Roadway Mapping Project for UNH Facilities Information Technology

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INTRODUCTION:

In the spring of 2006, the University of New Hampshire Facilities Information Technology (IT) department was presented with the task of creating a geographic information system (GIS) for the university campus. This project would include creating a detailed geodatabase of roadways, parking lots, and pedestrian walkways. To assist in the creation of a campus GIS, six undergraduate students were selected for the positions of initial data acquisition and post-processing. Seth Prouty and Jeremy Onysko requested and were chosen to assist in the planning and development of a roadway geodatabase.

METHODS:

The roadway geodatabase was constructed within ArcCatalog. An exhaustive feature library and data dictionary were created for each roadway feature. Features such as roadway paint markings, speed reduction devices, roadway centerlines, etc were used (see Figure 3). The data dictionary and feature library were incorporated into a Trimble RTK unit (see Photos 1 and 2). This unit was used for the collection of roadway area and curb area points. Utilizing Bluetooth technology, the RTK unit was continuously geocorrected from a base station located near Leavitt Lane; sub-centimeter position accuracies were thus possible. Much field work was involved in creating the geodatabase. Data points were recorded with the RTK unit and then uploaded to the computer using Trimble Geomatics Office for roadway edges and curb edges first. Shapefiles were created from the acquired points and from these; polygons were generated using the trace tool and snap-to feature. These polygons were representative of total roadway area and curb area.

RESULTS:

The roadway geodatabase created this semester is part of a larger campus GIS project. Although not entirely complete, much work was required to initially develop the geodatabase. The results of this project thus far:

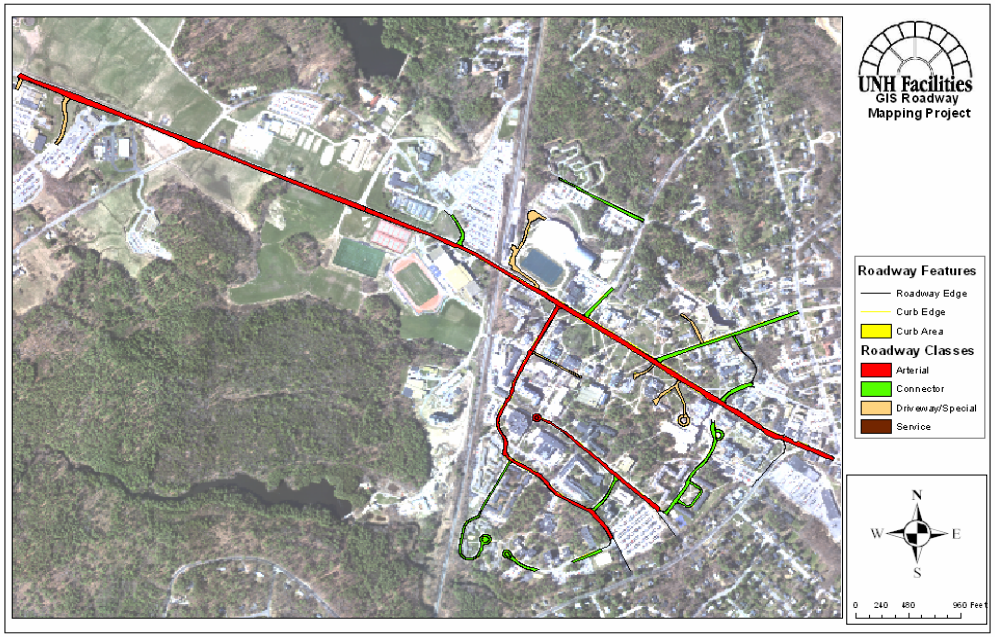
- -Development of a roadway geodatabase, including feature library and data dictionary.
- -Roadway (see Figure 6) and curb (see Figure 4) polygons for much of campus with road class, ownership, materials, and maintenance attributes recorded (see Figure 2).

CONCLUSIONS / DISCUSSION:

The roadway geodatabase was created to fulfill the need for more precise and accurate methods of managing roadway infrastructure. Although still incomplete, our work this semester will act as the building block for future development of the overall campus GIS.

