				
c. Aerial Triangulation	Sanborn's comprehensive AT report will include all required information to facilitate the efficient use of the imagery for additional data development by a third party.	Yes																																				
d. DTM	Sanborn's DTM files will include all required information to facilitate the efficient use of the imagery for additional data development by a third party.	Yes																																				
e. Metadata	Metadata will be provided in ASCII format capable of being parsed by the "mp" metadata parser available from the FGDC for all data deliverables.	Yes																																				
f. Project Procedures Guide	As part of our best practices from the previous project, Sanborn will update and customize the Project Procedures Guide for the 2009-12 project.	Yes																																				
Deliverable Products and Media	<p>Sanborn will deliver the following:</p> <table border="1"> <thead> <tr> <th>#</th> <th>File Content</th> <th>Media</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Statewide Coverage of Digital Ortho Imagery by Tile (GeoTIFF)</td> <td>External Hard Drive</td> </tr> <tr> <td>1</td> <td>Statewide Coverage of Digital Ortho Imagery Compressed in MrSID or JPG2000 format at 18/1 by Tile</td> <td>External Hard Drive</td> </tr> <tr> <td>1</td> <td>Statewide Coverage of Digital Terrain Models by Tile</td> <td>External Hard Drive and DVD</td> </tr> <tr> <td>1</td> <td>Statewide Coverage of Optional Products (contours, planimetrics, etc)</td> <td>External Hard Drive</td> </tr> <tr> <td>1</td> <td>All Ancillary Data* including, but not limited to, ground control and AT reports</td> <td>External Hard Drive and DVD</td> </tr> <tr> <td>1</td> <td>All Production Files including, but not limited to, TINs, Digital Surface Models, and Stereo Pairs.</td> <td>External Hard Drive</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>1 set</td> <td>134 Individual Jurisdiction Coverages** of Digital Ortho Imagery by Tile (GeoTIFF)</td> <td>External Hard Drive or DVD</td> </tr> <tr> <td>1 set</td> <td>Optional Products for Each Jurisdiction That Purchased Upgrades</td> <td>External Hard Drive or DVD</td> </tr> <tr> <td>1 set</td> <td>134 Individual Jurisdiction Coverages of Digital Terrain Models by Tile</td> <td>External Hard Drive or DVD</td> </tr> <tr> <td>1 set</td> <td>134 Individual Jurisdiction Coverages of all Ancillary Data*</td> <td>DVD</td> </tr> </tbody> </table>	#	File Content	Media	1	Statewide Coverage of Digital Ortho Imagery by Tile (GeoTIFF)	External Hard Drive	1	Statewide Coverage of Digital Ortho Imagery Compressed in MrSID or JPG2000 format at 18/1 by Tile	External Hard Drive	1	Statewide Coverage of Digital Terrain Models by Tile	External Hard Drive and DVD	1	Statewide Coverage of Optional Products (contours, planimetrics, etc)	External Hard Drive	1	All Ancillary Data* including, but not limited to, ground control and AT reports	External Hard Drive and DVD	1	All Production Files including, but not limited to, TINs, Digital Surface Models, and Stereo Pairs.	External Hard Drive				1 set	134 Individual Jurisdiction Coverages** of Digital Ortho Imagery by Tile (GeoTIFF)	External Hard Drive or DVD	1 set	Optional Products for Each Jurisdiction That Purchased Upgrades	External Hard Drive or DVD	1 set	134 Individual Jurisdiction Coverages of Digital Terrain Models by Tile	External Hard Drive or DVD	1 set	134 Individual Jurisdiction Coverages of all Ancillary Data*	DVD	Yes
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h. Specific Plan for Providing the Proposed Services

a. Services

Sanborn's technical response contained in this section adequately addresses each of the services required to complete the VBMP project.

b. Project Plan

Sanborn's technical response contained in this section provides details of our project approach that addresses each of the production steps and each of the product specifications.

c. Aircraft

2009 Acquisition	
Option 1	
1-foot resolution statewide	Sanborn requires four (4) aircraft to complete.
Anticipated 6-inch upgrade option	Sanborn requires one (1) aircraft to complete.
Option 2	
2-foot resolution statewide	Sanborn requires two (2) aircraft to complete.
Anticipated 1-foot upgrade option	Sanborn requires .5 aircraft to complete.
Anticipated 6-inch upgrade option	Sanborn requires one (1) aircraft to complete.

Sanborn has determined it will take five (5) total cameras to complete the 2009 acquisition and four (4) total cameras to complete the 2011 acquisition based on planned exposure counts. This is with an expectation that the majority of the work will be accomplished at the 1-foot resolution. If there are significant 6-inch upgrade areas, the number of aircraft will increase, which is why we have an additional five (5) digital cameras in reserve on our acquisition team.

d. Plan for Re-Visit of Areas

Any imagery that does not meet the VBMP project specifications will be corrected at no cost to VGIN. All re-flights must meet the accepted specifications and flight plans. Sanborn will use the same camera/sensors for all re-flights under similar or the same environmental conditions.

EXHIBIT B
Statement of Work

SCOPE STATEMENT:

The Virginia Base Mapping Program (VBMP) update project is divided into two collection phases: the Eastern half for Spring 2009 and the Western half for Spring 2011 with a 1,000' buffer to the state boundary. VGIN will select ortho products from two primary options:

- (1) 1-foot resolution statewide orthoimagery with an option to update to 6-inch resolution tiles,
- (2) 2-foot resolution statewide orthoimagery with an option to upgrade to 1-foot resolution tiles and/or 6-inch resolution tiles.

Resolution of Final Digital Orthoimage	Target Map Scale	Digital Ortho Tile Size
2 foot GSD	1:4,800 (1"=400')	10,000'x10,000'
1 foot GSD	1:2,400 (1"=200')	5,000'x5,000'
6 inch GSD	1:1,200 (1"=100')	2,500'x2,500'

Project Purpose:

Digital aerial data acquisition, ground control, aerotriangulation and development of statewide DTM and digital orthophotography data for the following ortho GSDs:

2009-Eastern Half						2011-Western Half					
GSD	Ortho Scale	No. Tiles*	Sq. Miles*	Line Miles*	* Models	GSD	Ortho Scale	No. Tiles*	Sq. Miles*	Lines Miles*	* Models
2'	1"=400'	7,031	24,235.3	7,847.3	7,435	2'	1"=400'	6,071	16,637.5	5,622.2	5,318
1'	1"=200'	21,531	22,874.7	14,618.9	27,700	1'	1"=200'	21,831	19,884.5	13,647.7	26,231
6"	1"=100'	19,246	TBD	TBD	TBD	6"	1"=100'	3,530	TBD	TBD	TBD

*approximate counts based on ESRI personal geodatabase provided in RFP_DATA2.zip file.

DTM Specification Options;

- **Base Topo DTM:** The base topo DTM will meet the minimum requirement for all scales of the Virginia Base Mapping Program (VBMP) photography at orthoimagery resolutions of 2', 1' or 6". This DTM product includes the minimum amount of mass points and breaklines necessary to support the horizontal accuracy of the digital orthophotography.
- **Contour DTM - (Optional Buy-up):** This option will utilize the Base Topo DTM, which will be further densified with additional mass points and breaklines to generate accurate contours at selected map scale. Breaklines captured along water features will be topologically structured and hydrologically corrected for a positive high-to-low stream flow. The contours delivered for this product (2' or 4' based on selected map scale) will meet both NSSDA vertical accuracy specifications and FEMA contour specifications.

Product

State Acquisition Options

Description:

Base Products - Option 1

- 1' GSD color orthos Statewide w/Base Topo DTM suitable for generating orthophotography with six-inch resolution upgrade option for local areas.

Base Products - Option 2

- 2' GSD color orthos Statewide w/Base Topo DTM suitable for generating orthophotography with one-foot and six-inch resolution upgrade option for local areas.

Local Government Options

- Resolution Upgrades: Minimum order of 25 contiguous tiles during the base years (2009 and 2011).
 - Upgrade from 1' GSD to 6" GSD w/supporting DTM
- Resolution Upgrades: Minimum order of 25 contiguous tiles during the base years (2009 and 2011).
 - Upgrade from 2' GSD to 1' GSD w/supporting DTM
 - Upgrade from 1' GSD to 6" GSD w/ supporting DTM
- Contours- Generation of contours that meet map accuracy standards produced as part of the VBMP.
 - Option 1: 4-ft. contours (source: one-foot resolution orthophotos with hydro-enforced DTMs)
 - Option 2: 2-ft. contours (source: six-inch resolution orthophotos with hydro-enforced DTMs)
- Structure Planimetrics- Planimetric structure outlines (within specified size) captured as a separate layer
 - Option 3:
 - Derived from one-foot resolution orthophotos to include structures with roofs having an aerial coverage of 200 sq. feet or greater
 - Derived from six-inch resolution orthophotos to include structures with roofs having an aerial coverage of 100 sq. ft. or greater
- Other Planimetrics- Planimetric data collected photogrammetrically from imagery in a softcopy stereo environment. Urban tiles defined as greater than 600 buildings per sq. mile and rural as less than 600 buildings per sq. mile.
 - Option 4: Feature content list, capture rate and minimum size/length based on mapping scale selected (100 scale or 200 scale)
- True Orthophotography-
 - Option 5:
 - One-ft. resolution upgrade
 - Six-inch resolution upgrade
- Priority Processing and Delivery

- Option 6: Estimated delivery timeframe from time of acquisition for a jurisdiction is four (4) months for initial delivery, and five (5) months for final products. Minimum order of 100 tiles.
- Off Year Flights-a minimum total order value of \$25,000 for the base ortho product applies 2010 and 2012.
 - Option 7: Partners will be given the option to have specified areas flown in any year during the 2009-2012 cycle other than the designated VGIN core flight years. Off year tile cost will be the same as the core flight years.

Other Additional Options

- Option 1-Statewide Orthoimagery Acceleration
 - Entire VBMP project schedule will complete within five (5) months. This additional option and the priority processing and delivery option are mutually exclusive.
- Option 2-3D Buildings
 - Derived from six-inch resolution orthophotos to include structures with roofs having an aerial coverage of 100 sq. feet or greater. The 3D block buildings are a base (footprint) with a height point. There is a minimum of two sq. miles per order.
- Option 3-Google Earth Enterprise
 - VGIN can host and distribute its orthoimagery and other source data to users defined by VGIN.
- Option 4-Rapid Response
 - One-foot resolution orthoimagery; horizontal accuracy of +/- 8-ft.; Geo-TIFF with world file deliverable
 - Standard 1.4m average point spacing LiDAR; .LAS or ASCII deliverable
- Option 5-LiDAR-Bare Earth DEM. .LAS or ASCII (or both) will be delivered for the Standard, FEMA, and High Density products. The LAS deliverable is classified into the following categories: ground, unclassified, low point, and overlap. The raw point cloud is an available delivery option. A standard ARCGRID DEM or standard ASCII GRID format can be provided. The ASCII format is an ASCII bare earth DEM format (the ground layer).
 - Standard 1.4 meter average point spacing
 - FEMA 1.4 meter average point spacing
 - FEMA 1.0 meter average point spacing
 - High-Density 0.7 meter average point spacing
- Option 6-Ground Based Lidar
 - Collection and data processing of high-definition ground based LiDAR data.
- Option 7-Sanborn Online-Direct Access to Premium Data Distribution System
 - Comprehensive database that provides spatially accurate, high-resolution geospatial imagery through an extensive, easy-to-use online library.
- Option 8- Three Inch Resolution Orthophotos
 - 3-inch GSD orthophotos based on tile size of 1,250' x 1,250'
 - DMC flying height = 2,325 ft. AGL
 - Meets 1"=100' map scale requirements

- Option 9-Forestry-Specific services that Sanborn can offer are:
 - Statewide stratified inventory and ecosystem mapping
 - Ecological system mapping (GAP level of detail) and regional map updates
 - Forest stand delineation and mapping to forest types
 - State forest stratified inventory
 - Stand inventory
 - Biomass and habitat mapping
 - Field data collection using real-time inventory mapping
 - Software development for data input, query, mapping and reporting
 - Software development to support forest inventory business processes
 - Inventory redesign and improvement using new technologies
 - Growth and yield modeling
 - Endangered species modeling
- Option 10-Pictometry Oblique Imagery
 - Nominal 12" GSD high level community and 6" GSD low level neighborhood images
- Option 11-(jurisdiction based)
 - Enhanced Impervious
 - Enhanced Land Cover

Project Phases

- 2009: Eastern-half of Commonwealth acquired and produced during FY09
- 2010: Off year; additional flights may be selected and produced as long as minimum total order value of \$25,000 for the base product is reached.
- 2011: Western-half of Commonwealth acquired and produced during FY11.
- 2012: Off year; additional flights may be selected and produced as long as minimum total order value of \$25,000 for the base product is reached.

Accuracy Specifications

All digital orthoimagery and development processes for the VBMP shall conform to the ASPRS Draft Aerial Photography Standards (1995) and Model Virginia Map Accuracy Standards (1992), which generally follow the ASPRS Accuracy Standard for Large-Scale Mapping (1990) for all imagery at the scales indicated except for the changes specified in this document. Accuracy will be tested and reported according to NSSDA Geospatial Positioning Accuracy Standards Part 3: National Standard for Spatial Data Accuracy Class 1.

Quality Measures (criteria that will determine acceptability)

- Meet all schedule milestones
- Client approval and acceptance of all deliverables for each project phase

Client Review and Acceptance

In order to meet the production schedule it will be necessary that the VGIN product review period does not exceed 30 working days for the orthophoto deliveries and 15 working days for the jurisdiction deliveries. Contractor will in turn then have 30 calendar days to make any necessary

corrections to data and return for final review and approval. The VGIN count of days begins upon VGIN receipt of data.

**Project
Management**

- Daily status reports on aerial collection will be delivered in an online Google Earth format as well as shapefiles.
- An Executive Steering Committee will be formed that will include the Sanborn CEO and key Virginia executives. This committee will meet on a quarterly basis.
- An online project portal will be used for status tracking, issue logs, and to communicate other relevant information.

Project Deliverables:

Project Deliverables	Description																																				
a. Project Control	Sanborn will submit a comprehensive control report (hard copy and electronic) documenting all recoverable ground control, a detailed network diagram, observation forms and, all horizontal and vertical control points as ESRI ArcView point feature shapefiles.																																				
b. Production Files	Sanborn will deliver stereo pairs, TINs, digital surface models, and all other data files used in the production of the final products.																																				
c. Aerial Triangulation	Sanborn's comprehensive AT report will include all required information to facilitate the efficient use of the imagery for additional data development by a third party.																																				
d. DTM	Sanborn's DTM files will include all required information to facilitate the efficient use of the imagery for additional data development by a third party.																																				
e. Metadata	Metadata will be provided in ASCII format capable of being parsed by the "mp" metadata parser available from the FGDC for all data deliverables.																																				
f. Project Procedures Guide	As part of our best practices from the previous project, Sanborn will update and customize the Project Procedures Guide for the 2009-12 project.																																				
g. Reporting	Interim, phase and final project reports																																				
h. Deliverable Products and Media	<p>Sanborn will deliver the following:</p> <ul style="list-style-type: none"> -Delivery of compressed geo-referenced county-wide mosaics within 60 days from final date of acquisition. <table border="1"> <thead> <tr> <th>#</th> <th>File Content</th> <th>Media</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Statewide Coverage of Digital Ortho Imagery by Tile (GeoTIFF)</td> <td>External Hard Drive</td> </tr> <tr> <td>1</td> <td>Statewide Coverage of Digital Ortho Imagery Compressed in MrSID or JPG2000 format at 18/1 by Tile</td> <td>External Hard Drive</td> </tr> <tr> <td>1</td> <td>Statewide Coverage of Digital Terrain Models by Tile</td> <td>External Hard Drive and DVD</td> </tr> <tr> <td>1</td> <td>Statewide Coverage of Optional Products (contours, planimetrics, etc)</td> <td>External Hard Drive</td> </tr> <tr> <td>1</td> <td>All Ancillary Data* including, but not limited to, ground control and AT reports</td> <td>External Hard Drive and DVD</td> </tr> <tr> <td>1</td> <td>All Production Files including, but not limited to, TINs, Digital Surface Models, and Stereo Pairs.</td> <td>External Hard Drive</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>1 set</td> <td>134 Individual Jurisdiction Coverages** of Digital Ortho Imagery by Tile (GeoTIFF)</td> <td>External Hard Drive or DVD</td> </tr> <tr> <td>1 set</td> <td>Optional Products for Each Jurisdiction That Purchased Upgrades</td> <td>External Hard Drive or DVD</td> </tr> <tr> <td>1 set</td> <td>134 Individual Jurisdiction Coverages of Digital Terrain Models by Tile</td> <td>External Hard Drive or DVD</td> </tr> <tr> <td>1 set</td> <td>134 Individual Jurisdiction Coverages of all Ancillary Data*</td> <td>DVD</td> </tr> </tbody> </table>	#	File Content	Media	1	Statewide Coverage of Digital Ortho Imagery by Tile (GeoTIFF)	External Hard Drive	1	Statewide Coverage of Digital Ortho Imagery Compressed in MrSID or JPG2000 format at 18/1 by Tile	External Hard Drive	1	Statewide Coverage of Digital Terrain Models by Tile	External Hard Drive and DVD	1	Statewide Coverage of Optional Products (contours, planimetrics, etc)	External Hard Drive	1	All Ancillary Data* including, but not limited to, ground control and AT reports	External Hard Drive and DVD	1	All Production Files including, but not limited to, TINs, Digital Surface Models, and Stereo Pairs.	External Hard Drive				1 set	134 Individual Jurisdiction Coverages** of Digital Ortho Imagery by Tile (GeoTIFF)	External Hard Drive or DVD	1 set	Optional Products for Each Jurisdiction That Purchased Upgrades	External Hard Drive or DVD	1 set	134 Individual Jurisdiction Coverages of Digital Terrain Models by Tile	External Hard Drive or DVD	1 set	134 Individual Jurisdiction Coverages of all Ancillary Data*	DVD
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AERIAL PHOTOGRAPHY

- **Aerial Photography**

Project Area:

The project encompasses the entire land area of the Commonwealth of Virginia. The State boundary is to be buffered by 1000'. Coastal areas of the State bordering the Atlantic Ocean or the Chesapeake Bay shall be buffered by 1000' or the extent of man-made features extending from shore.

