

BEST PRACTICES FOR ESTABLISHING AND MAINTAINING STATEWIDE CULTURAL RESOURCES GIS DATABASES

Requested by:

American Association of State Highway
and Transportation Officials (AASHTO)

Standing Committee on the Environment

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Table of Contents

Section	Page
1.0 Introduction.....	1
2.0 CRGIS Background and Approach to the Study	2
3.0 Methodology	4
3.1 Summary of Internet Review of State DOT Websites.....	4
3.2 Development of Questionnaire Sent to State DOTs with CRGIS	10
4.0 Results of the Questionnaire	14
4.1 CRGIS Database Development.....	14
4.2 Database Design.....	16
4.3 Database Access.....	18
4.4 Implementation of the CRGIS	19
4.5 Future Plans for the CRGIS	20
5.0 Development of Best Practices	21
5.1 CRGIS Database Development.....	21
5.2 CRGIS Database Design.....	22
5.3 Database Access.....	24
5.4 Implementation of the CRGIS	24
6.0 Summary and Conclusions	24
7.0 References.....	26
8.0 Acknowledgments and Contributors.....	26
Appendix A: Sample Agreement between a SHPO and DOT for Development and Maintenance of a Cultural Resource GIS.....	A-1
Appendix B: Responses to Detailed Questionnaire Received from State DOTs with CRGIS	B-1
Appendix C: Sample Metadata for Hypothetical CRGIS.....	C-1



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Best Practices for Establishing and Maintaining Statewide Cultural Resource GIS Databases for Use by State DOTs

1.0 Introduction

State Departments of Transportation (DOTs) conduct a multitude of roadway improvement projects spanning thousands of miles on an annual basis. During the design and implementation of these transportation improvement projects, all state DOTs review the potential effect of the project to historic properties for compliance with Section 4(f) of the *Department of Transportation Act*, Section 106 of the *National Historic Preservation Act* and the *National Environmental Policy Act* of 1969 (NEPA). Since transportation projects can impact long linear segments of a landscape due to the length of transportation corridors, state DOTs should have access to spatially-located cultural resource data in the form of a cultural resource Geographic Information System (CRGIS) database in order to accurately and efficiently assess the potential of a transportation project's effect on historic properties. Transportation improvement projects can cover vast areas of space, from simple intersection improvements to state-wide planning studies, and are an ideal candidate to be properly studied through the use of a CRGIS. GIS technology makes it possible to create cultural resource data layers that can be spatially and analytically compared to and overlaid with information on a variety of environmental and transportation-related data. In addition, state DOT planners and historic preservation specialists can factor in historic property information during planning and early project development directly from their desktop computers, when such a GIS is in place.

The theoretical use of GIS for cultural resources has wide applicability; the practical implementation of GIS for cultural resources has demonstrated a varying range of success from state to state. Methods for establishing the data structure for GIS databases can vary between state DOTs depending upon the geographic and cultural focus of the state. For example, prehistoric settlement patterns vary greatly between the Rocky Mountains and the eastern seaboard's coastal plain. Different attributes will be selected for the CRGIS depending upon the state's archaeological record. Similarly, within a state, the data structure chosen for a CRGIS may use different attributes given which state agency is creating the database. State Historic Preservation Offices (SHPOs) may be more interested in documenting all potential historic properties while state museums tend to focus their efforts on archaeological collections housed in their museums. In order to look beyond this interstate and intrastate variation, a nationwide study of CRGIS from state to state could create a compendium report that would synthesize the actual application of GIS within the state DOTs as well as relating personal experiences and opinions on the currently used CRGIS in those states.

The objective of this research effort was to inventory the range of CRGIS already established by state DOTs by identifying and reporting on the best practices implemented among the state DOTs that have developed CRGIS databases for transportation planning and environmental compliance. The results of the research are summarized in the following report and have formed the basis to develop guidance and best practices for other state DOTs that either: 1) are contemplating the development of a CRGIS; 2) have begun to develop a CRGIS; or 3) are



considering updating and enhancing an existing GIS to include cultural resources. Included with the report is the data structure for a hypothetical CRGIS using the variables and attributes already employed by various state DOTs.

For the purposes of this report, the term “cultural resource” is used interchangeably with “historic property,” as defined by 36 CFR § 880.16(l):

Historic property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria.

The theoretical database supplied in this report contains both point and polygon data as historic properties can include such examples as historic highways and railways, which would be coded as polygons while singular point data would represent the spatial location of archaeological sites or historic structures. Further discussion of the nature of the sample database is provided below.

2.0 CRGIS Background and Approach to the Study

Providing state DOTs access to CRGIS can streamline the historic preservation/environmental compliance process and allow for faster implementation of roadway improvements rather than suffering delays during the planning/environmental review process. By reviewing the CRGIS, historic property information can be spatially and analytically compared to and overlaid with a variety of environmental and transportation-related data. State DOT planners and historic preservation specialists can factor in cultural resource information during planning and early project development and avoid delays or costly mitigation efforts to critical projects.

When using a CRGIS database, the state DOT can:

1. identify cultural resources that are also Section 4(f) properties, during transportation planning and early project development;
2. design projects that avoid significant cultural resources that otherwise would require expensive and time consuming mitigation prior to construction;
3. identify, budget and schedule the level of effort needed to conduct cultural resources investigations at the beginning of the project development process, resulting in predictability in project costs and scheduling; and
4. identify the need for cultural resource mitigation during transportation planning or early in the project development process.

Prior to this study, two research programs conducted for NCHRP have addressed CRGIS use and development in their research design. The first of these studies, NCHRP 25-25, Task 49, “Effective Practices for Considering Historic Preservation in Transportation Planning and Early Project Development” has identified multiple state DOTs that have, or are developing, cultural

resource GIS databases. This study found that 15 state DOTs¹ have access to a CRGIS that is available for use in early project planning and early project development.

The second study, NCHRP 25-25, Task 48, “Compendium of Environmental Fieldwork Technologies” has also identified the existence of multiple state DOT GIS databases that are operational or are in the process of being created or updated. While cultural resource GIS databases are not the specific focus of environmental fieldwork techniques, one of the questions presented to the interviewed state DOTs asks about the types of GIS data available and how the GIS data are utilized for cultural resources. Of the nine state DOTs that responded to the questionnaire for the Task 48 study, eight² of the state DOTs indicated that they have access to a CRGIS for early project planning and early project development.

