TAX12007

GIS Database for the Digital Conversion of Countywide Tax Maps Cost Proposal

Proposed by:
Landmark Geospatial
A Subsidiary of Landmark Forestry LLC

LANDMARK geospatial
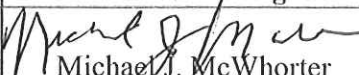
691 Stalnaker Addition
Horner, WV 26372

In response to:
"TAX12007 - GIS database for the digital
conversion of countywide tax maps"

TAX12007 COST SHEET

COUNTY	Digital Tax Parcel Polygon Data	Cost	Finished Tax Map Publication	Cost
BRAXTON	16,439		277	
CALHOUN	8,766		149	
GRANT	12,172		260	
HARDY	14,655		298	
JACKSON	19,474		322	
LEWIS	15,223		231	
LINCOLN	17,029		264	
LOGAN	29,212		399	
MCDOWELL	31,020		535	
MINGO	25,986	$90,691.14	369	$51,712.14
MONONGALIA	49,865		638	
MONROE	13,483		255	
ROANE	14,521		241	
TYLER	8,994		149	
WEBSTER	10,765		251	
Total	287,604		4638	
	Total Cost	$	Total Cost	$

Phone # & Fax #	Email address	Date	Vendor's name & signature
Phone: 304-269-4831 Fax: 304-269-6300	mike@landmark forestryllc.com	07-16-2012	Michael J. McWhorter

Basis for Award: Award shall be made to the lowest vendor meeting specifications.

TAX12007

GIS Database for the Digital Conversion of Countywide Tax Maps Technical Proposal

Proposed by:
Landmark Geospatial
A Subsidiary of Landmark Forestry LLC

LANDMARK
ge●spatial

691 Stalnaker Addition
Horner, WV 26372

In response to:
"TAX12007 - GIS database for the digital
conversion of countywide tax maps"

Connie Hill
State Tax Division, Property Tax Division
Greenbrooke Building
1124 Smith Street
Charleston, WV 25301

Dear Ms. Hill:

Landmark Geospatial is pleased to submit our proposal in response to the Request for Quote titled, "TAX12007 - GIS database for the digital conversion of countywide tax maps".

Landmark Geospatial has expertise in providing multiple services for county mapping projects, including tax parcel conversion, GIS, E911 addressing services and software development. We also specialize in providing various aerial imagery services. Our approach to the project will provide WVPTD and Mingo County with a complete, accurate and cost effective product.

Our company is based in Horner, West Virginia. We extend an invitation for you to visit our office, meet our staff and observe similar work in progress. We look forward to a successful working relationship with WVPTD and Mingo County that can be sustained long into the future. We sincerely appreciate this opportunity.

We invite you to contact the clients we have listed as references. Our track record speaks for itself in regards to implementing effective GIS solutions at the local government level. In addition to our technical capabilities, our staff has had great success in communicating with and training county employees to be able to effectively maintain and utilize GIS projects such as this.

If you have any questions, or further information is needed, please feel free to call me at 304-269-4831.

Sincerely,

Michael J. McWhorter
Managing Member
Landmark Geospatial, a subsidiary of Landmark Forestry LLC
www.landmarkgeospatial.com

Introduction

Landmark Geospatial ("Landmark") would like to present our bid in response to the request for quote "TAX12007 - GIS Database for the Digital Conversion of Countywide Tax Maps."

Landmark is experienced in the tax parcel mapping field and is currently working with several West Virginia counties. Landmark has an extensive background in geospatial services, including tax parcel database and geometry creation, update and quality assurance/quality control as well as production of digital and hard copy products suitable to meet the needs of the West Virginia Property Tax Division (WVPTD), County Tax Assessors and the general population. In addition, we also specialize in geospatial software development (extensions, stand-alone geospatial applications, web mapping applications, etc.). Our company values the accuracy of our final products we provide to our clients. We will, at the completion of the project, verify the data is to the highest accuracy possible before delivering the final product to WVPTD and the counties.

Summary

Landmark Geospatial uses the most current version of Environmental Systems Research Institute's (ESRI) ArcGIS. As with all of our previous county parcel conversion projects, Landmark Geospatial has developed the data within a geodatabase. The geodatabase will house a core set of data as described in Federal Geographic Data Committee (FGDC) 2009 and will conform to International Association of Assessing Officers (IAAO) 2009 standards, as applicable. The standards set forth include a single datum and coordinate system, base maps consisting of orthophotography and frame work base layers that implement established standards, use of existing map index data and incorporating these data into digital map book data layers, develop metadata in accordance with State and FGDC standards, and all parcels will have a Parcel Identification Number (PIN).

The project will meet the standards set forth in the two West Virginia surface tax map documents: ***Statewide Procedures for the Maintenance and Publishing of Surface Tax Maps*** and ***Manual Maintenance of Surface Tax Maps*** as well as standards developed by the IAAO. This will ensure mapping data complies to all specifications, guidelines and standards.

Should Landmark be selected, a kick-off meeting will be scheduled to address potential needs, refine workflows, and address questions or concerns. The meeting will take place within 15 days of the award date. Within 30 days of the meeting, a pilot project will be completed using the workflows set forth in the RFQ and kick-off meeting.

Landmark shall follow the workflow as outlined in TAX12007 RFQ. The workflow described reflects the workflow and methodologies already established at Landmark Geospatial. This includes, but is not limited to, rectification of tax maps, vectorization of

parcel data, attribution of surface parcels, integration of the Integrated Assessment System (IAS) data to GIS data, annotation, cartographic style and map publication.

Landmark's history of tax parcel conversion and map production within the state shows that we have an open line of communication and work side by side with County employees to produce the most beneficial product.

Landmark will produce monthly reports in accordance with WVPTD's requirements.

Upon completion of the project, Landmark will deliver a geodatabase containing all information required to produce digital tax maps which includes seamless countywide surface parcel polygons which have attribute information linked to the IAS, a digital map series paginated by district and map as they currently exist and an automated feature that converts map documents to .PDF format.

Landmark will provide Mingo County procedures, tools and workflows for maintenance of the data. Training for parcel maintenance and assistance with installation of the map book will occur upon completion of the conversion project. Landmark will submit to the WVPTD a onetime overhead cost analysis. All digital products will be delivered to the WVPTD and Mingo County, including, but not limited to the completed geodatabase, the map book project and the geo-rectified .tif files. Finally, a final report will be generated for the project milestones and results as well as the final tracking log used during the monthly progress reports.