2009-Eastern Half		
GSD	Ortho Scale	No. Tiles*
2'	1"=400'	7,031
1'	1"=200'	21,531
6"	1"=100'	19,246

2011-Western Half		
GSD	Ortho Scale	No. Tiles*
2'	1"=200'	6,071
1'	1"=200'	21,831
6"	1"=100'	3,530

*approximate tile counts based on ESRI personal geodatabase provided in RFP_DATA2.zip file.

Aerial Photography Details		
Acquisition Area	2009 – Eastern half	2011 – Western half
Time Frame	Spring: February – March	
Ground Condition	Snow free, leaf off, no clouds, cloud shadows, or other ground obscuring condition	
AGPS/INS	Novatel GL4 and Applanix POS INS	
Base Stations	Minimum of one base station occupied	
Sun Angle	Sun angle is 30 degrees or greater	
Time of Day	Between 10:00 a.m. and 3:00 p.m.	
End Overlap	60 percent	
Side Overlap	30 percent	
Pixel resolution	2-foot pixel resolution 1-foot pixel resolution 6-inch pixel resolution	

Aerial Photography Specifications: True color (24 bit) digital orthos at 2', 1' and 6" GSDs. All flight lines will be flown in a cardinal N-S or E-W direction, except for cross flights and in certain mountainous areas where non-cardinal direction flight lines may be required to compensate for extreme changes in elevation. A minimum of five aircraft equipped with DMC cameras will be available to acquire the VBMP update program in 2009 with an additional back up capacity of five DMC cameras.

Product	Flying Height (AGL)	Map Scale
1-ft. GSD	9300 ft.	200
2-ft. GSD	18600 ft.	400
6-in. GSD	4650 ft.	100

Horizontal Control: The horizontal control adjustment will be in NAD 83/93 (HARN) reference datum

Vertical Control: The vertical control will be NAVD 88 reference datum maintained by the NGS

Project Units: US Survey Feet

Conversion: 1 foot = 12/39.37 meter or 1 foot = 0.304 800 609 6012 meter

Forward Overlap: 60% +/- 3%

Sidelap: 30% +/- 3%

Crab: <3 degrees

Tilt: < 4 degree

Acquisition Conditions: Aerial acquisitions will be conducted during local leaf-off conditions during the spring of 2009 and 2011 for the VBMP update years and subsequent off-years upon agreement and only on days when conditions are considered optimal for collection of imagery to be used in the production of the required orthoimages, notably:

- Sun angle is 30° or greater from the horizon
- Acquisition area is free of snow, smoke, haze, and fog
- Leaf-off conditions
- Streams are within their normal banks
- Conditions are considered nominally cloud free

If snow is present on the ground, we will direct our aircraft to other areas of the project where conditions both on the ground and in the air are considered optimal. ***Note the client will have the final say as to when to stop flying due to leaf conditions.***

Airspace: Contractor will be responsible for identifying any areas of restricted airspace that may impact the data acquisition and coordinating flights with the proper authorities and agencies.

The commencement of the above project activity or work package is hereby authorized, to begin on February 1, 2008.

Remarks or special issues to be addressed:

Acquisition Coordination: Contractor will be responsible for coordinating the activities of all acquisition subcontractors, and will coordinate base station surveys and maintenance with the teams lead survey company. Note all flight crews will report acquisition progress status to the project manager on a daily basis, which will include electronic delivery of the flight log data for each mission within 24 hrs of collection.

Project tracking/reporting: A weekly status report will be prepared by the project manager and delivered to VGIN.

Consistency: Contractor will ensure that all aerial acquisition team members follow the same file naming conventions and reporting structure (format, content and frequency).

AEROTRIANGULATION

- Aerotriangulation**

Process: Sanborn will use as many existing ground control points as necessary to complete the digital aerial triangulation solution to the specification required. Below is a chart for each flight year and respective resolution that depicts the number of available control points and the estimated amount that will be utilized for each DAT block. Sanborn will perform self-calibration not to exceed seven jurisdictions at no additional fee. The aerotriangulation adjustment will be re-run one additional time using self-calibration parameters for each of the seven jurisdictions (if selected).

VGIN 2009 AT				
1-ft	Exposures*	Available GCPs	AT GCPs	Base Stations
Block 1	6100	253	122	2
Block 2	6200	537	124	5
Block 3	1780	38	36	1
Block 4	5340	250	107	3
Block 5	5350	350	107	2
Block 6	4070	328	81	4
2-ft	Exposures*	Available GCPs	AT GCPs	Base Stations
Block 1	3300	810	26	7
Block 2	2680	635	21	5
Block 3	1030	326	8	4
Block 4	580	38	5	1
VGIN 2011 AT				
1-ft	Exposures*	Available GCPs	AT GCPs	Base Stations
Block 1	1674	46	33	1
Block 2	4636	119	93	1
Block 3	3501	153	70	1
Block 4	6723	320	134	2
Block 5	5583	209	112	2
Block 6	2625	52	53	1
Block 7	2201	130	44	1
2-ft	Exposures*	Available GCPs	AT GCPs	Base Stations
Block 1	467	46	4	1
Block 2	1133	119	9	1
Block 3	1200	153	10	1
Block 4	1477	320	12	2
Block 5	1446	209	12	2
Block 6	718	52	6	1
Block 7	600	130	5	1

*exposure counts are approximate based on preliminary flight plans using the tile grids provided in RFP_DATA2.zip file.

Aerotriangulation Report

A final aerial triangulation report shall be compiled for the AT blocks and shall include the following information:

- Control and Flight Line Indexes (digital)
- Flight lines
- All control points and tie points appropriately labeled with station designations
 - All ground control points not used will be identified and reported to prior to their being rejected and not used in the AT solution for the block.
- Aerotriangulation Results

(RFP) Film Based AT Performance Measures	Matching Digital Imagery Performance Measures
Accuracy of image observations	$\sigma_0 \leq 3 \mu m$
RMSE in x,y at check points μ_x and $\mu_y \cong 2.0$ to $2.5 \sigma_0 * s$ Where s is the scale RF	0.6 Pixel (for 6" GSD Imagery) 0.6 Pixel (for 12" GSD imagery) 0.6 Pixel (for 24"GSD imagery)
RMSEz in height at check points $\mu_z \cong 0.1'$ per 1000' of flying height (FH)	0.7 Pixel (for 6" GSD imagery) 0.7 Pixel (for 12" GSD imagery) 0.7 Pixel (for 24" GSD imagery)
μ_x and $\mu_y < 5 \mu m$ as RMSE residuals at the automatic image points	0.24 Pixel (for 6" GSD Imagery) 0.24 Pixel (for 12" GSD imagery) 0.24 Pixel (for 24"GSD imagery)
	0.4 Pixel (for 12" GSD imagery) 0.4 Pixel (for 24"GSD imagery)

Horizontal control: The horizontal control adjustment will be in NAD 83/93 (HARN) reference datum

Vertical control: The vertical control will be NAVD 88 reference datum maintained by the NGS

General horizontal datum: There are two State Plane Coordinates System (SPCS) zones in Virginia; North and South.

Project units: US Survey Feet

Conversion: 1 foot = 12/39.37 meter or 1 foot = 0.304 800 609 6012 meter

Product specifications: Block AT results and final reports

Deliverable items:

Quantity	File Content	Media
1	Aerotriangulation Report per AT Block (digital reports)	DVD's
1	Aerotriangulation Results: <ul style="list-style-type: none">○ Adjusted control points, pass points, and residuals in the NAD83/93 SPCS coordinate system with NAVD88 elevations○ Standard deviation of the adjusted control point and pass point measurements○ Camera focal length used in adjustment and Calibration Report.	DVD

COMPILATION – BASE TOPO DTM

Specific Activity or Work Package:

Base Topo DTM: Base topographic digital terrain model (DTM) will meet the minimum requirement for all scales of the Virginia Base Mapping photography at orthoimagery resolutions of 2', 1' or 6". This DTM product includes the minimum amount of mass points and breaklines necessary to support the horizontal accuracy of the digital orthophotography. The mass points and breaklines generated for this DTM product will be accurately digitized in 3D, and will be on the ground, and will have a point spacing density sufficient for producing orthos at the specified GSD.

Note this DTM will not be of sufficient point density to generate accurate contours

Expected RMSEz accuracies for Base Topo DTM and Hydro Enforced DTM:

DMC Ground Sample Distance		
GSD	Flight Height	Expected RMSEz
0.5'	4650'	0.33 feet
1.0'	9300'	0.66 feet
2.0'	18600'	1.32 feet

Stereopairs: stereopairs, generated from the 2', 1' and 6" GSD imagery will be utilized for compiling the minimal breaklines and mass points depending on the base ortho option selected. .

Project Area: DTM data will be produced on a per AT block/per tile basis

Horizontal control: The horizontal control adjustment will be in NAD 83/93 (HARN) reference datum

Vertical control: The vertical control will be NAVD 88 reference datum maintained by the NGS

Project units: US Survey Feet

Conversion: 1 foot = 12/39.37 meter or 1 foot = 0.304 800 609 6012 meter

Deliverables: Microstation DGN files will follow the mutually agreed upon DTM schema.

ESRI shapefile coverage of all bridge polygons along with appropriate FGDC compliant Metadata

Media: All digital data deliverables will be written to DVD

Additional Information:

Remarks or special issues to be addressed:

Project tracking/reporting: A weekly status report will be prepared by the project manager and delivered to VGIN.

COMPILATION – CONTOUR DTM

Specific Activity or Work Package:

Contour DTM: This option will utilize the Base Topo DTM, which will be further densified with additional mass points and breaklines sufficient to generate accurate contours at the selected map scale. Breaklines captured along water features will be topologically structured and hydrologically corrected for a positive high-to-low stream flow. The contours delivered for this product (2' or 4' based on selected map scale) will meet both NSSDA vertical accuracy specifications and FEMA contour specifications. All hydrological features such as streams, ponds, lakes, river banks, dam and associated structures, etc. data should be topologically corrected and structured and will be delivered in the contour DTM.

Map Product	Ortho Resolution	Individual Mass Point & Breakline Points Vertical Accuracy RMSEz (NSSDA at 95%)	Overall Contour Vertical Accuracy (NSSDA at 95%)	Contour Products To Be Generated
DTM suitable for orthorectification and includes contour generation	1'	1.3'	2.6'	Generation of 4' contours that will meet NSSDA and FEMA accuracy specification for 4' contour intervals
DTM suitable for orthorectification and includes contour generation	6"	0.65'	1.3'	Generation of 2' contours that will meet NSSDA and FEMA accuracy specification for 2' contours

Stereopairs: stereopairs, generated from the 1' and 6" GSD imagery will be utilized for compiling the breaklines and mass points.

Project Area: DTM data will be produced on a per AT block/per tile basis

Horizontal control: The horizontal control adjustment will be in NAD 83/93 (HARN) reference datum

Vertical control: The vertical control will be NAVD 88 reference datum maintained by the NGS

Project units: US Survey Feet

Conversion: 1 foot = 12/39.37 meter or 1 foot = 0.304 800 609 6012 meter

Deliverables: Microstation DGN files will follow the mutually agreed upon DTM schema.ESRI shapefile coverage of all bridge polygons along with appropriate FGDC compliant Metadata

Media: All digital data deliverables will be written to DVD

Additional Information: This work authorization will be updated by the project manager as task orders for this specific service are received.

Remarks or special issues to be addressed:

Project tracking/reporting: A weekly status report will be prepared by the project manager and delivered to VGIN.

Quality control: Contractor established ISO9001/2000 documentation and procedures pertaining to this service will be adhered to by all contract personnel

CONTOUR GENERATION

Specific Activity or Work Package: contour generation at either 2’ or 4’ contour intervals

Terrain Surface: The terrain surface that will be used to generate the contours for this service will be the “Hydro-enforced Contour DTM”. All hydrological feature data should be topologically corrected and structured and will be delivered in the contour DTM.

Project Area: Contours will be generated on a task order/project area basis (county/city level)

Horizontal control: The horizontal control adjustment will be in NAD 83/93 (HARN) reference datum

Vertical control: The vertical control will be NAVD 88 reference datum maintained by the NGS

Project units: US Survey Feet

Conversion: 1 foot = 12/39.37 meter or 1 foot = 0.304 800 609 6012 meter

Contour Interval:

Contour Products To Be Generated	Ortho Resolution	Individual Mass Point & Breakline Vertical Accuracy RMSEz (NSSDA at 95%)	Overall Contour Vertical Accuracy z (NSSDA at 95%)
Generation of 4’ contours that will meet NSSDA and FEMA accuracy specification for 4’ contour intervals	1’	1.3’	2.6’
Generation of 2’ contours that will meet NSSDA and FEMA accuracy specification for 2’ contours	6”	0.65’	1.3’

Deliverables: ESRI shapefile coverage (levels: Index, Index Obscured, Intermediate, Intermediate Obscured), along with appropriate FGDC compliant Metadata

Media: All digital data deliverables will be written to DVD

Additional Information: This work authorization will be updated by the project manager as task orders for this specific service are received.

The commencement of the above project activity or work package is hereby

authorized, to begin on: TBD

Remarks or special issues to be addressed:

Project tracking/reporting: A weekly status report will be prepared by the project manager and delivered to VGIN.

Quality control: Contractor established ISO9001/2000 documentation and procedures pertaining to this service will be adhered to by their all personnel

Completion date: TBD

ORTHO

Specific Activity or Work Package:

Orthoimagery: Creation of 4-band (RGB,CIR) digital orthoimagery utilizing raw images from DMC camera, DTM data, and digital aerial triangulation results. The geometric accuracy of the digital orthoimagery within each state plane coordinate zone will meet the Virginia Base Mapping standards for 1"=100' and 1"=200' scale mapping and reported according to the NSSDA standard at 95% confidence level. Thus, the limiting RMSE in x, y coordinates is 2' and 1' for 1"=200' scale and 1"=100' scale mapping, respectively.

Terrain surface: Based on the option selected, and timing of when terrain option selected, there will be two different types, Base Topo DTM and/or Hydro-enforced Contour DTM surface data generated and used for development of digital orthoimagery.

Horizontal control: The horizontal control adjustment will be in NAD 83/93 (HARN) reference datum

Vertical control: The vertical control will be NAVD 88 reference datum maintained by the NGS

General horizontal datum: There are two State Plane Coordinates System (SPCS) zones in Virginia; North and South.

Project units: US Survey Feet

Conversion: 1 foot = 12/39.37 meter or 1 foot = 0.304 800 609 6012 meter

Product specifications: Each counted tile shall be of a single consistent resolution. In some cases there will be duplication of areas by tiles due to overlap between areas of different resolution. Overlap is required along the line separating the North and South SPCS zones. Each tile that overlaps into neighboring counties of different State Plane zones must be produced twice, once for the North Zone and once for the South Zone. If a full grid tile provides less than 2,000 feet for 2' GSD of orthoimagery overlap between two zones, an additional full grid tile shall be processed to provide a minimum of 2,000 feet. If a full grid tile provides less than 1,000 feet for 1' GSD of orthoimagery overlap between the two zones, an additional full grid tile or tiles shall be processed to provide a minimum of 1,000 feet. If a full grid tile provides less than 500' for 6" GSD of orthoimagery overlap between the two zones, an additional full grid tile or tiles shall be processed to provide a minimum of 500 feet of overlap on each side of the State Plane boundary.

Image radiometry: The digital orthoimagery will be radiometrically correct and match seamlessly. The goal is to produce digital imagery of nominally consistent tone and contrast throughout the state, as well as within single images. There shall be no areas of an orthophoto where orthophoto process is incomplete due to incomplete data (i.e., lack of DEM data, image gaps, etc.)

