March 7, 2011

WOOLPERT

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Mr. Todd Pulsifer
GIS Manager
Department of Public Utilities
City of Columbus
910 Dublin Road, 3rd Floor
Columbus, Ohio 43215

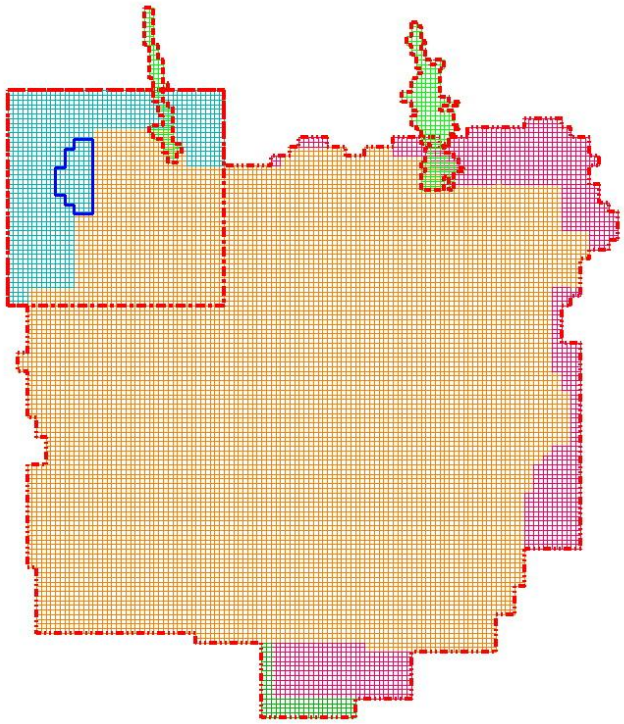
RE: 2011 Columbus Impervious Surface Mapping Program

Dear Mr. Pulsifer:

Woolpert is pleased to submit our scope and fee proposal for 2011 Columbus Impervious Surface Mapping. The impervious surface mapping will include aerial imagery, LiDAR acquisition, ground control, creation of color/color infrared ortho-imagery and the creation of an updated commercial/industrial impervious surface delineation (and optional residential parcels). The project area to be included in this 2011 mapping program is approximately 700 square miles in size. Woolpert will provide the following photogrammetric services:

Project Boundary

Below is a map delineating the 2011 project area. The project area is approximately 700 square miles in size and covers all of Franklin County and portions of Delaware, Licking, Fairfield and Union Counties. The Dublin Area (shown in light blue) has been included as a reference, as Dublin is also purchasing 3-inch imagery for 2011. The costs associated with Dublin have not been included into this proposal letter.



Aerial Imagery Acquisition

3-Inch Imagery

Woolpert will acquire new 4-band aerial imagery covering the City of Columbus Service Area (~700 square miles). Aerial Imagery will be acquired during the spring of 2011. This aerial imagery will support the generation of service area wide 1"=100' scale ortho-imagery with a pixel resolution of 3-inches.

LiDAR Acquisition

1-Meter Maximum Density

Woolpert will acquire new LiDAR data covering the City of Columbus Service Area (~700 square miles). LiDAR data will be acquired during the spring of 2011. This LiDAR data will have a point density **maximum** of 1-meter and be used to rectify the aerial imagery and be used as an integral dataset during the processing of the service area wide impervious surfaces and contouring. Woolpert's 2011 LiDAR flight plan has been modified from the 2009 LiDAR flight plan by positioning the new flight lines to be in between the existing 2009 flights. The re-positioning of the LiDAR flights will add additional point density to the existing LiDAR previously acquired for Columbus. With the additional density of LiDAR, refinement of impervious surfaces for residential parcels is achievable.

Ground Control

Woolpert will utilize existing and or perform a new ground control survey (if needed). Woolpert will supply a control diagram to the City of Columbus depicting existing or proposed new locations of horizontal and vertical GPS control points. Each control point will consist of a photo identifiable point (ie. edge of sidewalk at edge of paved driveway).

Aerial Triangulation

Woolpert will perform aerial triangulation on the newly acquired aerial imagery acquired during the spring of 2011. Triangulation extends and densifies the ground control and will subsequently support the 1"=100' scale ortho base mapping.

Ortho Base Mapping

3-Inch Orthos

Woolpert will produce service area wide 4-band, 1"=100' scale ortho-imagery, with a pixel resolution of **3-inches**. This ortho-imagery will be produced and delivered as 16-bit imagery, allowing for more precise delineation of impervious surfaces.

