

2006 NASCIO Recognition Awards Nomination Form

NASCIO 2006 Recognition Awards

Information Communications Technology Innovation

NC DOT Integrated Cooperative Planning Project

Executive Summary

North Carolina has the second largest state maintained road system in the United States with more than 78,000 miles of roadway. NCDOT is divided into 11 main divisions with 14 local division offices under the Division of Highways located geographically throughout the state. North Carolina has 100 counties, so each local office is responsible for a number of counties. While each of the local offices reports to the Division of Highways, there is a fair amount of local discretion in how work is performed. The 14 local division offices are responsible for construction, maintenance, roadside environmental programs, traffic services and the fiscal and facility operations involved in administering these functions.

In Region 6, annual bituminous (asphalt) resurfacing was being performed on a countywide basis, which resulted in excessive equipment mobilization and material handling. Work of several other units was often dependent on the resurfacing work—for example, road painting can not be done until the resurfacing is done. Lack of coordination between the units resulted in excessive mobilization and movement of staff. The region had no contemporary tools to use in their work—managers often prepared hand drawn maps to direct their staff to work locations.

The County Maintenance Engineers and the Bituminous Supervisor determined that each county's annual resurfacing could be completed regionally. The counties were divided into sections and each year the paving in these sections is prioritized based on their paving needs. The sections are then used to plan and coordinate the work of the Maintenance, Bituminous, Traffic and Roadside Units within the section. By doing this, each unit is more productive and the work more cost effective.

The GIS Unit assisted the Division in converting the hand drawn sectional maps into digital, GIS compatible layers. The GIS Unit then merged the Division road treatment data with the Pavement Condition survey and road condition data. The merged data was then overlaid on the GIS digital road layer. This new digital road layer allowed Division personnel to select road segments by querying multiple road conditions in a single query. A GIS application was then created to allow simple querying of data by Division personnel.

This regional approach to performing the bituminous resurfacing reduces equipment mobilization and material handling. The Integrated Cooperative Planning Procedure developed by the GIS Unit, County Maintenance Engineers, Bituminous Supervisor and DDC Unit has greatly improved communication and coordination between all units involved.

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Project Description

A. Description of Project.

North Carolina has the second largest state maintained road system in the United States with more than 78,000 miles of roadway. NCDOT is divided into 11 main divisions with 14 local division offices under the Division of Highways located geographically throughout the state. North Carolina has 100 counties, so each local office is responsible for a number of counties. While each of the local offices reports to the Division of Highways, there is a fair amount of local discretion in how work is performed. The 14 local division offices are responsible for construction, maintenance, roadside environmental programs, traffic services and the fiscal and facility operations involved in administering these functions.

In Region 6, annual bituminous (asphalt) resurfacing was being performed on a countywide basis, which resulted in excessive equipment mobilization and material handling. It was difficult to coordinate the maintenance work functions that needed to be completed prior to resurfacing the roads. The County Maintenance Engineers were providing spreadsheets or **hand drawn maps** of the proposed annual roadway resurfacing projects which were developed by visually reviewing the pavement condition survey report. They had no means of querying the information. The roads were located throughout the county and often prioritized on a "worst first" basis. (Some roads are maintained by the local governments, and some roads are even privately owned and are maintained by the owners. This is quite often true in rural areas.) The Bituminous Supervisor then developed a spreadsheet of the resurfacing plan and provided **hand drawn maps** to the traffic services unit describing the roads to be resurfaced.

The County Maintenance Unit would make every effort to mobilize to the appropriate roads in order to complete preparatory work prior to the bituminous resurfacing. The disparate location of the roads also resulted in excessive mobilization and material handling for the Bituminous Unit while performing the resurfacing. As the paving was completed, the Traffic Services Unit was then provided hand drawn maps indicating the roads requiring new pavement markings. Roadside Environmental was also provided hand drawn maps indicating which roads needed to be seeded and mulched as a result of shoulder operations.

The process improvement implemented at Region 6 was based on two things:

- Improved communications between the managers
- Implementation of a GIS based system.

Details of the process improvement follow.