In addition to the two NCHRP research efforts, the “National Historic Property-Inventory Initiative (NHPII) Survey Project,” an investigation co-funded by the National Park Service and the National Conference of State Historic Preservation Officers (NCSHPO), has conducted a nationwide inventory of historic property data collection and management systems, including GIS, used by State Historic Preservation Offices, Tribal Historic Preservation Offices and Federal Preservation Offices. This study identified numerous SHPOs across the country that are currently using or are developing a CRGIS, but did not discuss the relationship of the CRGIS to the state DOTs.

The results of the three studies provide a starting point to ascertain which states currently possess a CRGIS and to determine if the state DOT was involved with the development of the CRGIS. The following research steps have been conducted for the current Task 61 research project:

1. Conducted a search of state DOT web sites and contacted appropriate staff to identify those states that have developed cultural resource GIS databases
2. Conducted follow-up interviews with the state DOTs that have GIS databases to document, at a minimum: (a) the content of the databases; (b) how the databases were initiated, developed and are maintained; (c) the process for updating and adding new information to the databases, including quality control procedures; (d) important functions, features and operational elements of the database; (e) reliability and user-friendliness of the database; (f) data standards employed; and (g) how databases are made available to, and/or information is shared with other users, including linkages between state DOT and SHPO databases. This task was accomplished by developing a questionnaire and submitting it to all state DOTs that have exhibited evidence of a CRGIS.
3. Summarized the results of the questionnaire to identify a synthesis of common database practices and differences, as well as the types and variety of GIS data standards employed and the driving factors for those standards.

¹ The fifteen states identified with using a CRGIS are Arizona, California, Florida, Georgia, Illinois, Indiana, Kansas, Minnesota, North Carolina, Ohio, Oregon, Texas, Vermont, Virginia and Washington.

² The eight state DOTs responding that their state possessed a CRGIS included California, Delaware, Georgia, Illinois, Indiana, Missouri, Oregon and Washington.



4. Based upon the research and interview results and subsequent synthesis, effective best practices have been developed and recommendations have also been made for developing and maintaining statewide CRGIS for use by state DOTs. Included within the best practices are the sample database structures for a theoretical CRGIS.

The methods for conducting Task 61 are presented in Section 3 below while the results of the study are presented in Section 4.

3.0 Methodology

The methods employed to conduct the research for Task 61 are presented below, broken down by the steps taken to research state DOT websites for information on CRGIS, preparing the questions for the questionnaire presented to the state DOTs and selecting the appropriate state DOTs to answer the CRGIS questionnaire.

3.1 Summary of Internet Review of State DOT Websites

Websites for all 50 state DOTs, the District of Columbia and the U.S. territories were reviewed for evidence of a CRGIS developed by the DOT and/or used by the DOT for early project planning and development. From the results of NCHRP 25-25, Tasks 48 and 49, it was known that several state DOTs have in place a CRGIS or were using a CRGIS developed by another state agency. For this research project, all DOT websites were reviewed for evidence of a CRGIS by querying their website for the following key phrases: “GIS,” “cultural resource,” “predictive model,” “ArcView™,” “ESRI®,” or similar phrases. For the District of Columbia and the U.S. territories, no evidence of CRGIS information could be located on their respective websites. The results of the website review are therefore focused on the 50 state DOTs.

From this review of state DOT websites, it was determined that 14 state DOTs have developed and are using cultural resource GIS databases either as a means of storing data and/or applying the database to early planning for DOT projects intended to minimize or eliminate the potential to harm cultural resources. No evidence of a DOT-developed CRGIS could be identified on the websites of 36 state DOTs or by reviewing previously completed studies that investigated the use of GIS for cultural resources.

The results of the Internet research identified state DOTs that had developed statewide cultural resource GIS databases (CRGIS) and those state DOTs that showed no evidence of a CRGIS. However, the division between those DOTs that have a CRGIS and those that do not was not totally clear cut, as there were several state DOTs that were in the early stages of developing the CRGIS while there were also states where the State Historic Preservation Office (SHPO) had taken the lead to develop the CRGIS but the DOT was the funding source. Therefore, to better outline how certain state DOTs were selected for interviews as DOTs with or without a DOT CRGIS, the following criteria were used:

With DOT CRGIS (14 state DOTs identified from Internet research and review of prior studies)

- If the state DOT has in place or is close to completing the development of a state-wide CRGIS that is used or will be used for early project planning and the DOT was solely



responsible for the development of the CRGIS, then this state was noted as having a CRGIS. This scenario makes such state DOTs ideal for this study's detailed questioning.

- Those state DOTs that worked with their SHPO to develop the CRGIS were also placed in this category as long as the DOT was an integral part of the development of the CRGIS
- Ideally, the CRGIS should cover both archaeological and historic architectural resources and extend across the entire state. However, some state DOTs have developed and used CRGIS that contain only archaeological resources or are confined to a few counties or a specific region of the state. These state DOTs were also included as having a CRGIS category due to their long-term experience with using a CRGIS.

Without DOT CRGIS (36 state DOTs identified from Internet research)

- No evidence of GIS for cultural resources on the state DOT website.
- There were some state DOTs that simply funded the development of the CRGIS and had little to no involvement with the structure of the CRGIS. These state DOTs would fall into the "no DOT CRGIS" category as this study is focused on the state DOT development and use of CRGIS. Such state DOTs are designated as being without a DOT CRGIS.

Using these criteria, the ideal state DOT to question for this study:

1. would have been involved with the initial development and implementation over several years of a CRGIS that included both archaeological and historic architectural resources
2. would have covered the entire state; and
3. the CRGIS has been used for early project planning to avoid (or minimize) impacts to cultural resources.

On the other hand, some state DOTs possessed a CRGIS that they had developed as the funding agency to the SHPO, but had little input to the overall design of the CRGIS. These state DOTs were designated as being without a DOT CRGIS (technically, these states have a CRGIS, but it is not a DOT-derived CRGIS) even though they may currently use the CRGIS.

The selection of states with and without a DOT CRGIS was designed to identify state DOTs that have experience developing and using CRGIS, not just using a CRGIS. GIS is simply a tool that allows one to handle large datasets of spatial data and is ideal for cultural resource information on a state-wide scale. With a little training or course-work, anyone can use a GIS. It is commendable that there are as many state DOTs using CRGIS in the 21st century as there are; unfortunately, there are still many state DOTs that do not have access to CRGIS.

