Improving Communities Using ArcGIS, GPS and Hansen

Martin County, Florida

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Author's Names:

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Abstract:

Three months to deadline, understaffed and under financed, Martin County Florida's Engineering Department used ESRI GIS, backpack GPS units, Hansen's Roadway module and Hansen's GIS integration solutions to identify infrastructure elements and associated attributes and analyze data on map that led to a successful community enhancement project. This paper presentation will describe the Martin County's data collection process, using ArcGIS, backpack GPS, mobile mapping systems, Hansen's information management system and the role this technology integration played in the success of the project. Through this integration, and maps generated, Council quickly approved funding enabling

the department to repair, replace and retrofit streetlights, sidewalks, drainage facilities, pavement markings and road surfaces.

Paper Body:

The Project – Located in the rural western region of Martin County (approx. population 10,679) is a community whose infrastructure had been deteriorating at a rate exceeding allocated funding cycles. In the 2nd quarter of FY 2003, local officials and concerned citizens banded together to establish objectives to repair, replace and retrofit streetlights, sidewalks, drainage facilities, pavement markings and road surfaces.

Project Considerations and Outcomes – Private enterprises prefer to relocate to communities that provide a better quality of life: A community that keeps their infrastructure in good shape (e.g. roadways, sidewalks, and streetlights). The potential to provide new jobs and to increase the existing tax base justified this community enhancement project.

Use of Privatization – Adding spatial decision support tools to an Asset Management System can provide many benefits: From understanding asset location and spatial relationships to saving time and money on maintenance. In this case, integrating GIS with the Asset Management System enabled privatization and reduced the repair and enhancements costs on the Indiantown project. How? With accurate inventory and condition assessment information on the assets that needed to be repaired and/or upgraded, they were able to extract this information in a map format showing locations and types. A map layout of this information was printed and sent to vendors for competitive bidding, resulting in more accurate price proposals with the BEST prices provided.

Budget Justification – The use of both tabular data and spatial information provided the documentation necessary to support the County's request to increase funding to the project. With accurate infrastructure information and condition assessment data, staff was able to develop a detailed budget proposal from which the County Commissioners were able to make informed decisions.

Detailed Analysis Made Simple – Recognizing that streetlights were a critical component of the project; the Martin County Engineering Department staff used GPS technology to map the existing streetlights within the community. Once the streetlights were added to the ArcGIS project and after an initial site visit, the project team suggested that the inventory of streetlights needed to include those lights that were not functioning. With this new attribute, GIS analysts were able to create symbology for the streetlights indicating not only the location of the lights, but also whether the lights were functioning or needed repair. This data became very important in planning for future enhancements to the streetlights in the community.

In the streetlight intensity evaluation phase of the project, staff mapped the intensity (wattage) of each streetlight to provide a visual display of existing coverage (Fig 2). Although this information was available in tabular form, staff could not visually determine where lighting voids and deficiencies occurred. To accomplish this, streetlight intensity diagrams were obtained in paper format from the Florida Power and Light Co. for the various types of fixtures and wattage configurations that existed as well as the proposed upgrades. These diagrams were converted to polygons and then each streetlight was associated with its intensity values and light distribution pattern. The results of this analysis proved to be very effective in planning for future streetlight upgrades and were provided directly to FPL for use in the engineering design of the upgrades and repairs. Upon completion of the project the new features and attributes were imported back into the County's Asset Management System using GeoAdministrator.
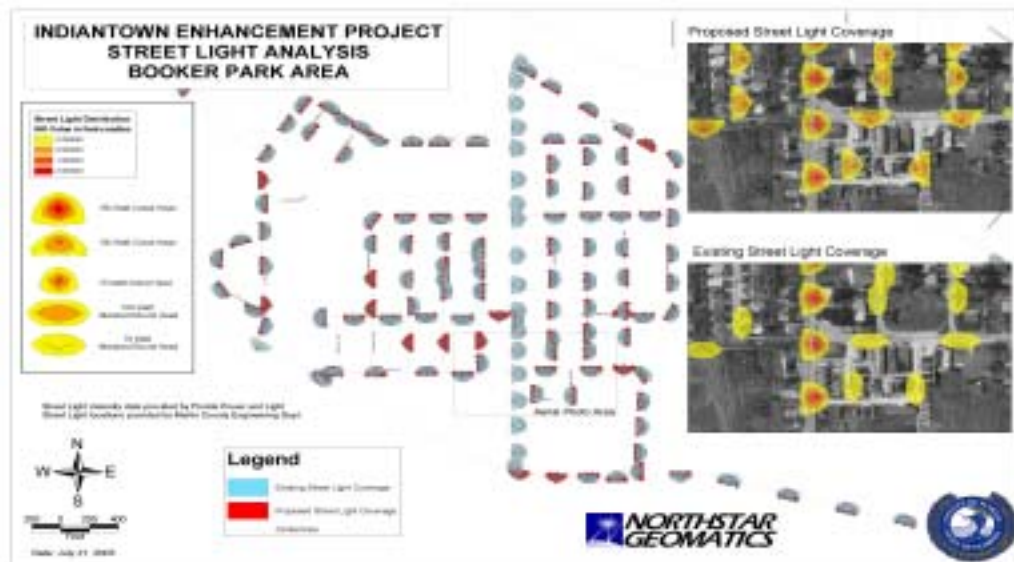

