Mapping Matters

By Qassim A. Abdullah, Ph.D., PLS, CP**

Your Questions Answered
The layman's perspective on technical theory and practical applications of mapping and GIS

Q: When shopping for lidar data, how do I know what point density I need for my project and whether I need breaklines to support the terrain modeling?

Dr. Abdullah: In my last article, I answered this question in terms of lidar data acquisition requirements for different terrain modeling applications. In this issue, I will address the question as it pertains to requirements for 3D modeling applications.

3D Urban Modeling Applications: The high density of lidar point clouds meets wide acceptance in different user communities who need high definition elevation data for applications other than terrain modeling. These applications include, but are not limited to, line-of-sight, 3D city modeling, 3D urban fly-throughs and simulation, and security and emergency planning. Homeland security agencies, for instance, have shown a strong interest in the use of dense lidar datasets for intercity combat planning and high profile security planning. In addition, the emerging capabilities of oblique

Bio-mass and Forest Modeling: Lidar points clouds are also proven to be very effective in studying and modeling forest floor and canopy. Lidar-derived spatial data ultimately can be used to achieve the following resource management goals:

- accurate inventory and composition of forested land,
- harvest planning,
- habitat monitoring,
- watershed protection, and
- fuel management (for fire management).

Furthermore, the "Mapping Matters" article published in the November 2007 issue of *PE&RS* provides more details on this very same subject. In that article, I suggested a lidar point density of 0.1 to 10 points per square meter, depending on the nature of the study.
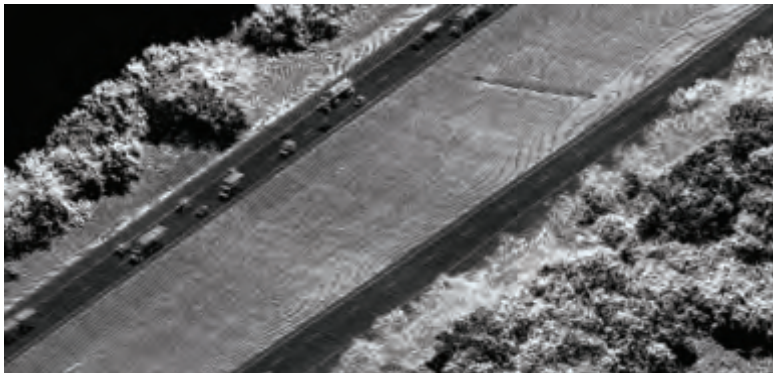

Figure 1. Sample lidar intensity data collected with 20 points per square meter over Interstate 70 in Maryland.

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imaging and modeling have added a greater emphasis on high quality and high definition elevation data; requirements that would be cost prohibitive without lidar technology. In most of the urban modeling applications, users are more concerned about the definitions and details of the lidar dataset than with the centimeter-level accuracy. Most 3D city modeling can be achieved with a lidar point density of 5 to 10 points per square meter. We are, however, witnessing an emerging new market for dense to ultra-dense lidar data and many lidar providers are equipping their operations with the sensors designed to meet such demand. Figures 1 and 2 illustrate the quality of the scene as represented by lidar intensity with post spacing of about 20 points per square meter. It is amazing how fine the details are that such data provides.
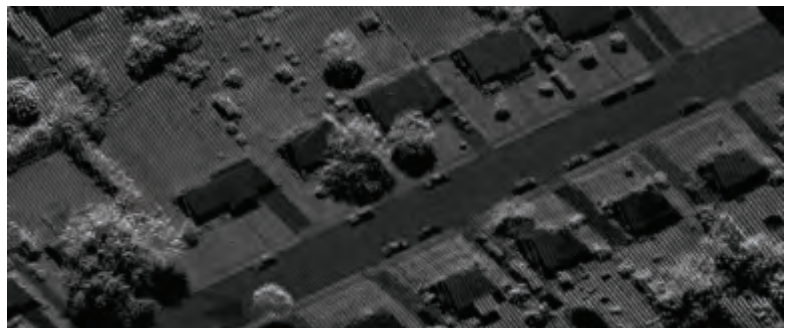

Figure 2. Sample lidar intensity data collected with 20 points per square meter over a residential area.

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Answers for all questions that are not published in *PE&RS* can be found on line at www.asprs.org/Mapping Matters.

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