Energy and Campus Development GIS Internship

Fall 2010 – Spring 2011

University of New Hampshire - Durham

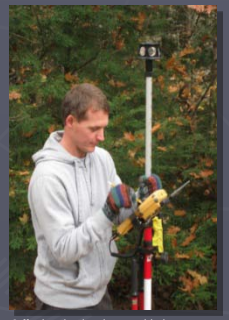
By Jeff Nelson

The primary data collection devices used during the internship. The Total Station pictured here (left) has been replaced by a Robotic Total Station that can be operated by a single user. At center is the reflecting rod used with the total station. At right is the RTK GPS unit. The 'bell' on top is the receiver and the removable handheld device located mid-shaft is the data logger that allows the user to store information about the points collected.

Introduction

The Energy and Campus Development GIS Group partners with the UNH Geography Department to offer a GIS Internship to interested candidates. This partnership has existed for several years, offering real-world, hands-on GPS and GIS experience to a wide range of Geography majors. Interns with the ECD GIS Group are given high quality one-on-one instruction in order to prepare them for a broad spectrum of potential tasks. Such tasks may include: Collection of surface and/or subsurface features using Real-Time Kinematic GPS or Robotic Total Station equipment, subsurface utility location and identification for compliance with the Dig Safe program, modification of existing Geodatabases, digitization of features in ArcMap software, analysis and extraction of data using ArcGIS ModelBuilder, as well as many other spatially-oriented tasks.

The data logger used with the RTK GPS unit. Users document feature attributes using attribute libraries which are designed prior to entering the field.



Jeff using the data logger with the new Robotic Total Station. The mirrors at the top of the rod reflect the total station's laser back to the unit in order to accurately measure distance.

ADA Accessibility Project – Fall 2010

During the Fall 2010 semester, the majority of intern duties involved the collection of field data using RTK GPS and the Robotic Total Station. As part of the University's movement toward full compliance with the Americans with Disabilities Act (ADA), existing pedestrian surface feature data was verified and updated. Location of ADA parking spaces, stairs, walkway curb-cuts, walkway surface type and slope were collected and then utilized in the GIS Group's ADA web map that helps users identify ADA accessible routes on campus. Perhaps one of the most important aspects of the map is it's ability to show unevenness or steepness. Patterns and color codes indicate the general texture or slope of a given pathway in order to warn users of uneven or steep terrain. In addition to outdoor surface data, individual buildings are investigated to determine their interior accessibility. Buildings on campus that lack ADA accessible entrances or necessary ramps and elevators can be identified in the Accessibility web map and avoided by persons with disabilities.

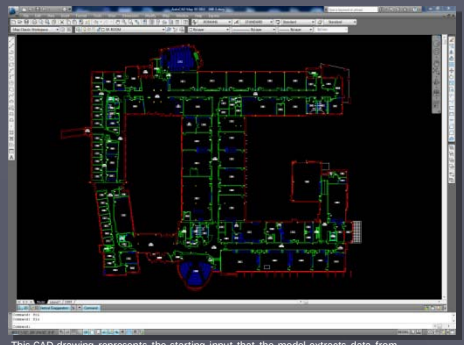
UNH's ADA Accessibility Interactive Web Map helps users find ADA accessible routes on campus. Colors are used to show varying levels of steepness for the safety and convenience of persons with disabilities on the UNH campus.

CAD Conversion Project – Spring 2011

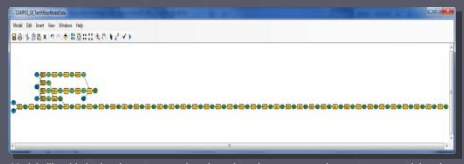
During the Spring 2011 semester, the majority of work involved the construction of spatial models using ArcGIS ModelBuilder. The models were designed to extract specific spatial and tabular data from building drawings originally made with CAD drafting software. Using the model, room lines were ultimately converted to polygons within a feature dataset that could be more fully analyzed by ArcGIS software. Once the project is completed, planners can answer questions about all of the rooms in every building on campus at once, something that the CAD program isn't capable of. Furthermore, ArcGIS can link the existing data to other databases on campus, allowing simple tabular data, like class schedules, chemical inventory, or space utilization, to be viewed graphically. In addition, the rooms and buildings will be georeferenced in ArcGIS, so that spatial analyses may be performed on them. In CAD, buildings are viewed one at a time, and are not spatially referenced, so spatial analysis is impossible. Once the building and room data is fully imported into ArcGIS and linked to other databases on campus, some very informative and complex spatial analyses will be possible. For example, the software can use building, room, chemical inventory, and space utilization data to predict which rooms would be affected by a potential gas leak and which parties to notify at any given time.

Results

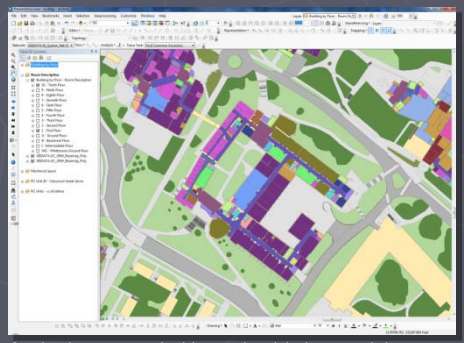
Both of these are very important ongoing projects for the Energy and Campus Development GIS Group. The ADA Accessibility web map is currently in the testing phase. Collection of the data by the GIS Group and their intern will continue as needed. The CAD Conversion project is still underway as well. Constructing the models used in the project takes a great deal of patience and attention to detail. Both projects will significantly improve life on campus. These are just two of the many projects that the GIS Group handles on a day-to-day basis.



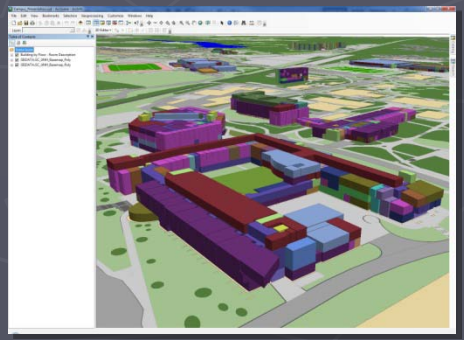
This CAD drawing represents the starting input that the model extracts data from. Individual room lines were ultimately converted to polygons according to the operations built into the model.



Models like this had to be constructed and run in order to extract the necessary spatial and tabular data from the CAD drawings. Each blue oval represents one floor of one building. This 10th floor model has just two buildings in it. The 1st floor model contains over 200 buildings. Each yellow rectangle represents an operation performed on each subsequent output dataset (green).



Once the polygons were created and the appropriate tabular data was attached, rooms could be viewed and analyzed using ArcMap.



As with the 2D ArcMap view above, this 3D ArcScene view shows each room on campus symbolized by how it is used.