Image Rectification Algorithm: Image rectification shall be carried out using either cubic convolution or better algorithm

a. Tile Configuration	2-foot resolution 10,000'x10,000' 1-foot resolution 5,000'x5,000' 6-inch resolution 2,500'x2,500'
b. Content	Neat line to tile grid.
c. Orientation	To Existing VBMP Ortho Grid from 2006/07 (Virginia State Plane Grid North and South).
d. Format	Sanborn will deliver each final orthoimage tile in GeoTIFF file format and a MrSID or JPG2000 compressed format. The exact compression parameters will be finalized in consultation between VGIN and Sanborn. Sanborn understands the jurisdiction delivery requirements and will provide all deliverables as stated in the RFP. We will provide the jurisdiction data in packets that are labeled on a county basis and will be formatted and ship to facilitate ease in distribution.

VGIN will provide a desired naming convention for all tiles. This naming convention is to be followed for all deliverable tiles.

Image mosaicking: Mosaicking shall be accomplished using both automated and interactive (manual) methods.

Frame mosaicking and feathering: Mosaicking will be used to create a seamless image of the entire project area and to minimize any visual edge lines of adjacent orthos due to tonal variations. The mosaicked edge line between adjacent orthos shall be chosen so as to minimize the obtrusiveness of the edge line itself. If feathering (a process used on the join between two adjacent orthos to help reduce the difference in tone and contrast between the adjacent orthos) is used along the edge line, it shall not result in any noticeable image degradation such as image blurring or double imagery. Edge mosaicking and feathering shall not affect the positional accuracy of the orthos

Pilot Project Areas: pilot projects consisting of 1 or 2 contiguous tiles will be generated, for both the 2' or 1' and 6" GSD orthos, in each of the following areas. The pilot tiles will be perpendicular to the acquisition flight:

- i) Pilots to be produced in the following main areas: Mountain, Piedmont and Coastal
- ii) There will be one urban pilot produced for both the 1' and 6" GSD imagery
- iii) Within each main area there will be four sub pilots produced: rural, water, forest, agricultural

Note the total number of pilot areas may be reduced should more than one land cover criteria appear in a given tile.

The main purpose of the pilot areas is to determine acceptable radiometry. Radiometry characteristics shall be determined jointly through consultations between the Contactor and VGIN. Once the optimal characteristics have been approved by VGIN, all other images shall be radiometrically balanced to have a similar overall appearance to the greatest extent possible based upon the terrain and ground cover.

Ortho Geometric Accuracy: The digital orthoimagery within each state plane coordinate zone shall be seamless. The imagery will be geometrically correct. The geometric accuracy as per NSSDA reporting standards at 95% confidence level is defined as:

Accuracy $r = 1.73 \times \text{RMSE}_r$, where RMSE_r is root mean square error in x and y coordinates at well defined check points. The limiting RMSE in x, y coordinates is 2' and 1' for 1"=200' scale and 1"=100' scale mapping, respectively, as per Virginia State Mapping standards. The RMSE errors are cumulative process errors including of ground surveys, map compilation and extraction of ground dimensions from the map. The orthoimagery compilation of final image map, however, is all digital processing unlike a conventional paper map. The extraction of the ground dimensions shall be from the digital orthoimagery instead of paper map eliminating errors of extraction from paper map.

General appearance and characteristics of the ortho imagery shall conform to the specifications set forth in the "VBMP 2008 Orthophotography Project, Acceptance Criteria for Associated Professional Services and Products".

Contractor shall ensure imagery is quality controlled at all stages and be free from distortions at bridges/interchanges, edge matched, and to the extent practical free from double image 'ghosting' effect at the mosaicking edges, and is sharp without blurring effect.

File compression: Statewide coverage of digital ortho imagery compressed in MrSID or JPG2000 format at 18:1 by tile

Null pixels: Null pixel will be assign a gray value of 255 or white color

Pixel origin: 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. World file coordinates will be expressed to at least 2 significant digits.

VGIN will provide a desired naming convention for all tiles. This naming convention is to be followed for all deliverable tiles.

PLANIMETRY, BUILDING POLYGONS

Specific Activity or Work Package:

Optional Planimetric Building Polygons:

- For 1"=200' or (1:2400) scale source mapping (1' GSD imagery): all structures with roofs having an aerial coverage of 200 square feet or greater will be captured from the photography as a polygon. Buildings will be delineated by tracing the apparent edge of the roofline for dwellings, businesses, houses, barns. Where appropriate, buildings will be squared at the corners so that the corners are orthogonal and within the established mapping accuracy tolerance for 1"=200' (1:2400) scale mapping. Buildings smaller than the minimum square size will be collected as points and delivered. Data collection will be done in 3D. The compiled data will have the elevation of the roof line.
- For 1"=100' or (1:1200) source scale mapping (6" GSD imagery): all structures with roofs having an aerial coverage of 100 square feet or greater will be captured from the photography as a polygon. Buildings will be delineated by tracing the apparent edge of the roofline for dwellings, businesses, houses, house trailers,

garages, barns, and accessory structures. Where appropriate, buildings will be squared at the corners so that the corners are orthogonal and within the established mapping accuracy tolerance for 1"=100' or (1:1200) scale mapping. Buildings smaller than the minimum square size will be collected as points and delivered. Data collection will be done in 3D. The compiled data will have the elevation of the roof line.

The commencement of the above project activity or work package is hereby authorized, to begin on: TBD

Remarks or special issues to be addressed:

Project tracking/reporting: A weekly status report will be prepared by the project manager and delivered to VGIN.

Quality control: Contractor established ISO9001/2000 documentation and procedures pertaining to this service will be adhered to by their all personnel

Completion date: TBD

APPENDIX:

A. Added-Value Services

An online web based system will be used to order upgrades for the 2009-2012 VBMP update program. The site will have security and provide an administrator to coordinate with VGIN regarding security. The site will have the following basic functions:

- Quickly zoom to area and define area of interest
- Merge existing shp files, boundaries, etc.
- Choose production options
- Review pricing
- Submit order
- Check out

B. Program Marketing Expertise

Proactive approach to the marketing plan in order to achieve and maintain participant levels across the Commonwealth for the duration of the project, which includes:

- ◆ **Seminars**—We understand the time-consuming coordination required to encourage participation. Therefore, Sanborn, in conjunction with VGIN, will conduct educational marketing seminars across the Commonwealth in order to generate participation from as many partners as possible.

To compliment the seminars, Sanborn will also provide:

- ◆ Mass mailing to potential partners
- ◆ Informational and interactive 2009-2012 VBMP participation web site
- ◆ Presence at local and regional conferences

Our intent is to complete the web site, mass mailing and seminars within two months of contract execution. Details on this approach can be found below.

1. Educational Marketing Seminars

Sanborn, in conjunction with VGIN, will conduct five (5) educational marketing seminars across the Commonwealth in order to reach all potential participants and inform them about their options under the program. The seminars will cover not only the base 2009-2012 VBMP, but also specific products that can be generated from the proposed flight, including LiDAR, impervious surfaces, land use/land cover maps, forest classification, contours, oblique imagery, 3D visualization, data hosting, and online quality control.

In addition, we will reach out to potential partners in the western part of the Commonwealth, who are not scheduled to be flown until 2011, in order to advise them that they can, under certain conditions, bring their schedule flight window forward to 2009 or 2010. For example, Montgomery, Blacksburg and Christiansburg Counties, as well as Virginia Tech are planning a 2009 flight, and we will encourage them to participate in this program.

Sanborn, in conjunction with VGIN, will ensure that all potential parties are invited formally to their respective seminar via U.S. mail and email (formal invitation and program overview included) at least two weeks before each seminar. Sanborn already has an extensive mailing list of additional potential partners, including utility companies and engineering firms, and we will use this list to supplement VGIN's list of current partners. We will follow up on each invitation with phone calls at least one week prior to the seminar to ensure maximum participation.

- a) Invitations
- b) Dates and Locations
- c) Duration and Agenda

The seminars will last for approximately two hours and will be conducted by Sanborn industry experts who will be able to answer any questions that may be asked. The seminars will be free to participants and refreshments will be provided. A sample agenda will be as follows:

- ◆ Introduction
- ◆ Explanation of the 2009-2012 VBMP
- ◆ Benefits of participation
- ◆ Details of available options
- ◆ Ordering process
- ◆ Question and answer session

2. Mass Mailing

To compliment seminar invitations and the seminars themselves, we will first prepare comprehensive 2009-2012 VBMP informational packets to send to all potential stakeholders. Packets will include:

- ◆ Base program product sheets which include specification and acceptance criteria
- ◆ A list of all available potential options with a brief overview and examples
- ◆ Seminar invitation
- ◆ Example cost sharing breakdown to explain how the funding from different government levels works, and to show the cost savings to each participant
- ◆ Program overview schedule to help establish client expectations regarding product delivery
- ◆ DVD with data samples and various formats

- ◆ Instructions on how to place an order
- ◆ Response sheet to request an onsite visit by Sanborn/VGIN
- ◆ Calendar of upcoming seminars/meetings throughout the project area where Sanborn will be in attendance
- ◆ Link to comprehensive program web site (see below)
- ◆ Other items as identified by VGIN and Sanborn

3. Program Web Site

In addition to the mass mailing, we will also complement seminar invitations and the seminars themselves by developing a comprehensive 2009-2012 VBMP project web site. The web address and benefits of the site will be addressed in both the mass mailings and the seminars.

The web site will include:

- ◆ General 2009-2012 VBMP information, including participation overview and answers to frequently asked questions
- ◆ Online form to enroll in program or to request a site visit
- ◆ All forms for enrollment available for download in .pdf
- ◆ Online version of the mass mailing
- ◆ Seminar dates/locations and registration information
- ◆ Online data samples
- ◆ Online data review/QC once project begins
- ◆ Other items as identified by VGIN and Sanborn

C. Optional – Geospatial Services

1. Rapid Response

Rapid response requests will involve limited areas, short notice, and require rapid delivery of the deliverables. Our expectation is that they will typically be requested to support planning or emergency response activities related to natural or cultural events/disasters.

Our assumption is this option will not be used frequently. Specifications for Rapid Response orthoimagery include:

- ◆ 1-ft GSD natural color or infrared
- ◆ Use existing DTM data for orthorectification
- ◆ Deliver in relevant projection
- ◆ Horizontal accuracy of +/- 8 ft.
- ◆ Tile/mosaic extents to be determined based on project area
- ◆ GeoTIFF with world file deliverable
- ◆ Deliver raw imagery within 72 hrs. of flight
- ◆ Deliver orthoimagery within two (2) weeks of request

Our plan is to acquire the rapid response imagery using a digital camera. This will enable us to meet the rapid turn-around times and to deliver georeferenced imagery within 72 hours of flight acquisition. Final decisions on data acquisition will be dependent on timing, area, proximity of resources, and resource availability. Sanborn's production operations will assume full

responsibility for the orthorectification tasks. This will eliminate and potential delays associated with the use of subcontractors.

The Sanborn Team also has the ability to perform other rapid response services. This includes the acquisition and processing of LiDAR data, acquisition of satellite imagery through our business partners, and other mapping services.

2. Sanborn Online-Direct Access to Premium Data Distribution System

Sanborn Online provides spatially accurate, high-resolution geospatial imagery through an extensive, easy-to-use online library. Our comprehensive database allows anyone to search, view, and order imagery and other geospatial data through a convenient online store. With access to premium data, SanbornOnline subscribers can stream data directly into various mapping applications such as ESRI® ArcGIS, 3D viewers and enterprise-wide map applications.

Using Sanborn Online's ArcGIS plug-in, geographic information system (GIS) users can view and download imagery straight to their desktops. This flexible system is suitable for imagery orders by using their existing .shp files to cut out premium data.

Sanborn offers customers secure data management and web access solutions for organizing, searching and delivering data. Customized online business solutions provide a choice of customer-managed or Sanborn managed web distribution of GIS and data products. Hosted software and data removes the overhead of many IT issues related to system and database maintenance, allowing the customer to focus on use and access to data. Virtual Online owners can also make data available to others through an e-business capability.

D. Optional – Additional Geospatial Products

1. Land Cover Mapping

Sanborn has developed a semi-automated approach to producing impervious, land use and land cover datasets. This process was developed to rapidly produce consistent and accurate land use datasets and has been used for Anne Arundel County, Maryland, and the states of Rhode Island, Delaware and Massachusetts. We are also currently under contract with Price William County, Virginia to provide such data in support of its stormwater utility assessment fee.

The process generates an impervious dataset, labels the dataset with an urban land use type and then creates the land use polygon boundaries using a series of decision rules developed with the client. The impervious lands are classified using remote sensing approaches and then merged into the land use classes based on a hierarchical expert system. The resulting map is similar to that delineated by hand by photointerpreters but is consistent and easily updatable. The system can be designed to use ancillary data such as parcel dataset and previous land use classifications.

d) "Standard" Land Cover Datasets

Sanborn's Standard Land Cover uses the information from high-resolution imagery to create segments that can be automatically classified into land cover categories. Sanborn has produced this type of land cover for the State of Maine, three Counties in Kentucky and areas in Florida. This product lends itself well to an increase in resolution but maintaining a similar classification scheme to the National Land Cover Dataset (NLCD 2001) 30 m information. This dataset is appropriate to be used at a 1:24,000 scale, and is excellent for planning, assessing areas of land

cover and operational decision making. Although the standard product covers the 18 classes of the NLCD, additional classes are often added depending on the desired need for the stakeholders. As part of this product a 5 m impervious is created for the whole project area which provides an excellent data source for any type of urban growth or hydrologic modeling. A 2.4 m version of this product is also being produced for the State of Hawaii.

e) **Comprehensive Impervious and Vegetation**

Sanborn uses the ability of the computer to recognize impervious surfaces based on its color, texture, size, shape and pattern to produce its “Comprehensive” impervious and vegetation maps. Analysts train the computer to recognize different types of impervious surfaces and then direct the computer to find other areas that have similar characteristics or properties. Once the computer has identified areas automatically, an analyst manually edits any confusion, i.e. areas that appear to look like impervious surfaces but are not (i.e. baseball diamonds). Finally, the dataset is quality controlled and the accuracy is assessed. This approach is faster and more cost effective than the planimetric approach to impervious. Using this approach Sanborn has created statewide impervious datasets for Maine, Rhode Island, Massachusetts, and Delaware, in addition to numerous cities and counties throughout the United States.

Sanborn also produces land cover from the high resolution imagery. This can be used for many applications but one of the major demands is for assessing the quantity of canopy, non canopy vegetation, water, bare soil, and impervious in an area. This dataset is integrated into American Forests’ CITYgreen program (<http://www.americanforests.org/productsandpubs/citygreen/>) but can be used for any application interested in canopy and green space.

2. LiDAR

Sanborn offers three types of LiDAR products (as well as custom LiDAR services including software to manipulate the data) that can assist any client in determining which is most appropriate for a particular application. Our services include:

- ◆ Standard
- ◆ FEMA-Compliant
 - ❖ 1.0 meter average point spacing
 - ❖ 1.4 meter average point spacing
- ◆ High-Density
- ◆ Ground-Based

f) **Standard LiDAR**

Standard LiDAR products are used as a cost effective way to collect large-area projects in a time constrained environment. As a general use, Sanborn’s Standard LiDAR products meet most needs for LiDAR-based elevation models.

Typical uses for the dataset include:

- ◆ Generation of bare-earth elevation models in sparse to moderate vegetative terrain
- ◆ Large area elevation models where vertical and horizontal positional accuracy are paramount
- ◆ Watersheds and other hydro studies
- ◆ Tree canopy size analysis for fuels and fire models
- ◆ Building and manmade structure detection and 3-D modeling

The Sanborn Standard LiDAR product is furnished as a bare earth digital elevation model (DEM) and can be optionally upgraded to a digital terrain model (DTM) and/or contour product.

g) FEMA-Compliant LiDAR

As a FEMA Map Modernization specific product, Sanborn's FEMA-Compliant LiDAR product meets FEMA guidelines and specification for LiDAR-based elevation models. This product can be captured at 1 meter or 1.4 meter average point line spacing. Typical uses for the dataset include:

- ◆ FEMA Flood Plain Map Modernization programs
- ◆ DFIRM map updates
- ◆ Watersheds and other hydro studies per FEMA specifications
- ◆ County mapping programs
- ◆ Mapping programs that include accuracy verification, reporting and metadata
- ◆ Suitable for use in creation of 2-foot accurate contours
- ◆ Breaklining is optional

The Sanborn FEMA-Compliant LIDAR product is furnished as a bare earth digital elevation model (DEM) and can be optionally upgraded to a digital terrain model (DTM) and/or contour product. All data and products associated with contract deliverables will meet or exceed relevant NSSDA standards and fully comply with the FGDC metadata format standard. Deliverables will be submitted to customer in digital format according to requirements outlined in the FEMA guidelines, Appendix A.

h) High-Density LiDAR

High-Density LiDAR is a project-specific, high accuracy and point concentrated data set. Sanborn's High-Density LiDAR products meet most needs for LiDAR-based elevation models in very dense vegetation and terrain constrained areas. Typical uses for the dataset include:

- ◆ Heavily vegetated project areas
- ◆ Remote and limited access project areas
- ◆ Land development, transportation and other corridor projects
- ◆ County mapping projects requiring sub-meter point postings
- ◆ Terrain, forestry, and volumetric analysis
- ◆ Utility and pipeline mapping projects
- ◆ Change detection and 3-D modeling in dense urban areas
- ◆ Breaklining is optional

Sanborn High-Density LiDAR has been used in a variety of mapping applications and has grown dramatically as a result of advanced technology. The increased sample density has improved the statistical probability of more accurately defining a surface model and mapped structures. This product is delivered as a file of first returns, last returns, intensity, and bare earth digital elevation model (DEM), and can be optionally upgraded to a digital terrain model (DTM) and/or contour product. Sanborn is also a user and reseller of most of the major LiDAR viewing and editing software packages, and can provide these to VGIN.