B. Significance to the Improvement of the Operation of Government.

Division of Highways, Division 6 wanted to develop a better way to plan, coordinate and improve the efficiency of the Division Bituminous Operations and improve coordination with other units. The County Maintenance Engineers and the Bituminous Supervisor determined that each county's annual resurfacing could be completed regionally. The counties were divided into sections and each year the paving in these sections is prioritized based on their paving needs. The sections are then used to plan and coordinate the work of the Maintenance, Bituminous, Traffic and Roadside Units within the section. By doing this, each unit is more productive and the work more cost effective.

The GIS Unit assisted the Division in converting the hand drawn sectional maps into digital, GIS compatible layers. The GIS Unit then merged the Division road treatment data with the Pavement Condition survey and road condition data. The merged data was then overlaid on the GIS digital road layer. This new digital road layer allowed Division personnel to select road segments by querying multiple road conditions in a single query. A GIS application was then created to allow simple querying of data by Division personnel. This application also facilitates a centralized means to ensure that all relevant data (input and output) is identical for clear communication between the GIS Unit, Division managers, and field crews. Development of this process required communication and cooperation between the County Maintenance Engineers, Bituminous Supervisor, the GIS Unit and the DDC Unit.

C. Benefits Realized by Service Recipients, Taxpayers, Agency or State.

Following the process improvement, the annual Division Bituminous (asphalt) Resurfacing is being performed on a regional basis within sections of the counties. The County Maintenance Engineer and the Road Maintenance Supervisors determine a priority of the section based on paving needs. The Bituminous Supervisor uses the digital maps and the querying tool developed by the GIS Unit to produce an automatically generated spreadsheet and maps to be provided to the County Maintenance Engineers and Road Maintenance Supervisors for review. This spreadsheet is used as a proposed annual bituminous paving plan. The querying tool allows the Bituminous Supervisor and the County Maintenance Engineers to instantly review the roads within a particular section using pavement condition, Average Daily Traffic, road widths, and pavement history as selection criteria. This ensures that all relevant data (input and output) is identical for clear communication between the GIS Unit, Division managers and field crews.

Following review of the proposed plan the County Maintenance Engineer, Road Maintenance Supervisor and the Bituminous Supervisor ride the roads and make revisions as necessary to the proposed paving plan. Determination of maintenance work to be completed prior to resurfacing is noted on the plan such as shoulder maintenance, crossline replacement, patching etc. The completed annual bituminous resurfacing plan generated by this process, including maps, is then distributed to all units. This allows each unit to schedule their work in the proper sequence in order to avoid conflict with work performed by other units. This regional approach to performing the bituminous resurfacing reduces equipment mobilization and material handling. The Integrated Cooperative Planning Procedure developed by the GIS Unit, County Maintenance Engineers, Bituminous Supervisor and DDC Unit has greatly improved communication and coordination between all units involved.

D. Return on Investment

The assistance to Division 6 yielded two important benefits. The most important is the establishment of two-way communications between the IT/GIS Unit and the customer (Division 6). In years past there have been many new process changes throughout the NCDOT. In many cases these changes have come from the top down. New processes tended to look at the overall benefits to similar customers; which in turn only solved similar requirements. This project used ideas from the customer (DOT field employees) to help improve their individual requirements. Meetings were arranged where GIS personnel directly witnessed fieldwork. This interaction provided a direct understanding of how the customer performed everyday duties and provided insight in how a new process could be created or improved. Division 6 personnel took training courses on the use of GIS software. The training allowed them the knowledge to request specific application development to meet their individual needs. As a by-product, the customer has stated that communication has also improved.

The second benefit is the return on investment. The GIS application drastically improved the planning abilities of Division 6 for the treating and paving of road systems. Planning for specific roadwork requires knowledge of current road conditions and characteristics. In the past it would take many days to identify and organize this data. The use of the GIS application allows the customer to receive the information in minutes. The GIS application also allows the customer to plan overall work schedules through out the Division counties. Supplies (road material, trucks, personnel, etc.) are now geographically scheduled for specific road projects. This allows the resources for each road project to move in the most cost-effective and time saving manner.

In the past, all the personnel and supplies would jump from one part of the county to the next to complete various road projects. Today Division 6 has saved hundreds of thousands of dollars using this new system. As of May 2006,

Division 6 was second in the state in completion of all road projects. The number one division has twice the personnel and 70% more equipment. The road projects are nearly the same.

The Integrated Cooperative Planning Project was the recipient of an internal award within DOT for Continuous Process Improvement for 2006.