LINK-GIS
A Northern Kentucky Geographic Information System

RFP Document and Technical Specifications for:

Aerial Imagery Acquisition, Digital Orthoimagery Production, LiDAR Acquisition, Digital Elevation Dataset Production, Digital Oblique Aerial Imagery Acquisition/Production & Associated Application Software, and Photogrammetric Updates and New Compilation of GIS Planimetric Mapping

Northern Kentucky Area Planning Commission (NKAPC)
Acting on behalf of

The LINK-GIS Partnership *- Kenton and Campbell Counties, Kentucky*

December 9, 2011

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I. Introduction

The **Northern Kentucky Area Planning Commission (NKAPC),** acting on behalf of the **LINK-GIS Partnership,** invites qualified firms to submit proposals for professional services related to the acquisition of:

- **Acquisition of Aerial Imagery and Production of Digital Orthoimagery**
- **Acquisition of LiDAR Data and Production of Digital Elevation Datasets**
- **Acquisition and Production of Digital Oblique Aerial Imagery & Associated Application Software and**
- **Photogrammetric Updates and new compilation of GIS Planimetric Mapping**

The details of this request are explained within this Request for Proposals (RFP.) This ***Request for Proposals (RFP)*** will be available at **9:00 AM EST on Friday, December 9, 2011** from the:

LINK-GIS Partnership
Northern Kentucky Area Planning Commission
2332 Royal Drive
Fort Mitchell, KY 41017

The LINK-GIS Partnership

LINK-GIS is a partnership between agencies in Kenton and Campbell Counties in Northern Kentucky.

Kenton County Partners: The partners in Kenton County include the Northern Kentucky Area Planning Commission **(NKAPC)**, the Sanitation District No. 1 **(SD1)**, the Kenton County Property Valuation Administrator **(KCPVA)**, the Kenton County Fiscal Court **(KCFC)** and the Northern Kentucky Water District **(NKWD)**. Each partner shares in the responsibility of data acquisition and maintenance.

Campbell County Partners: The partners in Campbell County include the Sanitation District No. 1 **(SD1)**, the Campbell County Property Valuation Administrator **(CCPVA)**, the Campbell County Fiscal Court **(CCFC)** and the Northern Kentucky Water District **(NKWD)**. Each partner shares in the responsibility of data acquisition and maintenance.

In order to promote data consistency and homogeneity, the **NKAPC** has been designated to develop, present and advertise this RFP for services by agreement of all **LINK-GIS Partners** in both Kenton and Campbell Counties. The NKAPC has been designated the managing partner of the **LINK-GIS Partnership**.

In addition to these partners, there are many other organizations, both public and private, that contribute both data and resources to the **LINK-GIS** system, and make use of its capabilities. Presently the GIS database contains data for the entirety of both Kenton and Campbell Counties.

Definition of GIS Project Areas

There are three (3) Project Areas defined in this RFP. The **LINK-GIS Partnership** is requiring that vendors treat the Project Areas as individual projects which may be awarded as standalone projects to different vendors. The three (3) Project Areas are:

Kenton County GIS Project Area: Includes the entirety of Kenton County and all areas in neighboring counties which may fall within the tile boundaries indicated in **Attachment A**. This Project Area is approximately 188 square miles (599 tiles – each tile covers 3500' x 2500').

Campbell County GIS Project Area: Includes the entirety of Campbell County and all areas in neighboring counties which may fall within the tile boundaries indicated in **Attachment B**. This Project Area is also approximately 188 square miles (599 tiles – each tile covers 3500' x 2500').

Combined LINK-GIS Project Area: Includes the entirety of both Kenton and Campbell Counties and all areas in neighboring counties which may fall within the tile boundaries indicated in **Attachment C**. This Project Area is approximately 353 square miles (1125 tiles – each tile covers 3500' x 2500'). Approximately 23 square miles (73 tiles) of this area are common to both Kenton and Campbell Counties.

Throughout both Kenton and Campbell Counties, terrain elevations range from approximately 475 feet to over 1,000 feet above sea level. The **LINK-GIS Partnership** will evaluate costs related to producing the products and services requested for:

The **Kenton County GIS Project Area** ***(Attachment A)***

The **Campbell County GIS Project Area** ***(Attachment B)***

The **Combined LINK-GIS Project Area** ***(Attachment C)***

Scope of Work Overview

Vendors responding to this RFP must respond with separate proposals for each of the three (3) Project Areas. These separate proposals must be treated as standalone projects and all costs must reflect the true cost of performing the tasks requested without respect to other project areas.

Failure to provide separate responses for each of the three (3) Project Areas shall be cause for disqualification of the vendor.

(Unless otherwise noted, the term "Project Area" in this section, shall be interpreted to mean either the Kenton County GIS Project Area [Attachment A] or the Campbell County GIS Project Area [Attachment B] or the Combined LINK-GIS Project Area [Attachment C]. The Scope of Work Overview is identical for all Project Areas.)

In responding to this RFP, the vendor must take into consideration that the **Kenton County GIS Scope of Work** and the **Campbell County GIS Scope of Work** are funded independently by the partners of the respective counties. Therefore, all costs proposed shall reflect this separation by separate proposed pricing and work schedules, treated as independent projects. **All costs, work schedules and/or tasks proposed shall be priced separately to reflect the true costs incurred in the respective areas as if there were no other projects**. The **Kenton County GIS Project Area** is illustrated in **Attachment A** and the **Campbell County GIS Project Area** is illustrated in **Attachment B**.

Although the **LINK-GIS Partnership** is composed of agencies from both Kenton and Campbell Counties, single county agencies may not expend tax revenues derived from one county on the production of data or services in another. However, because of the proximity and adjacency of the two counties, the **LINK-GIS Partnership** may wish to take advantage of any potential economies of scale which might be available by treating the combined areas as a single Project Area, the **Combined LINK-GIS Project Area**, as illustrated in **Attachment C**. The scope of work for this combined Project Area shall be referred to as the **Combined LINK-GIS Scope of Work**.

Notwithstanding the above, all costs and/or tasks proposed for the **Combined LINK-GIS Scope of Work** shall continue to be priced separately to reflect the true proportionate costs by county (as indicated in ***Attachment C***) incurred in the respective counties, with the following exception:

> *The approximate 23 square miles (73 tiles) of area common to Kenton and Campbell Counties, where all applicable costs shall be divided equally between **Kenton County LINK-GIS Partners and Campbell County LINK-GIS Partners**.*

All **LINK-GIS** mapping products shall be delivered in **Kentucky State Plane Coordinates, North Zone, NAD83 Coordinate Datum, 1993 HARN Adjustment (Linear Unit: Foot_US)**. Vertical datum shall be **National Geodetic Vertical Datum (NGVD) 1988 Adjustment**. More recent datum adjustments may be suggested by the vendor. The scope of work for this project will include:

- Acquisition of new, natural color and near infrared (NIR) imagery and production of digital orthoimagery
- Acquisition of new **LiDAR** data and production of new digital elevation datasets to include:
  - A new **LiDAR point cloud**
  - A new (bare earth) **Digital Terrain Model (DTM)**
  - New **Topographic Contour Lines** at a 2 foot contour interval
- Acquisition of **Digital Oblique Aerial Imagery & Associated Application Software** enabling its use within the **ArcGIS™** Software Environment.

- **New photogrammetric compilation** of planimetric data in rural areas and **photogrammetric updates** to planimetric data in urban areas *(rural and urban areas are designated in **Attachments A, B or C** as applicable)* to include the following layers:
  - Building footprints, concrete pads, and other impervious surfaces
  - Roadway edges (curbs) including drives at least 100' in length, parking lots and other impervious surfaces (no road centerlines will be updated or captured)
  - Bridges, including concrete box culverts
  - Recreational features – parks, playgrounds, ball fields, golf courses, etc.
  - Visible, surface drainage features, both
    - Natural - including rivers, streams, cross-country ditches, lakes, ponds, etc.
    - Artificial - including ditches, culverts, head walls, catch basins, etc.
  - Fences
    - In urban areas along interstate highways only
    - Everywhere else in rural areas
- **New photogrammetric compilation of sidewalks as line features (similar to road centerlines) and separately, as polygon features.** Although compilation of sidewalks will be considered optionally, vendors are required to provide cost estimates for their capture.

New, vertical, natural color and near infrared (NIR) aerial imagery shall be captured for the entire Project Area. This imagery must be captured at a scale sufficient for producing 1" = 100' planimetric mapping meeting the **American Society for Photogrammetry and Remote Sensing (ASPRS) Class 1 Accuracy Standards for Large Scale Maps** and for production of natural color and NIR digital orthoimagery at a resolution of 0.5 feet (6 inches). All aerial imagery shall be captured using a digital matrix array (frame based) aerial camera capable of capturing both natural color and near infrared (NIR) wavelengths.

New digital elevation datasets shall be produced in the Project Area. The new **DTM** shall be of sufficient quality to be used in the production of the digital orthoimages, for the compilation of **new 2 foot contours in all areas**, and for use in the photogrammetric compilation and update of planimetric layers.