3. Ground-Based LiDAR

Sanborn uses ground-based LiDAR for high-definition, high-accuracy mapping of any surface achieving 3cm to 5cm vertical accuracy with post intervals between 2in and 3in that can be used for transportation design, topographic mapping and asset management. Sanborn owns one (1) Trimble GX Advanced Static Terrestrial LiDAR (STL) systems for raw point cloud collection. Sanborn also operates an Applanix Landmark DTL for more rapid and large collection in a mobile environment. This method can collect approximately 500,000 points per second and can be driven as fast as 70 miles per hour. This method is highly accurate and can provide accuracies around 0.100m or better. It also can be equipped to collect video and/or 360 degree video. Assets such as cabling, signage, signals, etc can be extracted from the combination of the video and the LiDAR data. Traditional methods of data acquisition, like manual cataloging of assets, closing roadways to assess pavement condition, are more expensive than mobile mapping when considering the cost of labor and processing data. Combining kinematic GPS, Inertial Measuring Device (IMU), stereo imagery, video, and LiDAR collection provides very robust datasets. The data can be delivered in many image, GIS and CAD formats. The LANDMark system integrates with Sanborn's traditional LiDAR and image workflow. The LiDAR data can then be used for further feature extraction and surface generation.

4. Forestry Applications

Sanborn's Solutions Division has had a long relationship with the forestry and natural resource sector. Many of our analysts have advanced degrees in forestry and resource management. As a result, Sanborn can offer many solutions to this sector, including supporting the range of activities from imagery and LiDAR collection through to enterprise forest management systems (FMS).

Specific services that Sanborn can offer are

- ◆ Statewide stratified inventory and ecosystem mapping
- ◆ Ecological system mapping (GAP level of detail) and regional map updates
- ◆ Forest stand delineation and mapping to forest types
- ◆ State forest stratified inventory
- ◆ Stand inventory
- ◆ Biomass and habitat mapping
- ◆ Field data collection using real-time inventory mapping
- ◆ Software development for data input, query, mapping and reporting
- ◆ Software development to support forest inventory business processes
- ◆ Inventory redesign and improvement using new technologies
- ◆ Growth and yield modeling
- ◆ Endangered species modeling

Sanborn is also a leader in wildfire fuels mapping for surface and canopy fuels and is the designer of the Wildfire Risk Assessment System that is currently being used by the southern U.S. states.

5. Oblique Imagery

For the VBMP project we can provide Pictometry oblique aerial imagery in addition to the vertical orthoimagery. The imagery can be acquired for specific areas of interest. In addition to providing the oblique imagery, software visualization tools can be provided that will allow for integration of the accurate orthoimagery with the oblique photography.

Attachment 1 to Exhibit B: Statement of Work Clarifications

- Regarding Acceptance and Acceptance testing as described in Section 2.A. of the Contract, for the sake of clarity and the avoidance of doubt, all options or buy-ups purchased by the Authorized Users shall be subject to the terms and conditions of the Exhibits to the Contract, including the Acceptance Criteria as defined in Exhibit G.
- Regarding Termination as described in Section 3.E. of the Contract, for the sake of clarity and the avoidance of doubt, work in progress shall be pro-rated based on the percentage of Performance that has been determined to be complete based on agreed upon Acceptance Criteria and Acceptance by the Authorized User, which shall be paid to Supplier within thirty (30) days of Supplier's submission of a valid final invoice.
- Regarding Services and any applicable SOW as described in Section 4.B. of the Contract, for the sake of clarity and the avoidance of doubt, Supplier shall not be obligated to commence any work unless and until funding has been obligated to this project.
- Regarding Subcontractors as described in Section 7.D. of the Contract, for the sake of clarity and the avoidance of doubt, Sanborn shall identify any subcontractors that it intends to utilize that are not already identified in Sanborn's Proposal in writing for authorization, such authorization which shall not be unreasonably withheld.
- Regarding Warranty as described in Section 4: Appendix of Sanborn's Proposal, for the sake of clarity and the avoidance of doubt, the following VBMP Warranty and Warranty Procedures apply:

VBMP Warranty and Warranty Procedures

As with the 2006/2007 contract, Sanborn warrants the delivered products to VGIN for 24 months (2 years) following delivery to VGIN. Sanborn will repair or replace any products that are not in compliance with project specifications. Repair or replacement is determined by Sanborn.

The warranty provided by Sanborn is based on the product conforming to mutually agreeable acceptance criteria that will be established by Sanborn and VGIN governing the review of the delivered products.

1. All reviews/data inspections are to be performed at the map scale specified for the delivered product. All image quality reviews are to be performed at not greater than a 1.2:1 zoom level of the specification for the delivered product. Sanborn is not responsible for any anomalies or imperfections apparent at higher levels of zoom.
2. All alignments, seams, etc. will meet the specification as agreed to with VGIN.
3. Accuracy measurements will conform to the standard as specified for the specific delivered product and conform to the mutually agreed to acceptance criteria. Most accuracy measurements are the result of sampling and allow for outlying points, therefore a photogrammetric methodology must be undertaken to perform accurate assessments. Only clearly defined points can be used in this process. The criteria only apply to unambiguous measurements on clearly defined features. VGIN or VGIN representatives will perform the photogrammetric measuring procedures as

appropriate. These measurements will be verified by Sanborn for any deficient products.

4. Radiometry/Color balancing is often subjective. Sanborn only warrants the imagery will meet the radiometry specification agreed to with VGIN for the imagery region identified with VGIN.

If a recipient or user of the Sanborn delivered products to VGIN believes that a product does not meet the project specifications, and has evaluated the product against the Acceptance Criteria, they may submit a request for review. A determination should be made of the specific non-compliance by checking the questionable characteristic against the acceptance criteria before submitting a claim against the warranty. Submissions should include complete information, including tile name, location within tile, nature of the problem and the relationship to the acceptance criteria. A screen shot (jpg or bmp) is also helpful.

The request for review should be sent by email to VGIN@sanborn.com or by mail to VGIN Warranty, c/o Sanborn Map Company, 1935 Jamboree Drive, Colorado Springs, CO, 80920. Sanborn will review the information provided and the product. If Sanborn agrees, repair or replacement will occur within 30 days. If Sanborn, the claim will be sent to VGIN for mediation.

SANBORN MAKES OR PROVIDES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY, INTEGRATION, TITLE AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL SANBORN BE LIABLE, WHETHER IN CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, FOR ANY INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES.

RFP 2009-03 Pricing Submittal Virginia Based Mapping Program EXHIBIT D

TILE COST SHEETS

State Acquisition Options

Option 1: one-foot resolution, statewide, with six-inch resolution upgrade option for local areas. **A minimum order of 25 contiguous tiles are required for the upgrade during the base years (2009 and 2011).**

Cost per tile – Statewide 1-foot

		Cost per 5,000' x 5,000' tile
1.	one-foot resolution tile	\$60.00

Cost per tile – Upgrade Option – 6-inch resolution (0.5 Foot GSD)

	Tile Range - Number of tiles per price/cost*	Cost per 2,500' x 2,500' tile
1.	Any tile range	\$64.50
2.		\$
3.		\$
4.		\$
5.		\$

* Suppliers must list the range of tiles (by number) to which the costs in each row apply (e.g. 1-500, 500-5000, 5000 or greater).

Option 2: two-foot resolution, statewide, with one foot and six-inch resolution upgrade options for local areas. **A minimum order of 25 contiguous tiles are required for the upgrade during the base years (2009 and 2011).**

Cost per tile – Statewide two-foot

		Cost per 10,000' x 10,000' tile
1.	two-foot resolution tile	\$72.89

Cost per tile – Upgrade Option – one-foot resolution (One-Foot GSD)

	Tile Range - Number of tiles per price/cost*	Cost per 5,000' x 5,000' tile
1.	Any tile range	\$60.00
2.		\$
3.		\$
4.		\$
5.		\$

Cost per tile – Upgrade Option – six-inch resolution (0.5-Foot GSD)

	Tile Range - Number of tiles per price/cost*	Cost per 2,500' x 2,500' tile
--	--	-------------------------------

1.	Any tile range	\$64.50
2.		\$
3.		\$
4.		\$
5.		\$

* Offerors must list the range of tiles (by number) to which the costs in each row apply (e.g. 1-500, 500-5000, 5000 or greater).

Cost Increase and Decrease Factors

Suppliers shall submit cost increase and cost decrease factors for the 2009-2012 orthophotography project as described below. These factors should be expressed as a percentage of overall project cost.

Cost Increase Factors

Increase Factor 1: Statewide Hydro-Enforced DTM

VITA/VGIN requests that each Supplier submit a cost increase factor for completing all DTMs to meet the hydro-enforced standard as described in Section 5.4.b of this RFP. This increase factor should take into account the existing 2006 and 2007 DTMs that have already been developed at this standard. Whenever possible, the existing hydro-enforced DTMs should be updated and improved upon which is expected to result in a cost savings for this option. VITA/VGIN will be providing an ESRI personal geodatabase feature class of 2006 and 2007 tiles which will identify existing hydro-enforced DTMs.

% Cost Increase

20%

Increase Factor 2: Processing of Infrared Band

Supplier shall submit a cost increase factor for processing the infrared band for each image which would be included in the delivery of a final product with 4 bands. It is expected that this additional band will be collected during acquisition as stated in Section 5.1.a of this RFP.

% Cost Increase

0%

Cost Decrease Factors

Decrease Factor 1: No Delivery of Compressed Imagery Product

VITA/VGIN requests that each Supplier shall submit a cost decrease factor for delivery of GeoTiff files only. It is expected that removing the delivery of MrSID or JPG2000 files would result in some cost savings for the Commonwealth.

% Cost Decrease

0%

Decrease Factor 2: Use of Existing DTM

VITA/VGIN requests that each Supplier submit a cost decrease factor for using existing 2006 and 2007 DTMs as described in Section 5.4 of this RFP. Existing DTM data will be provided to each Supplier for evaluation as requested.

% Cost Decrease

0%

Decrease Factor 3: Use of Existing Ground Control Information

VITA/VGIN requests that each submit a cost decrease factor for using documented ground control information from the 2006/2007 project. Existing ground control information will be provided to each Supplier as requested.

% Cost Decrease

0%

Additional Upgrade Options

Additional Option One - Four-Foot Contours

(Source: one-foot resolution orthophotos with hydro-enforced DTMs)

	Tile Range - Number of tiles per price/cost*	Cost per 5,000' x 5,000' tile	Alternative unit of measure
1.	Any tile range	\$27.20	\$
2.		\$	\$
3.		\$	\$
4.		\$	\$
5.		\$	\$

* Suppliers must list the range of tiles (by number) to which the costs in each row apply (e.g. 1-500, 500-5000, 5000 or greater).

Additional Option 2 – Two-Foot Contours

(Source: Six-inch resolution orthophotos with hydro-enforced DTMs)

	Tile Range - Number of tiles per price/cost*	Cost per 2,500' x 2,500' tile	Alternative unit of measure
1.	Any tile range	\$13.60	\$
2.		\$	\$
3.		\$	\$
4.		\$	\$
5.		\$	\$

* Suppliers must list the range of tiles (by number) to which the costs in each row apply (e.g. 1-500, 500-5000, 5000 or greater).

Additional Option 3 - Structure Planimetrics

200 Scale: derived from *one-foot* resolution orthophotos to include structures with roofs having an aerial coverage of *200* square feet or greater

100 Scale: derived from *six-inch* resolution orthophotos to include structures with roofs having an aerial coverage of *100* square feet or greater

Additional Option 3 - Structure Planimetrics-price by jurisdiction

Structure Planimetrics by Jurisdiction (100 Scale 200 Scale)

Accomack	\$ 13,417.00
Albermarle	\$ 30,247.00
Alleghany	\$ 5,705.00
Amelia	\$ 4,066.00
Amherst	\$ 10,902.00
Appomatox	\$ 4,743.00
Arlington	\$ 63,448.00
Augusta	\$ 23,445.00
Bath	\$ 1,699.00
Bedford	\$ 21,745.00
Bland	\$ 2,397.00
Botetourt	\$ 10,833.00
Brunswick	\$ 6,202.00
Buchanan	\$ 8,590.00
Buckingham	\$ 5,426.00
Campbell	\$ 17,623.00
Caroline	\$ 8,188.00
Carroll	\$ 10,055.00
Charles City	\$ 2,427.00
Charlotte	\$ 4,231.00
Chesterfield	\$ 96,451.00
Clark	\$ 4,722.00
Craig	\$ 1,751.00
Culpeper	\$ 13,701.00
Cumberland	\$ 3,128.00
Dickenson	\$ 5,514.00
Dinwiddie	\$ 8,581.00
Essex	\$ 3,524.00
Fairfax	\$ 341,985.00
Fauquier	\$ 21,564.00
Floyd	\$ 4,930.00

Fluvania	\$ 8,060.00
Franklin	\$ 16,991.00
Frederick	\$ 22,708.00
Giles	\$ 5,791.00
Gloucester	\$ 12,702.00
Goochland	\$ 6,393.00
Grayson	\$ 5,621.00
Greene	\$ 5,803.00
Greenville	\$ 3,919.00
Halifax	\$ 12,396.00
Hanover	\$ 32,745.00
Henrico	\$ 94,254.00
Henry	\$ 19,411.00
Highland	\$ 846.00
Isle of Wight	\$ 11,172.00
James City	\$ 18,921.00
King & Queen	\$ 2,309.00
King George	\$ 6,598.00
King William	\$ 4,886.00
Lancaster	\$ 4,101.00
Lee	\$ 8,129.00
Loudoun	\$ 81,530.00
Louisa	\$ 9,818.00
Lunenburg	\$ 4,460.00
Madison	\$ 4,477.00
Matthews	\$ 3,145.00
Mecklenburg	\$ 11,077.00
Middlesex	\$ 3,575.00
Montgomery	\$ 28,622.00
Nelson	\$ 5,080.00
New Kent	\$ 5,301.00
Northampton	\$ 4,535.00
Northumberland	\$ 6,807.00
Nottoway	\$ 5,326.00
Orange	\$ 9,876.00
Page	\$ 8,089.00
Patrick	\$ 6,558.00
Pittsylvania	\$ 21,051.00
Powhatan	\$ 8,817.00
Pr. Edward	\$ 6,929.00
Prince George	\$ 11,697.00
Prince William	\$ 114,745.00
Pulaski	\$ 11,983.00
Rappahanock	\$ 2,444.00
Richmond	\$ 3,064.00
Roanoke	\$ 29,890.00
Rockbridge	\$ 7,187.00
Rockingham	\$ 23,937.00
Russell	\$ 9,849.00
Scott	\$ 7,834.00

Shenandoah	\$ 12,965.00
Smyth	\$ 11,092.00
Southampton	\$ 5,994.00
Spotsylvania	\$ 38,130.00
Stafford	\$ 39,129.00
Surry	\$ 2,376.00
Sussex	\$ 4,061.00
Tazewell	\$ 15,256.00
Warren	\$ 11,719.00
Washington	\$ 17,737.00
Westmoreland	\$ 5,808.00
Wise	\$ 14,230.00
Wythe	\$ 9,549.00
York	\$ 20,739.00
Alexandria City	\$ 56,561.00
Bedford City	\$ 2,748.00
Bristol City	\$ 7,635.00
Buena Vista City	\$ 2,748.00
Charlottesville city	\$ 16,149.00
Chesapeake city	\$ 94,731.00
Charles City	\$ 2,205.00
Colonial Heights city	\$ 7,725.00
Covington city,	\$ 2,760.00
Danville city	\$ 20,457.00
Emporia city	\$ 2,503.00
Fairfax City	\$ 9,733.00
Falls Church city	\$ 4,756.00
Franklin city	\$ 3,737.00
Fredericksburg city	\$ 9,025.00
Galax city	\$ 2,936.00
Hampton City	\$ 57,612.00
Harrisonburg city	\$ 16,210.00
Hopewell city	\$ 8,829.00
Lexington city,	\$ 2,727.00
Lynchburg city	\$ 25,631.00
Manassas city	\$ 14,848.00
Manassas Park city	\$ 4,546.00
Martinsville city	\$ 5,936.00
Newport News city	\$ 71,807.00
Norfolk city,	\$ 93,882.00
Norton city	\$ 1,481.00
Petersburg city	\$ 12,930.00
Poquoson city	\$ 4,618.00
Portsmouth city,	\$ 39,193.00
Radford city	\$ 5,830.00
Richmond city	\$ 75,984.00
Roanoke city	\$ 40,743.00
Salem city	\$ 10,741.00
Staunton city	\$ 10,517.00

Suffolk city	\$ 30,231.00
Virginia Beach city	\$ 173,722.00
Waynesboro city	\$ 9,156.00
Williamsburg city	\$ 5,058.00
Winchester city	\$ 10,931.00
Totals	\$2,704,249.00

Additional Option 4 - Other Planimetrics

Supplier is asked to submit pricing information on any other planimetric datasets that could be included as part of this contract. Pricing for these options should be listed in a format that is similar to the pricing for the structure planimetrics.