The application of GIS to cultural resources is the first step in establishing the use of CRGIS across the country. But for the purposes of determining the best practices for establishing and maintaining CRGIS, it is imperative to study those state DOTs that are not only using their CRGIS, but understand the most informative variables for the database and how to structure it so as to extract the maximal information from the CRGIS. Those state DOTs that developed their own CRGIS or lead the effort while working in conjunction with their SHPO have to understand the structure of their CRGIS and why certain variables were selected for their CRGIS. On the

other hand, those state DOTs that are using a previously developed CRGIS will not have the first-hand knowledge of the development of the CRGIS. This is not to say that state DOTs who have used CRGIS for many years but did not develop the CRGIS cannot contribute to the best practices, as their use and application of the CRGIS will likely have encountered many problems with the CRGIS that can be avoided by other DOTs using their own CRGIS. These states would have received the set of detailed questions, but would have been excluded from the DOTs selected for detailed analysis of their CRGIS to determine the best practices for establishing and maintaining CRGIS across the country.

For the purposes of this study, and since there were many state DOTs using CRGIS that they had developed, the criteria developed for selecting states for detailed questioning (to be discussed further below) were as follows:

- 1) the state DOT had to have developed its own CRGIS and had to have used it for many years;
- 2) the CRGIS provides state-wide coverage;
- 3) the CRGIS incorporates both below and above-ground cultural resources; and
- 4) the CRGIS has been used in early project planning.

With these selection criteria outlined, all 50 state DOTs were divided into two categories: DOTs with CRGIS and DOTs without CRGIS. One of two emails were sent to each of the state DOTs in December 2009, depending on whether or not the particular state DOT had been identified as having a CRGIS, based on the initial web search.

State DOTs initially identified as not having a CRGIS (36 state DOTs)

The review of each state DOT's website found that for the majority of the state DOTs, no evidence of a CRGIS could be easily located on the website. Most state DOTs are currently using GIS for other applications, but this review of both the state DOT websites and previously conducted studies³ found no evidence that these state DOTs had developed or are developing a CRGIS. Those DOTs initially identified as not having a CRGIS received the email below. However, the example provided is specific to Alabama DOT as each email was tailored to each state DOT to reflect the information gathered from the initial Internet review of the state DOT websites. Therefore, each state DOT would have received an email similar to the email shown below and the section that referenced specific information about any evidence of a CRGIS would be appropriately updated for the specific state DOT.

In December 2009, the 36 state DOTs for which evidence of a CRGIS could not be found were sent an email to verify that their state DOT does not, in fact, have a CRGIS in place or in development, or if it does, to determine if the state DOT would like to participate in this study and contribute any additional information to the study. The 36 state DOTs that received this email to determine if they actually do possess a CRGIS and would be willing to participate further included the following:

³ NCHRP 25-25, Tasks 49 and 48, the *National Historic Property-Inventory Initiative (NHPII) Survey Project* and the *National Conference of State Historic Preservation Officers, Square Table Discussion, Data Management in SHPO's: Organized by Wyoming SHPO*.



- Alabama
- Alaska
- Arizona
- Arkansas
- Colorado
- Connecticut
- Delaware
- Hawaii
- Idaho
- Iowa
- Kentucky
- Maine
- Maryland
- Massachusetts
- Michigan
- Mississippi
- Missouri
- Montana
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New York
- North Dakota
- Oklahoma
- Oregon
- Rhode Island
- South Carolina
- South Dakota
- Tennessee
- Utah
- Vermont
- Virginia
- West Virginia
- Wisconsin
- Wyoming

Email to state DOTs without DOT CRGIS:

The Louis Berger Group, Inc. is conducting a study for the National Cooperative Highway Research Program (NCHRP) that is focused on determining Best Practices for Establishing and Maintaining Statewide Cultural Resource GIS Databases for Use by State DOTs." This research project is part of the AASHTO Standing Committee on the Environment's research program 25-25 designed to secure flexible, ongoing, quick-response research on environmental issues in transportation. For further information on NCHRP 25-25, see the following link:

<http://144.171.11.40/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=761>.

I am currently leading the research effort for Task 61, which focuses on the use/development of cultural resource GIS databases by state DOTs for transportation planning and environmental compliance. Currently, we are canvassing all state DOTs to determine which state DOTs have a state-wide Cultural Resource GIS database in place and are using it for project planning. Based upon our Internet research, your state DOT was not found to possess a state-wide cultural resource GIS.

In order to ensure the most accurate information, we present the following questions:

1. Does your state DOT have in use or in development a statewide cultural resource GIS database that is used for early project planning?
 - a. If no – does the DOT intend to develop such a GIS database?
 - b. If yes, would the DOT be interested in being a part of a study that looks at the use of cultural resource GIS databases by state DOTs?
2. To the best of your knowledge, does your state SHPO have in use or in development a statewide cultural resource GIS database?
 - a. If yes, is/was the DOT involved with the development of the GIS database?
 - i. If no, then no further questions.
 - ii. If yes, then would the DOT be interested in being a part of a study that looks at the use of cultural resource GIS databases by state DOTs?

We noted that your state maintains a statewide archaeological database (the ASSF), but we could not find any information on a statewide architectural and archaeological database maintained by the DOT.

If you could provide a response to these questions within the next week, I would be most appreciative. If you indicate that you would like to participate in additional questioning, I will contact you immediately with a list of 15 specific questions that address the development and use of the statewide Cultural Resource GIS database.

Thank you for your time and I look forward to your response.

Based upon the results of these initial emails to state DOTs where it was initially believed that they lacked a CRGIS, it was found that some state DOTs were in fact using CRGIS. Of the initial 36 state DOTs contacted in this regard, a total of 11 indicated that they themselves possessed a statewide CRGIS or that they were involved with their SHPO in the development of the statewide CRGIS. These states are:

- Colorado
- Maine
- Michigan
- Missouri
- Rhode Island
- Wyoming
- Kentucky
- Maryland
- Mississippi
- Oregon
- Utah

Of these 11 state DOTs, Maine, Mississippi, Missouri, Michigan, Oregon, Utah and Wyoming indicated that they have developed (or are developing) the statewide CRGIS in conjunction with their SHPO and Kentucky stated that the SHPO developed the database. The remaining three state DOTs (Colorado, Maryland and Rhode Island) have themselves developed the CRGIS or are in the process of developing the CRGIS; of these, Rhode Island opted out of further participation in the study. In order to ensure a representative sample of state DOTs across the country, the remaining 10 DOTs (excluding Rhode Island) were added to the list of state DOTs to receive the detailed questions regarding the development and implementation of the CRGIS.