The vendor shall propose the best and most cost-effective solution for **photogrammetrically compiling and/or updating the planimetric data for the entire Project Area**. Planimetric data shall be **updated at 1" = 100' for urban areas** and shall be **newly compiled at 1" = 100' for rural areas** ("Urban" and "Rural" areas are designated in ***Attachments A, B and C***). The planimetric data requirements are found in **Section VIII**. The vendor should note that the planimetric data must be compiled in a manner suitable for stormwater analysis, specifically polygons for the calculation of impervious surface areas. All planimetric mapping produced shall conform to **ASPRS Class 1 Accuracy Standards for Large Scale Maps.**

All digital orthoimagery shall be organized on the established tile grid (*see **Attachment A, B or C** as applicable*). Planimetric mapping shall be delivered in **ArcGIS™ File GeoDatabase (FGDB)** format (compatible with ArcInfo Desktop Version 9.3.X) and therefore should not be organized on the tile

grid, but delivered as a single file for each layer. All data developed by the vendor through this procurement shall be delivered in a format that is compatible with the **LINK-GIS Partnership's** existing hardware and software environments and according to established standards specified in the **LINK-GIS** metadata.

II. General Requirements

This Request for Proposals is not an offer to purchase but is a request to receive proposals. The RFP, the proposal submitted in response, and any individually negotiated issues, will constitute any final contract which may result. Should conflicts arise, negotiated items shall take precedence over the RFP and the proposal; the RFP shall take precedence over the proposal.

The **LINK-GIS Partnership** reserves the right to accept or reject any or all responses, as well as the right to negotiate with one or more, or none of the responding firms. Additionally, the **LINK-GIS Partnership** may choose to acquire some, all, or none of the products and deliverables from separate firms, and may choose to contract for any or none of the three (3) Project Areas if, in its judgment, the best interests of the **LINK-GIS Partnership** will be served.

Omissions, alterations, or irregularities of any kind shall constitute sufficient cause for rejection of a proposal. However, the **LINK-GIS Partnership** reserves the right to waive irregularities in the proposals. The **LINK-GIS Partnership** reserves the right to advertise for new proposals if, in its judgment, the best interests of the **LINK-GIS Partnership** will be served.

By responding to this RFP, the vendor acknowledges that they have no prior knowledge of the contents of this RFP and the specifications defined in it. The vendor shall explicitly acknowledge and swear (or affirm) this fact by notarized affidavit *(see **Attachment D**.)* All expenses incurred by firms in connection with preparing and submitting responses to this RFP are that vendor's alone. It is the responsibility of each responding vendor to be aware of, and comply with, all relevant local, state, and federal licensing and statutory requirements. All proposals submitted become the property of the **LINK-GIS Partnership** and will not be returned. The **LINK-GIS Partnership** is not, and will not be, responsible for any costs incurred by the respondent in proposal preparation, presentations, site visits or benchmarks performed.

Format of Proposals

All proposals being submitted in response to this RFP shall contain at a minimum the following information. Please be clear and concise in your responses.

- Letter of Transmittal
- Executive Summary
- Brief overview of responding firm, including primary office location, other office locations pertinent to this response, primary business of the firm, and size of the firm.
- Submission of information showing sufficient financial strength to assure continued existence of the firm.
- List of organizations for which applicable/similar products have been produced and delivered, to include:
  - Location
  - Description of products produced and delivered

  - Contracting authority or client name, including contact person and telephone numbers
- Technical Response to RFP
- Separate cost and financing options for each Project Area
- Notarized **Affidavit of Independent Price Determination** *(see **Attachment D**)*
- Certification of product accuracy in terms of **ASPRS Class 1 Accuracy Standards for Large Scale Maps**
- Separate schedules of production and delivery for each Project Area
- Statement indicating the willingness of the firm to discuss the potential establishment of non-performance penalties if the firm is selected for negotiations.

Evaluation and Selection Criteria

The evaluation criteria for each proposal received will be the vendor's technical capabilities, and capacity to perform the indicated work in this RFP, and shall include the following:

Quality of proposal in showing an understanding of the required work necessary for meeting scope of the RFP	**5 %**
Compelling demonstration of ability of vendor to deliver products on time, at or below budgeted costs, while meeting the requirements of the project	**10 %**
Equipment available to perform work in a timely and professional manner	**5 %**
Capacity of vendor to perform the work, including demonstrated knowledge of aerial imagery processing and LiDAR services required for automated mapping and geographic information systems	**25 %**
Specialized experience and technical competence of firm and staff who will actually be working on the project, including past experience with similar projects for countywide areas including major urban areas	**15 %**
Project organization and management, including staffing, management control and subcontractor utilization	**15 %**
Fee proposal evaluation	**25 %**
TOTAL	**100 %**

A Selection Committee composed of representatives of the **LINK-GIS Partnership's** Technical Committee and members of **NKAPC's GIS, IT, and Administrative Departments** will rate each Proposal and may select up to three (3) proposals for further consideration. If more than one is selected, each vendor selected may be invited to discuss their proposal with the Selection Committee. Upon conclusion of any such discussions, one firm may be selected for negotiations. The Selection Committee will present their recommendations to **NKAPC's Executive Director** for concurrence prior to the commencement of any such negotiations.

Proposal Submission Requirements

The respondents must submit an original and eight (8) copies of the proposal by **4:00 PM EST on Friday, January 6, 2012** at the **NKAPC Offices**. The packages should be addressed as follows:

Dennis Andrew Gordon, FAICP
Executive Director
Northern Kentucky Area Planning Commission
2332 Royal Drive
Fort Mitchell, KY 41017

The respondents are responsible for assuring that the proposals are delivered by the deadline.

"Proposal for LINK-GIS Digital Imagery and Digital Elevation Products and Services" should be indicated clearly on the outside of proposal packages. All proposals received after the deadline will be returned to the respondents. All proposals received by the deadline shall be opened by **Mr. Dennis Gordon, FAICP, NKAPC Executive Director** and **Ms. Trisha Brush, GISP, Deputy Director for GIS Administration,** or their designee(s), **at 4:00 PM EST on Friday, January 6, 2012** at the NKAPC offices. The public is invited to attend.

LINK-GIS RFP Timetable and Selection Schedule

The following is the schedule for release, submission, and selection:

Milestone	Date
RFP Released	**9:00 AM EST - Friday, December 9, 2011**
RFP Questions Submittal Due Date	**5:00 PM EST - Friday, December 16, 2011**
Responses to Submitted Questions	**5:00 PM EST – Friday, December 23, 2011**
Proposal Due Date	**4:00 PM EST - Friday, January 6, 2012**
Preferred Vendor Selection and Notification (Negotiations begin)	**3:00 PM EST - Friday, January 20, 2012**

Requirements

The project shall consist of producing and delivering all specified Digital Orthoimage Products, Digital Oblique Aerial Imagery & Associated Application Software, Digital Elevation Data, and Digital Planimetric Data in the format specified by this RFP, and furnishing all documentation necessary to satisfy the requirements of the RFP. Additionally, all tools, materials, supervision, and labor necessary to make the final products usable by the **LINK-GIS Partnership**, shall be furnished by the responding firm. Completion of the project shall consist of, but not be limited to, the following items:

- Provision of separate project production and delivery schedule for each Project Area
- Provision of a separate bi-monthly project status report and schedule for each Project Area
- Delivery of all documentation described in the approved submission

- Delivery of all digital orthoimage products in the specified format
- Delivery of all digital oblique aerial imagery products & associated application software
- Delivery of all digital elevation data products in the specified formats
- Delivery of all digital planimetric data products in the specified format
- Provision of a certification of product accuracy in terms of **ASPRS Class Accuracy Standards** for all products furnished. The statement should specifically warrant that the delivered products are sufficient to be used for the intended purposes stated earlier.

The RFP states the **LINK-GIS Partnership's** requirements relative to the design and delivery of the products presently contemplated. "Price extras" caused by failure of the responding firm to fully comply with the technical specifications will not be allowed. Each exception to the RFP must be noted. To avoid any misunderstanding in this matter, the following statement shall be included in the submission:

"We certify that the products quoted in this proposal conform fully in every respect to the specifications submitted to us in the subject RFP dated ***December 9, 2011****, with the following exceptions (. . . exceptions may be listed here . . .)"*

By responding to this RFP, the vendor agrees that all proposed costs shall remain firm for a period of not less than 90 calendar days from the date of the opening of the firm's proposal.

Product Delivery Schedule

Each proposal shall include a separate preliminary schedule for each Project Area for the production and delivery of all deliverables. Anticipated schedules for full completion of these Project Areas are indicated in **Section VII** of this RFP. The **LINK-GIS Partnership** products will be delivered to, and used in the **LINK-GIS** (NKAPC) office, located at:

LINK-GIS Partnership
Northern Kentucky Area Planning Commission
2332 Royal Drive
Fort Mitchell, KY 41017

The offices are open to all applicants, between **8:00 AM and 5:00 PM EST, Monday-Friday** (holidays excepted).

Obligations and Responsibilities of Firms Responding to the RFP

By submitting a proposal, the responding firm will be held accountable for having informed themselves as to the conditions under which the work will be accomplished, the contents of all applicable proposal documents and the provisions of all laws, ordinances, regulations, wage rates, and labor conditions prevailing at the work site. Any failure, omission, or neglect to so inform themselves of such items will not relieve the submitting firm of their obligation to successfully execute and perform completely the work within the time allocated in the contract.