With the final ortho tiles being delivered in 16-bit and with four imagery bands (RGBN), the ortho tiles will be approximately 200 megabytes in size (using the tile size of 1,250' x 1,250').

The imagery will be delivered in geotiff format, with the appropriate tiff world files and metadata. Upon acceptance of the ortho-imagery by the City, Woolpert will produce a service area wide MrSID Imagery.

3-Inch Ortho-Imagery – Corner of Lane and Olentangy Roads

Impervious Surface Delineation

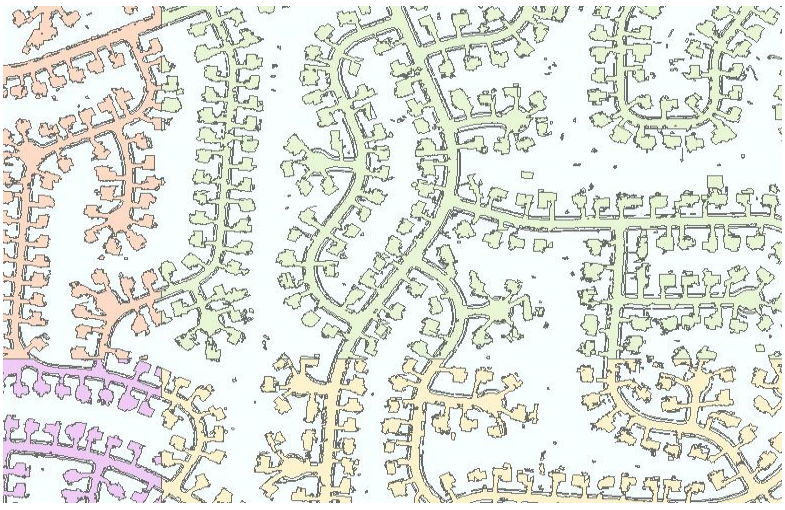
Optional - Commercial/Industrial Parcel ISM

Woolpert will utilize the newly acquired ortho-imagery and LiDAR datasets to produce an updated service area wide impervious surface layer. The process to generate the impervious surfaces (commercial/industrial parcels) will be performed using the semi-automated feature extraction process. After the impervious surfaces are produced (covering the entire ~600 square mile service area), commercial/industrial parcels will be extracted, cleaned and delivered. Only commercial/industrial parcels will be reviewed, cleaned and delivered.

Optional - Commercial/Industrial and Residential Parcel ISM

Woolpert will utilize the new ortho-imagery and LiDAR to produce updated impervious surfaces for the commercial/industrial parcels and produce new impervious surfaces for the residential parcels contained within the ~600 square mile service area of Columbus. Woolpert has provided an option for 1-meter maximum LiDAR point density, which will allow for more defined feature extraction.

The process to generate the impervious surfaces will be performed using the semi-automated feature extraction process. After the impervious surfaces are produced (covering the entire service area), commercial, industrial and residential parcels will be extracted, cleaned and delivered.



The picture above illustrates the visual quality of residential parcel impervious surfaces using the semi-automated feature extraction process.

Optional - 1-Foot Contour

Utilizing the newly acquired aerial imagery and LiDAR data, Woolpert will create 1-foot contours covering the City of Columbus Service Area (~600 Square miles in size). Woolpert will use stereo imagery to compile 3D breaklines, which are used to supplement the LiDAR masspoints. Due to the accuracy requirement, the existing 2007 DTM cannot be used and thus a new DTM will be produced.

Upon completion of supplementing the LiDAR with 3D breaklines, Woolpert will initiate editing and translation of the 1-foot contours and spot elevations. Woolpert will provide the 1-foot contours in ArcGIS Geodatabase and AutoCAD formats. The contours delivered in geodatabase format will be provided as a coverage, where as, the AutoCAD delivery will be provided in tiled format (based upon the ortho tiles). The vertical accuracy of the 1-foot contours will be **+/- nine inches** or ¾'s of the contour interval.

Optional - 2-Foot Contour

Utilizing the newly acquired aerial imagery and LiDAR data, Woolpert will update the existing 2-foot contours created in 2007. Please note that the contour update will take place on ~544 square miles (in 2007, 2-foot contours were only produced to cover the extent of Franklin County, not the Columbus Service Area). Woolpert will produce new 2-foot contours covering the remainder of the 600 square mile area (56 square miles). Woolpert will use stereo imagery to compile 3D breaklines, which are used to supplement the LiDAR masspoints.