From the 36 initial emails sent to the state DOTs that had been initially believed to not have a CRGIS, 26 state DOTs responded to the email inquiry (72%). Of these 26 state DOTs that responded, 15 responded to say that they did not have in place a CRGIS while the remaining 11 state DOTs indicated (as mentioned above) that they did in fact have a CRGIS. No response was received from 10 of the state DOTs that were part of the 36 state DOTs receiving the initial email requesting verification that they do not have a CRGIS. Follow-up emails were sent to these 10 non-responsive state DOTs to request their answers to the two questions, but no further response was received from them.

State DOTs initially identified as having a CRGIS (14 state DOTs)

As mentioned above, following the results of the initial Internet study of state DOTs, the remaining 14 state DOTs were identified as possessing a CRGIS that they had developed themselves or had developed in conjunction with their SHPO. These 14 state DOTs include:

- California
- Florida
- Georgia
- Illinois
- Indiana
- Kansas
- Louisiana
- Minnesota
- New Mexico
- North Carolina
- Ohio
- Pennsylvania
- Texas
- Washington

These state DOTs were sent the email to the right indicating the nature of this study and soliciting their participation by answering a series of questions which were attached to the email. The example shown below is specific to Georgia DOT's development of a CRGIS in conjunction with the Georgia SHPO, but similar descriptions specific to the state DOT were included in the initial email to each state DOT with having evidence of a CRGIS.

Summarizing the results of the Internet research and responses to the initial email inquiries, we find that 23 state DOTs confirmed that they have a CRGIS; two additional state DOTs believed to have a CRGIS could not be confirmed. However, four of the 23 states confirming their use of a CRGIS (Indiana, Louisiana, New Mexico and Texas) were determined to have had little or no involvement in the development of their CRGIS and were removed from the list of state DOTs with a CRGIS, reducing the total for purposes of this study to 19 states. Of the other 25 state DOTs, 15 responded to say that they do not possess a CRGIS while no response was received from the remaining 10 state DOTs without a CRGIS. Including Indiana, Louisiana, New Mexico and Texas with the 15 states that responded that they do not have a

Email to state DOTs with CRGIS:

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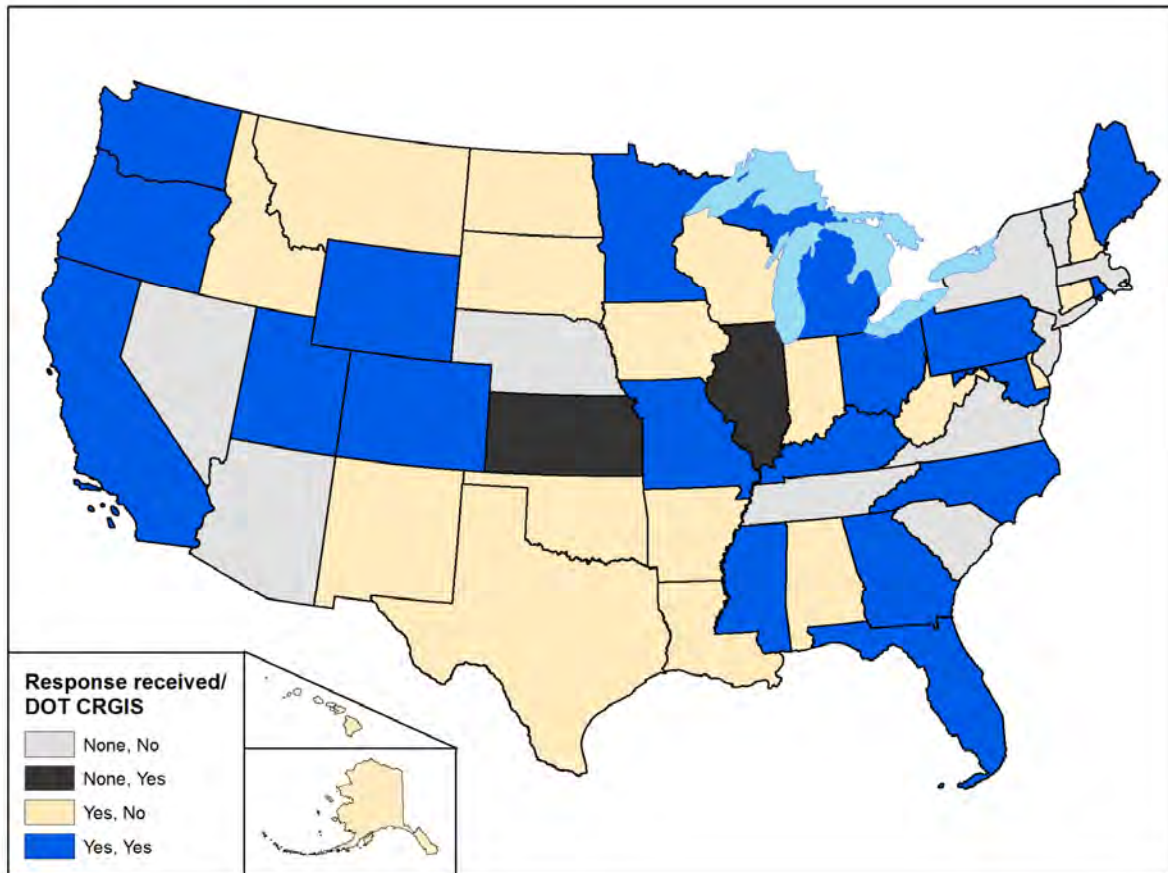
We would like to include your state as one of the states for detailed analysis of your state-wide Cultural Resource GIS. In order to ensure the most accurate information, I have attached a series of questions regarding the planning, development and implementation of your CR GIS database.

If your DOT is amenable to being part of this study, could these questions be answered by yourself or someone with firsthand knowledge of your state DOT's CR GIS database? If you could provide a response to these questions within the next week, I would be most appreciative.

