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LiDAR or Aerial Photogrammetry: Which is the Right Tool for Your Energy Project?

With all of the buzz about LiDAR, it appears to be the preferred choice for obtaining data for the design of electric transmission projects. With other mapping tools available such as aerial photogrammetry, I wondered if there was a best use of one over the other. So I decided to dig in a bit and share my findings. At the broadest sense, I've concluded that every project is unique and no one-size-fits all solution exists to address the overall needs of energy project design or redesign.

Let's start with aerial borne LiDAR. The process requires an airplane- or helicopter-mounted scanner which shoots pulsating laser beams downward during flight. After coming in contact with structures, vegetation, and surfaces, the beams reflect back to the airborne system to record the timing of the LiDAR returns. From that information, coordinates and measurements are gathered. Immense amounts of data, densely covering key areas of interest, can be collected with LiDAR. A single flight can return millions of high-precision points along a narrow corridor.

The value of LiDAR lies in extreme and accurate detail, especially when measuring above-ground features and obstructions for the design of new, or assessment of existing, electric power lines. When our T&D clients are assessing or planning thermal upgrades to existing transmission lines, designing around complex structures, or planning for vegetation management, LiDAR makes good sense. In response to the Fall 2010 NERC alert, LiDAR beats aerial photogrammetry hands down as the preferred tool to aid utilities in assessing compliance on transmission lines and structures. This is due to the high volume of lines requiring efficient high-precision assessment. Aerial photogrammetry would not be a cost-effective or efficient solution in this case. Due to the demand of LiDAR on projects, the technology continues to improve and advance at a rapid pace.

Aerial photogrammetry uses a series of overlapping aerial photographs to create an accurate and scalable stereoscopic image of the ground and its features. Photogrammetrists pull precision horizontal and vertical coordinates and measurements from key features in the image. They are able to easily create breaklines and generate comprehensive 3D digital terrain models. The need for breaklines should be weighed as well because creating them is not as easy to do when processing LiDAR data. A single flight path can allow for the collection of a swath of data up to two miles wide. Though the area covered is greater than that of LiDAR, there is less raw data, making it easier to handle and process.

Often times, aerial photogrammetry provides the most value for electric transmission and distribution designers when they are assessing a new corridor location or project site. The wider swath of data allows more room for centerline adjustments and assessing multiple corridors. LiDAR data swaths are a great deal narrower, therefore requiring a



proposed centerline to be further refined, which can prove to be limiting to a designer. Aerial photogrammetry also allows for quick retrieval of additional data without the cost of another flight.

Finally, the mobilization of helicopter-flown LiDAR can easily cost twice that of a fixed-wing aircraft. The size of project and level of detail required should be considered to ensure a return on investment. If a project is smaller in size but requires comprehensive data in key areas, a designer may find that it is just as feasible to use aerial photogrammetry supplemented by traditional ground surveying to pick up the finite details. A designer may also find situations in which both aerial photogrammetry and LiDAR data provide a benefit on the same project. As I stated early on, every project is different.

The unique processes and solutions of aerial photogrammetry and LiDAR can make or break a project. Though LiDAR's advanced technology may be all the buzz, take the time to weigh the benefits and understand the capabilities to ensure you select the most cost-effective and beneficial tool for your project.



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