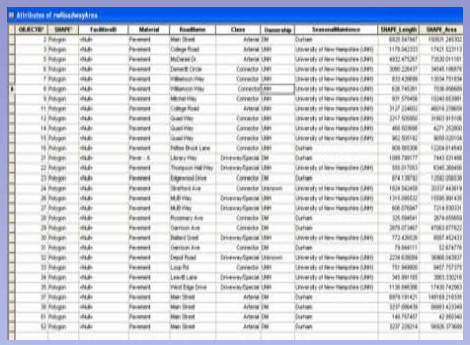
While the project overall went fairly smoothly, some issues needed to be addressed. Certain areas on campus had particular issues with higher than acceptable PDOP ranges and thus accuracies had to be noted when taking points. Other areas encountered had unique materials that needed to be noted and consequently entered into the data dictionary (see Figure 5). Fortunately, much planning had gone into the initial setup of the data dictionary as well as the geodatabase itself and therefore these issues were accounted for.

FIGURE 1- Roadway Mapping Geodatabase



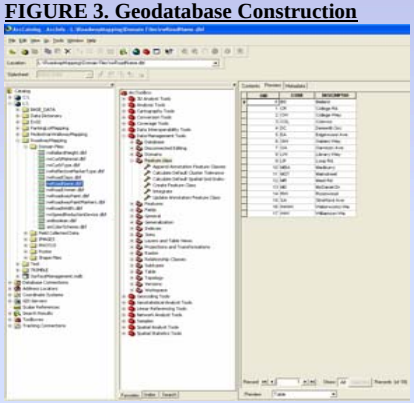
During the Spring of 2006 UNH Facilities GIS Division was tasked with creating a Roadway Geodatabase to aid in roadway infrastructure management and to complement the RSMS programs for roadway management on the UNH campus.

FIGURE 2. Roadway Attribute Table



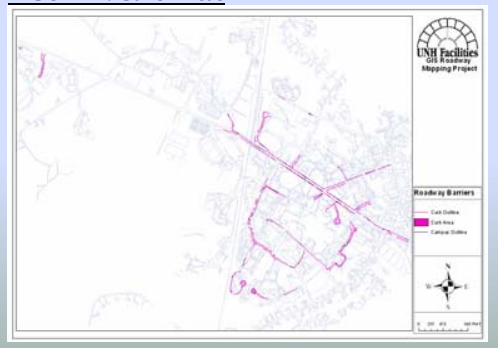
The attribute table for roadway areas shows how we chose to define each area using attributes such as road name, road ownership, seasonal maintenance and classes. Figure 2 also shows total areas and lengths for each road.

FIGURE 3. Geodatabase Construction



ArcCatalog was used to create a feature library. Additionally a data dictionary was created for each roadway feature and entered into the geodatabase.

FIGURE 4. Curb Areas



This map shows the curb areas mapped across campus. Note that many areas do not have curbs and are not mapped.

PHOTO 1

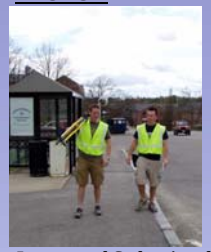


PHOTO 2

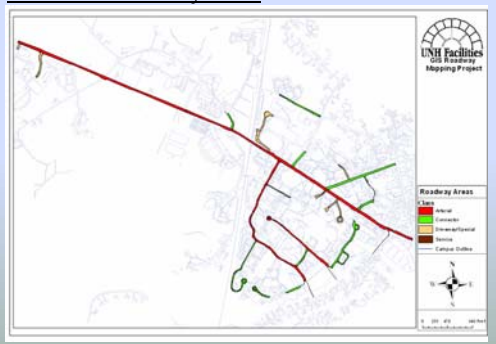
Jeremy and Seth using the RTK unit to collect GPS points. These points were later uploaded to Trimble Geomatics Office where it was converted for use in ArcMap.

Figure 5. Potential Post-Processing Issues

(A) Traffic circles were a common situation on campus which required some careful consideration during post processing. Additional roadway and curb lines were developed to complete polygon features.

Unique materials that needed to be accounted for in the data: (B) Metal flashing on curb edge, (C) Paving blocks on Library Way, (D) Fieldstone curbing, and (E) Accessibility ramps.

FIGURE 6. Roadway Areas



All roadways are classified and selecting a polygon will open the attribute table (see Figure 2).

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