Thank you for your time and I look forward to your response.



CRGIS increases the total of state DOTs without a CRGIS to 19. Further discussion is provided in the following section.



In summary, the DOTs with or without a CRGIS are as follows:

		CRGIS Confirmed	
		No	Yes
Response received	No	Arizona Massachusetts Nebraska Nevada New Jersey New York South Carolina Tennessee Vermont Virginia (n = 10)	Illinois Kansas (n=2)
	Yes	Alabama Alaska Arkansas Connecticut Delaware Hawaii Idaho Indiana Iowa Louisiana Montana New Hampshire New Mexico North Dakota Oklahoma South Dakota Texas West Virginia Wisconsin (n = 19)	California Colorado Florida Georgia Kentucky Maine Maryland Michigan Minnesota Mississippi Missouri North Carolina Ohio Oregon Pennsylvania Rhode Island Utah Washington Wyoming (n = 19)

3.2 Development of Questionnaire Sent to State DOTs with CRGIS

From the responses received to the initial emails, a total of 25 state DOTs were identified that have been determined to possess a CRGIS. Of these 25 state DOTs, one state opted out of further questions for the study. A series of questions were then sent to the 24 state DOTs. The questions sent to each state DOT were the same for each state DOT; the only difference was that a watermark of the state's name was inserted behind the text for ease in compiling the answers to the questions. The set of questions emailed to all states with a CRGIS were as follows:

Questions sent to the 24 states identified as possessing a CRGIS

1. What GIS program is used for the database?
2. Where is the database located? On a DOT server or some other server? How secure is this server?
3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?
4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?
5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated
6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?
7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"
8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format?
9. How was the creation of the database funded?
 - a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data?
10. What geographic coordinate system was used for the database? What map units are used in the database?
11. What data standards are used for the database?
 - a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language).
12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?

- a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.
 - b. Does the database contain only cultural resource information or does it also include environmental variables?
 - c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?
13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.?
 14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources?
 15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded?

Responses to the inquiries were mixed; some DOTs were quick to respond and offered to complete the questionnaire quickly, some responses were received several weeks after the email was delivered while a few state DOTs were non-responsive. Overall, 17 state DOTs (71%) of the 24 state DOTs responded with information to use in this study. Seven state DOTs did not respond to the email request for participation in the study; follow-up emails were sent to these seven state DOTs and responses were never received.

Selection of State DOTs for Detailed Analysis and Determination of CRGIS Best Practices

Once the state DOT detailed questionnaires were reviewed, the following criteria were used to identify the state DOTs that possess a CRGIS to be analyzed for determining best practices for the development and use of CRGIS for other states:

- CRGIS developed by the state DOT or in conjunction with the SHPO or other state agency and the CRGIS has been in use for several years in order to ascertain any problems with the design of the database
- State-wide coverage
- Incorporates both below ground (archaeological) and above ground (historic architectural) resources
- Shows evidence of successfully being employed for early project planning.

Of the 24 state DOTs determined to have a statewide CRGIS, a few were found to be using a CRGIS that was not developed by the DOT. In most cases, the DOT funded the creation of the CRGIS and presently is a user of the CRGIS, but the DOT was not the developer and is not



responsible for the day to day ownership of the CRGIS. The following state DOTs were found to have aspects of a CRGIS, but they do not have a statewide CRGIS developed by the DOT: Indiana, Louisiana, New Mexico and Texas. Although each of these state DOTs has a CRGIS of some manner, they were excluded from further analysis for various reasons, as detailed below.

- *Indiana DOT* – The Indiana DOT Cultural Resources Section does not maintain a statewide CRGIS. The Indiana SHPO has a non-spatial database of archaeological sites called the Indiana State Historic Architectural and Archaeological Research Database (SHAARD). This database has site forms for the archaeological sites. The Indiana SHPO also maintains GIS shapefiles for archaeological sites and this is separate to SHAARD. Indiana DOT has recently initiated the process of placing Indiana DOT survey data into a GIS. It is the goal of the Indiana DOT to assemble these pieces, with the assistance of other state and federal agencies, into a statewide archaeological GIS. The GIS will not include historic architectural resources. The Indiana DOT, while recognizing that it is moving forward with the development of an archaeological GIS, does not possess a CRGIS and was dropped from further study.
- *Louisiana DOT* – Louisiana DOT has access to a statewide CRGIS and was the funding agency for the CRGIS through the FHWA. The Louisiana DOT funded the project to place the hard copies of cultural resource records from the Louisiana SHPO into a CRGIS. The CRGIS is housed at the Louisiana SHPO. The Louisiana DOT was not involved with the development of the CRGIS; instead, a consultant to Louisiana DOT developed the CRGIS. Although the Louisiana DOT was a driving force to get the documents in a CRGIS, they were not involved with the creation and implementation of the CRGIS. Although the state of Louisiana possesses a statewide CRGIS, this CRGIS was not directly developed by the Louisiana DOT and this state DOT was removed from further study. One useful piece of information from the Louisiana DOT was the agreement they drafted with the Louisiana SHPO when the CRGIS was created. This agreement states the responsibilities of the DOT and the SHPO as related to the development and upkeep of the CRGIS. This agreement can serve as a model when other state DOTs are creating a CRGIS in conjunction with a SHPO or other state agency. The agreement is included in Appendix A to this report.
- *New Mexico DOT* – The state of New Mexico possesses a CRGIS that is housed with the New Mexico Department of Cultural Affairs and is managed by the New Mexico SHPO. The New Mexico DOT uses the CRGIS, but it had no role in the creation or management of the CRGIS. Although the New Mexico DOT is using a CRGIS, its lack of participation in the development of the CRGIS necessitated removing New Mexico DOT from further consideration for this study.
- *Texas DOT* – The Texas statewide database is called the Texas Historic Sites Atlas and was developed and is maintained by the Texas Historical Commission (THC), which is the Texas SHPO. The Texas DOT did supervise the creation of the Texas Historic Sites Atlas and it was funded by the FHWA through the Texas DOT, but the Texas DOT was merely the source of funds to create the CRGIS. It was interesting to note that the Texas DOT respondent indicated that one of the primary reasons for creating the CRGIS was to