Landmark keeps on and offsite backups of all client related server and workstation data. Offsite backups are kept in fireproof containers. Backups of servers and workstations are performed weekly. Landmark uses the most recent version of firewall and virus protection with automatic updates performed weekly.

Company History

Landmark Forestry, parent company to Landmark Geospatial, was originally founded as a forest consulting firm with two offices in West Virginia. Our firm's headquarters is located near the town of Weston in Horner, West Virginia. It is here that Landmark began in 1992 as a single person firm working primarily with non-industrial private landowners. Since that time, Landmark Forestry developed a group now called Landmark Geospatial, whose operations include GIS, tax parcel conversion and update, GIS integrated applications, aerial photography. From these locations, Landmark serves a broad array of clients ranging from non-industrial private landowners to many corporate clients along the east coast. Landmark prides itself in professional, accurate, and timely work that is overseen by a work ethic of the highest standard. It is our mission to provide forest management and geospatial solutions that are powered by technology and guided by experience and education.

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Appendices

1.0   Spatial Definitions

Landmark Geospatial will use the State Plane coordinate system for all data used in the project. The datum will be North American Datum (NAD) of 1983 and the units will be in feet. The zone for the coordinate system will be dependent on the county being converted. In the instance of Mingo County, the zone will be West Virginia South.

2.0   Tax Map Accuracy Standards

Landmark Geospatial will comply with the horizontal accuracy standards set forth in the literature of 1:4800 or +/-13.33 feet when creating or revising data for the project.

Since Landmark has extensive prior experience with other West Virginia county's tax parcel conversion processes, the staff is aware that many county tax maps may be outdated and that they were originally rectified to the best available imagery. It is understood that error may have occurred during the procedure.

Solutions to difficulties in rectification of tax maps are addressed further in Section 10.0 of the document.

3.0   Data Sources

Landmark Geospatial is familiar with the document written by Donaldson that outlines the base layers to be used for digital conversion of countywide tax maps. These data are:

- Statewide Addressing and Mapping Board (SAMB) 2003 aerial photography
- Other aerial photography as directed by WVPTD and Mingo County
- Road data from the SAMB, USGS, and others as applicable
  - o Centerlines
  - o Edge of pavement
- Hydrography from SAMB and the National Hydrography Dataset (NHD)
- Boundaries including the Census Bureau's Incorporated Areas and Public Lands information
- Structures from the SAMB including building footprints and centroids
- Elevation data from the SAMB and USGS
- Land ownership data from the WV Department. Tax & Revenue and Mingo County
- Geographic name information from the USGS
- Geodetic control
  - o Horizontal - State Plane (north or south), feet, NAD83, GRS80
  - o Vertical – NAVD 1988

If the data are of varying scales, the more accurate data will be used in the basemap. Appropriate documentation reflecting the change, including metadata, will be produced.

3.1 Digital Color Orthophotography

West Virginia's Statewide Addressing and Mapping Board's (WVSAMB) 2003 2-foot color imagery will be used as the basis for rectification of Mingo County's tax maps. Landmark is very familiar with the WVSAMB's color imagery and has used it as a reference base layer for several tax parcel projects in other counties in West Virginia.

3.1a Secondary Imagery

If secondary imagery is used, Landmark will accurately document any deviations in the attributes of the data layer as well as in the metadata.

4.0 Map Sheets and Index Grids

Landmark Geospatial has extensive experience converting existing county reference systems for tax maps. While Landmark would conform to the specifications set forth by the statement of work which involves creating the map index grid based on the georectified tax map boundaries, we would like to present methodology that we have utilized in other counties. We would start by creating the map index grid with tiles the exact size from the tax maps with no overlap and orient the grid such a way that it best overlays the geo-rectified maps. Advantages of this method include:
- No tile overlap
- No areas that are not represented on tax maps
- Counties can identify parcels that should have been named on a different map

(We would give the county a list of parcels that would be candidates to be moved to a different map number based on spatial location). Counties could then re-number the parcels on the new map, fulfilling the requirement that all parcels be shown on the map that they are on.

Landmark understands that the index grid is essential for the development of the digital map book product, and the index is utilized in many steps during the parcel construction process (annotation on correct map, splitting parcel boundaries at map boundary, etc.). The standard methodology is to create attributes for the index grid listed here:
- fixed scale
- map rotation
- dynamic scale text (e.g. 1" = 400')
- tax map number (e.g. 2-10 for district 2, map 10)
- district name

Any other attributes that the WVPTD or Mingo County require can be incorporated into the index grid as well.

5.0 Roads

Landmark Geospatial will implement the road rights-of-way buffers as provided by the county. It is our belief that an accurate, cartographically pleasing parcel database begins with the road rights-of-way. Landmark's process for the vector creation section of parcel conversion involves creating a spatially accurate, cartographically pleasing road buffer layer that mimics the original tax map appearance. It has been our experience that we always have to re-digitize road centerlines in order to achieve the

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desired product. If roads need added or removed, Landmark will keep an open conversation with Mingo County and West Virginia Division of Highways (WVDOH), if necessary, to identify potential problem areas, work toward resolution of problem areas, or to acquire more road network information if needed.

6.0 Railroads

Landmark Geospatial understands that defining and buffering rights-of-way widths for railroads and rail trails will follow the same methodology as determining road widths. The buffer will determine where the parcel lines meet the railroad rights-of-way.

7.0 Easements

All easements will be digitized from the georeferenced TIFF tax map images. Landmark will also digitize major power line and gas rights-of-way from the WVSAMB imagery. Easements will be a separate line feature class in the geodatabase.

8.0 In-land Water

Where parcel lines share a boundary with a waterway, the waterway line will be used as the parcel boundary. The layers will reflect high and low water levels.

9.0 Parcel Layer Attributes

The following attributes will be included in the parcel polygon layer. Many of these attributes will be populated upon IAS data integration.

