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Integrating Survey and Reality Capture into the Infrastructure Lifecycle

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Learning Objectives

- Learn how to identify the primary role of survey in predesign, design, construction, and as-built process
- Learn how to set up dynamic one-person survey crews using cloud-enabled workflows
- Learn how to establish workflows for field to finish using reality capture, automated linework, automated feature extraction, survey database, and feature code libraries
- Learn how to integrate survey data into accurate 3D designs, as-builts, GIS, and asset management

Description

This class will discuss the different roles of survey and reality capture in the infrastructure lifecycle. Using Topcon Magnet, ReCap software, Civil 3D software, and InfraWorks software, we will integrate survey data into the predesign, design, construction, and as-built processes. By capitalizing on modern survey technology, we will discuss the benefits of rapidly deployed 1-person survey crews and how they can quickly and accurately gather data and share it in real time using cloud-enabled workflows. Using photogrammetry (UAV and land based), LIDAR, laser scans, and ground-penetrating radar, we can streamline 3D modeling using point clouds to increase efficiency and quality of survey data. We will outline how to automate survey workflows to generate surfaces, linework, and features using reality capture. Finally, we will identify the benefits of streamlining survey workflows and integrating them into every stage of the infrastructure lifecycle.

Speaker

Working as a Land Surveyor for the past 15 years, Mr. Maxwell has developed a strong work ethic and interpersonal communication skills. He is well versed in both the field and office operations of surveying, and has a solid understanding of the guidelines and standards that are applied at federal, state, and borough levels. Mr. Maxwell is fluent with data reduction software, AutoCAD, and provides innovative techniques to increase efficiency and quality. Jake's experience working in remote locations all over the state enables me to prepare for challenges, with safety as a priority. As a third generation Alaskan, Mr. Maxwell enjoy outdoor activities year round. He has traveled to many parts of the state for both work and adventure. Being a part of a team committed to developing Alaska future infrastructure sustainability, is what drives Jake to come to work prepared to do his best.

About Anchorage Municipal Light and Power

Anchorage Municipal Light & Power (AMLP) provides safe, reliable and affordable electric utility service to over 30,000 residential and commercial customers in its roughly 20-square-mile service territory. AMLP serves commercial, university and medical customers in the Downtown and Midtown business districts, as well as industrial loads in the Ship Creek and Anchorage Port areas and residents in some of Anchorage's oldest neighborhoods. In addition, AMLP provides bulk power to Joint Base Elmendorf-Richardson and sells electricity to other Alaska Railbelt utilities. AMLP is owned by the Municipality of Anchorage, which purchased the distribution system from the privately owned Anchorage Power & Light Co. in 1932. AMLP is subject to the Regulatory Commission of Alaska.

Since 1932, AMLP has grown to include generation and transmission, as well as upgraded and expanded distribution. The utility has a one-third working interest in the Beluga River gas field, making it one of the only vertically integrated natural-gas-fired utilities on the West Coast. The gas field will provide AMLP with a secure and reliable source of fuel for most of its needs through 2018. About 15 percent of AMLP's generation is from renewable hydroelectric resources and the utility has been investing millions in upgrading its aging facility to include clean and efficient natural-gas-fired generation. AMLP is building a 120-megawatt thermal generation plant in east Anchorage which will be one of the most energy efficient thermal-generation plants in the world upon commissioning the end 2016.

Learn how to identify the primary role of survey in predesign, design, construction, and as-built process

The survey section is involved with every part of the construction and design. This hands on involvement streamlines projects from predesign conception, constructing the project, to having accurate records of what was built. Most utility systems, will connect to existing, or will be connected to infrastructure in the future. Having accurate records is essential for the past, present, and future projects. It is also the survey section to coordinate with the drafting, engineering, locating, and construction departments.

- **Predesign:** Survey coordinates with the engineers of project scope, conducts property and easement research
- **Design:** Survey performs property survey, design topographic surveys, and coordinates all design locates. Additionally, survey coordinates the staking sheets and placements
- **Construction:** Survey stakes out proposed facilities, and property, right-of-way, and easement lines
- **As-Built:** A surveyor is embedded with a crew to gather as much data as possible to be categorized and placed into the GIS map

Learn how to set up dynamic one-person survey crews using cloud-enabled workflows

Having multiple one-person survey crews, and the equipment to support them, enables incredible efficiencies and accurate as-built records. AML&P's group of surveyors supports our entire engineering group, and all of our in-house and contract construction crews. Utilizing the Topcon Magnet cloud-enabled software, we are able to send data back and forth between the office and field. Computations can be made quickly, to keep crews up and running.

- Jobs are uploaded and downloaded via Topcon Magnet Enterprise cloud-based software
- Flexibility with manpower allows more to be completed with less man hours
- Having a surveyor entrenched with the construction personnel enables less downtime for the crews who do not have to worry about maintaining ROW and placement stakes or utility locates

Learn how to establish workflows for field to finish using reality capture, automated linework, automated feature extraction, survey database, and feature code libraries

Using Feature Code Libraries and built-in functions within Topcon Magnet, we are able to “draw the linework” while collecting the data. The survey data is post-processed, and imported into the Survey Database within Civil 3D. Linework and symbols are automatically generated with dynamic properties, on the proper layers. This function greatly reduces drafting time from traditional methods by approximately 75%. Furthermore, reality capture datasets can be imported into the drawing for complex projects.

- By automating linework and symbols, less blunders happen between data collection, and drafting projects
- Linework is shown as collected on data collectors to ensure quality
- Drafting of survey data time is reduced by approximately 75%

Learn how to integrate survey data into accurate 3D designs, as-builts, GIS, and asset management

Using multiple data capture methods with accurate survey control, enables the most precise asset management. Finding the “right tool for the job” is essential. Using a combination of GPS, conventional survey, laser scanners, UAV’s, and ground penetrating radar, we are able to accurately capture data for future generations.

- GPS is used as the day-to-day workhorse
- Robotic total stations are used in GPS hostile environments, and for projects indoors
- UAV’s are used for large scale projects
- Laser scanners are utilized for complex and dangerous situations
- GPR is applied for finding previously placed features without accurate as-built data
- Survey grade as-builts are categorized and uploaded to the GIS map for future use
- Standardized templates for projects and drawings allow seamless integration of survey data into design and as-built workflows