Upon completion of supplementing the LiDAR with 3D breaklines, Woolpert will initiate editing and translation of the 2-foot contours and spot elevations. Woolpert will provide the 2-foot contours in ArcGIS Geodatabase and AutoCAD formats. The contours delivered in geodatabase format will be provided as a coverage, where as, the AutoCAD delivery will be provided in tiled format (based upon the ortho tiles).

The picture to the right is taken from the 2-foot contours generated for the City of Columbus and Franklin County in 2007.

The vertical accuracy of the 2-foot contours is +/- 12 inches.

Deliverables

Woolpert will supply the City of Columbus, Public Utilities with an external hard drive containing the digital ortho-

imagery and LiDAR datasets. The impervious surfaces will be delivered on a DVD/USB thumb drive. One GPS Control Report containing a control listing in the appropriate datum and log sheets with descriptions of points used in the survey will also be supplied.

Ortho-Imagery

The ortho-imagery will be delivered in geotiff format, with the associated tiff world files. The orthos will be delivered in 1,250' x 1,250' tiled format.

Upon review and acceptance of the geotiff imagery, MrSID mosaics will be processed. Multiple MrSID mosaics may be produced and delivered.

LiDAR

The LiDAR data will be delivered in LAS format and classified (using automated algorithms) as ground, vegetation and buildings. The LiDAR will be delivered in tiled format with each LiDAR tile being 1,250' x 1,250' based upon the tile size used for the 3-inch ortho-imagery.

Optional - Impervious Surface Mapping

The impervious surface mapping will be delivered in ESRI geo-database format. Depending upon the final size of the geo-database, the data may be delivered on CD or DVD.

Optional - Contouring

Woolpert will supply the 1- or 2-foot contours on either DVD, USB thumb drive or USB hard drive (depending upon file size). The contours will be provided in ArcGIS geodatabase and AutoCAD formats. If the City would like additional or different formats, this can be negotiated.

Schedule

Imagery Acquisition and Ground Control

Woolpert will acquire new aerial imagery on or before April 30, 2011. The ground control survey will be performed during or after aerial imagery acquisition.

3-Inch, 4-Band, 16-Bit Orthos

The anticipated delivery schedule for the 4-band, 16-bit imagery is September 30, 2011.

1-Meter LiDAR Maximum Point Density

The anticipated delivery schedule for the LiDAR is September 30, 2011.

Optional - Impervious Surface Update Commercial/Industrial Parcels Only

The anticipated delivery schedule for the impervious surface is to be negotiated.

Optional - Impervious Surface Commercial/Industrial & Residential Parcels

The anticipated delivery schedule for the impervious surface is to be negotiated.

Optional - 1-Foot Contours

The anticipated delivery schedule for the new 1-foot contours is to be negotiated.

Optional - 2-Foot Contours

The anticipated delivery schedule for the updated 2-foot contours is to be negotiated.

Estimated Fees – Primary Services

ORTHO & LiDAR SERVICES	
Service	*Fee*
3-Inch Imagery Acquisition, Ground Control & 3-Inch, 4-band, 16-bit Orthos (~700 square miles)	**$211,857.00**
1-Meter Maximum LiDAR Point Density Acquisition & Processing (~700 square miles)	**$164,946.00**
Total Fee:	**$376,803.00**

Estimated Fees – Optional Services

OPTIONAL SERVICES	
Service	*Fee*
City of Columbus Impervious Surface Delineation Update of Commercial & Industrial Parcels Only (600 square miles)	**$39,772.00**
City of Columbus Impervious Surface Delineation Commercial, Industrial and Residential Parcels (600 square miles)	**$568,478.00**
1-Foot Contours covering the Columbus Service Area (600 square miles in size) - New	**$527,348.00**
2-Foot Contours covering the Columbus Service Area (600 square miles in size) – Update/New	**$82,670.00**

We appreciate the opportunity to present this price proposal and look forward to working with your team again. If you have any questions or need further clarification regarding the above, please call me at 937.531.1323. I can also be reached via my e-mail address: brian.stevens@woolpert.com.

Sincerely,

WOOLPERT Inc.

Brian Stevens, CP, SP
Project Manager