Use of Subcontractors

None of the services or deliverables described in this RFP may be subcontracted by the potential successful vendor without the prior knowledge and written approval of the **LINK-GIS Partnership**. If subcontractors are requested and approved, the vendor shall nonetheless retain full responsibility to the **LINK-GIS Partnership** for all work completed or uncompleted by any subcontractors.

For approval purposes, the vendor shall provide the **LINK-GIS Partnership** with references for any proposed subcontractors and a description of the services they will perform. The **LINK-GIS Partnership** reserves the right to accept or reject any proposed subcontractor.

Domestic Production of Services and Deliverables

All services and final deliverables described in this RFP shall be entirely performed and created in the United States of America and in accord with all applicable local, state, and federal laws.

Corrections

Erasures or other changes in the firm's submission must be explained or noted over the company CEO's/President's or authorized designee's signature.

Corporations

If the successful approved firm is a corporate body, it shall furnish at the time of executions of the contract, a resolution of the directors of the corporation bearing the seal of the corporation, evidencing authority of the officer signing the contract to do so.

Particular attention is called to any statutory requirements of the **Commonwealth of Kentucky** relative to the licensing of corporations organized under the laws of any other state.

Equal Employment Opportunity

Attention of all firms responding to this RFP is particularly called to the requirements for insuring that employees and applicants for employment are not discriminated against because of their race, creed, color, sex, or national origin.

Costs Related to Proposal

The respondent shall be fully responsible for all costs incurred in the development and submission of its proposal. Neither the **NKAPC,** nor the **LINK-GIS Partnership** shall assume any contractual obligation as a result of the issuance of this Request for Proposals, the preparation or submission of a proposal, the evaluation of proposals, or final selection. Selected proposal respondents may be asked

to present their proposals to the **LINK-GIS Partnership**. The costs of such presentations shall be borne solely by the respondents.

Invoicing and Payment

Products required by the contract shall be delivered on separate schedules for each Project Area to be agreed upon with the **LINK-GIS Partnership**. Separate delivery and payment schedules for each Project Area will be decided upon as a part of any negotiations.

III. Aerial Imagery Specifications

*(Unless otherwise noted, the term **"Project Area"** in this section shall be interpreted to mean either the **Kenton County GIS Project Area** **[Attachment A]** or the **Campbell County GIS Project Area** **[Attachment B]** or the **Combined LINK-GIS Project Area** **[Attachment C]**, as applicable. The **Aerial Imagery Specifications** are identical for all **Project Areas**.)*

Attachment(s) A, B and/or C *(as applicable)* shall become part of any potential contractual agreement between **LINK-GIS** and a responding vendor. The flight plan presented by the vendor for the spring 2012 fly-over shall be based on the described Project Area and shall be submitted to the **LINK-GIS Partnership** for approval.

Existing Monumentation and Ground and Image/Photo Control

The NKAPC, in conjunction with several other local and county agencies, has established an extensive and highly accurate monumentation network covering Kenton and Campbell Counties. **To the maximum extent, both possible and practicable, vendors are strongly encouraged to make use of this monumentation network when establishing ground control and image/photo control in their proposals.** An **ArcGIS™ FGDB** dataset containing the points in this monumentation network will be made available to all vendors as part of this RFP.

The vendor shall provide the location and identification of all ground control and image/photo control points established and used during the flyover in **ArcGIS™ File GeoDatabase (FGDB)** format.

Conditions

Vertical, natural color and, coincident and concurrent, near infrared (NIR) aerial imaging shall be accomplished in the spring of 2012, during the period when deciduous trees are without leaves. Imaging will not be undertaken when the ground is obscured by snow, haze, fog, or dust, when streams are not within their normal banks, or when cloud shadows will appear on more than 5 % of the area in any one image. The images shall not contain objectionable shadows caused by relief or low solar altitude.

Flight Plan and Scale

The vendor shall prepare a proposed flight plan based on the appropriate Project Area Map ***(Attachments A, B and/or C** as applicable)* which shall show the flight lines to be utilized. Each flight line will be flown continuously across the Project Area. The principal points of the first two (2) and last two (2) frames of each flight strip shall fall outside the boundaries of the Project Area, and all side boundaries shall be covered by a minimum of 25% of the camera image frame. This flight plan shall be submitted as part of the proposal. The final accepted flight plan to be developed after any potential contract award shall be submitted in **ArcGIS™ FGDB** format to the **LINK-GIS Partnership** upon completion of the imagery acquisition.

In this digital flight plan, a point shall be digitized to represent the principal point of each individual

image frame. The attribute table of the principal points database shall indicate a unique ID for each point, the frame number, the flight line number to which the frame belongs, the starting and ending flight line segments to which the frame belongs, the state plane coordinates of the principal point of the image frame, the three dimensional (Airborne GPS) coordinates of the sensing platform at the time of frame exposure, and the attitude (roll, pitch and yaw angles) of the sensing platform at the time of frame exposure.

Each flight line shall be digitized as a chain of individual line segments representing the flight line segments connecting the principal points of the consecutive image frames. Each flight line shall be digitized in the order and direction that the frames are flown. The attribute table of the flight line segments shall indicate a unique ID for each segment, the flight line number to which the segment belongs, the IDs of the "From" and "To" principal points defining the segment and the straight line (planar) distance of each segment in feet. Unacceptable aerial imagery shall be reflown by the vendor at no additional cost to the **LINK-GIS Partnership**, with the reflight coverage overlapping the accepted imagery by at least two stereo models.

Natural color and near infrared (NIR) aerial imagery shall be obtained at a scale appropriate for production of the specified 1" = 100' planimetric mapping and color digital orthoimagery products. Respondents should specify the aerial imaging scales they plan to use for this project in their response and should include justification for said scale.

End lap, Side lap, Crab, Tilt

Consecutive images in each flight line shall have an average forward overlap of 60% (±2 %) to ensure full stereoscopic coverage. End lap of less than 55% or more than 65% in one or more exposures will be cause for rejection of the flight strip, or a portion thereof.

Side lap between adjacent parallel flight lines shall be a minimum of 30%. Any parallel flight lines having side lap of 25% or less will be rejected and reflown.

Crab in excess of three degrees (3°) measured with respect to both lines of flight may be cause for rejection of a flight strip or any portion thereof in which the excess crab occurs. This includes relative crab between any two successive exposures.

Tilt of the camera from vertical at the instant of exposure shall not exceed 3%, nor shall it exceed 5% between successive exposure stations. Average tilt over the entire project shall not exceed 1%.

Aerial Camera

The vendor shall accomplish the imagery with a digital aerial camera of the "matrix array" variety which takes only full frame digital images, and shall not be of the "pushbroom" or "linear array" variety.

The aerial camera shall be a precision aerial mapping camera equipped with a low distortion, high resolution lens. Camera characteristics shall be such that the aerial images taken can be satisfactorily

used with the vendor's proposed photogrammetric compilation equipment and environment. The camera shall be equipped with and utilize electronic Forward Motion Compensation (FMC).

All digital aerial images taken shall be clear and sharp in detail and of high radiometric quality. The camera shall capture the images in an uncompressed "lossless" image format. The camera shall, at minimum, utilize a 12-bit per pixel radiometric resolution. The images shall also be free from image blurs, image artifacts, "cold" or "hot" pixels, color distortion, color balance or tonal problems, or any other kind of "digital blemish". All fiducial marks or other registration mark images shall be visible, clear and sharp.

A USGS camera calibration report, no more than three years old, or its equivalent, shall be submitted with the response to these technical specifications for each aerial camera to be used to assure that the camera lens, focal length, light filter, shutter, image format, and its digital sensor array are all adequate and within acceptable accuracies.

The absence of a USGS camera calibration report (or its equivalent) verifying that the camera meets the specified requirements may be cause for disqualification of the vendor. The combination of camera, cone, lens, camera body, and digital sensor array submitted for approval shall be, if acceptable, the only combination used for this project. The entire Project Area shall be flown using only one type of camera assembly. If the dimensional stability of the camera has been disturbed since its last calibration, the vendor shall have the camera recalibrated prior to acquisition of imagery. The vendor will be ultimately responsible for errors caused as a result of incorrect calibration of the camera.

Airborne GPS (ABGPS)

In the acquisition of the aerial imagery, airborne GPS data shall be captured using an onboard dual frequency GPS receiver and an equivalent ground base station receiver. The photogrammetric camera must have an event marker to send and receive the returning pulses from the geodetic survey grade receiver. Base station receivers shall also accept dual frequency receivers. The receivers shall collect the GPS data at a rate no less often than one-second intervals and the data shall be post-processed using on-the-fly (OTF) ambiguity resolution techniques to obtain positions on each exposure station within an RMSE of 5 cm. To reduce potential errors, the base station receivers and the airborne receiver should be of the same make and ABGPS compatible.

To maintain quality, the PDOP should not exceed 4, the satellite configuration should be a minimum of five (5) satellites when collecting data during the flight mission and the mask must be a minimum of ten degrees (10°). The number of base stations required should be a minimum of two (2) with each baseline being no more than 30 miles from each other. It is preferable to have at least one base station located within the project site. Each base station must be positioned over a first order point (such as a HARN point).