ATTRIBUTE	DESCRIPTION
PARID	Full Parcel ID number from IAS (ex. 03 12002500000000)
DIST	District number
MAP	Map number
PID	Parcel number
LOT	Lot number
PID_ALT	Alternate unique identifier for the parcel defined by the jurisdiction
ACRES	Calculated acres from polygon feature
NAME	Owner name from IAS
ADDRESS	Owner's mailing address from IAS
LOCATION	Street address for the parcel from IAS
SUBDIV	Name of the subdivision or condominium name
IAS_ACRES	Land area value from IAS
SOURCE_REF	Source reference for the parcel
SOURCE_DATE	Source reference date (deed or plat)
OWNER_TYPE	Classification of owner or exempt status
IMPROVE	Whether or not there is an improvement on the parcel
ASSESS_LAND	Value of the land from IAS
ASSESS_IMPR	Value for improvements from IAS
ASSESS_TOTAL	Total assessed value from IAS
ASSESS_CLASS	Assessment or tax classification from IAS
MOD_DATE	Date of modification
MOD_AUTH	Modification author

10.0 Tax Map Rectification

To geo-rectify Mingo County's tax maps, Landmark will utilize the best imagery available. As put forth in the RFQ, the 2003 SAMB aerial photography will be used unless otherwise stated by the WVPTD or the county. If Landmark does use other imagery, it will be accurately described in the attributes of the data and within the metadata.

Landmark's workflow for geo-rectifying a tax map mimics the workflow in the RFQ. The staff set the data frame properties at the specified fixed scale (e.g. 1:4800) that coincides with the map being rectified. The layout view page size is changed to 24x36 and the data frame is stretched to the page extents. The "fit to display" command on the georeferencing toolbar is used to align the tax map with the view extent and ensure proper scale. Geographic control points are placed, minimum of 4 in the farthest corner as practical using the magnifier window.

10.1 Control Points and Transformations – First Order Affine

Landmark Geospatial's staff georeferences tax maps by placing geographic control points on identifiable features visible on both tax map and orthophotography. Examples of identifiable features include road intersections, road/stream intersections, bridges and other clearly identifiable landmarks.

Landmark uses the 1st order polynomial (affine) transformation with a minimum of 4 geographic control points. While the RFQ calls for a Root Mean Square Error (RMSE) of less than 10 with maximum threshold of 20, Landmark prides itself on an RMSE of 5 or less. Permanent transformations to the tax map .tif files are made using the "rectify" command. Link tables will be saved with the same name as the tax map .tif as a text file. Landmark's staff understands that the RMSE values for each tax map will be recorded in the tax map tracking spreadsheet. All files associated with output geotif product will be included with the monthly and final deliverables.

10.2 Geo-rectification Difficulties

From experience in several counties, Landmark understands that sometimes one tax map can be inherently inaccurate, poorly created, or not to the appropriate scale. If the map requires multiple attempts at georeferencing, each area will be clipped from the original tax map and a new file will be created, so that each portion may be georeferenced separately. Landmark uses a naming convention that makes tax maps that have had to be clipped easily identifiable by its file name. Comprehensive documentation of tax maps that require clipping for multiple georeferences will be kept, including notes about the georeferencing that will be incorporated into the final deliverable.

Also, if a tax map has no identifiable features that match features on the imagery or other sorts of geo-rectification difficulties, Landmark will map adjacent tax maps first and then edge match the problematic tax map.

Finally, if any of the above mentioned methods do not accurately represent parcel boundaries or the tax maps accurately, clear and concise documentation will be created.

11.0 Tax Map Index Grid

As mentioned in section 4.0, Landmark believes our method of tax map index grid creation to be the best-case scenario for all involved and will result in a cleaner, seamless index. If our methodology for creating the tax map index grid is not accepted, we would gladly conform to the requirements set forth in the RFQ. The tax map index grid will be created by drawing vector polygons around the extent of each raster tax map boundary. Landmark understands that the "index_grid" is a required deliverable each month as well as part of the final deliverable.

While in past projects, Landmark has not recorded RMSE in the index map for previous projects, the staff is very familiar with RMSE in the context of georeferencing and can easily incorporate this step into standard daily workflow.

The attribute list in the RFQ is very similar to the standard attributes that Landmark uses when creating a tax map index grid. Modifications to meet the needs of the WVPTD and Mingo County do not pose a problem.

12.0 Vectorization of Surface Parcels

Existing Data
Landmark has downloaded the tax district boundary shapefile created by the West Virginia Department of Tax and Revenue. Landmark understands that these boundaries are set and no editing will take place on this dataset.

Landmark understands that the existing digital parcel data is currently in shapefile format and will need revised. It has most often been our experience that the "start from scratch" approach is best in regards to parcel conversion as opposed to correcting existing data, but the current shapefile may be utilized for reference.

Database Design
Landmark will meet with the WVPTD and Mingo County staff to discuss the best possible solution for geodatabase design for Mingo County. We have extensive experience in effective geodatabase design and pride ourselves in automated, efficient workflows with quality control checks and balances.

Parcel Conversion
Landmark will begin the parcel conversion process by georeferencing the updated tax .tif images using the 2003 WVSAMB aerial imagery. The next step is creating a spatially correct cartographically pleasing road right-of-way buffer. Landmark has two types of parcel construction methods (corporate and rural).

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For the corporate or 50' and 100' scale areas, we make all attempts to create parcel boundaries that have the same dimensions as were originally annotated on the original tax maps. We have found this to be an area that has been extremely lacking in many of the parcel conversions that were completed by previous vendors of the WVPTD. After an accurate, cartographically pleasing road buffer is created in corporate areas, parcel boundaries are drawn one block at a time with our custom semi-automated tools. These tools allow fast creation of parcel boundaries that have the correct survey or deed dimensions, and eliminate digitizing that involves more human intervention. Imagery is utilized to obtain a "starting point" in a particular block, and once the first boundary is drawn, subsequent boundaries in the same block are constructed from the original line and all lines are at the specified distances when at all possible. Care is taken in regards to construct parallel parcel boundaries where several parcels in the same block or area have the same bearing. This has been another shortcoming of data that has previously been produced by vendors of the WVPTD.

The rural areas/districts are typically constructed after the corporate areas due to the fact that we can utilize the more accurate corporate area as a starting point for the rural areas and move outward from there. Starting out from the corporate areas and road buffers, Landmark creates parcel boundaries for the rural areas/districts by utilizing the georeferenced tax maps, aerial imagery, and COGO (where available). The accuracy of rural areas highly depends on features visible on imagery (ex. Fence lines).

