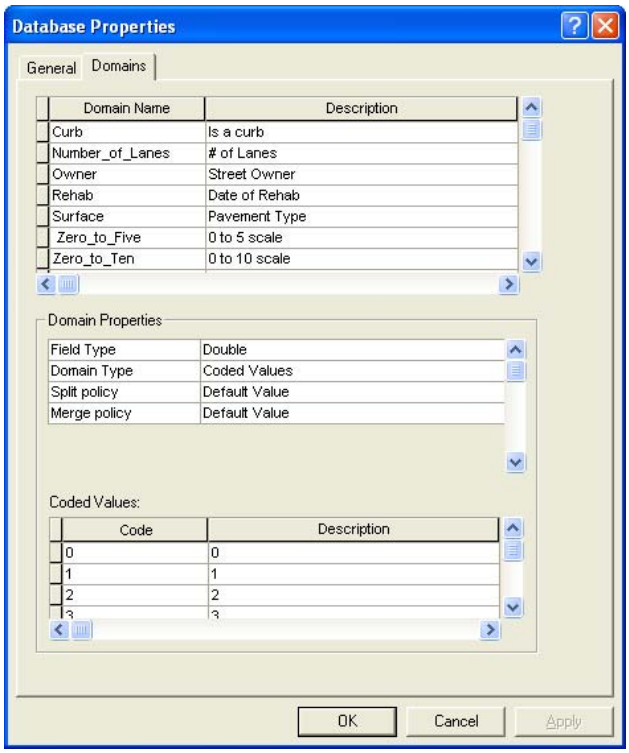
Street Condition and Inventory Assessment of College Station, Texas
or
Three Easy Steps to Citywide Street Inventory and Condition Assessment

Introduction

College Station is a city of 70,000 people and has an area of nearly 47 square miles. The GIS Department was asked by Public Works to develop a method to inventory and assess the condition of all streets it is responsible for maintaining. This paper is directed at those who have been, or could be, asked to undertake a similar project and would like to see an example of progress from conception through completion. The discussion will explain the project's design, its utilization in the field, the method for grading the condition of each street segment, data manipulation, and overall results.

Project Design

There are two components to the street inventory and condition assessment method: the street network and a geodatabase to contain it. To preserve the original street network (whether the current street network is a standalone shapefile, in a geodatabase, or in SDE) exporting the street network into a newly created geodatabase is necessary. Exporting to a geodatabase serves a secondary purpose as domains are established for the criteria to grade the street condition. Domains are established in the geodatabase to facilitate data entry. Domains with values of 0 to 5 or 0 to 10, created as field type Double, are attributed to each new field that contains an attribute to be scored when the fields are created, as shown in Figure 1. Lower scores are best, with 0 being optimal and 5 or 10 being most flawed.



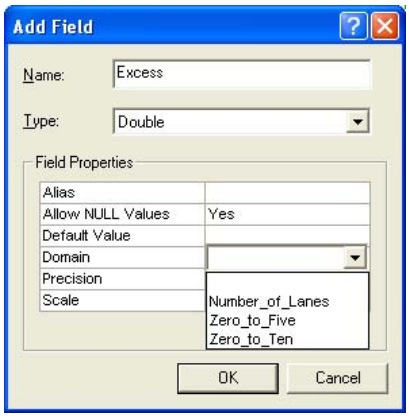


Figure 1 - Domain creation and field assignment

The scale for each attribute was determined based upon its relative importance. This mitigated risk of human error by providing drop-down menus containing possible score choices during editing sessions. Street condition is based upon a cumulative score of road quality as determined by examining 13 distinct pavement criteria, including the presence or severity of transverse cracking, longitudinal cracking, alligator cracking, pot holes, raveling, rutting, corrugations, ride, polished aggregate, deficient drainage, shrinkage, shoving, and excess. The total possible scores could range from 0 to 100, with a score of 0 representing a flawless road.