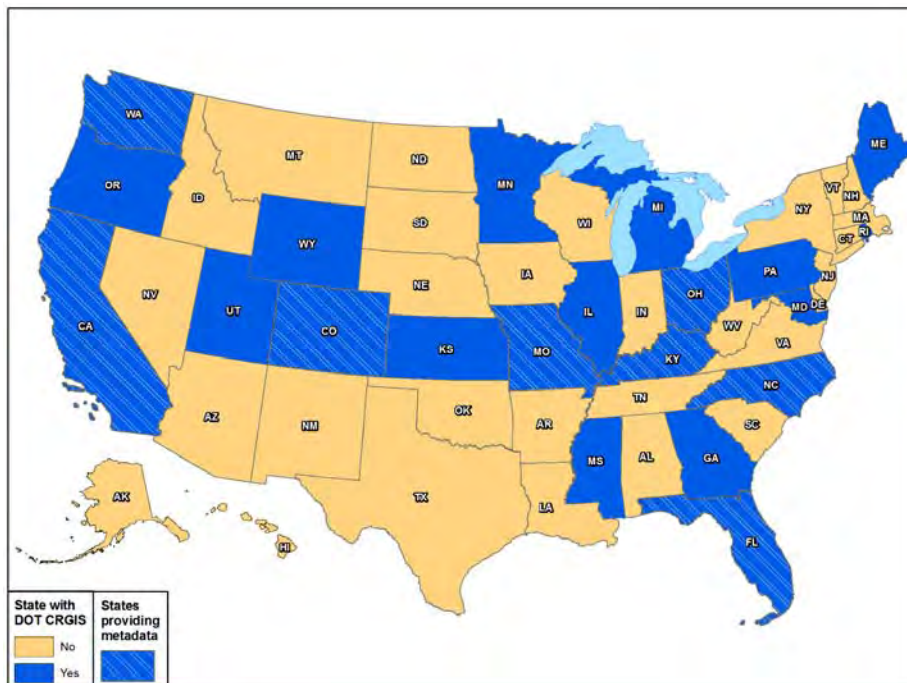
allow for on-line access to the SHPO information and eliminate unnecessary travel across Texas to the SHPO in Austin. Despite the presence of this CRGIS in Texas, the Texas DOT could not provide any information related to the development and maintenance of the CRGIS. Therefore, the Texas CRGIS was removed from further analysis for this study.

Of the 24 questionnaires sent to the state DOTs, 17 were received with answers (answers from all states are provided in Appendix B). The state DOTs providing responses to the questionnaire include California, Colorado, Florida, Georgia, Indiana, Kentucky, Louisiana, Minnesota, Missouri, New Mexico, North Carolina, Ohio, Pennsylvania, Texas, Utah, Washington and Wyoming. Although responses were received from Indiana, Louisiana, New Mexico and Texas, these four state DOTs were eliminated from further discussion for the reasons outlined above.

The last level of information requested from the state DOTs were samples of the metadata to their CRGIS. The U.S. Federal Geographic Data Committee (FGDC) defines “metadata” as:

a file of information which captures the basic characteristics of a data or information resource. It represents the who, what, when, where, why and how of the resource. Geospatial metadata are used to document geographic digital resources such as Geographic Information System (GIS) files, geospatial databases, and earth imagery. A geospatial metadata record includes core library catalog elements such as Title, Abstract, and Publication Data; geographic elements such as Geographic Extent and Projection Information; and database elements such as Attribute Label Definitions and Attribute Domain Values.
<http://www.fgdc.gov/metadata>

Of the 13 state DOTs that were involved with the development of their state CRGIS, eight state DOTs provided samples of their metadata. Following efforts to provide more time to state DOTs to respond to the survey in order to collect additional responses to the questionnaire and/or receive follow-up data from the state DOTs, a final deadline of April 23, 2010 was set to receive information to be included in the report. The deadline of April 23 was passed without any additional information received from the state DOTs.



The eight state DOTs that have been selected for the detailed analysis of their CRGIS include the following: **California, Colorado, Florida, Kentucky, Missouri, North Carolina, Ohio and Washington.** Although these eight state DOTs form the basis for the results of this study, the additional information provided by the nine state DOTs that answered the detailed questionnaire but were

eliminated from the final analysis⁴ are also used to provide a more robust understanding of the varying approaches taken to developing and using CRGIS by state DOTs.

4.0 Results of the Questionnaire

The 15 questions sent to the state DOTs that indicated they would be willing to participate in the survey were streamlined into five areas of discussion: 1.) CRGIS database development; 2.) database design; 3.) database access; 4.) implementation of the CRGIS; and 5.) future plans for the CRGIS. The summaries for each of these areas are presented below using primarily the results of the answers from the eight states providing all requested information supplemented by the nine states that answered the questionnaire but did not provide samples of their CRGIS metadata.

4.1 CRGIS Database Development

These questions focused on the development process leading to the creation of the CRGIS. Summaries for each question are presented separately below.

What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database? (Question #6)

The majority of the CRGIS databases were created by either the DOT themselves (17.6% - 3 out of 17), the SHPO (17.6% - 3 out of 17), the DOT and the SHPO jointly (35.3% - 6 out of 17) or the DOT in conjunction with the SHPO and other state/federal agencies or private institutions (29.4% or 5 out of 17). Other state or federal agencies that were involved with the development of the CR GIS included a local university who houses the database (University of Georgia's Information Technology Outreach Services for Georgia DOT's NAHRGIS - Natural, Archaeological, and Historic Resources GIS), the Office of State Archaeology (for Kentucky and North Carolina) and the Department of Conservation (Missouri).

For all of the surveyed states, none of the state DOTs created a position specifically for the development of the CRGIS. Not every state provided an indication of the time it took to create the database, but the average response (n=5) was 8.6 years from initial discussion of the database design to full implementation of the database.

What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project? (Question #7)

The most commonly cited answer⁵ for the catalyst that drove the development was for facilitating early project planning (53.3% or 8 of 15 responses received). Of the remaining responses, other motivating factors included:

⁴ The nine state DOTs with CRGIS and that answered the questionnaire but did not provide metadata for their CRGIS include Georgia, Indiana, Louisiana, Minnesota, New Mexico, Pennsylvania, Texas, Utah and Wyoming.