Sanborn is pleased to offer additional planimetric features. A detailed list by mapping scale is included. The feature content list contains the feature categories, capture rates stated by percentage and any minimum size or lengths that may apply.

Tiles that fall outside municipal boundaries are considered rural and meet the following density definition: urban is defined as greater than 600 buildings per sq. mile and rural as less than 600 buildings per sq. mile.

	Option - range	Cost / Tile
1.	Cost per 2,500' x 2,500' tile	\$340.00 / Tile
2.	Cost per 5,000' x 5,000' tile - Rural	\$276.00 / Tile
3.	Cost per 5,000' x 5,000' tile - Urban	\$907.00 / Tile

100 Scale Mapping-Feature Content List for 6-in. orthoimagery		
<i>Paved & UnPaved Surfaces</i>	<i>Capture Rate %</i>	<i>Minimum Size/Length</i>
Roads	95%	
Shoulders	90%	
Driveways	85%	
Parking	90%	10 car-400 sq. ft.
Alleys	95%	
Sidewalk-Private & Public	75%	
Trails	80%	
<i>Railroads</i>		
Railroad	90%	
Abandoned Railroad	90%	
Crossing	95%	
Roundhouse	99%	
<i>Structures</i>		
Buildings	92%	10x10 = 100 sq. ft.
Ruins	95%	10x10 = 100 sq. ft.
Decks>100 sq. ft.	90%	
Canopies >100 sq. ft.	90%	
Tanks	95%	
Propone Tanks	75%	
Silos	95%	
Bunkers	90%	
Foundations	95%	
Smokestacks	95%	

Water Towers	100%	
Pools (below ground)	95%	
Pools (above ground)	95%	
Windmill	99%	
<u>Barriers</u>		
Fences	80%	
Guard Rails	85%	
Walls	75%	
Retaining Walls	75%	
Rock Walls	75%	
<u>Utilities</u>		
Manholes	60%	
Catch basins	60%	
Fire hydrants	40%	
Traffic Signals	85%	
Traffic Signal Poles	85%	
Light Poles	85%	
Utility Poles	85%	
<u>Disturbed Areas</u>		
Pile	95.0%	
Construction site	95.0%	
Quarries	98.0%	
Open Mine	98.0%	
Rock Outcrop	85.0%	
Boulders	85.0%	
Disturbed Areas	95.0%	
<u>Water Features</u>		
Lakes	95.0%	> than 5 acres
Rivers	99.0%	
Streams/Creeks	95.0%	
Concrete Drain	90.0%	
Ponds	95.0%	
Reservoirs	95.0%	
Ditches	95.0%	
Marsh/Swamp	90.0%	
Beach	99.0%	
<u>Water Structures</u>		
Bridges	98.0%	
Dams	98.0%	
Earth Dams	95.0%	
Piers	95.0%	
Breakwater	95.0%	
Wall	85.0%	
Culverts(small<20'in Length)	75.0%	
Culverts(Large>20'in Length)	90.0%	
<u>Landmarks</u>		
Golf Course outline	100.0%	
Greens	95.0%	
Tees	95.0%	
Sandtraps	95.0%	
Public Playgrounds	95.0%	
Athletic Fields	95.0%	
Open Storage	90.0%	

Cemeteries	100.0%	
Tennis Courts	95.0%	
Public Parks	98.0%	
Street Hardware		
LargeOverhead Signs	90.0%	
Billboards	90.0%	
Bus Stop Shelters	95.0%	
Vegetation		
Tree Outlines	90.0%	
Single Trees	75.0%	
Brush Outline	90.0%	
Orchards/Nurseries	95.0%	
Crops	90.0%	
Airport		
Runway	100.0%	
Taxiway	100.0%	
Apron	100.0%	
Paintlines	90.0%	
Helipad	100.0%	

200 Scale Mapping-Feature Content List for 1-ft. orthoimagery		
<u>Paved & UnPaved Surfaces</u>	<u>Capture Rate %</u>	<u>Minimum Size/Length</u>
Roads	85.0%	
Driveways	80.0%	150' or longer
Parking	85.0%	
Alleys	85.0%	
Trails	80.0%	
<u>Railroads</u>		
Railroad	85.0%	
Abandoned Railroad	85.0%	
Roundhouse	99.0%	
<u>Structures</u>		
Buildings	95.0%	20' X 20' (200 sq ft)
Ruins	90.0%	20' X 20' (200 sq ft)
Tanks	95.0%	
Silos	90.0%	
Bunkers	80.0%	
Foundations	95.0%	
Smokestacks	90.0%	
Water Towers	100.0%	
<u>Barriers</u>		
Fences	75.0%	
Guard Rails	75.0%	
Walls	75.0%	
Retaining Walls	75.0%	
<u>Utilities</u>		
Light Poles	30.0%	
Utility Poles	40.0%	
<u>Disturbed Areas</u>		
Pile	90.0%	
Construction site	90.0%	
Quarries	95.0%	

Open Mine	95.0%	
Boulders	75.0%	
Disturbed Areas	95.0%	
Water Features		
Lakes	95.0%	
Rivers	99.0%	
Streams/Creeks	90.0%	
Ponds	95.0%	
Reservoirs	95.0%	
Ditches	90.0%	
Marsh/Swamp	85.0%	
Beach	99.0%	
Water Structures		
Bridges	95.0%	
Dams	85.0%	
Earth Dams	65.0%	
Piers	95.0%	
Culverts(Large>20'in Length)	50.0%	
Landmarks		
Golf Course outline	100.00%	
Public Playgrounds	90.0%	
Athletic Fields	90.0%	
Open Storage	75.0%	
Cemeteries	95.0%	
Public Parks	90.0%	
Street Hardware		
Vegetation		
Tree Outlines	80.0%	
Orchards/Nurseries	85.0%	
Airport		
Runway	100.0%	
(P) stands for painted feature		

Additional Option 5 – True Orthophotography

Supplier is asked to submit pricing information for a true orthophoto upgrade option.

True Orthophotography – one-foot resolution (One Foot GSD)

	Tile Range - Number of tiles per price/cost*	Cost per 5,000' x 5,000' tile
1.	Any tile range	\$1,768.00
2.		\$
3.		\$
4.		\$
5.		\$

True Orthophotography – six-inch resolution (0.5-Foot GSD)

	Tile Range - Number of tiles per price/cost*	Cost per 2,500' x 2,500' tile
1.	Any tile range	\$867.00
2.		\$

3.		\$
4.		\$
5.		\$

* Suppliers must list the range of tiles (by number) to which the costs in each row apply (e.g. 1-500, 500-5000, 5000 or greater).

Additional Option 6 – Priority Processing and Delivery

Supplier is encouraged innovative solutions to achieve the fastest turn around of data possible for partners that choose this upgrade option. The proposed solution should include the estimated delivery timeframe from time of acquisition, and the amount of time savings this represents from a typical delivery.

Sanborn can provide priority processing and delivery for any jurisdiction in the Commonwealth. Should VGIN partners choose the priority option, the estimated delivery timeframe from time of acquisition for a jurisdiction is four (4) months for initial delivery, and five (5) months for final products, resulting in a 30 day time savings in the required VBMP six (6) month project schedule.

	Tile Range - Number of tiles per price/cost*	Cost per tile (any size)
1.	100-500 tiles of 1 foot	\$15.00
2.	501-1000 tiles of 1 foot	\$18.00
3.	100-500 tiles of 6 inch	\$16.38
4.	501-1000 tiles of 6 inch	\$19.65
5.	1001-2500 tiles of 6 inch	\$22.93

Minimum order of 100 tiles.

* Suppliers must list the range of tiles (by number) to which the costs in each row apply (e.g. 1-500, 500-5000, 5000 or greater).

Additional Option 7 – Off Year Flights

Suppliers must submit whether they will agree to give each VGIN Partner the option to have specified areas flown during “off years.” The VITA/VGIN core flights will take place in designated localities in the eastern portion of Virginia during 2009 and the western portion of Virginia during 2011. Partners will be given the option to have specified areas flown in any year during the 2009-2012 cycle other than the designated VGIN core flight year.

While it is the preference of VITA/VGIN that prices for tiles during off years should be the same as core years, it is recognized that this may not be a possibility. Please indicate whether or not the prices will be the same, and if not, list alternative tile pricing for off year flights.

Off year tile cost will be the same as the core flight years - Yes No

A minimum total order value of \$25,000 for the base ortho product applies for the 2010 and 2012 off year flights. The tiles need to be contiguous.

Cost per tile – Off Year Flights – 2-foot resolution (2-Foot GSD)

	Tile Range - Number of tiles per price/cost*	Cost per 10,000' x 10,000' tile
1.		\$
2.		\$
3.		\$

4.		\$
5.		\$

Cost per tile – Off Year Flights – 1-foot resolution (1-Foot GSD)

	Tile Range - Number of tiles per price/cost*	Cost per 5,000' x 5,000' tile
1.		\$
2.		\$
3.		\$
4.		\$
5.		\$

Cost per tile – Off Year Flights – six-inch resolution (0.5-Foot GSD)

	Tile Range - Number of tiles per price/cost*	Cost per 2,500' x 2,500' tile
1.		\$
2.		\$
3.		\$
4.		\$
5.		\$

* Suppliers must list the range of tiles (by number) to which the costs in each row apply (e.g. 1-500, 500-5000, 5000 or greater).

Media:

VGIN will require the following deliverable products and media:

-Delivery of compressed geo-referenced county-wide mosaics within 60 days from final date of acquisition.

#	File Content	Media
1	Statewide Coverage of Digital Ortho Imagery by Tile (GeoTIFF)	External Hard Drive
1	Statewide Coverage of Digital Ortho Imagery Compressed in MrSID or JPG2000 format at 18/1 by Tile	External Hard Drive
1	Statewide Coverage of Digital Terrain Models by Tile	External Hard Drive and DVD
1	Statewide Coverage of Optional Products (contours, planimetrics, etc)	External Hard Drive
1	All Ancillary Data* including, but not limited to, ground control and AT reports	External Hard Drive and DVD
1	All Production Files including, but not limited to, TINs, Digital Surface Models, and Stereo Pairs.	External Hard Drive
1 set	134 Individual Jurisdiction Coverages** of Digital Ortho Imagery by Tile (GeoTIFF)	External Hard Drive or DVD
1 set	Optional Products for Each Jurisdiction That Purchased Upgrades	External Hard Drive or DVD
1 set	134 Individual Jurisdiction Coverages of Digital Terrain Models by Tile	External Hard Drive

		or DVD
1 set	134 Individual Jurisdiction Coverages of all Ancillary Data*	DVD

* All data products produced in the digital ortho development process required to facilitate the efficient development of planimetric or contour features by a 3rd party Supplier at a later date.

** 134 individual sets of media, each set containing complete deliverable covering one each of Virginia's 134 counties or cities, [one media set for each of Virginia's cities and counties] buffered by one image tile.

Additional attributes may be required which will be determined jointly between VGIN and the Supplier.

Other Additional Options

VITA/VGIN recognizes that these upgrades do not represent all options that may be made available from each Supplier. With that in mind, Suppliers are encouraged to submit any other options deemed appropriate that could be offered through this contract in their proposal. Pricing for these options should be listed in a similar format as the specific upgrades listed above

Other Additional Option 1 – Statewide Orthoimagery Acceleration

Sanborn is pleased to offer an entire VBMP schedule upgrade of 30 days where the entire VBMP project schedule for the orthoimagery base map products will complete within five (5) months instead of the required six (6) month schedule. This additional option and the priority processing and delivery Option 6 listed above are mutually exclusive.

	Option	Cost
1.	Statewide orthoimagery	20% of total contract value

Other Additional Option 2 – 3D Buildings

Derived from *six-inch* resolution orthophotos to include structures with roofs having an aerial coverage of 100 square feet or greater

	Option - range	Cost / Unit
1.	Any Building Density	\$1.60 / building

Our 3D block buildings are a base (footprint) with a height point. There is a minimum of two (2) sq. miles per order.

Other Additional Option 3 – Google Earth Enterprise

Flat Fee

\$210,408

Other Additional Option 4 – Rapid Response (Orthoimagery and LiDAR)

a) Orthoimagery Cost per sq. mile – one-foot resolution (One-Foot GSD)

	Item	Cost / Unit
1.	Expedition Fee	\$20,000 per request
2.	Price per sq. mile – any range	\$150.00 per sq. mile

b) LiDAR Cost per sq. mile – Standard 1.4m average point spacing)

	Item	Cost / Unit
1.	Expedition Fee	\$20,000 per request
2.	Price per sq. mile – any range	\$400.00 per sq. mile

Other Additional Option 5 – LiDAR

Pricing for acquisition and delivery of a LiDAR Bare Earth DEM. LAS or ASCII (or both) will be delivered for the Standard, FEMA, and High Density products. The LAS deliverable is classified into the following categories: ground, unclassified, low point, and overlap. Raw point cloud is a free delivery option. For no additional fee, a Standard ARCGRID DEM or Standard ASCII GRID format can be provided. The ASCII format is an ASCII Bare Earth DEM format (the ground layer).

Additionally, a mobilization cost of \$6,000 per aircraft will be added to the prices below.

	Option - Range	Standard 1.4m Cost / Sq. Mile	FEMA 1.4m Cost / Sq. Mile	FEMA 1.0m Cost / Sq. Mile	High-Density 0.7m Cost / Sq. Mile
1.	100 – 199 square miles	\$233 / sq. mile	\$491.00 / sq. mile	\$559.00 / sq. mile	\$587.00 / sq. mile
2.	200 – 499 square miles	\$162 / sq. mile	\$374.00 / sq. mile	\$475.00 / sq. mile	\$516.00 / sq. mile
3.	500 – 999 square miles	\$132 / sq. mile	\$271.00 / sq. mile	\$400.00 / sq. mile	\$451.00 / sq. mile
4.	1000 – 1999 square miles	\$127 / sq. mile	\$206.00 / sq. mile	\$354.00 / sq. mile	\$413.00 / sq. mile
5.	2000 – 3999 square miles	\$124 / sq. mile	\$176.00 / sq. mile	\$318.00 / sq. mile	\$374.00 / sq. mile
6.	4000 – 7999 square miles	\$116 / sq. mile	\$160.00 / sq. mile	\$298.00 / sq. mile	\$348.00 / sq. mile
7.	8000 – 15999 square miles	\$112 / sq. mile	\$152.00 / sq. mile	\$274.00 / sq. mile	\$323.00 / sq. mile
8.	16000 – 31999 square miles	\$109 / sq. mile	\$140.00 / sq. mile	\$270.00 / sq. mile	\$323.00 / sq. mile
9.	Over 32000 square miles	\$107 / sq. mile	\$138.00 / sq. mile	\$270.00 / sq. mile	\$323.00 / sq. mile

Other Additional Option 6 – Ground Based LiDAR

This cost is for collection and data processing of the high-definition ground based LiDAR data. Additional processing for feature extraction would be custom quoted based on scope of work and feature detail. *Mobilization fee of \$20,000. Minimum order fee of \$30,000 applies.

	Option - range	Cost / Line Mile
1.	Any Square Mile Area	\$250 / line mile*

Other Additional Option 7 – Sanborn Online-Direct Access to Premium Data Distribution System

**Flat Fee Every 2
Years**

\$50,000

Other Additional Option 8 – Three Inch Resolution Orthophotos

Cost per mile – three-inch resolution (three-inch GSD).

	Item	Cost / City
1.	10 square mile area	\$15,916 per city
2.	20 square mile area	\$25,698 per city

Cost per tile – Upgrade Option – three-inch resolution (Three-Inch GSD)	
Tile Range – Number of tiles per price/cost	Cost per 1,250' x 1250' tile
70 – 149 tiles	\$111
150-299 tiles	\$73
300-449 tiles	\$60
450 and more tiles	\$54

Other Additional Option 9 – Forestry

Forestry services will be custom quoted based on identified requirement, scope of work detail and agreed upon specification.