Data Collection

A three-person Public Works crew spent approximately a month assessing each street segment in College Station that they are responsible for maintaining (approximately 234 linear miles). They utilized a custom GIS project on a laptop that they used in the field. The project was stripped down for simplicity. The only item in the table of contents was the streets file to be edited, and essentially the only buttons on the menu bar were for starting, stopping, and saving edits, saving the project, and the selection tool. The use of toolbars and other non-essential tool buttons were kept to a minimum to avoid confusion and complication. As they visited each segment, they would rank the severity of each of the 13 criteria, an example is shown in Figure 2. At the close of each day, the street data was backed-up on a removable USB storage device.

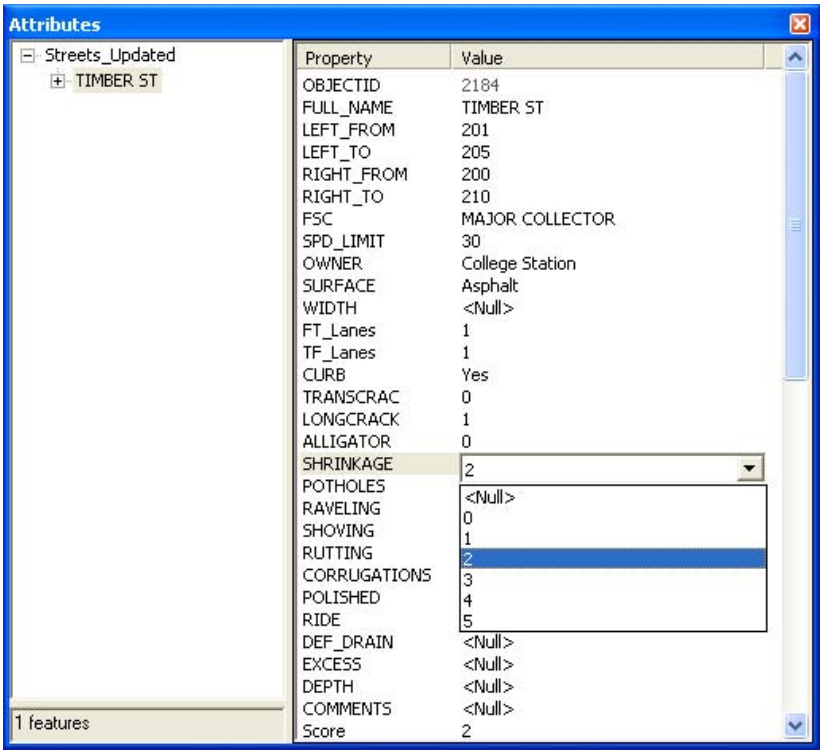


Figure 2 - Score entry method for street condition

Data Processing

The Public Works Department had three aspects of the city's streets they wished to have updated on their departmental intranet map service based upon the condition assessment information. They wanted to see the condition of each street segment, the condition of each street, and the overall condition for each of the 15 "public works areas" that they've divided the city into. Once the completed data was given back to the GIS department (on the USB device), a bit of post processing was necessary. The cumulative scores for each segment were calculated by adding a new "Total" field and field calculating the results based upon the sum of the 13 scores, as illustrated in Figure 2. The score sum for each street segment was subtracted from 100 (so that 100, instead of 0, now becomes a flawless score) to allow for a more traditional representation of quality. The total score for each street was calculated by dissolving the street segments by name and averaging their "Total" scores. The score per "public works area" was determined by intersecting the street segments and the areas, dissolving by a common field, and maintaining an average of the scores contained within each area.