The vendor will be responsible for post-processing the airborne and base station data and prepare this data for aerial triangulation processes. The processing should be performed daily to ensure the recordings for each flight are acceptable. Any flight lines with unsatisfactory recordings shall be re-

flown at the earliest opportunity. A hardcopy and digital format may be required for delineating the nadir point on each exposure (easting, northing, and elevation). The accuracy of each point must meet the mapping requirements as noted in this document.

Supporting ground-based GPS surveys shall be conducted with sufficient accuracy to support production of the final orthoimages and planimetric/topographic mapping to meet **ASPRS Class 1 Accuracy Standards** for 1" = 100' mapping.

Labeling and Image Index

Each exposure shall be digitally labeled at the edge of the frame, just inside the image area, on the north edge. This labeling shall include the following information at a minimum:

- Date of imagery
- Nominal scale of imagery
- Camera focal length
- "**Kenton County GIS Project Area**" or "**Campbell County GIS Project Area**" or "**Combined LINK-GIS Project Area"** *(as applicable)*
- Flight line number
- Exposure number

The nominal scale of imagery shall be given in inches and feet. Flight line numbers are not to be repeated anywhere within the imagery coverage of the contract and will be numbered consecutively, starting with Strip No. 1, and continuing sequentially over all flight lines.

Digital Frames

A set of digital image frames corresponding to the Project Area shall be prepared from the original digital exposures. These digital frames shall be in uncompressed TIFF image format containing the full 12-bit radiometric pixel values for each wavelength that is collected, and shall be sent to the **LINK-GIS Partnership** for evaluation purposes within two weeks after the date of aerial image acquisition. All digital image frames will remain the property of the **LINK-GIS Partnership**.

The vendor shall also prepare a geo-rectified, reduced resolution image frame for each full aerial frame taken. These geo-rectified frames shall correspond to the individual frames of the digital flight plan and shall reflect the orientation and location of the frame "footprint" at the time of exposure. Together with the digital flight plan, these images shall be used to produce a digital image-mosaic of the entirety of the Project Area.

IV. Digital Orthoimagery Specifications

*(Unless otherwise noted, the term **"Project Area"** in this section shall be interpreted to mean either the **Kenton County GIS Project Area** **[Attachment A]** or the **Campbell County GIS Project Area** **[Attachment B]** or the **Combined LINK-GIS Project Area** **[Attachment C]**, as applicable. The **Digital Orthoimage Requirements** are identical for all **Project Areas**.)*

This Section describes the specifications for the production of the digital orthoimagery. Vendor proposals shall clearly state and explain the compliance, or non-compliance with these requirements. Appropriate documentation shall be included to fully describe system features and capabilities and shall be identified through a cross reference.

General Specifications

Natural color and near infrared (NIR) digital orthoimages shall be produced for each tile specified within the Project Area (*see **Attachment A, B and/or C** as applicable*).

The digital image shall also be digitally rectified to an orthographic projection on a pixel-by-pixel basis. The **LINK-GIS Partnership** requires the digital orthoimages to be created directly through the procedures described above, and not through the scanning of a hard copy orthoimage.

Equipment and Production Requirements

The proposals should include a discussion of the procedures and equipment used in the production of the color digital orthoimages. Special consideration should be given to the following production requirements:

Camera pixel resolution - Include in the proposal the specific camera pixel resolution that will be used in production. Pixel resolution shall not be interpolated to a finer resolution than that developed through the original digital camera exposure.

Processing - In the proposal, the respondent should give a detailed explanation of the methods proposed for the creation of the color digital orthoimages.

Ground Resolution – All digital orthoimages will be delivered at a pixel resolution of 0.5 feet. The respondents should explain the methods used to reach the desired resolution.

Image Mosaicking and Quality - The image with the best contrast shall be used as a reference image when the color digital orthoimages are mosaicked. All other images shall have their brightness values adjusted to that of the reference image. The delivered digital orthoimages will not contain defects such as out-of-focus imagery, blurs, whorls, twists, color blemishes, dust marks, scratches, or inconsistencies in tone and density between individual orthoimages and/or adjacent sheets.

Orthoimage "Early Delivery" Image Files

In order to have the new imagery available for viewing and reference as early as possible, the vendor shall deliver one set of "early delivery" orthoimage files for the Project Area in **GeoTIFF** format. This "early delivery" orthoimage dataset must be fully delivered prior to the delivery of any elevation or planimetric data layers.

The orthoimage files shall be organized according to the tile grid layout presented in the appropriate attachment ***(see Attachments A, B & C)***. The orthoimagery shall contain four (4), eight bit (8-bit, 256 level) values corresponding to the red, green, blue and near infrared (R, G, B, NIR) bands and must be produced directly from the digital data.

It is understood and acknowledged that this "early delivery" orthoimage dataset may not meet the full quality standards this RFP specifies for the final deliverable. However, the **LINK-GIS Partnership** desires this "early delivery" product for restricted and preliminary use and to begin the QA/QC process as quickly as possible. Any "early delivery" orthoimage file that is rejected in the QA/QC process and returned to the vendor for correction will necessitate a new replacement file.

Data Structure and Coordinate System

The final data delivery shall consist of a completely mosaicked, uncompressed orthoimage dataset of the entire Project Area in **FGDBR** image format on a portable hard drive. The final orthoimage dataset must be produced directly from the digital data and shall be georeferenced by the vendor prior to delivery.

Additionally, a **MrSID™** format image file and an **ERDAS™/Intergraph™ Enhanced Compressed Wavelet (.ECW**) format image file, each georeferenced and created with a 25:1 compression ratio, shall be provided for the Project Area. These compressed image files may also be delivered on the portable hard drive with the final uncompressed dataset.

All digital orthoimage products shall be referenced horizontally to the **Kentucky State Plane Coordinate System, North Zone, NAD83, 1993 HARN Adjustment (Linear Unit: Foot_US).** More recent datum adjustments may be suggested by the vendor.

Accuracy Standards

The final digital orthoimage dataset produced through this procurement shall meet the **ASPRS Class 1 Accuracy Standards for Large Scale Maps**.

Quality Control

Quality control procedures shall be utilized by the vendor. The respondents should discuss the quality control procedures proposed for the production of digital orthoimages. The specific devices and procedures, the proposed methods for correcting errors, and the proposed level of support required by the Partnership should be detailed in the proposal.

V. LiDAR Data Acquisition and Deliverables

*(Unless otherwise noted, the term **"Project Area"** in this section shall be interpreted to mean either the **Kenton County GIS Project Area** **[Attachment A]** or the **Campbell County GIS Project Area** **[Attachment B]** or the **Combined LINK-GIS Project Area** **[Attachment C]**, as applicable. The **LiDAR Data Acquisition and Deliverables** are identical for all **Project Areas**.)*

Specifications for the acquisition of **LiDAR** data are described in this section.

LiDAR Specifications

A **LiDAR** point cloud, to be used for the modeling of bare earth, buildings, vegetation and other three dimensional features, and for the production of other elevation datasets, shall be acquired. The **LiDAR** point cloud shall contain elevation values for **first** and, where applicable, **last and intermediate return signals**. The **LiDAR** point cloud shall cover the entirety of the Project Area, shall extend beyond the borders of the Project Area by at least ½ mile and shall be of sufficient density to produce the elevation data products described in **Section VI**. Additionally, the vendor shall describe the following items:

- **LiDAR** cloud specifications (horizontal point density, horizontal & vertical RMS error, ground footprint size, pulse rate and other relevant technical data)
- **LiDAR** collection device, including calibration test methods and results
- **LiDAR** collection mission (flight height, flight-line sidelap, point density)
- Aircraft, navigation and mission planning activities
- Any image, photo or video products collected during **LiDAR** mission(s)
- Any difference in data collection in urban areas vs. rural areas
- In all cases, the **LiDAR** data captured shall be of sufficient quality and density to support the creation of a DTM for use in the creation of the orthophotos and for generation of 2 foot and, where applicable, 4 foot contours
- Filtering and quality control processes used to eliminate missing coverage, invalid point locations, elevations, "foam" or other anomalies

LiDAR Mission

The **LiDAR** Mission may be flown with airplane or helicopter and shall be flown at a time with no snow cover and when water levels are reasonably normal (not flood stage). The vendor shall ensure that the following requirements are adhered to:

- The Vendor shall contact the FAA and coordinate the **LiDAR** Mission with them
- The **LiDAR** receiver shall, where applicable, capture multiple returns
- The **LiDAR** receiver shall capture an intensity value with at least 256 levels (8-bit) for each return
- The **LiDAR** mission may be flown with airplane or helicopter. Flights may be flown day or night. The number and location of flight lines, sidelap, cycle speed, beam repetition rate, scan angle and swath width shall be provided to the **LINK-GIS Partnership** (NKAPC) before the flight mission

The vendor shall validate the quality of the **LiDAR** data at the end of each mission day. The vendor may choose to collect film, video, or digital imagery during the mission to validate the quality of the **LiDAR** data and to assist in creating the bald-earth surface, but it is not a requirement in this scope of work. A copy of any additional imagery shall be included as a deliverable to the **LINK-GIS Partnership** (NKAPC).