12.1 Coordinate Geometry (COGO)

Landmark Geospatial understands that if the option of having areas constructed by the COGO methodology is selected, the staff will perform an up-front review of the existing data, as well as an on-going review during production to identify the necessary plat maps needed to be constructed using COGO. This will be a work in progress and will provide Landmark a jump start to obtain the necessary plats. Our past parcel conversion projects have utilized COGO to improve areas of need and we have requested deeds and plats from the county on an as needed basis. Typically the county will scan the deeds/plats and provide them to us in image format (.pdf or .tiff). We have had good success with improving the accuracy of parcels within areas based on COGO.

COGO work will only be performed at the approval of the WVPTD and Mingo County and will not impede the overall progress of the project.

13.0 Tax Parcel Attribute Tagging

Landmark Forestry's database design will meet the requirements of the attribute information requested within the RFQ. Other attribute information can be added and discussed during the initial project kick-off meeting. Below is a table of attributes Landmark currently uses in its parcel projects.

ATTRIBUTES	DESCRIPTION
OBJECTID	Feature ID number
PARID (ROOTID)	Full Parcel ID number from IAS (ex. 03 12002500000000) (string)
DIST	District number (string)
MAP	Map number (string)
PID	Parcel number (string)
LOT	Lot number (string)
IASACRES	Acres value from IAS database (double)
CALCACRES	Calculated acres from polygon feature (double)
SOURCE	Method of entry (string)
MOD_DATE	Date of modification (date)
MOD_AUTH	Modification author (string)
SHAPE	ESRI default field
SHAPE_LENGTH	ESRI default field
SHAPE_BELOW	ESRI default field

Landmark will incorporate the following attributes to follow the schema set forth in the RFQ.
- COUNTY (number)
- INSET
- SCALE
- SUBPCL
- REV1
- REV1_DATE
- NOTES1
- REV2
- REV2_DATE
- NOTES2

13.1 Special PIDs and Generic Parcels

Polygons created that are not parcels will receive unique special parcel identification numbers. Examples of these features include roads, water, railroads, area assessed in another county, property of the US Government that does not have a parcel number, exempt parcels with no parcel number and "problem" parcels, i.e. parcels with a non-decipherable parcel ID or related issue.

The parcels meeting these requirements will receive special parcel ID numbers as laid out in Table 4, "Conventions of special PIDs for miscellaneous vector data layers" in the RFQ.

14.0 Annotation

Landmark Geospatial understands that the annotation requirements must be met as outlined in the **Statewide Procedures Guide for the Maintenance of Surface Tax Maps (189CRS4)**. Landmark and the county will discuss and mutually agree upon what features are to be captured by Landmark. Landmark will capture all basic annotation features directly related to the tax parcels as indicated on the updated tax maps.

We will discuss our process to produce a presentable hard copy plot for each tax map. The completion of all annotation/labeling must be completed prior to the map generation. Landmark and the county will discuss which annotation attributes will be included in the project. At a minimum Landmark will develop the following annotation:
- Parcel identifier
- Parcel dimensions or acreage
- Lot numbers
- Subdivision block identifiers
- Municipal and tax district names
- Names of streets, highways, alleys, railroads, rivers, lakes

Using Table 5, "Pen Weight Conversion Chart" of the RFQ, Landmark staff will set font sizes based on this table and the standards outlined by the State.

15.0 IAS Data Linkages

Landmark Geospatial will obtain a copy of Mingo County's IAS data and convert it into a Microsoft Access database format. At this point, fields will be appended from all the separate tables into a single ownership table that can be directly related to the digitally mapped parcel data. Landmark will generate a 'mismatch' report for each delivered area that can be forwarded to Mingo County with the monthly progress reports for resolution. The report will provide Mingo County with feedback. Modifications can then be incorporated directly into the database.

IAS error "mismatch' report

With each data delivery, Landmark will provide an IAS database *mismatch report.* This report is in Microsoft Access format and contains two tables. One table contains a list of parcels that are mapped in the digital parcel data and not found in the IAS ownership

table. The other table is a list of parcels that are contained in the IAS but not found in any of the mapping or on the tax maps. This would give the county an idea of how many parcels would need to be added after the conversion process.

16.0 Metadata
Metadata will be created for all layers using ESRI's metadata editor and will comply with the North American Profile (NAP) of ISO 19115, the FGDC. Staff members at Landmark are very familiar with the FGDC standards for metadata content and have created and edited metadata for many geospatial projects.

17.0 Monthly Deliverables
With each monthly delivery, Landmark will also provide monthly progress reports. The progress reports will be in the format of a Microsoft Excel spreadsheet, as detailed in Figure 1, "Example for submitting monthly progress reports and the final deliverable" in the RFQ. The report will detail the number of parcels and maps completed and delivery status, link tables from rectified tax maps, along with any other pertinent project information. These reports are to be reviewed by the WVPTD and Mingo County staff. Landmark can provide conference calls, web support demonstrations with county staff to discuss any issues that may arise. Landmark can hold on-site status review meetings with county staff members which include discussions and data review, etc.

18.0 Finished Tax Maps
Landmark Geospatial is engaged in several West Virginia digital parcel mapping projects and is familiar with the map book creation process. Using ArcGIS functionality, a tax map book layout is created for each district and map at the appropriate scale. (Ex: 1-inch = 100-feet and 1-inch = 400-feet scale maps). The users of the final product will have easy "print-on-demand" capability. The maps will be able to be scanned, converted to grey scale and reduced to 50% of original size while still being legible and usable. Dynamic text is standard in Landmark's tax map template in the title block which includes district name, map number, the date the map was prepared, scale text, legend, north arrow, a locator map showing adjacent maps, restrictions of use and other features. The margins in the tax map template comply with the margins in the State standards for publishing surface tax maps. Our sample template is shown in Appendix B.

19.0 Data Quality Objectives (DQO)
Landmark Geospatial has adequate staff to perform quality control throughout the conversion process and will record the time spent performing checks in the monthly progress reports. We have extensive programming and database experience and can run many automated spatial and aspatial quality control checks to ensure the data is of utmost accuracy.

19.1 Geo-rectifying Tax Maps

Maintaining integrity of the tax maps will be the utmost priority. To achieve this, Landmark has qualified management staff with previous geo-rectifying experience that will review all work performed and will record this as the value "Rev2" in the tracking log.

An adequate amount of staff time is set aside for quality assurance/quality control of the project. QA/QC checks will be performed throughout the lifespan of the project.

As stated in section 10.1 of this document, Landmark's target RMSE is 5 or less, but understands the RFQ requires less than 10 with a maximum threshold of 20.

