

Facilities Information Technology: Overhead Electric Project

Photos: Joe with the RTK GPS and Tablet PC



These two photographs show Joe measuring an offset point with the RTK GPS unit and collecting utility pole attributes with the tablet PC.

Photos: RTK GPS and Trimble Data Logger



The RTK GPS unit was used to measure the precise location of utility poles and store that information in the Trimble data logger via Bluetooth. Trimble Geomatics Office was then used to check the data into ArcMap.

Figure 2: Tablet PC and Utility Pole Attributes



Utility pole attributes could be updated in the field using ArcPad on the tablet PC as well as revisited in ArcMap.

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Abstract

Introduction

In the fall of 2006, the University of New Hampshire (UNH) Geographic Information Systems (GIS) Department of Facilities Information Technology (FIT) was given the task to validate and extend the dataset of utility poles and aerial wires on campus. Undergraduate Joe Guerra was employed as a GIS intern for the Overhead Electric Project. He gained experience collecting data in the field, using a tablet PC, using RTK GPS equipment, and ESRI ArcGIS software. Joe also gained credit towards his Geography Major and hopes to apply what he has learned to future work with the GIS Department.

Project Overview

The purpose of the Overhead Electric Project was to validate utility pole locations and attributes, and develop a comprehensive overhead electric geodatabase of aerial wires on the UNH campus. The attributes of the 646 utility poles recorded include location, the amount of riser poles, transformers, meters, switches, the amount and type of lights, and other features. The location and orientations of approximately 18.6 miles of aerial wires were also recorded.

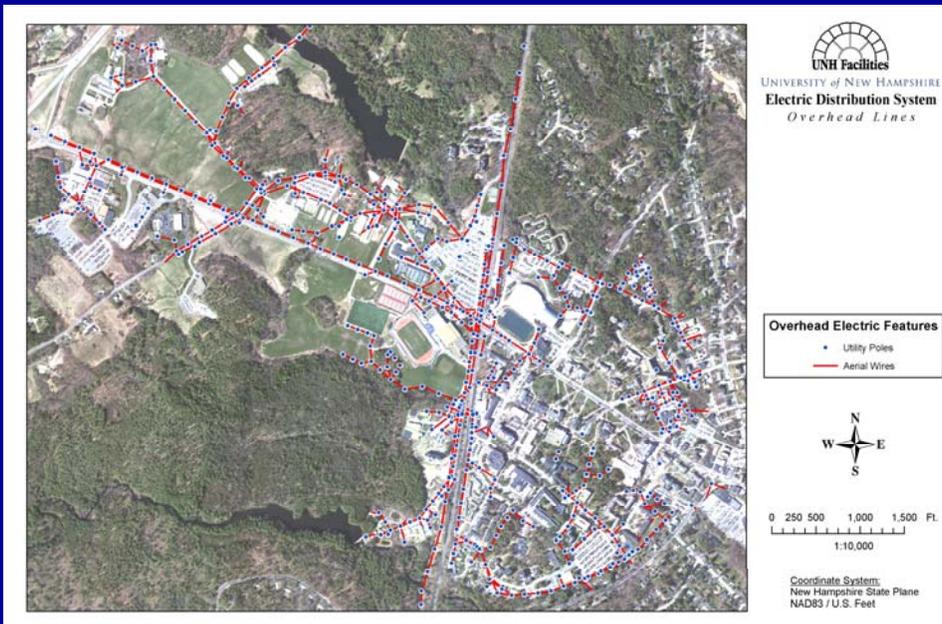
Results

The Overhead Electric Project produced a comprehensive geodatabase of utility poles, aerial wires, and their attributes for the UNH campus. This geodatabase contains the most updated and complete information as of December 2006. The success of this project did not come without a couple of difficulties. Data collection in the field was sometimes challenging. Adding or deleting utility poles usually complicated the arrangement of aerial wires. Identifying utility poles was sometimes difficult because of the outdated UNH campus map used in ArcPad and poor satellite coverage by the handheld GPS. Also, poor satellite coverage led to time consuming RTK offset measurements. Nevertheless, ArcMap was efficient software to monitor project progress and ensure accurate data. Fortunately, pleasant weather predominated data collection since the tablet PC was not designed for rough conditions.

Technologies

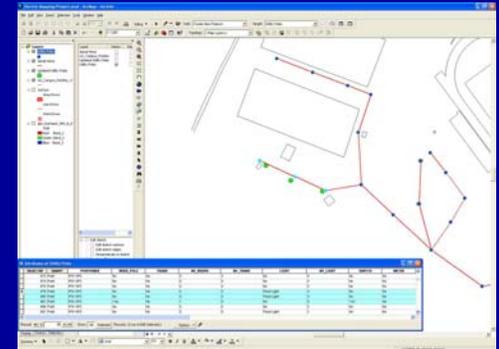
The Overhead Electric Project utilized a number of technologies for different elements of the project. A handheld GPS and tablet PC with ArcPad software was used for recording and transferring field collected data. RTK GPS equipment was used to measure the precise location of utility poles. The RTK unit utilized a network of 26 GPS satellites in space and the UNH CORS base station to measure the location of utility poles to sub-centimeter accuracy. Sometimes it was necessary to combine the RTK unit with distance measuring equipment and a surveying compass, to measure offset points, when satellite coverage was obscured near utility poles. RTK GPS data was stored in a Trimble data logger via Bluetooth and could be transferred to ArcMap via Trimble Geomatics Office. Field data collected by the tablet and RTK could be edited, analyzed, and assembled in ArcMap.

Figure 1: Overhead Electric Geodatabase



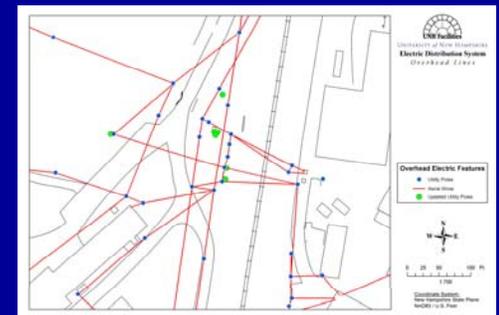
This is the full extent of the Overhead Electric Project depicting 646 utility poles and 18.6 miles of aerial wires on the University of New Hampshire campus. This information is contained within a complete geodatabase current as of December of 2006.

Figure 3: ArcMap Editing Session



ESRI ArcMap version 9.1 software was used to edit newly added utility poles and ensure proper snapping of aerial wires.

Figure 4: Areas of Difficulty



Areas with many newly installed utility poles and complicated aerial configurations required careful attention and the bulk of ArcMap editing.

Figure 5: Areas of Ease



Many areas of campus had relatively straight-forward utility pole and aerial wire configurations. This made data collection and post processing validations easier.