



U.S. Department  
of Transportation

Federal Highway  
Administration

## 1984 Biennial Awards

### Excellence In Highway Design

**Category VI**  
**Historic Preservation and**  
**Cultural Enhancement**  
(Cultural, Historical, Natural, and  
Archeological Sites)

**Specific Criteria:**

- Preserving historical or archeological sites
- Restoration
- Enhancement efforts

#### **Judged Superior**

##### **Delaware Department of Transportation**

Following preliminary work in actual examination of land forms in the area of Route 13, LANDSAT satellite data were used *effectively* to predict locations of potential archeological resources.

# Entry Form

## 1984 Biennial Awards

Tape this page or copy to back of each photograph and send to:

U.S. Department of Transportation  
Federal Highway Administration Division Office  
(see back of this form)

### Excellence In Highway Design

Entries must be postmarked by May 31, 1984.

1. PLEASE TYPE. Describe the project in a problem-solution format or present the most significant achievement of the project. Particularly address one or more of the general criteria. (150-200 typewritten words, single spaced, clearly expressed in NONTECHNICAL language and easily understood by any lay person).

The University of Delaware Center for Archaeological Research, under contract with the Delaware Department of Transportation, Division of Highways, Location and Environmental Studies Office, developed methods for making quantified predictions of likely locations for prehistoric archaeological sites within Delaware's proposed Route 13 Relief Route Corridor. Predictions were developed by using synoptic analysis of LANDSAT satellite data. Locations known to contain archaeological sites were analyzed to see if special environmental factors (distance to surface water, interfaces of well-drained and poorly-drained soils, presence/absence of marshes etc.) could be correlated with site locations. Correlations were developed using a statistics package called logistical regression. Similar analyses were carried out for areas known not to contain archaeological sites as well. Environmental data were mapped using LANDSAT satellite data processed with an ERDAS interactive image analysis computer system. The ERDAS computer was then used to analyze areas with no archaeological survey data. Application of the logistical regression to unknown areas using the ERDAS/LANDSAT environmental data base compared the environmental settings of unsurveyed areas to those of surveyed areas and generated an estimate of the probability of finding a prehistoric site in the unsurveyed area based on the similarity of the environments to known site areas. Tests of predictions showed a 92% accuracy. Areas with high site probability values were mapped and used to delineate "sensitive" areas for assistance with highway alignment selection purposes.

2. Category Number and Title VI Historic Preservation and Cultural Enhancement
3. Number of Photographs in This Entry Three  
(2 or 3 glossy photographs, unmounted, 11 x 14-inches, color, in duplicate)  
Photo #1 I.D. No. DE 1 Photo #2 I.D. No. DE 2 Photo #3 I.D. No. DE 3
4. Name of Person Submitting This Entry and Knowledgeable Regarding Questions Concerning Entry  
Kevin W. Cunningham, DeLDOT Archaeologist  
Address Department of Transportation, Division of Highways, P.O. Box 778  
Dover, Delaware Zip 19903 Tel. No. 302-736-3243  
(Area Code)
5. Name of Organization to Receive Award Delaware Department of Transportation, Division of Highways  
Address P.O. Box 778 Dover, Delaware  
Zip 19903 Tel. No. 302-736-4642  
(Area Code)  
Name of Senior Representative to Notify Joseph T. Wutka, Jr., Location & Environmental Engineer  
Address Delaware Department of Transportation, Division of Highways, P. O. Box 778  
Dover, Delaware Zip 19903 Tel. No. 302-736-4642  
(Area Code)
6. Project Owner Delaware Department of Transportation, Division of Highways  
Address P.O. Box 778, Dover, Delaware  
Zip 19903 Tel. No. 302-736-4642  
(Area Code)
7. Agencies or Firms Responsible for Design, if Other Than Owner  
Name Jay F. Custer, Director Center for Archaeological Research, University of Delaware  
Address Orchard Street, Newark, Delaware  
Zip 19716 Tel. No. 302-451-2821  
(Area Code)
8. Project Location Information Route No. U.S. Rt. 13 Date Project Completed January 1984

**CULTURAL RESOURCE PLANNING STUDIES FOR THE  
ROUTE 13 RELIEF ROUTE**

**NEW CASTLE AND KENT COUNTIES, DELAWARE**

**Project Description:**

The Delaware Department of Transportation and the Federal Highway Administration are planning the construction of a limited access alternative to Route 13, the major north-south highway in Delaware. The proposed project area crosses the major drainages of the northern half of Delaware in numerous areas where large archaeological sites and historic standing structures are known to be present, and predicted to be present.