Other Additional Option 10 – Oblique Imagery

Sanborn will provide nominal 12" GSD high level Community and 6" GSD low level Neighborhood images to the agencies and municipalities under this Virginia VITA bid. Pricing is for leased image libraries, with the customer receiving a Perpetual License after the initial term of the contract.

12" GSD 2-way Premier Community oblique images

\$57.00 per sector

6" GSD 4-way Premier Neighborhood oblique image

\$445.00 per sector

Other Additional Option 11 – Enhanced Impervious and Enhanced Land Cover Costs

Community Name	Estimated Area (square miles)	Enhanced Impervious Cost	Enhanced Land Cover Cost
Manassas Park	2.5	\$4,968.00	\$7,782.48
Franklin City	8.31	\$4,968.00	\$7,782.48
Emporia	6.96	\$4,968.00	\$7,782.48
Falls Church	1.99	\$4,968.00	\$7,782.48
Williamsburg	9.17	\$4,968.00	\$7,782.48
Buena Vista	6.82	\$4,968.00	\$7,782.48
Lexington	2.49	\$4,968.00	\$7,782.48
Norton	7.53	\$4,968.00	\$7,782.48
Bristol	13.22	\$4,968.00	\$7,782.48
Bedford City	6.89	\$4,968.00	\$7,782.48
Radford	10.18	\$4,968.00	\$7,782.48
Colonial Heights	7.96	\$4,968.00	\$7,782.48
Fredericksburg	10.51	\$4,968.00	\$7,782.48
Galax	8.22	\$4,968.00	\$7,782.48
Covington	5.51	\$4,968.00	\$7,782.48
Hopewell	10.86	\$4,968.00	\$7,782.48
Martinsville	11	\$4,968.00	\$7,782.48
Waynesboro	14.77	\$4,968.00	\$7,782.48
Fairfax City	6.27	\$4,968.00	\$7,782.48
Manassas	9.99	\$4,968.00	\$7,782.48
Salem	14.5	\$4,968.00	\$7,782.48
Winchester	9.34	\$4,968.00	\$7,782.48
Harrisonburg	17.59	\$4,968.00	\$7,782.48
Staunton	19.75	\$4,968.00	\$7,782.48
Charlottesville	10.18	\$4,968.00	\$7,782.48
Poquoson	15.26	\$4,968.00	\$7,782.48
Alexandria	15.35	\$4,968.00	\$7,782.48
Petersburg	23.16	\$4,968.00	\$7,782.48
Arlington	26.14	\$4,968.00	\$7,782.48
Portsmouth	28.36	\$4,968.00	\$7,782.48
Roanoke City	42.9	\$4,968.00	\$7,782.48
Danville	43.92	\$4,968.00	\$7,782.48
Hampton	53.16	\$4,968.00	\$9,275.16
Norfolk	56.15	\$4,968.00	\$9,307.93
Lynchburg	49.74	\$4,968.00	\$9,471.08
Mathews	88.78	\$4,968.00	\$9,847.39
Richmond City	62.58	\$5,944.11	\$12,667.94
Newport News	69.58	\$5,773.90	\$13,415.86
York	108.13	\$5,345.61	\$16,997.80
Middlesex	134.18	\$5,355.10	\$19,308.14

Lancaster	135.87	\$5,707.66	\$20,643.90
James City	149.96	\$7,320.18	\$24,138.01
Greene	156.95	\$6,928.95	\$24,185.71
Northampton	164.28	\$7,249.97	\$25,968.35
King George	185.28	\$7,647.19	\$27,288.66
Clarke	178.06	\$7,688.83	\$27,368.09
Richmond	200.66	\$7,892.51	\$28,700.53
Charles City	190.62	\$8,317.74	\$30,522.35
Northumberland	211.16	\$8,378.40	\$30,522.40
Gloucester	222.38	\$9,030.42	\$32,605.94
Warren	216.31	\$9,775.96	\$33,275.54
New Kent	220.04	\$9,394.97	\$34,068.35
Westmoreland	237.32	\$10,457.76	\$38,050.42
Henrico	244.5	\$14,260.54	\$39,504.11
Powhatan	262.43	\$11,274.00	\$41,018.54
Rappahannock	266.87	\$11,307.37	\$41,133.34
Essex	272.11	\$11,393.54	\$41,338.14
Roanoke	251.16	\$14,509.12	\$42,512.38
Prince George	269.71	\$12,156.51	\$42,912.73
Stafford	278.67	\$12,908.10	\$43,368.91
Greensville	296.81	\$12,141.52	\$43,710.13
King William	285.36	\$11,994.85	\$43,737.52
Fluvanna	290.2	\$12,168.69	\$43,986.64
Surry	281.54	\$12,014.44	\$44,042.36
Goochland	290.01	\$12,341.30	\$44,363.57
Cumberland	299.73	\$12,199.86	\$44,372.52
Virginia Beach	257.9	\$16,722.77	\$44,781.89
Nottoway	316.1	\$13,117.51	\$46,175.71
Page	314.09	\$13,936.61	\$48,296.26
Isle of Wight	320.63	\$13,698.45	\$49,270.20
Madison	321.8	\$13,837.29	\$49,744.76
Craig	330.67	\$13,788.51	\$50,031.60
King and Queen	320.79	\$13,740.55	\$50,335.21
Dickenson	333.66	\$14,567.00	\$50,576.15
Pulaski	329.59	\$15,020.32	\$51,644.42
Appomattox	334.73	\$14,362.34	\$51,737.80
Orange	343.51	\$14,784.65	\$52,894.16
Prince Edward	353.84	\$14,841.05	\$53,286.78
Chesapeake	350.06	\$17,179.64	\$53,883.50
Prince William	348.56	\$18,008.71	\$54,008.66
Giles	360.34	\$15,242.95	\$54,234.47
Bland	358.73	\$15,285.47	\$55,448.63
Amelia	358.36	\$15,453.41	\$56,150.30
Henry	384.39	\$16,825.81	\$57,399.38
Culpeper	382.27	\$16,465.93	\$58,515.34
Floyd	381.22	\$16,140.05	\$58,627.56
Montgomery	389.42	\$19,103.22	\$61,081.93
Suffolk	410.97	\$17,774.21	\$62,053.16
Wise	405.18	\$18,431.82	\$62,801.59
Frederick	415.77	\$18,633.80	\$63,329.64

Accomack	421.49	\$17,670.48	\$63,613.20
Highland	415.85	\$17,350.68	\$63,811.87
Spotsylvania	412.3	\$18,574.31	\$64,584.44
Lunenburg	432.37	\$17,952.47	\$65,118.47
Grayson	445.88	\$18,667.79	\$67,739.36
Lee	437.31	\$19,628.26	\$68,601.04
Fairfax	406.55	\$28,016.44	\$68,655.54
Alleghany	448.91	\$19,553.71	\$69,162.80
Chesterfield	437.28	\$22,268.46	\$69,345.06
Smyth	452.3	\$19,451.03	\$69,480.28
Nelson	474.39	\$19,874.31	\$71,054.66
Charlotte	477.44	\$19,886.78	\$72,128.03
Wythe	464.61	\$20,548.10	\$72,622.28
Amherst	478.78	\$20,783.01	\$72,997.84
Carroll	477.65	\$20,548.56	\$73,731.61
Patrick	485.86	\$20,297.54	\$73,863.56
Hanover	473.99	\$21,385.23	\$74,326.22
Russell	476.76	\$21,121.11	\$74,431.80
Buchanan	503.88	\$21,476.53	\$75,183.14
Sussex	492.83	\$20,736.96	\$75,367.46
Campbell	507.16	\$21,983.65	\$76,972.96
Dinwiddie	507.06	\$21,637.80	\$77,508.49
Louisa	510.69	\$21,364.99	\$77,575.38
Shenandoah	512.52	\$22,204.80	\$77,670.68
Tazewell	519.89	\$23,470.18	\$80,180.78
Bath	534.56	\$22,003.68	\$80,366.44
Caroline	538.67	\$22,612.80	\$82,052.10
Scott	538.62	\$23,155.05	\$83,409.31
Loudoun	521.24	\$26,005.89	\$83,525.46
Botetourt	545.93	\$24,136.33	\$84,143.06
Brunswick	569.37	\$24,686.52	\$87,586.07
Washington	565.91	\$25,096.04	\$88,870.09
Buckingham	583.56	\$24,619.38	\$89,634.11
Southampton	602.43	\$25,000.77	\$91,206.44
Rockbridge	600.98	\$26,268.12	\$92,624.04
Fauquier	651.88	\$27,859.04	\$99,506.06
Mecklenburg	679.28	\$28,809.87	\$103,261.74
Franklin	711.48	\$30,648.21	\$109,901.92
Albemarle	726.26	\$31,957.60	\$111,051.44
Bedford	769.35	\$34,399.80	\$118,908.42
Halifax	829.56	\$35,679.71	\$128,056.06
Rockingham	853.29	\$38,886.63	\$133,826.38
Pittsylvania	978.24	\$41,715.95	\$147,751.26
Augusta	971.4	\$44,018.84	\$151,321.75
Totals:	39976.23	\$1,918,702.48	\$6,341,708.05

NOTE:

No penalties or liquidated damages liabilities apply to the contract selected upgrade options. No increase or change in bonding requirements will apply to the contract selected upgrade options. Force Majeure provisions apply in full.

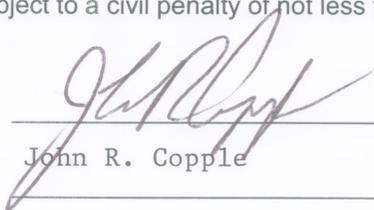
EXHIBIT E: CERTIFICATION REGARDING LOBBYING

The undersigned certifies, to the best of his or her knowledge and belief, that:

- i). No Federal appropriated funds have been paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee or an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal Contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal Contract, grant, loan, or cooperative agreement.
- ii). If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal Contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- iii). The undersigned shall require that the language of this certification be included in the award documents for all sub awards at all tiers (including subcontracts, sub grants, and Contracts under grants, loans and cooperative agreements) and that all sub recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Signature:



Printed Name:

John R. Cople

Organization:

The Sanborn Map Company, Inc.

Date:

12/23/2008

EXHIBIT F
CLARIFICATION
QUESTIONS AND ANSWERS

Q: Please expand on your experience with past projects similar in scope to the VBMP 2009-1012 orthophotography update that used similar technology and specifications and how it relates to this RFP. Please provide examples with results achieved at the proposed 6", 12" and 24" GSD levels.

A: Sanborn has successfully completed more frame-based digital camera orthoimagery programs than any other single U.S.-based photogrammetric company. Sanborn has owned and utilized digital camera technology for more than four years, and has completed dozens of project with similar specifications during that time. Sanborn owns four DMC cameras, and our acquisition team includes 10 DMC cameras in total.

For the past two flying seasons Sanborn has exclusively used our DMC cameras (proposed for this project) for state and local programs. Similar projects include statewide programs (New York, Delaware and Virginia/NAIP), regional programs (Houston Galveston Area Consortium, seven counties in Iowa, and Pima Association of Governments), and county/city projects (Gwinnett County, GA, Prince William County, VA, and Greenwich, CT). We are providing sample imagery for Prince William (1'), State of Iowa (2') and Houston-Galveston Area Council (6"). The image samples can be downloaded from our FTP site.

To log on to the FTP site go to <ftp://ftp.sanborn.com>

- ◆ You will be prompted for a username and password:
 - ❖ Username: `sanborn_samples` (all lowercase)
 - ❖ Password: `$@mpl3$`

Q: Please give specific information on the roles and responsibilities of each subcontractor that will be involved in the project.

A: Sanborn's team members for the 2009/2012 VBMP program and their respective roles are as follows:

3001 Inc, headquartered in Fairfax, Virginia, will provide multiple DMC sensors for image acquisition and will produce approximately 30% of the orthophotography. 3001 and Sanborn have partnered on many projects, including the State of New York. 3001 utilizes the same equipment and procedures as Sanborn, and all imagery will be quality controlled by Sanborn and seamlessly integrated into the State's data sets.

The Atlantic Group, headquartered in Huntsville, Alabama, will provide one DMC sensor for image acquisition and serve as back up capacity for orthophotography. Sanborn and TAG have a strategic business relationship and work on dozens of projects together.

ASI, headquartered in Watkins, Colorado, will provide one DMC sensor for image acquisition. ASI has supported Sanborn with their DMC on many projects.

Richard Crouse and Associates, headquartered in Frederick, Maryland, will provide one DMC sensor for image acquisition. RCA has supported Sanborn on dozens of occasions, including the 2006/2007 VBMP program

Geometrics GPS, headquartered in Fredericksburg, Virginia, will provide all necessary survey support for the project. Geometrics GPS was the main survey partner for the 2006/2007 project and clearly outperformed all other survey partners.

Camera/Sensor

Q: Please explain the potential risks with your proposed camera platform in the event of an AGPS/IMU failure or malfunction and how and when you would address these failures.

A: Very little risk of losing GPS information exists when using digital camera platforms. Sanborn designed each flight block based upon 60 mile flight line lengths in order to minimize IMU drift. The DMC imagery is “frame-based”, which allows us to use normal photogrammetric solutions to keep the photography usable in the event of a GPS/IMU malfunction. In the unforeseen event of an AGPS/IMU failure, Sanborn’s photogrammetrist will evaluate the location of the missing GPS event and determine if it is necessary to supplement with ground control or conduct a reflight. This review process occurs during the acquisition stage when data is received on a daily basis in the office, and both ABGPS/IMU and image processing are occurring simultaneously.

Q: At what flying heights and scales will imagery be acquired at 2’ and 1’ GSD, respectively, from your proposed system configuration? What would your imagery acquisition plan be for the 6” GSD areas?

A: Sanborn will acquire the 2’, 1’ and 6-inch GSD products using a DMC camera at the respective flying heights and scales:

Product	Flying Height (AGL)	Map Scale
1-ft. GSD	9300 ft.	200
2-ft. GSD	18600 ft.	400
6-in. GSD	4650 ft.	100

For planning purposes, Sanborn included in our proposal a representative project plan for a 6-inch upgrade area using Fairfax County as an example. The flight plan, control plan, DAT block layout, and base station layout is included in our proposal, Section 4 Appendix. This representative plan illustrates Sanborn’s project approach for handling upgraded areas. For both collection years, Sanborn will prioritize aircraft to capture low-altitude upgrade areas for 6-inch orthos and jurisdictions that select priority processing and delivery. Having completed the 2006/2007 program, Sanborn is keenly aware of the

State's obligations to those jurisdictions that are paying to improve their dataset and, as mentioned, we will prioritize accordingly.

Ground Control

Q: What procedures would be followed if the ground control is found to have higher residuals than the permissible tolerance when the targets are clearly visible?

A: First, Sanborn will confirm the panel/target location as it relates to the monument with the surveyor. Secondly, during the aerotriangulation phase Sanborn will investigate the photogrammetric measurement so that it is in the correct location on the visible panel, and adjust or re-measure as necessary. Lastly, Sanborn will utilize additional parameters during the aerotriangulation solution to determine if systematic errors have contributed to a higher residual on any given control point.

Q: Please elaborate on your proposed ground control solution, including the percentage of panels, the extent to which you will reuse 2007 VBMP control points, and the strategy for using independent checkpoints.

A: Sanborn's project design leverages VGIN's ground control investment from 2006/2007 VBMP. There are more than 2,000 surveyed ground control points that were established and utilized in the 2006/2007 program. Sanborn will use as many of these points as necessary to complete the digital aerial triangulation solution to the specification required. Below is a chart for each flight year and respective resolution that depicts the number of available control points and the estimated amount that will be utilized for each DAT block. These details were included in Sanborn's submitted proposal in Section 4.

VGIN 2009 AT				
1-ft	Exposures	Available GCPs	AT GCPs	Base Stations
Block 1	6100	253	122	2
Block 2	6200	537	124	5
Block 3	1780	38	36	1
Block 4	5340	250	107	3
Block 5	5350	350	107	2
Block 6	4070	328	81	4
2-ft	Exposures	Available GCPs	AT GCPs	Base Stations
Block 1	3300	810	26	7
Block 2	2680	635	21	5
Block 3	1030	326	8	4
Block 4	580	38	5	1

VGIN 2011 AT				
1-ft	Exposures	Available GCPs	AT GCPs	Base Stations
Block 1	1674	46	33	1
Block 2	4636	119	93	1
Block 3	3501	153	70	1
Block 4	6723	320	134	2
Block 5	5583	209	112	2
Block 6	2625	52	53	1
Block 7	2201	130	44	1
2-ft	Exposures	Available GCPs	AT GCPs	Base Stations
Block 1	467	46	4	1
Block 2	1133	119	9	1
Block 3	1200	153	10	1
Block 4	1477	320	12	2
Block 5	1446	209	12	2
Block 6	718	52	6	1
Block 7	600	130	5	1

AT

Q: What self-calibration parameters and techniques will be used in the digital AT solution and how effective is the procedure in compensating for systematic errors?