LiDAR Surface Classification Categories

To the maximum extent possible, if the data allows, the vendor shall classify the **LiDAR** data into categories representing the following surface types:

- Bare earth
- Low vegetation (generally under 4 feet; examples: tall grasses, ornamental shrubs)
- Medium vegetation (generally 4 – 10 feet; examples: large shrubs, small trees)
- High vegetation (generally 10 or more feet; example: tree canopy)
- Structures
- Low points (noise)
- High points (noise)
- Model key points
- Water surfaces
- Other (unclassified)

LiDAR Point Cloud Deliverable

The **LiDAR Point Cloud Deliverable** shall be delivered in **LAS Version 1.3** format and shall contain **x, y, and z coordinates, a return signal intensity value, and a surface classification value**. Where applicable, multiple **z** points, return signal intensity values, and surface classifications, if any, shall also be included for coincident returns. All **LiDAR** points shall be referenced horizontally to the **Kentucky State Plane Coordinate System, North Zone, NAD83, 1993 HARN Adjustment (Linear Unit: Foot_US)**. Vertical (**z**) values shall be referenced to the **National Geodetic Vertical Datum (NGVD) 1988 Adjustment**. More recent datum adjustments may be suggested by the vendor.

VI. Digital Elevation Dataset Specifications and Deliverables

*(Unless otherwise noted, the term **"Project Area"** in this section shall be interpreted to mean either the **Kenton County GIS Project Area** **[Attachment A]** or the **Campbell County GIS Project Area** **[Attachment B]** or the **Combined LINK-GIS Project Area** **[Attachment C]**, as applicable. The **Digital Elevation Dataset Specifications** are identical for all **Project Areas**.)*

Digital Terrain Model (DTM) Specifications

A **DTM** (bare earth surface) shall be produced to support the creation of the digital orthoimages as well as the generation of topographic contour lines.

The **DTM** shall consist of **LiDAR** "model key" data points supplemented with breaklines at all significant terrain breaks as may be needed to support generation of two foot (2') contours, and sufficient to be used in the production of the digital orthoimagery. All hydrography lines, bridges, buildings, road and parking lot edges, rail centerlines, and any other significant feature causing an abrupt change in the terrain, will be compiled as terrain breaks. Additionally, accurate contouring at this interval will require the use of "hard" and "soft" breaklines to depict varying degrees of sharpness in linear terrain changes.

The **DTM** shall be produced to support generation of contours at a two foot (2') interval for the entire Project Area. The topographical elevation requirements for well-defined points shall meet or exceed **ASPRS Class 1 Accuracy Standards** for a two foot (2') contour interval for topographic feature points and **DTM** elevation points.

DTM Deliverable

The **DTM** deliverable shall be delivered in **ArcGIS™ File GeoDatabase (FGDB)** format and shall consist of "Model Key" points from the **LiDAR Point Cloud** represented as a **PointZ** feature class, and supplemental breaklines represented as a **PolylineZ** feature class. All features in the **DTM** shall be referenced horizontally to the **Kentucky State Plane Coordinate System, North Zone, NAD83, 1993 HARN Adjustment (Linear Unit: Foot_US)**. Vertical **(z)** values shall be referenced to the **National Geodetic Vertical Datum (NGVD) 1988 Adjustment.** More recent datum adjustments may be suggested by the vendor.

Topographic Contour Line Specifications

Topographic contour lines shall be computer generated from the **DTM** and shall be delivered in **ArcGIS™ File GeoDatabase (FGDB)** format as a seamless GIS layer of 2 foot contours. Contour lines should be smoothed cartographic curves which are continuous, pass through buildings, and reflect the terrain under bridges and overpasses.

The contour lines shall not loop, repeat, contain gaps or broken segments, or intersect other contour lines. All contour lines must be spatially consistent in the elevation they are intended to represent.

The attribute table of the contour lines shall contain a numeric value representing the elevation of the contour line. All contours shall meet or exceed map accuracy standards for **ASPRS Class 1 Accuracy Standards.** In addition, the vendor shall:

- Describe the process for calculating and smoothing the contours
- Describe the quality control processes used

Topographic Contour Line Deliverable

The Topographic Contour Line deliverable shall consist of an **ArcGIS™ FGDB** layer of 2 foot contour lines referenced to the **Kentucky State Plane Coordinate System, North Zone, NAD83, 1993 HARN Adjustment (Linear Unit: Foot_US)**. Vertical (**z**) values shall be referenced to the **National Geodetic Vertical Datum (NGVD) 1988 Adjustment.** More recent datum adjustments may be suggested by the vendor.

VII. Digital Oblique Aerial Imagery Specifications and Associated Applications Software

*(Unless otherwise noted, the term **"Project Area"** in this section shall be interpreted to mean either the **Kenton County GIS Project Area** **[Attachment A]** or the **Campbell County GIS Project Area** **[Attachment B]** or the **Combined LINK-GIS Project Area** **[Attachment C]**, as applicable. The **Digital Oblique Aerial Imagery Specifications** are identical for all **Project Areas**.)*

Definition

Digital Oblique Aerial Imagery shall be defined as digital, natural color, aerial imagery of the earths' surface, taken from a nominally consistent altitude over the Project Area, and from a nominally consistent oblique angle.

Specifications

Digital Oblique Aerial Imagery shall be captured and processed to meet, at minimum, the following specifications:

- **Captured so as to ensure complete and overlapping image coverage of the Project Area**
- **Captured so as to permit oblique views of the Project Area in the four (4) cardinal directions from any point in the plane of the nominal altitude over the Project Area**
- **Captured so as to present an unobstructed view of the ground**
- **Captured with sufficient detail and clarity to produce nominal pixel footprint sizes from 6 inches in the image foreground to 12 inches in the image background**
- **Processed with a Digital Terrain Model (DTM) of the Project Area in such a manner as to permit nominal measurements, in the horizontal and vertical spaces, of features visible in an oblique view, from any point in the plane of the nominal altitude over the Project Area**

Oblique Imagery Delivery Schedule

In order to have the oblique imagery available for viewing and reference as early as possible, the vendor shall deliver a product which fully meets the specifications as soon as is practical while fully maintaining quality standards.

The vendor shall propose the data organization of the oblique imagery to maximize the speed of production, delivery and data use without compromising the quality of the final product.

Optional Higher Altitude Digital Oblique Aerial Imagery Specifications

The vendor shall also provide cost estimates for the production of an optional and separately priced oblique imagery product, flown at a higher altitude over the Project Area than the product described above. This product shall be captured and processed to meet, at minimum, the following specifications:

- **Captured so as to ensure complete and overlapping image coverage of the Project Area**
- **Captured so as to permit oblique views of the Project Area in the four (4) cardinal directions from any point in the plane of the nominal altitude over the Project Area**
- **Captured so as to present an unobstructed view of the ground**
- **Captured with sufficient detail and clarity to produce nominal pixel footprint sizes from 12 inches in the image foreground to 24 inches in the image background**
- **Processed with a Digital Terrain Model (DTM) of the Project Area in such a manner as to permit nominal measurements, in the horizontal and vertical spaces, of features visible in an oblique view, from any point in the plane of the nominal altitude over the Project Area**

Associated Applications Software

The vendor shall provide an **ArcInfo™ Desktop** software extension which permits the dynamic and geographic linking of the Digital Oblique Aerial Imagery to the data layers in the active Data Frame within an **ArcMap™** Session. The software shall, at minimum, provide the following capabilities:

- **Capable of automatically changing the display extent of the linked oblique view by selecting a location in the linked active Data Frame**
- **Permit panning and zooming within the oblique view**
- **Permit nominal measurements, in the horizontal and vertical spaces, of features visible in an oblique view**

In its response the vendor shall discuss the capabilities and features of the software providing this functionality.

The vendor shall provide a software application which enables the import and re-projection of two dimensional GIS layers into an oblique view for purposes of visualization and measurement. In its response the vendor shall discuss the capabilities and features of the software providing this functionality.

The vendor shall provide a software application enabling the simultaneous viewing of the most recent imagery and new imagery, designed to allow users to identify areas of change in the Project Area. In its response the vendor shall discuss the capabilities and features of the software providing this functionality.

The vendor shall provide a software application for the automatic detection and identification of areas of significant change between the most recent imagery and new imagery of the Project Area. In its response the vendor shall discuss the capabilities and features of the software providing this functionality.

Deliverable

The Digital Oblique Aerial Imagery deliverable shall consist of all of the products and software described in this section, delivered in a format compatible with the **ArcGIS™** software environment.

All oblique imagery shall be delivered on a portable hard drive in the proper and recommended format to enable immediate use. Instructions for installation of the data and software for use by **LINK-GIS Partnership** users shall be provided.

VIII. Photogrammetric Updates and New Compilation of GIS Planimetric Mapping Specifications

*(Unless otherwise noted, the term **"Project Area"** in this section shall be interpreted to mean either the **Kenton County GIS Project Area** [Attachment A] or the **Campbell County GIS Project Area** [Attachment B] or the **Combined LINK-GIS Project Area** [Attachment C], as applicable. The **Planimetric Mapping Specifications** are identical for all **Project Areas**.)*

The specifications for compiling and/or updating the planimetric base map layers are described in this section. Vendor proposals shall clearly state and explain the compliance, or non-compliance with these requirements. Appropriate documentation shall be included to fully describe system features and capabilities. The **LINK-GIS Partnership** reserves the right to evaluate the costs associated with the planimetric mapping prior to deciding if it shall be included in this procurement.