- developing a database that could be accessed across the state (20% or 3 of 15 responses, all in larger states – Florida, Pennsylvania and Texas),
- desired a GIS for archaeology
- transform an existing non-spatial database to a GIS database
- spurred by energy development projects

How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format? (Question #8)

For this question, the most frequently cited answer was that the CRGIS was created by taking the existing cultural resource data, if it was with the SHPO, DOT or office of state archaeology, and simply scanning in the information and digitizing the location of archaeological sites and historic structures (68.8% or 11 of 16 responses). The methods by which the scanning were accomplished varied by state as some databases were created by hiring graduate students to do the bulk of the digitizing or creating a position at the SHPO that was dedicated to the development of the GIS database.

The other approaches used to develop the GIS database included:

- Taking existing cultural resource databases and converting them to a GIS. This approach was employed by Georgia and North Carolina.
- Examining existing records and then using GPS to survey the known archaeological sites. However, this information would have been restricted to the information on file with the DOT and would cover only the areas under the interest of the DOT or restricted to transportation corridors. This was the approach employed by California.
- Converted existing Universal Transverse Mercator (UTM) coordinates to a GIS database, as employed by Minnesota.
- After discussing the development of the CRGIS with several state and federal agencies, Missouri hired a consultant to develop the GIS. This approach was completed in four years from initial discussion to full implementation of the CRGIS and was the fastest process to create a CRGIS.

Once the CRGIS was created, of the states providing information on ground-truthing, only 4 states indicated that portions of the CRGIS were ground-truthed to verify the accuracy of the database. Other states didn't answer the question (n= 8) or 4 states indicated that they didn't ground truth at first and are ground-truthing as they move forward with the use of the database.

How was the creation of the database funded?

- a. *How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data? (Question #9)*

⁵ Louisiana and Utah did not provide answers for this question. For the remainder of the questions, Louisiana is excluded as they did not provide further answers to the questionnaire.

The most commonly cited answer for funding of the database was that the funds came from a federal source (n=11 or 68.8%), either a Transportation Equity Act for the 21st Century (TEA-21) award (n=5), through the Federal Highway Administration (n=2) or that the DOT funded it with an unnamed federal source (n=2). Other sources for the funding included:

- Combination of DOT, Department of Conservation, FHWA, US Army Corps of Engineers and US Forest Services (Missouri)
- FHWA, USACE and DOT (Pennsylvania)
- National Parks Service (New Mexico)
- State funds only (Ohio)
- Department of Energy grant (Wyoming)

As for the future funding of the CRGIS, not every state provided a response to this question. The most commonly cited answer was that the SHPO would update the database on a moving-forward basis (n=8 or 50% of responses).

Only a portion of the responses addressed the future funding of the CRGIS. Georgia indicated that state funding would be used to update and maintain the CRGIS at the University of Georgia while Kentucky indicated that fees charged to access the database would be used to create temporary positions that would be part-time dedicated to update the database. Only Pennsylvania indicated that a DOT position has been created to maintain the database.

4.2 Database Design

The following section describes the answers to questions that addressed the design of the structure to the CRGIS:

What GIS program is used for the database? (Question #1)

By far the most common software program used for the CRGIS is a variant of ESRI[®] ArcView GIS, *i.e.*, either the standalone desktop ArcView 9.3.1, which is used to directly access the data by authorized users of the database, or via the internet using ArcSDE or ArcIMS. ArcSDE, now migrated to ArcServer in the latest version of ArcGIS, is the software that handles the data on the server while ArcIMS is the software that publishes the GIS data to the Internet. So, the responses that indicate ArcView is used for the CRGIS (n=13 or 81.3%) all show that the CRGIS is being used, updated and implemented with a variant of ESRI[®] technology. The other three responses that did not mention ArcView included two that are using GeoMedia (by Intergraph) and one that is using Mapguide, an internet based program allowing for the development of internet based applications using geospatial services on the internet. This technology is currently used by Georgia, but they will be switching to ArcGIS later this year.

What data standards are used for the database?

- a. *Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language) (Question #11)*



For data standards, it was not a surprise to find that of the states providing an answer to this question (n=13), the most common standards used for the CGRIS are either derived from the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata or they are using the FGDC standards (n=12 or 92.3%). The only standards that differed from the FGDC standards were used by North Carolina, where the ESRI CSDGM standards are used. Their reasoning for using these standards was that the ESRI profile provides information not addressed in the FGDC standard, such as an image of the database, or information beyond what FGDC standards contain.

What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?

- a. *What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.*
- b. *Does the database contain only cultural resource information or does it also include environmental variables?*
- c. *What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units? (Question #12)*

By their definition, the CRGIS databases all contain vector data. Some CRGIS databases also contained raster data, such as scanned images of USGS quad maps or digital orthophotos, while only four states (25%) mentioned that their CRGIS also contained grid data, which represents data illustrating the results of archaeological site predictive model cells.

The base vector data for the Colorado CRGIS is established differently than the rest of the CRGIS databases included in this study. When Colorado established their CRGIS, the base unit of study was not the cultural resource (*i.e.*, historic architectural resource or archaeological site), but instead, it is the survey conducted along their roadway. Within the vector representing the survey, information is included as to the presence or absence of archaeological resources. This base for the data differs from the other state DOTs as all other states have created CRGIS with the historic property as the base. Even with California DOT, which used their own roadways as the base for their GPS survey, they still created the historic property as the entry for each row in the database and not the roadway. This difference in organization of the CRGIS will be explored further in the development of an ideal CRGIS for best practices (Task 5).

More than half of the CRGIS databases contain just cultural resource information (n=10 or 62.5%) while the remaining six CRGIS databases also contain environmental information within the CRGIS. When the environmental data are used in conjunction with the historic property information, especially archaeological data, the CRGIS is used to create archaeological site predictive models in the four states cited above (California, Minnesota, Missouri and Washington). The resolution of grid data for these predictive models was not provided by the states.

What geographic coordinate system was used for the database? What map units are used in the database? (Question #10)



Most states use a projection system that is specific to their region, typically a form of the State Plan projection system or if the state is too narrow to fit into a UTM band, then a UTM projection system.

The following table summarizes the projection systems used by the state DOTs in their respective CRGIS.