A: Having completed several large programs using the DMC system, Sanborn has found the horizontal and vertical accuracies achieved from the AT solution exceed the accuracy standards required by VGIN without using self-calibration. Sanborn ensures our camera systems are calibrated by performing boresight procedures prior to every major project.

QA/QC

Q: Describe your visual inspection process including what zoom level is used by the operators in data creation and follow up internal checks.

A: Sanborn puts most of the effort of creating orthophotos into controlling the quality of the imagery. When a seamless database of imagery is created, *each and every portion* of every image undergoes visual inspection by an experienced imaging technician. Any artifacts in the imagery will be corrected prior to submission. Sanborn views seam lines at map scale, zooming in further when needed to see detail and compensate for terrain relief.

A variety of quality control steps will be performed in the orthoimagery production process. QA/QC steps will be conducted iteratively and will include the following:

- ◆ Visual inspection of geometry—Evaluate final geometric fit for compliance to specifications and/or published data quality statistics

- ❖ Obvious seams
- ❖ Edge matching (roads, buildings)
- ❖ Bridge warping
- ❖ Excessive radial displacement in buildings
- ◆ Visual QC of mosaic—Evaluate product quality and modify as needed to meet project specifications
 - ❖ Blurred imagery
 - ❖ Inconsistencies of color balancing
 - ❖ Artifacts removed
 - ❖ Shadow detail
- ◆ Product packaging—Final review of product with regard to content, format, labeling, etc.

Q: With respect to Virginia's hilly slopes and steep mountainous terrain, please explain why your chosen sensor (frame based or push broom) is the best solution.

A: Sanborn's choice of using a frame-based sensor (DMC) is based on our experienced performance of using the DMC to meet the requirements for terrain of this type and compatibility with existing digital photogrammetric processes and workflows, such that no specific software modifications are necessary to process the image data. In addition, independent verification of the DMC performance can be found in the two attached documents, "Increasing Geometric Accuracy of DMC's Virtual Images" and "Geometric Accuracy Potential of the Digital Modular Camera". The documents attest to the similarity in photogrammetric processing between traditional analog sensors and frame-based digital sensors. Further verification of the frame-based sensor approach is contained in the attached New York State Department of Transportation test that was performed using an analog sensor and one of the DMC sensors currently in use by one of our proposed subcontractor, Northrop-Grumman/3001. Sanborn is confident that our choice of the DMC sensor mitigates the risk of VGIN's transition from analog to digital collection.

The summary quote below from these papers provides verification of the statements above.

Functions and procedures within the photogrammetric processing chain which are used to process digital images obtained by scanning aerial photographs can be applied directly to the DMC images. A second advantage is that the DMC images can be oriented in much the same way as conventional aerial photographs, without any additional

measurements for the exterior orientation parameters, i.e. from GPS/INS. (Tang, Dorstel, Jacobsen, Heipke, Hinz, 2000).

Sanborn would like to point out that Virginia's existing high-quality DTM dataset from the 2006/2007 VBMP project will be utilized by Sanborn in the 2009-2012 VBMP update project. The existing surface produced by Sanborn for the 2006/2007 VBMP project was validated by a third party QA/QC vendor, (Infotech) and accepted. Sanborn anticipates that updates will be required to portions of the dataset and the DMC can fully meet the specifications of the program as shown in our answer to Question 5. As a result, Sanborn is very confident in the quality and integrity of the existing terrain surface and our project approach utilizes this dataset with the expectation Sanborn will update the terrain dataset in area of change.

Q: What procedures do you intend to employ to insure that the requested digital orthophotography tiles do not have a tilted nadir nor extensive relief displacement for areas of terrain transition (level to hilly slopes to steep mountains)?

A: Sanborn's project design approach is based on our successful completion of the previous VGIN project and the resulting knowledge of the terrain we gained during the program. The Sanborn design utilizes sufficient forward and side lap (60/30) to minimize vertical distortion in the resultant orthoimagery. In addition, our flight planning takes into account terrain relief such that flight lines are designed to maintain consistent photo scale thus minimizing the effects of vertical distortion. This means that we break the flight line and plan a new flight line when vertical relief creates a variance in the photo scale. This ensures that we have a consistent photo scale that is not impacted by significant terrain change. This procedure applies to both analog and digital frame-based sensors. Sanborn utilized this procedure on the prior VGIN program that resulted in imagery without tilted nadir or extensive relief displacement that was accepted by VGIN and your QA/QC partner.

Sanborn reviews the collected images to ensure that excessive crab or tilt due to weather conditions does not result in distorted images, and any images that need to be recollected are immediately reflown. The DMC mount is a gyro-stabilized gimble mount that will minimize the impact of changes in plane attitude. The DMC incorporates electronic forward motion compensation that further enhances image quality and reduces the potential for distortion.

In areas of steep mountains or hilly terrain areas, the DTM will contain sufficient mass points and break lines, so that relief displacement for areas of terrain transition are not displayed as "smeared" areas in the final orthoimagery.

In addition, as described in the attached paper "Geometric Accuracy Potential of the Digital Modular Camera", the influence in planimetry and in height can be circumvented by using sub-images in the photogrammetric processing chain. Sanborn mimics this method in our proprietary ortho processing software, METRO, by using only the inner

area or “sweet spot” of every available photograph. This minimizes radial displacement, which increases toward the outer area of a photograph.

Q: In your response (p3-16) to RFP Sec 5.4a, you state that, “The data collected will result in RMSEZ accuracies of 0.5’ and 1’ from the photography scales of 1”=600’ and 1”=1,200’, respectively.” Would you capture digital imagery at 1”=600’ and 1”=1200’, respectively, to generate base topo DTM and hydro-enforced DTM? Please clarify how you will generate imagery at those scales?

A: We were simply referencing prior photo scale measurements for ease of understanding since the frame-based digital sensors don’t have true photo scale equivalents. All digital cameras have a ground sample distance (GSD) that reflects the size of the pixel in the image. The actual measurement of the focal length of the lens (DMC: 120mm), the size of the detectors (DMC: 12 microns), is used to calculate the flying height at which a specific GSD is achieved. The DMC design accomplishes accuracies similar to those achieved when using the same resolution of an analog camera, i.e. six-inch digital GSD is equivalent to six-inch resolution analog accuracy. Since the photo scale is not relevant, trying to make the comparison of a photo scale with a digital sensor is not valid. Sanborn will achieve an RMSE Z of 0.5 feet and 1.0 feet for the six-inch GSD and 12-inch GSD imagery, respectively. These values were interpreted from the photo scales stated in the RFP sections 5.4a and 5.4b. The expected DMC RMSE Z accuracies at the proposed flying heights are as follows:

DMC Ground Sample Distance		
GSD	Flight Height	Expected RMSE Z
0.5'	4650'	0.33 feet
1.0'	9300'	0.66 feet
2.0'	18600'	1.32 feet

Q: As an important component of risk and quality control management, listed below are the minimum VGIN AT performance measure requirements expressed in the pixel units for digital imagery. The industry claims that digital sensors can exceed the performance achieved by the film cameras and in fact better results have been reported in publications than the measures in this table.

Will you meet and/or exceed the performance standards listed in pixel units?

A: Sanborn expects to exceed the standards listed in the table below. For reference, we have added a 4th column indicating the expected DAT accuracies based upon the VGIN requirements.

(RFP) Film Based AT	Film Imagery (Scanned 14	Matching Digital	
----------------------------	---------------------------------	-------------------------	--

Performance Measures	□ m) (RFP) Performance Measures	Imagery Performance Measures	Sanborn DMC Solution
Accuracy of image observations	□ o □ 5 □ m	□ o □ 3 □ m	□ o □ 2.5 □ m
RMSE in x,y at check points □ x and □ y □ 2.0 to 2.5 □ o * s Where s is the scale RF	Scale 1"=600': 9 cm (3.5") Scale 1"=1200': 18 cm(7.0") Scale 1"=2400': 36 cm (14")	0.6 Pixel (for 6" GSD Imagery) 0.6 Pixel (for 12" GSD imagery) 0.6 Pixel (for 24" GSD imagery)	0.3 Pixel (for 6" GSD Imagery) 0.3 Pixel (for 12" GSD imagery) 0.3 Pixel (for 24" GSD imagery)
RMSEz in height at check points □ z □ 0.1' per 1000' of flying height (FH)	FH 3600'; □ z = 0.36' (4.32") FH 7200'; □ z = 0.72' (8.64") FH 14400'; □ z = 1.44' (17.28")	0.7 Pixel (for 6" GSD imagery) 0.7 Pixel (for 12" GSD imagery) 0.7 Pixel (for 24" GSD imagery)	0.5 Pixel (for 6" GSD imagery) 0.5 Pixel (for 12" GSD imagery) 0.5 Pixel (for 24" GSD imagery)
□ x and □ y < 5 □ m as RMSE residuals at the automatic image points	Scale 1"=600': 3.6 cm (1.42") Scale 1"=1200': 7.2 cm (2.84") Scale 1"=2400': 14.4 cm (5.68")	0.24 Pixel (for 6" GSD Imagery) 0.24 Pixel (for 12" GSD imagery) 0.24 Pixel (for 24" GSD imagery)	0.2 Pixel (for 6" GSD Imagery) 0.2 Pixel (for 12" GSD imagery) 0.2 Pixel (for 24" GSD imagery)
RMSE in x, y, z at all ground control points*	Scale 1"=600': 2.4" Scale 1"=1200': 4.8" Scale 1"=2400': 9.6"	0.4 Pixel (for 6" GSD Imagery) 0.4 Pixel (for 12" GSD imagery) 0.4 Pixel (for 24" GSD imagery)	0.3 Pixel (for 6" GSD Imagery) 0.3 Pixel (for 12" GSD imagery) 0.3 Pixel (for 24" GSD imagery)

**Note: This should be "Mean Standard Deviation". The computed mean standard deviation represents the overall Precision not Accuracy and has to do with geometry of the block and number of rays (in theory if all data are correct - no blunder, no systematic errors, correct math model, correct weights - then this value will be very close to RMSE.*

Q: The VBMP 2009-1012 project requirements are equally important for digital orthophotography, control, digital AT and Base Topo DTM data for further use of the products.

Have you completed any hydro-enforced DTM and contour projects from 6” and 12” pixels with the DMC camera as proposed, respectively, and achieved the accuracy results as specified in the RFP (Table, page 22)? Could you please provide the accuracy results as achieved? Please cite results of any two to three projects and indicate whether those results were verified by an independent QC/QA.

A:

Project Name	Product	Accuracy Results (as specified in VGIN RFP)	Achieved Accuracy RMSE _x	Achieved Accuracy RMSE _y	Achieved Accuracy RMSE _z
Baltimore County, Md.	Ortho, 1/4-foot GSD; 2-foot contours	Yes	0.06	0.12	0.07
KRIS	Ortho, 6-inch GSD; 2-foot contours	Yes	0.21	0.24	0.24

For the projects listed, the client performed the independent QC/QA.

Q: VGIN requires a sound risk and quality control management plan embedded in planning, design, and acquisition of the aerial imagery acquisition and processing stages. Experience has shown that under a limited operational window a variety of risk factors can adversely impact the outcome of the projects.

The block size dimensions should not be too large so as to minimize IMU drift and shift errors, and especially for realization of a reliable vertical solution which minimizes the effect of Geoidal slope variation. Ground reference stations should preferably be in the middle of the block with a back up second base station preferably within the block.

- a) As part of risk and quality control management, VGIN would prefer daily flyovers of a calibrated field for the system boresite corrections. Please explain your plan with regards to this procedure.
- b) In case of AGPS/IMU failure, cross flights should be required as an alternative depending upon the extent of the problem. Please explain when and what measures will be taken for timely detection of issues and managing risks within the flying window.

A:

a) Sanborn regularly performs boresight calculations to check the current misalignment angle values using a portion of a real time flight mission. We will update the parameters as necessary to eliminate errors in the post processed rotation angles. With a frame-based sensor (DMC), boresighting is performed to ensure the IMU is properly calibrated to the camera system. Once the system is calibrated (similar to an airborne LiDAR system), the ability to produce very accurate image orientation parameters has been established. Boresighting in itself, however, does not directly modify the AGPS solution in a frame-based sensor, which is the most critical element in achieving the accuracies VGIN requires. With frame-based sensors, analog and digital, the IMU is not required to achieve published map accuracies. Therefore, boresighting the sensor does not have a direct impact on AT and mapping accuracies.

b) The advantage of the DMC proposed by Sanborn is its similar operation to an analog sensor. The DMC, unlike push-broom sensors does not require GPS/IMU data to achieve an accurate AT solution (Tang, Dorstel, Jacobsen, Heipke, Hinz, 2000). Therefore, there is no need for cross strips to address a GPS/IMU failure.

Sanborn's process is that once a flight mission is completed, the crew will send the GPS and IMU data to the office for preprocessing and review. In the unlikely event the data is corrupt or suspect; the flight team will discuss options to solve the problem. If the very unlikely event the situation is catastrophic, meaning all GPS data is lost, and the mission was completed at the periphery of the project area, a reflight will most likely be performed. If only a few events were lost, and the flight containing missing data was surrounded by exposures containing good GPS, then the imagery would not be recaptured. Due to the improved accuracy of digital frame imagery, and the smaller footprint relative to film, the AT process will "bridge" the photos that do not contain accurate GPS data. The IMU data is not required to achieve the required accuracies for the AT solution. If the IMU data is lost, Sanborn will conduct a more rigorous AT solution. In addition, there are sufficient ground control points to ensure the vertical accuracy will be achieved in the final AT solution.

Q: RFP specifications require control to be paneled prior to aerial photography acquisition. Do you plan to panel all estimated GCPs provided in your answer to question 6, presented on November 7, 2008?

In your response, page 3-9, to RFP, you state that 'paneling will only be required on existing points that will be used for horizontal check points for the DAT block'. Please explain why it is not important to panel all ground control. Also explain what control points would be used for vertical check points for the DAT block.

What is your plan for independent blind control check points (BCPs) for use in AT? How would you ensure the integrity of BCP independent checks?

A: Sanborn will panel all estimated GCPs provided in our answer to Question 6.

The number of existing points available within the state is greater than required to exceed the **horizontal** map accuracies required by VGIN. Therefore, Sanborn is passing on a cost savings to VGIN by not paneling all existing points. Due to the smaller footprint size of the digital frame camera when compared to film, there are 2.4X the number of camera stations available over the same area. This increased AGPS redundancy decreases the need for horizontal ground control observations. During AT mensuration, Sanborn will be observing as many of the existing un-paneled and PID points as possible and use them as **vertical only** points in the AT solution. The accuracy of the DAT solution will provide a near perfect drive to all survey locations, thus removing any doubt as to the location. We will also use the current published recovery sheets and terrestrial photos to identify the survey location.

Q: In your response to question 7 on November 7, 2008 regarding, “what self calibration parameters and techniques will be used in the digital AT...”, you did not consider self-calibration a necessary technique, however, you did indicate willingness to follow the suggested procedures. It is well known that the DMC camera, like some other systems, has significant amount of lens distortions and presence of systematic errors. Lack of correction for these systematic errors reduces the image accuracy and can propagate unfavorably into object space during AT. This can lead to lower vertical accuracy of determined object points (Intergraph authored paper). It is, therefore, critical to improve the geometrical accuracy of the DMC’s virtual images.

Several mathematical models are in use including the two techniques suggested by the Intergraph corporation. The first method uses ‘correction grids’ which are used as inputs in the DMC post processing software. The second method uses ‘proper’ sets of additional parameters in self-calibration bundle block adjustments. These methods can increase the vertical accuracy of the object space points by a factor of 2 to 4 as reported by the supplier of the DMC. In the 2006/07 Fairfax County project there was over 30% improvement in the quality of observations from use of self-calibration which is a significant change

VGIN requires that the ‘proper’ set of additional parameters in self calibration or correction grid techniques be used appropriately in the DAT adjustment to increase geometric accuracy of virtual images.

Please explain what method you intend to use in the DAT block adjustment.

A: Any lens (digital and analog camera) has some aberrations that are not possible to remove or model its distortion by lab calibration. Self-calibration is an option that attempts to model the remaining systematic errors. Self-calibration also has its own problems, as mentioned in Mostafa Madani’s paper (Beijing, 2008), which needs to be studied very carefully.

ISAT has a self-calibration option which one can use if needed. ISAT has also an option to use correction grid which is a better choice, if needed. Again, we do not see any need for self-calibration adjustment for the VGIN project.

We will use our extensive experience to provide VGIN with the highest quality ortho imagery, both in geometric accuracy and radiometric quality.

Q: VGIN requires that automatic tie points common to all overlapping photographs be reliable observations/measurements. Accordingly, weaker two rays (fold) tie point observations shall be excluded unless they are manually verified or measured. This may be necessary in some situations such as the edge of blocks or poor correlation models falling over wooded areas, etc.