Landmark recognizes that other transformations than first order polynomial (affine) can be used, however the staff is discouraged from using other transformations. If there is a circumstance that arises that another transformation is more suitable, adequate documentation showing the type of transformation used and any other relevant information will be created.

19.2 Other QC Mechanisms

Landmark QA/QC process occurs with a review of each existing tax map during and after compilation. Prior to project start up, staff is gathered to discuss project specifications and scope of work. Our data creation process includes validation of data and correction to any topology errors that occur. Our project deliveries will be on a monthly basis. WVPTD and Mingo County have a 30-calendar-day review period to accept preliminary deliverable or request for additional modifications to be made to the data. The preliminary deliveries are for review purposes only and should not be maintained or edited. Mingo County will include any errors found along with any other comments and return the information to Landmark for corrections.

The GIS production process is supported by many customized scripts and validation rules to assure the integrity of the spatial and attribute data. Customized reports are also run by technicians as automated error discovery tools during the entire work flow of the project. Reports are run at various stages during the production work flow to detect any errors that might exist prior to moving to the next stage. The automated reports detect errors such as parcel polygons with missing or duplicate tax parcel identifiers. Reports also assure that all parcel polygons with a county tax parcel identifier number have a related record in the ownership database.

Topology feature classes are created within the geodatabase to assure data quality within and between the feature classes being edited. Topologies are stored in a geodatabase as one or more relationships that define how the features in the feature classes share geometry. Rules are defined in the topology to control the relationships between features. Certain topology rules validate the relationships of features within a feature class and other rules validate the relationships between features in two different feature classes. For example, two rules that are created for the tax parcel polygon feature class are that parcels must not overlap and that gaps must not exist between parcel polygons.

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Landmark understands that the index grid for tax maps, not including insert maps, should not have large gaps and should have reasonable adjacency.

Landmark will work toward a near 100% match with parcel polygons versus IAS data. This can be accomplished through the mismatch reports discussed in section 15 of this document.

As stated in section 1 of this document, the map accuracy standards will meet or exceed 1:4800 or +/-13.33 feet.

Landmark will ensure that deeded versus mapped acreages or dimension values will be +/-30%.

Finally, the overall occurrence of error will not exceed 20%.

Appendix A - Relevant Project Examples
Resumes of key project personnel are in Appendix C. Below are some examples of relevant projects that Landmark has either completed or are currently ongoing.

Randolph County, West Virginia – Parcel Conversion Project
Landmark has been working closely with the staff of the Randolph County Assessor's office to implement the plan to ensure that the county's maps are under compliance with WVPTD state guidelines. At our recommendation, all districts in the county will be readjusted/ corrected to the 2009 Landmark Imagery. Some of the work has been done by our staff and some by county personnel. Upon completion of the parcel correction, the county will decide what percentage of the annotation that they would like to create and what percentage they want landmark to create. We value our working relationship with the Randolph County Assessor's Office and believe it to be a great model for effective private-public sector cooperation.

Contact: Mrs. Phyllis Yokum, Assessor
4 Randolph Ave, Rm. 201
Elkins, WV 26241
Phone: 304-269-6311
Email: pyokum@assessor.state.wv.us

Randolph County, West Virginia
Before Landmark Geospatial Parcel Correction Methodology

Randolph County, West Virginia
After Landmark Geospatial Parcel Correction Methodology

Lewis County, West Virginia – Parcel Conversion Project

Landmark is currently in the final stages of a county-wide parcel conversion project for Lewis County, WV. Final delivery includes a seamless county-wide parcel layer that includes all annotation required for tax map production. We have also been contracted to maintain the parcel splits and consolidations and will be making further enhancements to the accuracy of the parcel database via deeds and survey plats.

Contact: Mr. T. Chad Kelley, Assessor
PO Box 706
Lewis County Courthouse
Weston, WV 26452
Phone: 304-269-8205
Email: ckelley1@assessor.state.wv.us

Preston County, West Virginia – Parcel Conversion Project (Lyon District)

Landmark was contracted by Preston County to perform a digital parcel conversion project with annotation for Lyon District in Preston County, WV. The project involved correcting and adjusting existing parcel data to the physical features shown on the 2003 WVSAMB imagery, creating annotation features for the district, and compiling a mismatch report. As a part of this project, Landmark also provided specialized training in ArcEditor.

Contact: Ms. Terri Funk, Assessor
106 W. Main Street
Kingwood, WV 26537
Phone: 304-329-1220
Email: tlfunk@assessor.state.wv.us

Lewis County, West Virginia
Before Landmark Geospatial Parcel Correction Methodology

Lewis County, West Virginia
After Landmark Geospatial Parcel Correction Methodology

Preston County, West Virginia
Before Landmark Geospatial Parcel Correction Methodology

PrestonCounty, West Virginia
After Landmark Geospatial Parcel Correction Methodology

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Morgan County, West Virginia - Parcel Conversion project

Landmark has been contracted by the Morgan County Assessor's office to continue the county's digital parcel mapping project. The project involves reviewing and correcting existing digital parcel data. The process involves georeferencing tax maps to the 2003 WVSAMB imagery and adjusting and digitizing property lines, as necessary. Upon completion of the digital parcel layer, Landmark will also create all annotation features required for tax map production. The project schedule calls for delivery of products on a district-by-district basis. The final product will be a countywide seamless parcel geodatabase with all necessary annotation for tax map production.

Contact: Ronald McIntire, Assessor
Contact: Debbie Weaver, Deputy Assessor/Mapper
77 Fairfax Street
Berkeley Springs, WV 25411
Phone: 304-258-8570 or 8576
Email: mcintire@assessor.state.wv.us

Taylor County, West Virginia – Parcel Maintenance Project

Landmark is contracted by the Taylor County Assessor's Office to perform yearly digital parcel maintenance services. The county provided the necessary deeds, plats, surveys, etc. to be incorporated into the existing digital parcel data. Maintenance was accomplished using the COGO methodology. Digital data was delivered in ArcGIS format.

Contact: Ms. Judy Collett, Assessor
214 W. Main Street
Grafton, WV 26354
Phone: 304-265-2420
Email: jcollett@assessor.state.wv.us

Lewis County, West Virginia – Parcel Maintenance Project

Landmark has been contracted by the Lewis County Assessor's Office to perform digital parcel maintenance services. The county provided the necessary deeds, plats, surveys, etc. to be incorporated into the existing digital parcel data. Maintenance was accomplished using the COGO methodology.