Planimetric Layers to be compiled/updated

The proposal shall include a description of the methods to be used for **photogrammetrically compiling and/or updating the planimetric base mapping for the Project Area.** The **LINK-GIS Partnership** will provide to the successful vendor a copy of its existing planimetric layers for reference in the process of compiling/updating. All newly compiled and updated mapping shall meet the **American Society for Photogrammetry and Remote Sensing (ASPRS) Class 1 Accuracy Standards for Large Scale Maps.**

The vendor shall take special note that the southern portion of the Project Area *(see **Attachment A, B, or C** as applicable)* contains planimetric data which, in the past, was photogrammetrically compiled at 1" = 200' scale. This area shall be completely and newly photogrammetrically compiled at a scale of 1" = 100' in order to match the remaining data in the Project Area. Therefore, in the designated southern portion of the Project Area alone, all compilation will be new, and no updating in this area will be performed.

In updating the existing 1" = 100' layers in the northern portion of the Project Area *(see **Attachment A, B, or C** as applicable)* the following guidelines shall be used to determine whether new compilation or updating is the appropriate course of action:

When to update features:

- If a feature in the current planimetric layer is no longer representative of the same feature visible in the new imagery, the vendor shall photogrammetrically update or re-compile the feature to accurately represent the visible feature.

- If a feature in the current planimetric layer is no longer visible in the new imagery, or has been replaced with a new feature, the vendor shall delete the old feature from the layer and shall, if appropriate, replace it with a photogrammetrically compiled representation of the new feature which has replaced it in the new imagery.

When to compile new features:

- If the current planimetric layer does not contain a feature which is visible in the new imagery, the vendor shall photogrammetrically compile a new planimetric representation of the visible feature.

When no action is necessary:

- If the current planimetric layer already contains an accurately compiled representation of a visible feature, no further compilation is necessary for that feature.

The planimetric mapping will include the following features:

- Building footprints, concrete pads and other impervious surfaces as polygons
- Roadways as polygons using road edges and curbs, including drives at least 100' in length (no road centerlines will be captured)
- Bridges, including concrete box culverts, as polygons
- Parking lots, loading docks and other impervious surfaces as polygons
- Recreational features – parks, ball fields, golf courses, etc. as polygons
- Visible surface drainage features, both
  - Natural - including rivers, streams, cross country ditches, lakes, ponds, etc. as polygons and line features
  - Artificial - including ditches, culverts, head walls, catch basins, etc. as line and point features
- Fences as line features, both
  - In urban areas along interstate highways only
  - Everywhere else in rural areas

In addition, the vendor shall propose the cost of the following items **for optional consideration**:

- *New photogrammetric compilation of sidewalks as line features in all areas (priced separately as an option)*
- *New photogrammetric compilation of sidewalks as polygon features in all areas (priced separately as an option)*

Planimetric Equipment Requirements

The specific photogrammetric equipment to be used for compilation must be specified in the proposal. The interactive editing system to be used should also be specified. The equipment used for production must be the same equipment identified in the proposal.

Planimetric Content

The graphic representation requirements of the features captured, as well as annotation and attribute requirements, are shown in the table following this sub-section.

All planimetrics will be compiled/updated photogrammetrically at 1" = 100' for all areas. An impervious area geodatabase will be produced outside of this procurement by the **LINK-GIS Partnership** using the planimetric polygon features captured through this procurement. Therefore, the vendor shall take special note of how the planimetric features are to be captured in anticipation of the need to produce this geodatabase. In particular, each building, parking lot, roadway, or other impervious surface will need to be captured as a polygon. Impervious surface driveways will also need to be captured as polygons. If grass, dirt, or planters are contained within parking lots these need to be captured as polygons, so that they may be tagged as exclusionary polygons (islands) at the time the impervious geodatabase is produced by the partnership.

Production Requirements

With regard to the compilation/update of planimetric features, it is important that the vendor understand the following requirement:

There shall be no overshoots, undershoots, overlaps or gaps between or amongst adjacent features which visually appear in the aerial imagery to be physically and immediately adjacent to (i.e., actually touching) another feature.

The following compilation requirements must be adhered to by the vendor with full **ArcGIS™** topology. The **LINK-GIS Partnership** Metadata specifies the current data structure and will be provided for review.

- Common Boundaries - All graphic features that share a common boundary, regardless of digital map layer, must have the exact same digital representation of that feature in all common layers.
- Point Duplication - No duplication of points that occur within a data string is permitted.
- Connectivity - where graphic elements visually meet, they must also digitally meet. All confluences of line, area, and polygon data must be exact mathematically; that is, no "overshoots," "undershoots", "offsets" or "pseudo nodes" are permitted. Lines that connect polygons must intersect those polygons precisely; that is, every end point must be an intersection point of the respective polygon.
- Line Quality - A high quality cartographic appearance shall be achieved. Transitions from straight line to curvilinear line segments shall be smooth, and without angular inflections at the point of intersection. The digital representation must not contain extraneous data at a non-visible level. There shall be no jags, hooks, or zero length segments. Curvilinear graphic features should be smooth with a minimum number of points. When appropriate, line smoothing programs should be used to minimize the angular inflection in curvilinear lines.
- Any lines that are straight, or should be straight, shall be digitized using only two points that represent the beginning and ending points of the line.
- The compilation of new drainage features, whether natural or artificial, shall be done in a manner which reflects the direction of water flow from higher to lower elevation, in order to facilitate the modeling of stream network flow.
- Segmentation - the digital representation of linear elements must reflect the visual network structure of the data type. An element should not be broken or segmented unless that segmentation reflects a visual or attribute

code characteristic, or unless the break is forced by database limitations.

- Area and Polygon Closure and Centroids - for area features being digitized, the last coordinate pair must be exactly (mathematically) equal to the first coordinate pair; that is, the last vertex point shall "snap" to the same location as the first.
- Point Criteria - all point features shall be digitized as a single x, y coordinate pair at the visual center of that graphic feature.

Data Structure and Coordinate System

The planimetric data layers shall be delivered in **ArcGIS™ File GeoDatabase (FGDB)** format. All files will be referenced to the **Kentucky State Plane Coordinate System, North Zone, NAD83, 1993 HARN Adjustment (Linear Unit: Foot_US)** by the vendor prior to delivery. Vertical datum will be **National Geodetic Vertical Datum (NGVD) 1988 Adjustment**. More recent datum adjustments may be suggested by the vendor.

Accuracy Standards

All planimetric data shall be compiled in accordance with the **ASPRS Class 1 Accuracy Standards for Large Scale Maps.**

Precision

All coordinate data shall be created and stored using double precision coordinates.

Photogrammetric Layers Check Files

The vendor shall provide digital photogrammetric check files for each layer compiled/updated. These files shall be delivered in **ArcGIS™ File GeoDatabase (FGDB)** format on portable hard drive or via file transfer over the Internet. Any digital photogrammetric check file that is rejected and returned to the vendor for corrections will necessitate a new replacement file. The vendor shall provide a tracking application to track the quality control status of each delivery.

IX. Deliverables and Schedule

Project Tracking System

The vendor shall provide an on-line, web-based, GIS based graphical project tracking system available to the **LINK-GIS Partnership** on a 24-hour, 7 days-a-week basis, for the duration of the project. The vendor shall make regular and frequent updates to this web site indicating the current progress for each phase of the project and for each of the products being produced. The site shall also provide an updated timeline for all remaining tasks, work, work areas and deliverables. Where necessary, the **LINK-GIS Partnership** shall have the ability to make updates to the project status indicating the progress of its review of data delivered by the vendor.

Deliverables

Unless otherwise specified, the vendor shall provide ten (10) final copies of all digital data produced on portable hard drive. All final digital orthoimagery, digital elevation data sets, and digital planimetric data layers shall include complete and accurate metadata in **ArcGIS™** compatible format. This requirement is an integral part of the data deliveries.