You state in the RFP response that, “Sanborn will automatically measure up to seven (7) or more tie points in each of the standard Van Gruber locations”. How would you ensure this criteria in areas of poor correlation models? Please explain the tools and procedures that you plan to use to ensure reliability of automatic tie points.

A: As Intergraph ISAT users, Sanborn requires that the auto matching routine returns up to 7 tie points per Van Gruber area when completed. This value has been determined to be a good compromise between having too few or too many points to edit and quantify during the AT process. In areas of obscured ground, water bodies, and forested areas, the software may be unable to reliably meet this criterion. During the review of the point distribution, Sanborn will first visit the “weak areas” as noted by the software, and add additional tie points as necessary to form good block geometry. Second, we will observe the distribution of tie points throughout the block, noting weak areas that were not indicated by the software. We will then measure multi-ray tie points in these areas to add strength and redundancy to the block. As a final check, we will review models with the highest RMSEs, ensuring all model ties are within the VGIN mapping requirements. During this step, we will reference the existing DTM data, to ensure compliance to the standards.

Q: VGIN requires that the adequate level of higher zoom be used in the process of point measurements, data digitization and creation, and visual inspection process for orthoimagery, planimetric and topographical data development at various stages of production and quality control. The digital orthoimagery and DTM data products are scale free. The orthoimagery is used in many applications at twice or three times the target map scale. Thus the quality and accuracy of orthoimagery and data is of paramount importance. Most facilities set stereo models at higher zooms of twice or larger scales for digitization in the photogrammetric production processes. VGIN QC/QA of orthoimagery shall be performed at higher zoom than the target map scale as necessary.

Would you capture features at greater zoom (twice the target map scale) to ensure quality and application needs which includes the QC of final orthoimagery deliverables?

A: As verbally stated in the meeting on November 7th, Sanborn captures features at greater zoom (twice the target map scale) to ensure quality.

Q: Briefly describe the DTM update method of existing 2006/2007 data for additions and deletions in areas of changed terrain features.

A: Sanborn's experienced compilers will reference the existing terrain surface data and review each and every model in a stereo environment looking for areas that have changed. In the event the compiler decides the terrain surface has been altered, new mass points and/or break lines are collected in order to accurately model the terrain thus updating the existing DTM data set.

Q: As soon a contract is signed, VGIN will be contacting partners about ordering upgrades to the base product. Some of the upgrade options (resolution upgrades and true ortho) will affect flight planning. Can you give us an estimated deadline for receiving these upgrade requests from partners that will allow you sufficient time for flight planning?

A: Per our RFP response, Sanborn has planned for aircraft resources to be dedicated and onsite in the VGIN project area no later than February 1st, 2009 for collection.

With this assumption in mind, Sanborn would prefer any upgrade request affecting flight planning to be received no later than the morning of January 26th, 2009. However, certain geographies may be flown later in the acquisition window than others, and ground and weather conditions will determine the actual schedule of imagery acquisition. Sanborn will work with VGIN on a case-by-case basis if upgrade requests are made from VGIN partners after 1/26/09 and will make every possible effort to accommodate any requests.

Q: Would you be willing to work with VGIN to create a system for ordering upgrades? This system could include, but not necessarily be limited to, a central tracking database, tile shapefiles with appropriate attributes, an upgrade website, and an automated online ordering of upgrades. Please propose any ideas you have for developing this system.

A: Yes, Sanborn is willing to work with VGIN to create an online web based system to order upgrades. Sanborn is open to any approach VGIN may require. In fact, we included such an application in our proposal, in the marketing plan section. Sanborn already has an existing web based WMS and OGC compliant system named Sanborn Online. Sanborn could quickly implement a VGIN specific system with slight modifications to this existing system. Sanborn Online is a system designed to support needs such as ordering, storage, and distribution. It has a security system and an administration capability.

The system is designed to accomplish many functions and can even allow the purchase and re-processing of the VGIN imagery by a user should VGIN desire to sell the imagery that is procured. The standard portal not yet modified for VGIN use may be accessed at:

<http://sanborn.datadoors.net/DataDoorsWeb/Order.aspx>

login as:

username: sanbornonline

password: 4sanborn

Sanborn would modify the site to have security and provide an administrator to coordinate with VGIN regarding security, etc. Sanborn envisions the following basic site functions.

1. Quickly Zoom to Area and Define Area of Interest
2. Merge existing shape files, boundaries, etc.
3. Choose Product Options
4. Review Pricing
5. Submit order
6. Check out

Please see the slides attached for further information.

Q: Would you be willing to change the pricing methodology of the structure planimetrics from a per building cost to a jurisdictional cost?

A: Yes.

Q: VGIN’s partners need to know the entire cost of an upgrade ahead of time, and your current pricing methodology for structure planimetrics would make getting an exact cost ahead of time very difficult. Can you explain how Sanborn would give a cost estimate based on the current methodology of a price per building based on the number of buildings per tile? If it’s not possible to give an accurate cost estimate using this method, would Sanborn be willing to change the pricing to a jurisdictional cost?

A: Yes. We would use U.S. Census or other valid data provided by VGIN to ascertain the most accurate building count for each jurisdiction.

Q: Please provide more detail on the pricing for the three inch resolution upgrade option (Other Additional Option 8). It isn’t clear how price would be determined for a specific area. Is it possible to switch this pricing to a per tile cost?

A: Yes. Sanborn has developed the following pricing for three-inch resolution upgrade options based on a per tile (1,250’ x 1,250’):

Cost per tile – Upgrade Option – three-inch resolution (Three-Inch GSD)	
Tile Range – Number of tiles per price/cost	Cost per 1,250’ x 1250’ tile
70 – 149 tiles	\$111
150-299 tiles	\$73
300-449 tiles	\$60
450 and more tiles	\$54

Q: Sanborn lists setup and mobilization fees for some of the additional LiDAR options. Are there any setup fees for any of the other upgrade options?

A: Except where already stated, there are no additional set-up and mobilization fees.

Q: Are there any late setup fees for upgrade requests that occur after a specified date? For example, if a locality included in the 2009 flight area requests contours upgrades during 2011, will they incur additional charges?

A: No late set-up fees for upgrade requests that occur after a specified date will be applied.

Q: Are there any additional fees for off year flights?

A: There will be no additional fees for off-year flights.

1. Is there a fee to use your online QA tool?

No, this is considered added value to our customers.

Q: In the previous set of questions, Sanborn agreed to create an online upgrade ordering system. Is there a fee to create this system and are there any ongoing fees for use of the system?

A: There is no charge for the ordering system. However, if you want to host imagery (or have imagery stored) in this system, there would be a charge. The charge will depend upon the amount of data that is to be stored.

Q: You list the fee for your Sanborn Online Direct tool as a flat fee of \$50,000. Does this mean that there are no additional fees for system usage and storage of data throughout the life of this contract?

A: For storage of data, there will be a bi-annual fee of \$50,000. There is no additional fee for system usage. The system is accessed through the web. All of the internet access fees to access the system are the responsibility of the users.

Q: You list the fee for the creation of statewide hydro enforced DTM as a 20% increase of the project cost. Can this option be purchased by VITA/VGIN any time during the life of the contract, or does it have to be purchased up front?

A: Yes, it can be purchased at any time during the life of the contract.

Q: For Additional Option 4 (Other Planimetrics), please describe the format of the deliverables that will be received by the customer.

A: An ESRI Geodatabase will be provided.

Q: How will the distinction be made between rural and urban tiles for Additional Option 4 (Other Planimetrics)?

A: Rural tiles would be those tiles outside of municipal boundaries.

Q: Is the minimum number of tiles to order for Additional Option 6 (Priority Processing and Delivery) 100?

A: Yes, the minimum is 100 tiles.

Q: Is there a minimum order for Other Additional Option 2 (3D Buildings)?

A: Our 3-d block buildings are a base (footprint) with a height point. There is a minimum of two (2) square miles per order.

Q: Please describe in more detail what the deliverables will be for Other Additional Option 5 (LiDAR). In what format will the data be delivered? Will the raw data (point cloud) be available as a deliverable as well as a DEM?

A: LAS or ASCII (or both) will be delivered for the Standard, FEMA, and High Density products. The LAS deliverable is classified into the following categories: ground, unclassified, low point, and overlap. Yes, raw point cloud is a free delivery option. For no additional fee, a Standard ARCGRID DEM or Standard ASCII GRID format can be provided. The ASCII format is an ASCII Bare Earth DEM format (the ground layer).

Q: If VITA/VGIN selects Option A (1 foot statewide), can 2 foot tiles still be purchased as an off year upgrade option?

A: Yes.

Q: On page 19 of your Detailed Description of Proposed Solution document, you state that "buildings smaller than the minimum square size will be collected as points". Will these points be included in the deliverable for structures?

A: Yes.

Q: In your response to question 2 from the list of questions on 12/10/2008, you stated that there will be a charge for hosting/storing imagery for the online ordering system. Would this hosting/storage fee still be charged if VGIN is paying the \$50,000 fee to have imagery stored for the Sanborn Online Direct tool? As an option, would Sanborn have the capability and be willing to utilize an internet map service with imagery from VGIN to use as part of the online ordering tool?

A: Sanborn will not charge a double fee if the Sanborn Online tool is selected as well as the Online Ordering system as long as the data hosting/storage is through the Sanborn Online tool.

Sanborn has an existing internet map service which was proposed as Sanborn Online. If VGIN wants Sanborn to evaluate an alternative Sanborn has the capability and is willing to evaluate the use of an alternative internet map service and determine the integration needed.

Q: In your response to question 3 from the list of questions on 12/10/2008, you stated that there will be a bi-annual fee of \$50,000 for data storage on the Sanborn Online Direct tool. Please clarify your definition of bi-annual. Does this refer to every 6 months or every 2 years?

A: Every 2 years.

Q: In your response to question 6 from the list of questions on 12/10/2008, you stated that rural tiles would be those outside of municipal boundaries. As you know, cities are independent entities in the Commonwealth of Virginia. Does this refer to areas that are outside of independent city boundaries?

A: Yes.

Sanborn has defined urban as greater than 600 buildings per sq. mile and rural as less than 600 buildings per sq. mile. We are willing to discuss these definitions with VGIN which we think applies to your geography.

Q: Is there a minimum number of tiles required for a resolution upgrade from 1 foot to 6 inch pixels? If so, do these tiles need to be contiguous?

A: Yes, a minimum number of 25 tiles are required for the upgrade during the base years (2009 and 2011) and for the off flight years refer to answer in Question 5.

Yes, the tiles need to be contiguous.

Q: Is there a minimum number of tiles required for off year flights, and do the tiles need to be contiguous?

A: Sanborn's pricing would be the same for the off year flights and would require a minimum order value of \$25,000 for the base ortho product.

Yes, the tiles need to be contiguous.

Q: You have responded to VGIN's questions about self-calibration in previous questions as well as in previous meetings. However, we still need further clarification with regards to where you stand on using this technique. Is it your position that you will not use self-

calibration as part of your standard procedures? If so, would you be willing to perform self-calibration (and possibly other enhancement procedures) if requested in specific areas and specific situations? VGIN has stated that we are already aware that some local governments would like to use the AT to develop additional datasets. We want to make sure that we can deliver an AT product that will fully meet their needs.

A: Yes, Sanborn is willing to perform self-calibration for up to three jurisdictions at no additional fee. Sanborn is willing to re-run the aerotriangulation one additional time using the self-calibration parameters for each of the three jurisdictions.

Exhibit G – Acceptance Criteria

VBMP 2009-2012 Orthophotography Project Acceptance Criteria for Associated Professional Services and Products

The final products for the Virginia Base Mapping Program (VBMP) 2009-2012 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 Contractor for review and/or correction or replacement. Results of all tests will be documented and shared with Contractor. 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 Contractor 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: DVD 2.0, 4.7 GB single sided (4.3 GB usable) USB External Drive, (250 GB to 1 TB)	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
9.	Datum	NAD83/93 HARN (North and South Zones)
10.	Units	US Survey Feet
11.	4-band orthoimage	Red, Green, Blue (RGB) and Color Infrared (CIR)

12.	Tonal quality	Less than 2% of values at 0 or 255
13.	Natural color and CIR with digital capture only in 4-band image	Red, Green, Blue (RGB) and Color Infrared (CIR)
14.	Image blemishes and artifacts	<p>Generally acceptable within these limits:</p> <p>If 1 pixel wide, 100 pixels in length.</p> <p>If 2 pixels wide, 60 pixels in length.</p> <p>If 3 pixels wide, 20 pixels in length.</p> <p>If 4 - 12 pixels wide, 12 pixels in length.</p> <p>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.).</p> <p>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).</p>
16.	Conformance of sheet to index grid	Sheet will match the client provided grid. There will be no gap or overlap between tiles.
20.	MrSid	The correct compression ratio 18:1 and reads in ESRI software
21.	Mosaic lines	Mosaic lines through buildings and above ground transportation structures shall be avoided to the greatest extent practical.
22.	Metadata	Complies with FGDC standards and runs through the MP parser.
23.	Scratches	Orthoimagery appearance shall be scratch and dust free; sharp uniform balanced color contrast.
24.	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 DTM 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.
25.	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		
26.	Ground Resolution	1.0 US Survey Feet
27.	RMSE of known ground points measured on the image <i>See ASPRS Class I Standards Page 8, Table 16, and NSSDA Part 3, Appendices 3-A and 3-D for explanation of formulas.</i>	RMSE _x = RMSE _y = 2' (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 <4.9'
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.	Mismatch of features between 200 & 100 scale	Equal to or less than 3 feet as RMSE on well defined ground features (roads, sidewalks, curbs).
31	Sheet size	5000 feet (5000 pixels) East-West by 5000 feet (5000 pixels) North-South
1"=100'-scale only		
32.	Ground resolution	0.5 US Survey Feet
33.	RMSE of known ground points measured on the image <i>See ASPRS Class I Standards Page 8, Table 16, and NSSDA Part 3, Appendices 3-A and 3-D for explanation of formulas.</i>	RMSE _x = RMSE _y = 1' (2 pixels) and RMSE _r = 1.4142 *RMSE _x = 1.4142*RMSE _y
34.	Absolute accuracy	NSSDA accuracy (20+ points) such that 95% of the points tested shall meet the criteria of 1.73*RMSE _r 2.5'
35.	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
36.	Sheet Size	2500 feet (5000 pixels) East-West by 2500 feet (5000 pixels) North-South

Aerotriangulation Acceptance Criteria

	Tested Characteristic All Scales	Measure of Acceptability
37.	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 3b. and 6.c. page 19, in tabular form, number of control used, graphical output of residuals,
38.	Report Completeness	All information complete and readable
39.	Precision of Image Observations	Sigma (0) less than or equal to 5 microns is acceptable.
40.	Horizontal accuracy against ground control control check points tested in accordance with 10+ points at NSSDA criteria	The ranges from 0.47' to 0.59' and 0.23' to 0.29'. for 1' and 6" GSD photography, respectively (equivalent to higher and lower flying photography as specified in the RFP)

41.	Vertical accuracy against ground control check points tested in accordance with 10+ points at NSSDA criteria	RMSE values for 1' and 6" GSD photography shall be within 0.72' and 0.36', respectively, (equivalent to higher and lower flying photography as specified in the RFP)
42.	Accuracy against image coordinates	RMSE less than or equal to 5 microns is acceptable.
43.	Max. offsets [E, N] to any one blind QA point	3 * RMSE for that scale
44.	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
45.	Report Format	Conforms to required convention
46.	Report Completeness	All information complete and readable
47.	Horizontal accuracy against HARN control	Will achieve 1 st Order accuracy (10 ppm +100,000) 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 5-7 cm.
48.	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
49.	Offsets [E, N] to any one blind QA point	2 * Standard deviation
50.	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
51.	GPS BASE Station Accuracy	If base stations operate during collection, then all data will be submitted for OPUS processing with final results overall RMS <3cm – http://www.ngs.noaa.gov/OPUS/Using_OPUS.htm

Digital Terrain Model QA Acceptance Criteria

	Tested Characteristic All Scales	Measure of Acceptability
52.	Media DVD 2.0, 4.7 GB single sided (4.3 GB usable) USB External Drive, (250 GB to 1 TB)	Media is readable, all files accessible, no files corrupted
53.	File organization	Files written will be of a useable file size not to exceed 2 Gb per file.

54	File name	Conforms to required convention
55	Format	In Microstation DGN format Version 8, all features will have x, y, z values
56	Georeferencing	Locates in proper tile grid cell
57.	Contours DTM break lines & mass point density	Sufficient to accurately build terrain to support contour production.
58	Base Topo DTM points density	Sufficient to accurately build terrain to support ortho production. Sufficient to support accurate orthorectification, but not suitable for generating contours.
59	Continuity	No spikes or holes, no gaps of sufficient size to affect orthorectification, regardless of perspective center.
60	Attributes	Conform to DTM standard

Ancillary Data Acceptance Criteria

	Ancillary Data	Measure of Acceptability
61	Ancillary Data	All items will be written to media and verified that they are readable (not corrupt)