Contact: Mr. T. Chad Kelley
Weston, WV 26354
Phone: 304-265-2420
Email: jcollett@assessor.state.wv.us

Randolph County, Pendleton County, Taylor County, West Virginia- Public Access System

Landmark has created many custom software applications with mapping functionality and has had a great response from our Public GIS Access application. This is an ArcGIS Engine application that utilizes a cartographically appealing map designed by Landmark to display parcel geodata in a way easily viewed by visitors to the Assessor's Office. This application links directly to the IAS database to obtain the most current owner information. Users can print custom maps and IAS information reports.

Upshur, Randolph, Barbour and Lewis 911 Addressing Projects

Landmark was contracted by these four counties to complete their 911 Addressing and Mapping projects as required by the WV State Addressing and Mapping Board. The data collected consisted of spatial data (road centerlines and structures) as well as tabular/attribute data (structure information and structure photographs). Of utmost importance in the addressing and mapping projects was the USPS edit sheet matching, which Landmark performed at a level well above what was required. In addition, the projects included a phone matching component which was also completed accurately in a very timely manner. At the onset of these projects, Landmark deemed it necessary to develop its own addressing software which incorporated all aspects of the data collection/matching process. The software was developed as an ESRI ArcGIS desktop extension, and all 3 counties are utilizing Landmark's software to complete their addressing tasks.

Upshur County Contact: Terri Jo Bennett
38 West Main Street, Room 301
Buckhannon, WV 26201
Phone: 304-472-1673

Randolph County Contact: Marvin O. Hill
32 Randolph Avenue
Elkins, WV 26241
Phone: 304-636-0483

Barbour County Contact: Cindy Hart
8 N. Main Street
Phillipi, WV 26416
Phone: 304-457-5686

Lewis County Contact: William F. Rowan
201 Orchard Street
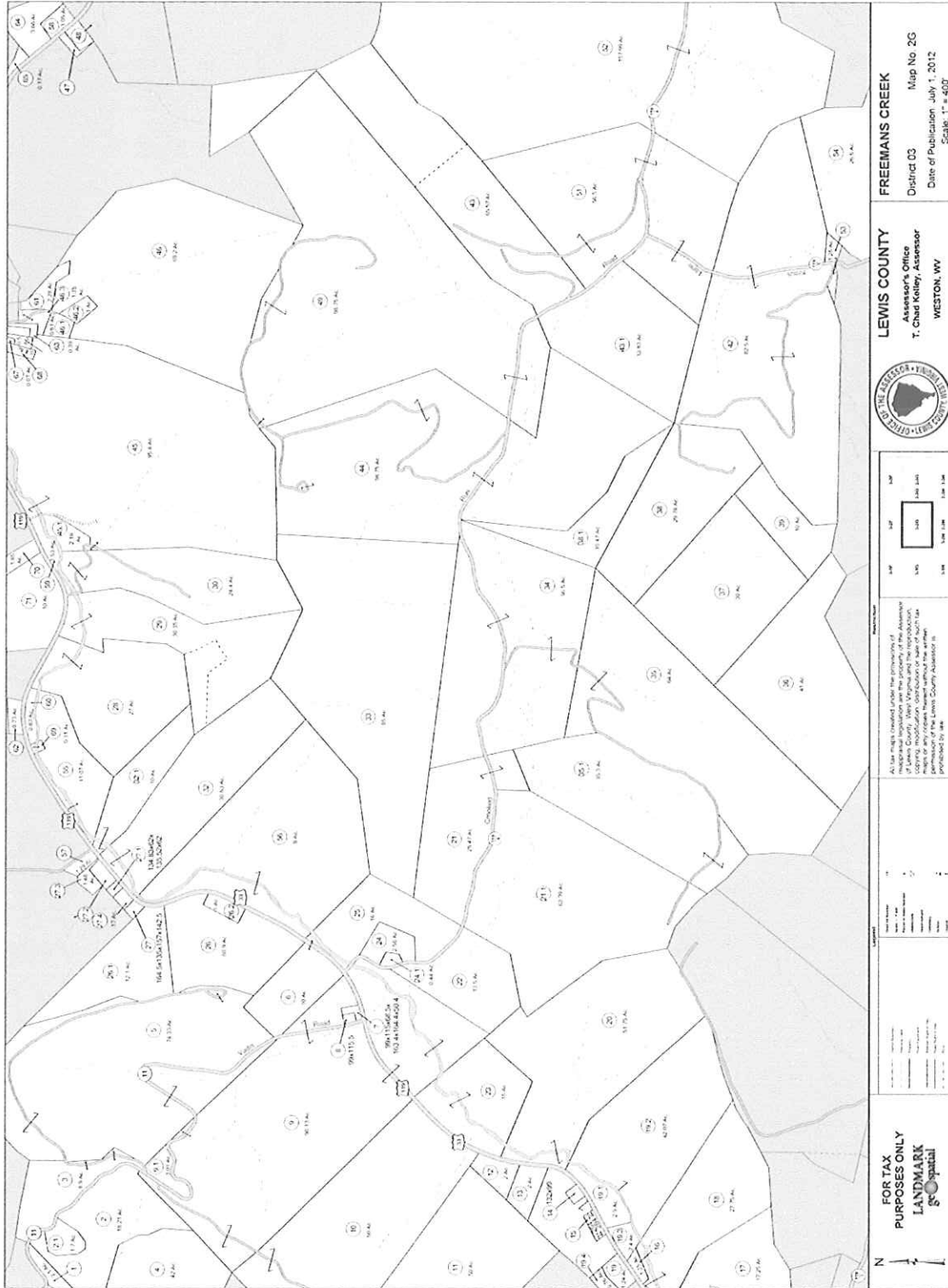Weston, WV 26452
(304) 269-8241

Upshur County, Taylor County Web Mapping Applications

Landmark was contracted by Upshur and Taylor Counties in West Virginia to develop custom Web Mapping Applications to incorporate the county's GIS datasets. These applications are cutting-edge visually appealing applications that have custom functionality. The applications were developed in Flex and utilize ArcGIS server web services. To visit these applications, click on the following url(s).

www.landmarkgeospatial.com/upshur

www.taylorcountyassessorwv.com

Appendix B - Sample Tax Map Book Template

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RESUME
FOR
MICAHAEL McWHORTER

EDUCATION:
- B.S. in Forest Resource Management, West Virginia University, Morgantown, WV 1986.