- **Digital Color Aerial Imagery (original, unprocessed imagery)**
  - One **ArcGIS™ File GeoDatabase (FGDB)** of ground control and image/photo control points
  - One **ArcGIS™ File GeoDatabase (FGDB)** of final flight plan
  - One complete set of color (R,G,B,NIR) full image frames containing full 12-bit per pixel resolution, in uncompressed or lossless compressed **TIFF** format

- **Digital Color Orthoimagery**
  - "Early Delivery" - Uncompressed **GeoTIFF** format with associated world files, containing four (4) bands of 8-bit data (R,G,B,NIR)
  - Final Delivery – Fully mosaicked, uncompressed, color balanced, orthoimage dataset in **FGDBR** format, containing four (4) bands of 8-bit data (R,G,B,NIR)
  - 6 inch pixels in all areas
  - **MrSID™** format file at 25:1 compression ratio
  - **ERDAS™/Intergraph™** Enhanced Compressed Wavelet (ECW) file at 25:1 compression ratio

- **Digital Elevation Data *(all elevation data delivered in NGVD 1988 Vertical Datum in feet)***
  - **LiDAR – LAS Version 1.3** format point cloud, including multiple z-values (where applicable), multiple return signal intensity values (where applicable), and point classifications as described in **Section V**.
  - **DTM** (bare earth surface) – Mass point file(s) and breakline file(s) in **ASCII** format, capable of generating 2 foot contours in all areas
  - **Topographic contour lines - ArcGIS™ File GeoDatabase (FGDB)** layer of 2 foot contour lines in all areas with contours coded with elevation value

- **Digital Oblique Aerial Imagery and Associated Applications Software**
  - Delivered on portable hard drive in vendor's recommended organizational schema, ready for immediate use
  - Instructions for installation of imagery on **LINK-GIS Partnership** hardware, according to vendor's recommended organizational schema, shall be provided
  - Instructions for installation of software on **LINK-GIS Partnership** hardware shall be provided

- **Planimetric Base Mapping**
  - Delivered as single, seamless layers in **ArcGIS™ File GeoDatabase (FGDB)** format
  - Updated photogrammetrically compiled planimetric data in urban areas
  - New photogrammetrically compiled planimetric data in rural areas
  - All photogrammetric compilation shall be accomplished at 1" = 100'

Proposed Schedule

The vendor shall propose a schedule that will achieve all of the objectives outlined in this RFP. The schedule shall include all phases of the project and shall clearly indicate task/deliverable dependencies within or between phases. Significant milestones and delivery dates shall also be indicated. The schedule should be realistic and not over promise on milestones or delivery dates.

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A Northern Kentucky Geographic Information System

X. GIS Project Area Cost Worksheets (Refer to Associated Attachments)

Product or Service (Kenton County Standalone. See Attachment A)	Kenton Co. GIS Project Area Cost
Ground/Image/Photo Control and Aerial Triangulation	
Cost for Kenton County GIS	**$0.00**
Aerial Imagery	
Cost for Kenton County GIS	**$0.00**
Digital Orthoimage Production	
Cost for Kenton County GIS	**$0.00**
Orthoimage Data Set Compression	
MrSID™ (25:1 compression)	$0.00
Intergraph (25:1 compression - .ECW)	$0.00
Cost for Kenton County GIS	**$0.00**
Digital Elevation Data Production	
LiDAR Point Cloud	$0.00
Digital Terrain Model - DTM	$0.00
Topographic Contour Lines (2' contour interval)	$0.00
Cost for Kenton County GIS	**$0.00**
Digital Oblique Aerial Imagery Production (lower altitude)	
Cost for Kenton County GIS	**$0.00**
Application Software for Digital Oblique Aerial Imagery	
Cost for Kenton County GIS	**$0.00**
Photogrammetric Compilation/Update at 1" = 100'	
Cost for Kenton County GIS	**$0.00**
Sub-totals before Optional Layers	
Sub-total cost for Kenton County GIS	**$0.00**
Optional Photogrammetric Capture & Optional Higher Altitude Oblique Imagery	
Sidewalks captured as polygons	$0.00
Sidewalks captured as lines	$0.00
Optional higher altitude oblique imagery	$0.00
Sub-total cost of Optional Products for Kenton County	**$0.00**
Grand Total for Kenton Co. GIS Project Area	**$0.00**

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Product or Service (Campbell County Standalone. See Attachment B)	Campbell Co. GIS Area Cost
Ground/Image/Photo Control and Aerial Triangulation	
Cost for Campbell County GIS	**$0.00**
Aerial Imagery	
Cost for Campbell County GIS	**$0.00**
Digital Orthoimage Production	
Cost for Campbell County GIS	**$0.00**
Orthoimage Data Set Compression	
MrSID™ (25:1 compression)	$0.00
Intergraph (25:1 compression - .ECW)	$0.00
Cost for Campbell County GIS	**$0.00**
Digital Elevation Data Production	
LiDAR Point Cloud	$0.00
Digital Terrain Model - DTM	$0.00
Topographic Contour Lines (2' contour interval)	$0.00
Cost for Campbell County GIS	**$0.00**
Digital Oblique Aerial Imagery Production (lower altitude)	
Cost for Campbell County GIS	**$0.00**
Application Software for Digital Oblique Aerial Imagery	
Cost for Campbell County GIS	**$0.00**
Photogrammetric Compilation/Update at 1" = 100'	
Cost for Campbell County GIS	**$0.00**
Sub-totals before Optional Layers	
Sub-total cost for Campbell County GIS	**$0.00**
Optional Photogrammetric Capture & Optional Higher Altitude Oblique Imagery	
Sidewalks captured as polygons	$0.00
Sidewalks captured as lines	$0.00
Optional higher altitude oblique imagery	$0.00
Sub-total cost of Optional Products for Campbell County	**$0.00**
Grand Total for Campbell Co. GIS Project Area	**$0.00**

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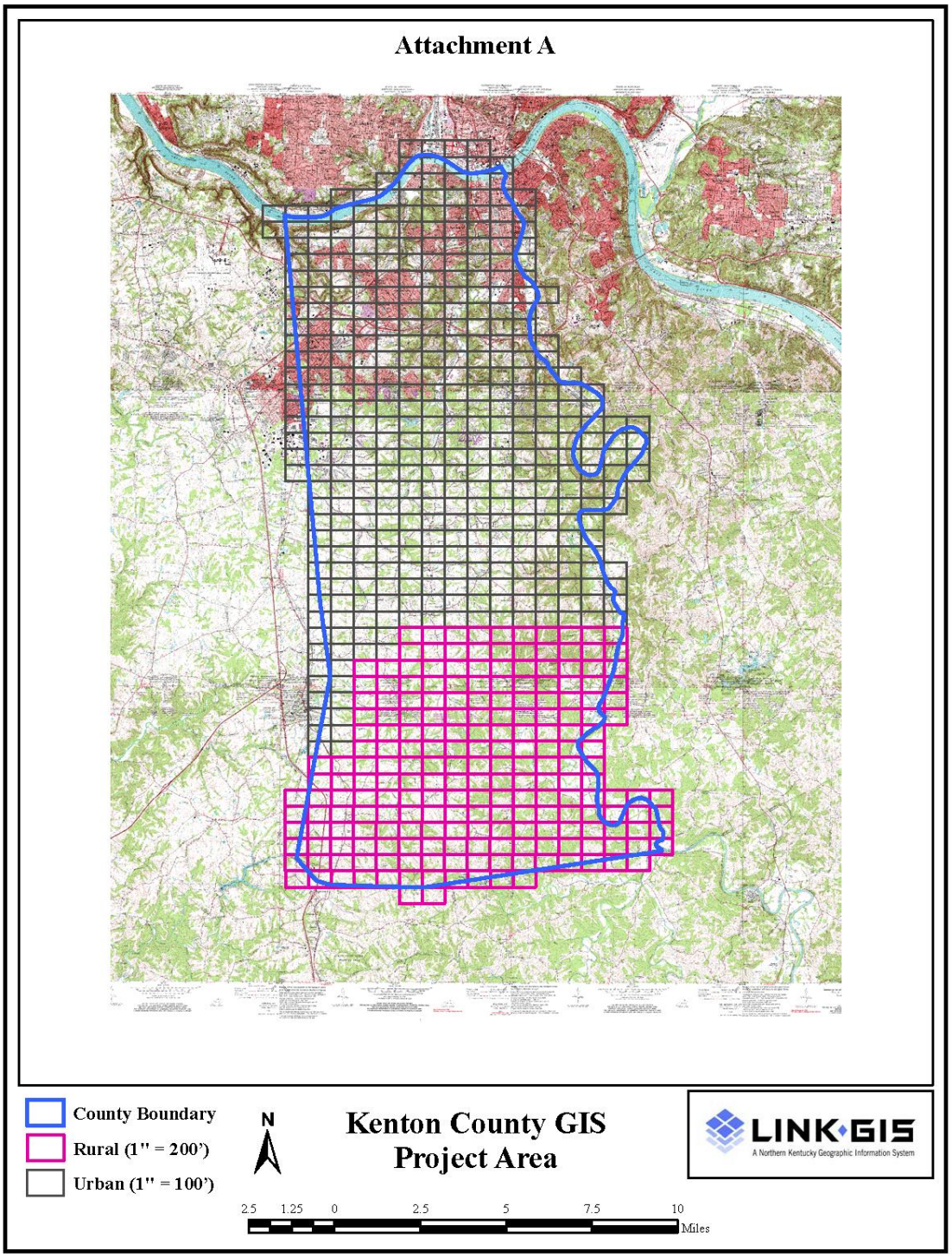
Product or Service (Combined LINK-GIS Project Area. See Attachment C)	Kenton Co. GIS Area Cost	Kenton Co. Overlap Area Cost	Campbell Co. GIS Area Cost	Campbell Co. Overlap Area Cost
Ground/Image/Photo Control and Aerial Triangulation				
Totals for Individual Project Areas	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Aerial Imagery				
Totals for Individual Project Areas	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Digital Orthoimage Production				
Totals for Individual Project Areas	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Orthoimage Data Set Compression (priced by county as a whole)				
MrSID™ (25:1 compression)	$0.00		$0.00	
Intergraph (25:1 compression - .ECW)	$0.00		$0.00	
Totals for Individual Counties	**$0.00**		**$0.00**	
Digital Elevation Data Production				
LiDAR Point Cloud	$0.00	$0.00	$0.00	$0.00
Digital Terrain Model - DTM	$0.00	$0.00	$0.00	$0.00
Topographic Contour Lines (2' contours)	$0.00	$0.00	$0.00	$0.00
Totals for Individual Project Areas	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Digital Oblique Aerial Imagery Production (lower altitude)				
Totals for Individual Project Areas	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Application Software for Digital Oblique Aerial Imagery				
Cost for County as a whole	**$0.00**		**$0.00**	
Photogrammetric Compilation/Update at 1" = 100'				
Sub-totals for Individual Project Areas	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Sub-totals before Optional Layers				
Sub-totals for Individual Project Areas	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Optional Photogrammetric Capture & Optional Higher Altitude Oblique Imagery				
Sidewalks captured as polygons	$0.00	$0.00	$0.00	$0.00
Sidewalks captured as lines	$0.00	$0.00	$0.00	$0.00
Optional higher altitude oblique imagery	$0.00	$0.00	$0.00	$0.00
Sub-totals for Optional Products	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Grand Totals for Individual Project Areas	**$0.00**	**$0.00**	**$0.00**	**$0.00**

