SPATIAL SYSTEMS ASSOCIATES, INC. | NEWS FOR THE GIS & FMIS USER COMMUNITY

Contours and Lidar Data

A Message from Larry E. Newman

President, P.E., LEED AP

Lidar data is a great resource to assist in understanding our world. It can be used to provide information about building heights, tree heights and canopies, and landscape changes – just to name a few examples. We also use it to establish an accurate terrain model to represent the ground.

The terrain model can directly contribute to interactive 3D visualizations, however, it is very challenging to use as a 2D map overlay. This challenge is due to the cartographic competition with all of the other map layers...property lines, building footprints, tree lines, color coded land use/zoning classification, etc. The remedy to this is to represent the topography of the land with contours. Traditionally, contour lines have been generated through photogrammetric practices resulting in accurate and cartographically acceptable data. Contour lines can also be derived from the lidar data, however the data often does not match what users (planners, engineers, developers, inspectors) are accustomed to seeing from contours generated from photogrammetric processes. While photogrammetric contour development is as much an art as a science, the automated contour generation from lidar is purely analytical.

So what are cartographically acceptable contours? These

CONNECT WITH US

Friend us on Facebook

Follow us on Twitter

Check out our blog

Forward this to a Friend

SSA GIS & FMIS

CONTACT US

info@spatialsys.com

VISIT US ON THE WEB

SSA GIS

GIS SERVICES

Consulting

Develop an understanding of your organizations needs and explore how GIS technology can meet them***...READ MORE***

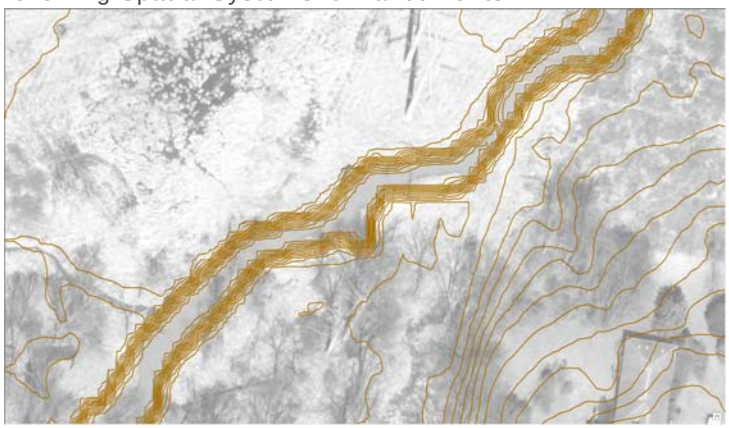
where needed, have index and intermediate intervals, and are labeled frequently enough to be easy to determine the approximate height of any location on the map.

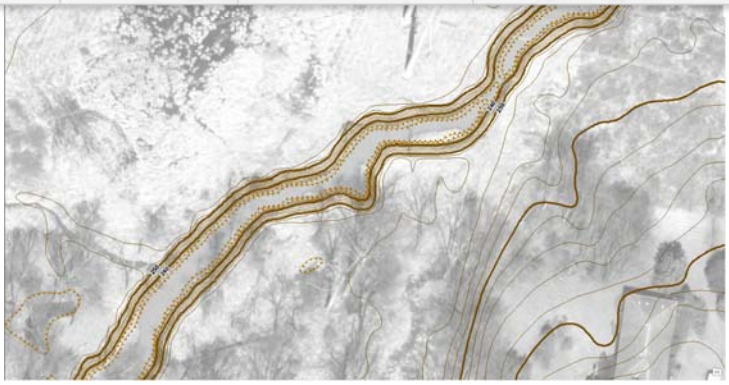
Generating contours from lidar data has become much easier over the last 10 years using out of the box tools and processes. The end result of these routines provide accurate contour data, however the cartographic quality of these contours leaves much to be desired. The resulting data is often presented as jagged lines with sharp changes in direction. While certain tools are available to apply splining algorithms to line work to smooth out abrupt changes, such algorithms do not check to ensure that the resulting contour line does not violate the ½ contour interval rule—that is, the algorithms may produce artistic line work that no longer meets accuracy requirements.

So the question is, how do we retain the accuracy of the data (which is of utmost importance) while balancing the cartographic enhancements to provide an end product that meets the expectations of the end user?

At Spatial Systems, we have been addressing this very question for the last decade. Though the technology and processing has improved over that time period, we are still unable to generate contour data that matches what the user is accustomed to seeing using off the shelf processes. To address this, we have developed a series of routines that produce a visually acceptable contour product while retaining the accuracy of the source lidar data. All iterations of these routines ensure that the data accuracy is upheld while introducing line work enhancements resulting in data that is more closely representative of those contours generated from photogrammetric practices.

The following images show the before and after changes following Spatial Systems' enhancements:





While the resulting contour line work from these routines meet accuracy standards, keep in mind that any derivative product is necessarily less representative of the collected data than the data itself—interpretations and approximations must be made to develop the DEM and contour data from the source lidar data. These derivative data products should primarily be used for display purposes. Any analytical work that is performed should use the lidar data. Further, bear in mind that the lidar data are only representative of what the laser can see from the air. Culverts under roadways, bridges, and other underground conveyances of water are not evident in the mass point file.

For more information please visit www.spatialsys.com and don't hesitate to contact us to explore contour generation for your environment.