WORK EXPERIENCE:
1992 - present: Owner, Landmark Forestry LLC, Horner, WV..
- Manage operations of offices with 26 employees.
- Developed a comprehensive forest inventory software program for use in field data collection.
- Provide Digital Aerial Imagery for use by clients in forestry applications.
- Inventory and create forest management plans for private landowners.
- Administrate timber sales for private and corporate clients.
- Provide Timber Appraisal Services for private and corporate clients.
- Evaluate timber trespass areas.
- Assist forest industry corporations in collecting forest resource inventory data.
- Collect GPS data for use in forestry applications.
- Utilize Geographic Information System to assist clients in management of properties and large scale forest inventories.

1987 - 1992: Service Forster, West Virginia Division of Forestry, Berkley, Morgan, Jefferson, Lewis Counties, WV.

1986 - 1987:Self-employed in urban tree care business, Berkley and Lewis County, WV.

1986 - 1986: Forester, Penn Line Service, Cleveland, OH.

REGISTRATIONS AND AFFIATIONS:
- West Virginia: Registered Professional Forester #312.
- Maryland: Registered Professional Forester #383.
- Member of West Virginia Forestry Association.
- Member # 052940 of Society of American Foresters.
- 1996-97 Member of three-person panel to select the Logger of the Year for West Virginia.
- Served as chairman of same committee for 1998 and 1999.
- Sat on Sustainable Forestry Initiative committee for West Virginia.
- Who's Who in West Virginia Business in 2009
- Numerous honours and awards for Lewis County in the state of West Virginia for 4-H involvement and sponsorships.

RESUME
FOR
WESLEY BAILES

EDUCATION:
West Virginia University, Bachelors of Science in Forest Resource Management,
Master's Degree in Forestry

WORK EXPERIENCE:
2004 to present: Software Development/GIS, Landmark Forestry LLC

➢ Manager of Landmark Geospatial Contract Acquisition and Project Management
(September 2011 to current)
➢ Development of ArcGIS (ArcView, ArcEditor) software extensions.
➢ Development of ArcGIS (ArcView, ArcEditor) software extensions.
➢ Development of Stand-Alone desktop applications that incorporate mapping
functionality (ArcGIS Engine)
➢ Development of ArcGIS Server Web Applications (.NET, Flex)
➢ Development and maintenance of many commercial/in-house software
applications (database, mobile and geospatial applications)
➢ Software experience: Microsoft Visual Studio (.NET), Adobe Flash Builder,
Microsoft SQL Server, Microsoft Office products (Access, Word, etc.), ArcGIS
desktop software (ArcView, ArcEditor), ArcGIS Server (application development
and administration)

REGISTRATIONS AND AFFILIATIONS:
Member of ESRI Developer Network
West Virginia Registered Professional Forester Number 676

RESUME
FOR
CHAD WESTFALL

EDUCATION:

- ➤ B.S. in Forest Resources Management, West Virginia University, Morgantown, WV, 2000.
- ➤ A.S. in Forest Technology, Glenville State College, Glenville, WV, 1998.
- ➤ A.S. in Land Surveying Engineering, Glenville State College, Glenville, WV, 1998.

WORK EXPERIENCE:

2000 – Present: **Regional Manager, Landmark Forestry LLC, Horner, WV.**
- Provide Digital Aerial Imagery for use by clients in forestry applications.
- Inventory and create forest management plans for private landowners.
- Administrate timber sales for private and corporate clients.
- Provide Timber Appraisal Services for private and corporate clients.
- Evaluate timber trespass areas.
- Assist forest industry corporations in collecting forest resource inventory data.
- Collect GPS data for use in forestry applications.
- Utilize Geographic Information Systems to assist clients in management of properties and large scale forest inventories.

1998 – 1999: **Forestry Technician, Natco Forestry Services, Parkersburg, WV.**
1996 – 1997: **Forest Technician, Summer Landmark Surveying and Forestry, Horner, WV.**

DETAILED TASKS ASSIGNED

PROFESSIONAL ASSOCIATIONS

- West Virginia Board of Registered Foresters #569

HONORS AND AWARDS

- Graduated Glenville State College Magna Cum Laude

RESUME
FOR
JANETTE BASILE

EDUCATION:
- West Virginia University, Master of Arts in Geography with emphasis on Geographic Information Systems (GIS) and Remote Sensing
- West Virginia University, Bachelors of Arts in Geography with minors in Geology and Communication Studies

WORK EXPERIENCE:
2010 to present: GIS Analyst, Landmark Forestry LLC
- Provide GIS analysis and support for parcel mapping projects
- Software experience: ArcGIS 10.x

2005 – 2010: GIS Manager, Canaan Valley Institute
- Provide GIS and remote sensing support to the Aquatics Resources, Research and Development and Operations teams
- Seek funding opportunities and fee for service projects
- Provide educational services (workshops, demos, etc.) for internal personnel and external organizations
- Develop educational materials for workshops, demos, etc.
- Provide surveying skills using Total Station survey equipment.
- Provide geospatial hardware and software technical support for internal staff and stakeholders
- Provide backup Information Technology (IT) support, as needed
- Serve as geospatial point person for Quality Assurance/Quality Control (QA/QC) team
- Serve as office and field safety committee lead
- Provide first aid training and assist with CPR training for staff

2002 – 2005: GIS Technical Support Specialist, Canaan Valley Institute
- Provide educational services (workshops, demos, etc.)
- Develop educational materials for workshops, demos, etc
- Provide GIS and remote sensing support to site-specific projects
- Provide surveying skills using Total Station survey equipment
- Assist with web mapping services
- Backup cartographic support
- Other computer technical support

REGISTRATIONS AND AFFILIATIONS:
- West Virginia Association of Geographic Professionals (WVAGP)
- Gamma Theta Upsilon (Geography Honorary Fraternity

TAX12007

GIS Database for the Digital Conversion of Countywide Tax Maps

Required Vendor Documentation

Proposed by:
Landmark Geospatial
A Subsidiary of Landmark Forestry LLC

691 Stalnaker Addition
Horner, WV 26372

In response to:
"TAX12007 - GIS database for the digital
conversion of countywide tax maps"

CERTIFICATION AND SIGNATURE PAGE

By signing below, I certify that I have reviewed this Solicitation in its entirety; understand the requirements, terms and conditions, and other information contained herein; that I am submitting this bid or proposal for review and consideration; that I am authorized by the bidder to execute this bid or any documents related thereto on bidder's behalf; that I am authorized to bind the bidder in a contractual relationship; and that to the best of my knowledge, the bidder has properly registered with any State agency that may require registration.