XI. Attachments



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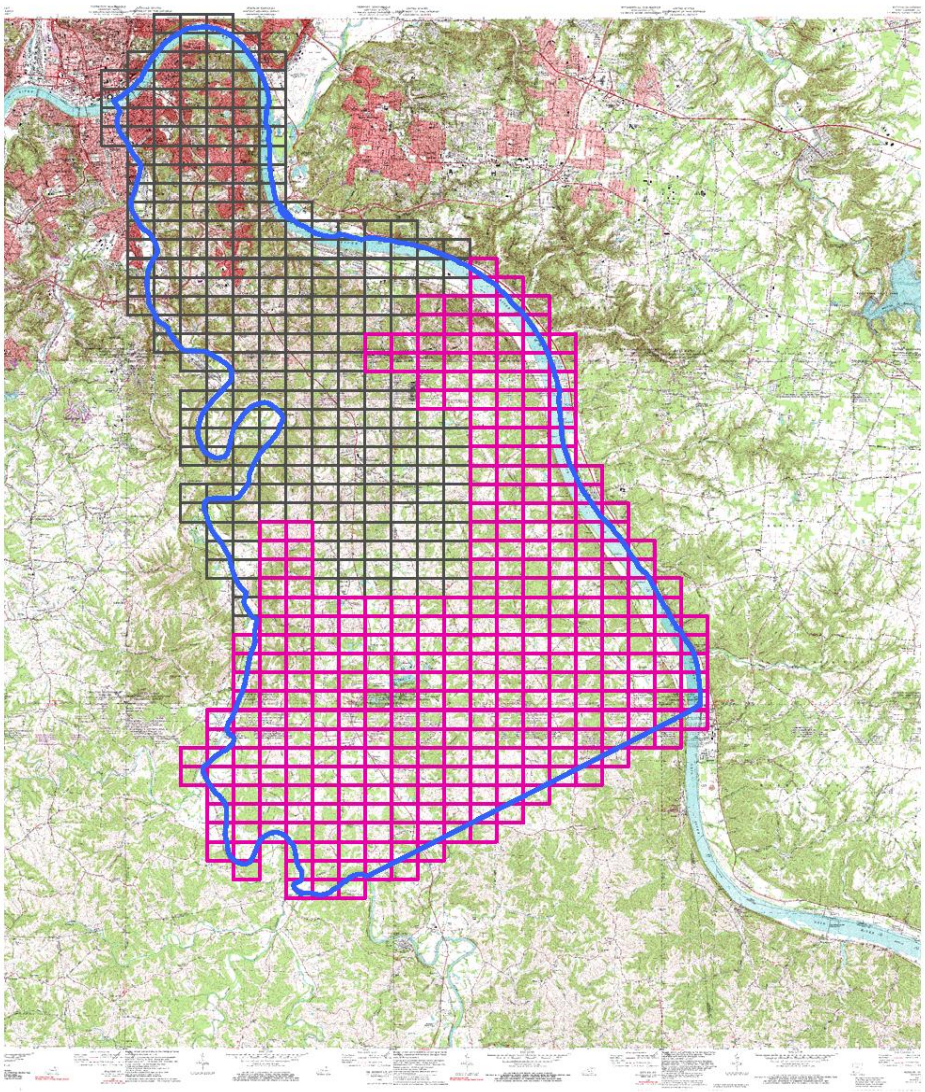
Attachment B



County Boundary
Rural (1" = 200')
Urban (1" = 100')

N

Campbell County GIS Project Area

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2.5 1.25 0 2.5 5 7.5 10
Miles

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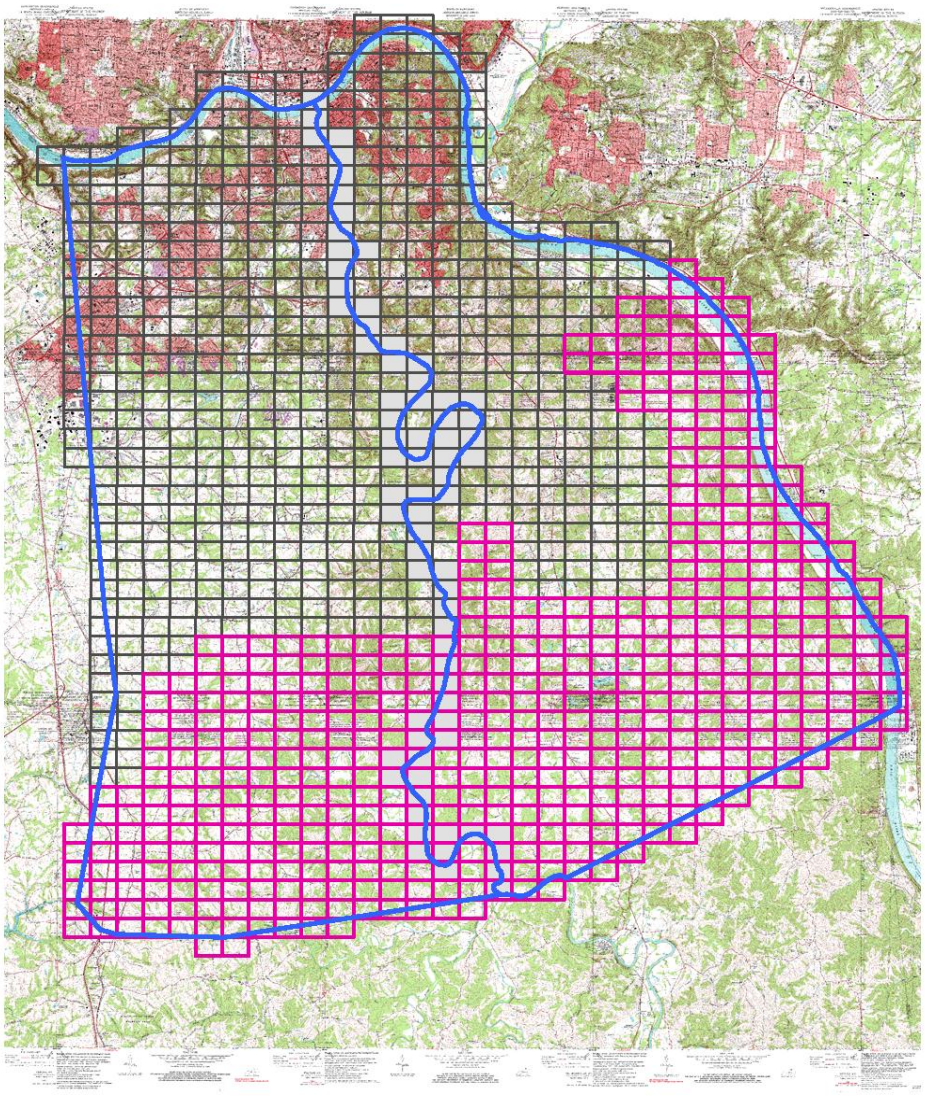
Attachment C



County Boundary
Rural (1" = 200')
Urban (1" = 100')
Kenton/Campbell Overlap Area - 73 Tiles

N

Combined LINK-GIS Project Area

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2.5 1.25 0 2.5 5 7.5 10
Miles

Attachment D

Affidavit of Independent Price Determination

A proposal shall not be considered for award if the price in the proposal was not arrived at independently without collusion, consultation, or agreement as to any matter relating to such prices with any other Offeror or with any competitor. In addition, the Offeror is prohibited from making multiple proposals in a different form.

Should conflict of interest be detected any time during the contract, the contract shall be null and void and the Contractor shall assume all costs of this project until such time that a new Contractor is selected.

Vendor must complete the following certified statement and submit it with Cost Proposal.

I, _____, representing_____ ,
(Print name) (Company Name)

Certify that the price in this proposal was arrived without any conflict of interest, as described above.

_____ _____
Signature Printed Name

_____ _____
Title Date

Company Name _____

Address _____

_____

_____

Subscribed and sworn to before me by _____ _____
(Affiant) (Title)

of _____this _____ day of _____ , 20 _____.
(Company Name)

_____
Notary Public

[seal of notary] **My commission expires:_____**