Figure 2

The GIS approach also provided the ability to evaluate potential conflicts of other desired enhancements, such as the construction of a sidewalk in an area experiencing drainage problems, which would need to be addressed prior to sidewalk construction (Fig 3).

Fortunately, Martin County had recently completed an extensive inventory of many of the desired features such as pavement markings, striping, sidewalks and road centerline data using mobile mapping technology. These existing attributes were extracted from the Hansen database and provided to NorthStar Geomatics for use in the GIS project. The County had previously acquired quality digital orthophotos, which were extremely useful in the Indiantown project.

Project Summary:

In less than three months:
- A plan was developed
- Informed decisions were made based on
  - Comprehensive analysis
  - Visualization tools
- Accurate price proposals were received
- Funding was obtained
- Work commenced

The Indiantown Community Enhancement project demonstrated the effectiveness of integrating the County's Hansen database with ArcGIS technology. The concurrent use of tabular data stored in Hansen with spatial information impacted the budget in a positive manner. Displaying the data on a map provided the visual documentation necessary to support the County's request to increase the funding for the project. We believe this project will serve as a model for future neighborhood enhancement projects.

Assets Analyzed –
- Signs: 811
- Sidewalks: 39,122 ft.
- Road Centerline Miles: 45
- Pavement markings: 126
  - (e.g. ADA ramps, crosswalks, right turn arrows, etc.)
- Striping: 43,103 ft.
- Streetlights: 348

Acknowledgements:

Citizens of Indiantown, Florida. The citizens of Indiantown take great pride in their community. They played a significant role in assisting local government employees in the collection of certain asset inventories.

Martin County Board of County Commissioners
Governing body, policy makers

Martin County Engineering Department
Lead project management role

Hansen
Hansen's suite of Transportation modules (e.g. Roadway, Streets, Pavement Management) and GIS tools (GeoAdministrator and GeoAssistant)

NorthStar Geomatics, Inc.
Local Survey and Mapping Firm, data collection and GIS integration

Transmap Corporation
Data collection firm specializing in mobile mapping technology.

Appendixes:

None.

End Notes:

None.

References:

None.

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Biography

Kimberly Maynard Roden

Kim Roden, Operations Manager of the Engineering Department in Martin County, Florida, provides support in the daily operations of a department with an operating budget of $10.7 mil. and a capital improvement budget of $20.5 mil. Kim has been with Martin County since 1987 providing long range planning assistance on budget and finance issues and project management support on transportation related projects. During calendar year '01 Kim was made responsible for the implementation of Martin County's Asset Management System with primary focus being database development, data collection and GIS integration. Kim received her BA from the University of Florida in '81 and is currently working on her master's degree in public administration.

Brian Weinke

Brian Wienke is the GIS Product Manager at Hansen, an ESRI Business Partner. Brian is responsible for managing the Hansen GIS solutions from strategic planning to tactical activities, including product direction, marketing, sales support, and GIS technical consultant to both internal and external customers. Brian keeps abreast of technology developments relevant to GIS and industry initiatives to ensure Hansen products are competitive and meet user requirements. Brian has a bachelor's degree from University of California, Riverside, and over six years experience in GIS product management. Prior to joining Hansen in 2003 Brian worked as GIS Product Line Manager at a 9-1-1 software solutions company and as a Business GIS Product Marketing Manager at ESRI in Redlands.