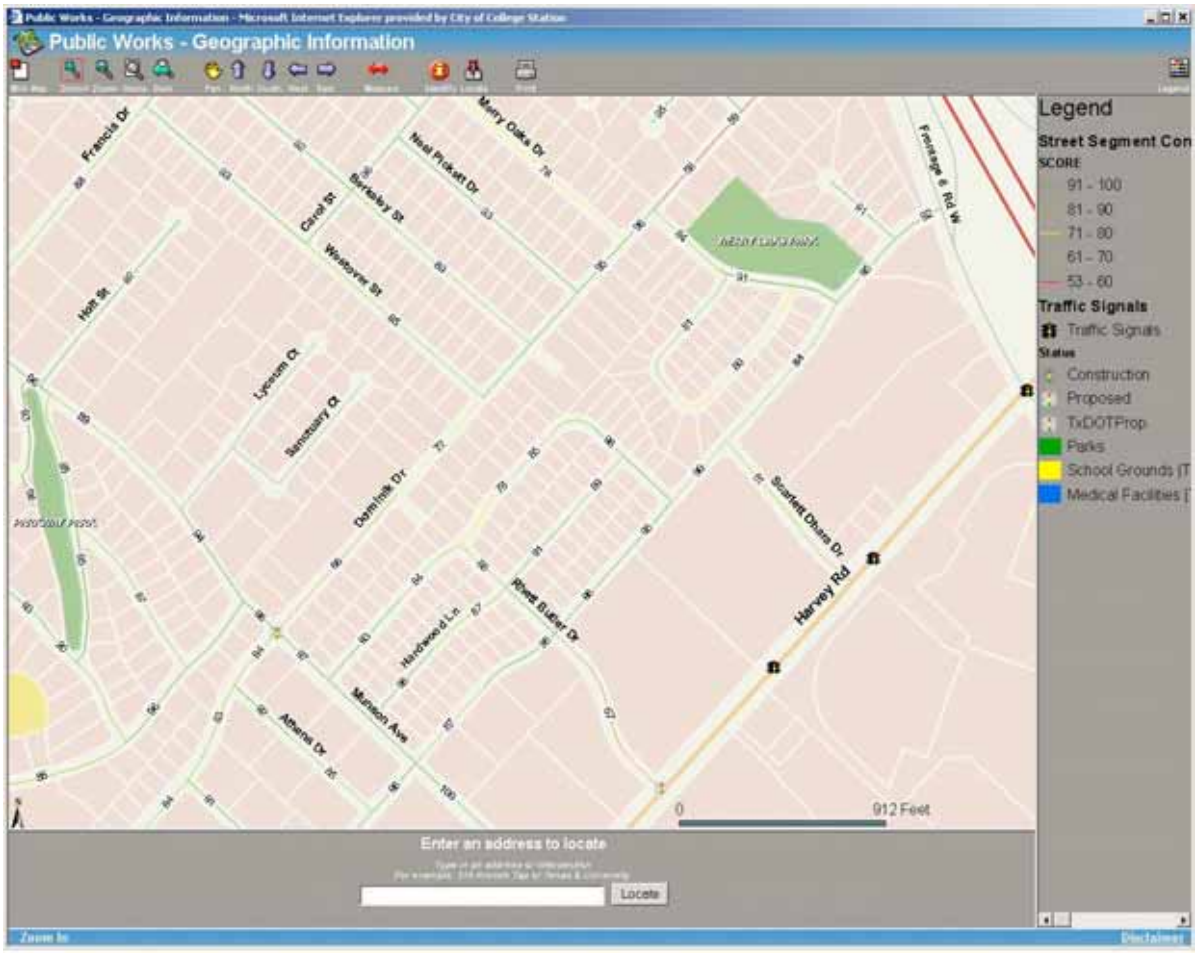


Figure 3 - ArcIMS display of street segment scores

Implementation

Public Works uses this information to assist in determining work priority. It provides a starting point to decide where the streets are that they need to concentrate their resources on. The IMS map provides an easily-accessible visual means to ensure that maintenance is focused on the streets identified as being in the greatest need of attention. If the street condition assessment is done annually as planned, it will also provide a historical record of street conditions.