**Problem**

Working from known archaeological sites and their distributions, it was clear from the start of the project that the highway corridor would be likely to adversely affect numerous prehistoric and historic archaeological sites and historic standing structures eligible for listing on the National Register of Historic Places. The original study area for the project was a corridor 40 miles long and 7 miles wide within which 8 potential alignments were proposed. The problem was to come up with a way of minimizing the impact on the known and expected cultural resources. An interesting aspect of the problem was how to devise a way to accurately predict the location of potential prehistoric archaeological site locations.

**Solution:**

The Delaware Department of Transportation (DelDOT) contracted with the University of Delaware Center for Archaeological Research (UDCAR) to develop a data base on all

known cultural resources in the project area including standing structures, historic archaeological sites, and prehistoric archaeological sites. Additionally, UDCAR applied a series of predictive models developed to predict prehistoric archaeological site locations using satellite data from **LANDSAT**. A series of sensitivity maps were developed and these maps noted areas where cultural resources were likely to be impacted. DelDOT then funded additional field survey, focused on the sensitive areas, to develop more specific data on site locations for use in selecting the final right-of-way. The additional survey was also used as a test of the **LANDSAT**-generated predictive models and the test showed them to be 90% accurate in locating prehistoric archeological sites.

The specific site location data and inventories of sites have been used to select the final two alignments and impacts on numerous major prehistoric and historic archaeological site complexes were avoided. Direct impacts on historic standing structures was reduced to less than 10 structures in both alignments combined. The survey work also produced new site location data on archaeological sites from the 6500 - 3000 B.C. time period, which was relatively unknown archaeologically prior to this project. The project thus produced both useful planning information and useful archaeological data and is a firm basis for later alignment-specific survey and data recovery.

**Organizations Responsible:**

Delaware Department of Transportation

Kevin W. Cunningham,  
Joseph Wutka

University of Delaware Center for  
Archaeological Research

Jay F. Custer  
David C. Bachman

# NEWS RELEASE

Public Information Office  
(736-4313)

DEPARTMENT OF TRANSPORTATION  
P. O. Box 778      Dover, Delaware 19901

84-111

5/29/84

The Delaware Department of Transportation (DelDOT) is currently involved in a two year planning study to determine how to best relieve traffic congestion on overburdened U.S. 13, Delaware's major north-south artery. One proposal under study is the construction of a limited access highway involving approximately 40 miles of new alignment. The University of Delaware Center for Archaeological Research, was hired by DelDOT to conduct a cultural resources planning study, identifying zones within the proposed project area that were likely to contain significant archaeological resources.

Predictions of likely archaeological zones were obtained through the use of LANDSAT satellite data, processed with an ERDAS interactive image analysis computer system. This state of the art technology permitted archaeologists to determine if environmental factors, such as proximity to water, in known archaeological sites could be correlated with site locations.

Environmental data was mapped by the LANDSAT satellite and processed by the ERDAS computer. The computer was then used to analyze areas lacking archaeological survey data. The probability of finding a prehistoric site in an unsurveyed area was generated by comparing the environmental characteristics of surveyed areas with those of unsurveyed areas. Tests of these predictions have shown an accuracy rating of 92%.

More-----

The Center for Archaeological Research prepared maps detailing areas with high, medium, and low probability of archaeological value. In addition, significant historic houses were noted and mapped. DelDOT will utilize this data to consider archaeologically sensitive areas when planning for the new "Relief Route" alignment.

-end-

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5/29/84