Landmark Geospatial, A Subsidiary of Landmark Forestry LLC
(Company)

_____Michael J. McWhorter, Managing Member
(Representative Name, Title)

 304-269-4831 / 304-269-6300
(Contact Phone/Fax Number)

July 16, 2012
(Date)

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.: TAY12007

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.
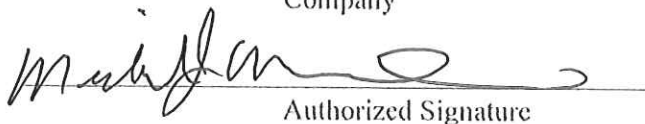
Addendum Numbers Received:
(Check the box next to each addendum received)

[X]   Addendum No. 1   [   ]   Addendum No. 6

[   ]   Addendum No. 2   [   ]   Addendum No. 7

[   ]   Addendum No. 3   [   ]   Addendum No. 8

[   ]   Addendum No. 4   [   ]   Addendum No. 9

[   ]   Addendum No. 5   [   ]   Addendum No. 10

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Landmark Geospatial, A Subsidiary of Landmark Forestry LLC
Company

_____
Authorized Signature

July 16, 2012
Date

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.

Revised 6/8/2012

Rev. 09/08

State of West Virginia
VENDOR PREFERENCE CERTIFICATE

Certification and application* is hereby made for Preference in accordance with *West Virginia Code*, §5A-3-37. (Does not apply to construction contracts). *West Virginia Code*, §5A-3-37, provides an opportunity for qualifying vendors to request (at the time of bid) preference for their residency status. Such preference is an evaluation method only and will be applied only to the cost bid in accordance with the *West Virginia Code*. This certificate for application is to be used to request such preference. The Purchasing Division will make the determination of the Resident Vendor Preference, if applicable.

1. Application is made for 2.5% resident vendor preference for the reason checked:
__X__ Bidder is an individual resident vendor and has resided continuously in West Virginia for four (4) years immediately preceding the date of this certification; or,
_____ Bidder is a partnership, association or corporation resident vendor and has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; or 80% of the ownership interest of Bidder is held by another individual, partnership, association or corporation resident vendor who has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; or,
_____ Bidder is a nonresident vendor which has an affiliate or subsidiary which employs a minimum of one hundred state residents and which has maintained its headquarters or principal place of business within West Virginia continuously for the four (4) years immediately preceding the date of this certification; or,

2. Application is made for 2.5% resident vendor preference for the reason checked:
__X__ Bidder is a resident vendor who certifies that, during the life of the contract, on average at least 75% of the employees working on the project being bid are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; or,

3. Application is made for 2.5% resident vendor preference for the reason checked:
_____ Bidder is a nonresident vendor employing a minimum of one hundred state residents or is a nonresident vendor with an affiliate or subsidiary which maintains its headquarters or principal place of business within West Virginia employing a minimum of one hundred state residents who certifies that, during the life of the contract, on average at least 75% of the employees or Bidder's affiliate's or subsidiary's employees are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; or,

4. Application is made for 5% resident vendor preference for the reason checked:
__X__ Bidder meets either the requirement of both subdivisions (1) and (2) or subdivision (1) and (3) as stated above; or,

5. Application is made for 3.5% resident vendor preference who is a veteran for the reason checked:
_____ Bidder is an individual resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard and has resided in West Virginia continuously for the four years immediately preceding the date on which the bid is submitted; or,

6. Application is made for 3.5% resident vendor preference who is a veteran for the reason checked:
_____ Bidder is a resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard, if, for purposes of producing or distributing the commodities or completing the project which is the subject of the vendor's bid and continuously over the entire term of the project, on average at least seventy-five percent of the vendor's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years.

Bidder understands if the Secretary of Revenue determines that a Bidder receiving preference has failed to continue to meet the requirements for such preference, the Secretary may order the Director of Purchasing to: (a) reject the bid; or (b) assess a penalty against such Bidder in an amount not to exceed 5% of the bid amount and that such penalty will be paid to the contracting agency or deducted from any unpaid balance on the contract or purchase order.

By submission of this certificate, Bidder agrees to disclose any reasonably requested information to the Purchasing Division and authorizes the Department of Revenue to disclose to the Director of Purchasing appropriate information verifying that Bidder has paid the required business taxes, provided that such information does not contain the amounts of taxes paid nor any other information deemed by the Tax Commissioner to be confidential.

Under penalty of law for false swearing (West Virginia Code, §61-5-3), Bidder hereby certifies that this certificate is true and accurate in all respects; and that if a contract is issued to Bidder and if anything contained within this certificate changes during the term of the contract, Bidder will notify the Purchasing Division in writing immediately.

Bidder: __Michael J. McWhorter__   Signed: _[signature]_

Date: __July 16, 2012__   Title: __Managing Member__

*Check any combination of preference consideration(s) indicated above, which you are entitled to receive.

RFQ No. _TAX12007_

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

West Virginia Code §5A-3-10a states: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

EXCEPTION: The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

Under penalty of law for false swearing (*West Virginia Code §61-5-3*), it is hereby certified that the vendor affirms and acknowledges the information in this affidavit and is in compliance with the requirements as stated.

WITNESS THE FOLLOWING SIGNATURE

Vendor's Name: _Michael J. McWhorter_

Authorized Signature: _____ Date: _July 16, 2012_

State of _West Virginia_

County of _Lewis_ , to-wit:

Taken, subscribed, and sworn to before me this _17_ day of _July_ , 20_12_.

My Commission expires _December 29_ , 20_14_.

AFFIX SEAL HERE

NOTARY PUBLIC _____

OFFICIAL SEAL
STATE OF WEST VIRGINIA
NOTARY PUBLIC
BRIAN J. MILLS
MOUNTAIN AIR SERVICES, LLC
P.O. BOX 188
HORNER, WV 26372
My Commission expires December 29, 2014

Purchasing Affidavit (Revised 12/15/09)