Projection system	Count
California State Plane	1
Kentucky Single Zone State Plane	1
North Carolina State Plane North	1
Ohio State Plane South	1
Texas Statewide Mapping System NAD 83	1
UTM NAD 83 (various zones)	6
UTM NAD 27 (various zones)	2
HARN 83 Florida	1
HARN 83 Washington State Plane	1
GCS NAD 83	1

Depending upon the size of a state, it may make sense to use a UTM zone rather than a state plane that can distort projections at the edges of the zone. However, the type of zone will be a matter of personal choice as most modern GIS software packages are able to re-project the GIS data into another projection system on the fly. This was not the case only a few years ago before the emergence of ArcView 8.x.

Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.? (Question #13)

Some of the state DOTs responding to this question did provide the following information as to other sources of information that their CRGIS linked to, including:

Other data	Count
Scanned images of cultural resource report	8
Historic resource survey forms	3
Links to National Register site files	2
Scanned images of USGS topographic maps	3

4.3 Database Access

Information on the access to the CRGIS data is summarized here. This information pertains to how the data are accessed or protected from being inadvertently changed.

Where is the database located? On a DOT server or some other server? How secure is this server? (Question #2)

As most of the CRGISs have been developed by DOTs or funded by DOTs, it follows that the data that comprise the CRGISs are housed at the respective DOTs, as evidenced by half of the CRGISs being stored on a DOT server. The SHPOs hold the data for four of the CRGISs while the remaining four databases are stored at a state university (Florida and Georgia) that houses statewide GIS data, the statewide Office of Information Technology (New Mexico) or on a consultant's server (North Carolina). All of the states responded to say that these servers are very secure and either require network authentication to access the data directly or they are located behind a very secure firewall.



How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user? (Question #3)

Most states responded to say that the data are accessed by either password protection (n=10 or 62.5%) or that the data can be accessed via the internet through an ArcIMS application (n=6 or 37.5%). For those states indicating that a password was required to access the data, this access was granted to those individuals who work daily with the CRGIS or are regularly updating the database. None of the states responded that the data could be downloaded from the CRGIS.

Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access? (Question #4)

Access to the database by the public was found to be granted in only five states (31.3% of all states). In each of these cases, public access is granted to historic architectural resources or National Register nomination forms, but never to archaeological site files. Archaeological information is accessible to archaeological professionals that must request access to this information and be approved by the SHPO or office of state archaeology, wherever the archaeological site file information is stored.

Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated. (Question #5)

In the states surveyed for this study, only six states were found to allow for remote updates to their CRGIS by authorized users of the CRGIS (37.5%). Most states do not allow for remote updates to their databases, as this could compromise the validity of the database.

Updates to the CRGIS are made by the entity that houses the database. Updates can occur daily (though this was the case only in Washington, where the SHPO makes daily updates to the database), but they were found to be made quarterly in two cases (by Washington DOT and in Ohio by the Ohio GIS coordinator) or weekly in Kentucky and Missouri. Other states did not indicate that the data are updated regularly, but that they could be updated by the DOT (California, Colorado, Florida, Georgia and Indiana) or by the SHPO (New Mexico, Pennsylvania, Texas, Utah and Wyoming). For Minnesota, updates are hindered by a corruption to the CRGIS that prevents one from being able to discern if a data entry represents a site or one of many points that represent a larger site. Therefore, updates are hard to process and are not made that frequently. Lastly, North Carolina's CRGIS is static and has not been updated since it was created.

4.4 Implementation of the CRGIS

This section summarizes how the state DOT has implemented the CRGIS.



How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources? (Question #14)

Responses by the state DOTs were restricted to the answers provided in the question; no states offered any additional uses of their state CRGIS. For implementation, it follows that if a state DOT is using their CRGIS for early project planning, then they are also using it as a location tools as the base data are required to be in a spatial database to analyze a proposed project's potential to affect historic resources, or the definition of a GIS.

Implementation	Count
Locational (presence/absence)	4
Early Project Planning	8
Predictive Modeling	4

4.5 Future Plans for the CRGIS

This section addresses the future plans for the CRGIS and addresses future funding of the CRGIS in order to ensure the continued viability of the database.

What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded? (Question #15)

Results of this question are difficult to summarize in a single statement. Some states indicated their future plans are to keep the *status quo* and continue using their CRGIS as is (n=5 or 31.3%). Some state DOTs would like to be using their CRGIS for predictive modeling (e.g., Ohio), but need to verify the accuracy of their database before relying on the results of a model that may be using misplaced archaeological data.

California indicated that their future plans are to centralize their CRGIS from the 12 CalTrans districts to a single central system based in Sacramento and will handle all GIS data across the state, as related to roadways. Kentucky, Ohio, Pennsylvania and Utah indicated that they want to include links to other cultural resource information, such as cultural resource reports, National Register nomination forms, HABS/HAER documents, and/or state historic resource survey forms. North Carolina's future plans involve taking ownership of the CRGIS as it is currently housed on a consultant's server. Once they have the database in house, they can start updating the database with recently generated archaeological site file information. Minnesota will be taking their CRGIS and making it available on the internet through an ArcIMS application.

Only a few states provided an answer to the future funding question. Kentucky indicated that fees charged to state and federal agencies to access the CRGIS do provide revenue and that they are considering charging cultural resource consultants an annual fee to access CRGIS. Missouri expressed a concern that their current funds may not be sufficient to maintain the CRGIS and that they would look to discuss cost sharing measures with their partnering agencies in order to ensure that the CRGIS continues to exist and provide valuable cultural resource information.

5.0 Development of Best Practices

This section presents the results of determining the best practices for creating a CRGIS by state DOTs that are thinking of developing a CRGIS, have begun to develop a CRGIS, or are considering updating and enhancing an existing CRGIS. In order to facilitate the development of a CRGIS by a state DOT, a data structure for a hypothetical CRGIS has also been developed from the most efficient variables used and employed by existing state DOT CRGIS databases. The data structure (Appendix C) is shown by displaying the metadata for a hypothetical CRGIS using five different GIS data files. The data files contain the specific cultural resource information that would be used by a state DOT to develop a CRGIS.

The best practices identified here can be summarized in five areas, as previously presented in Section 4:

- 1.) CRGIS database development
- 2.) database design
- 3.) database access
- 4.) implementation of the CRGIS
- 5.) future plans for the CRGIS

The best practices identified for these five areas derive from input received from the following 17 state DOTs: California, Colorado, Florida, Georgia, Indiana, Kentucky, Louisiana, Minnesota, Missouri, New Mexico, North Carolina, Ohio, Pennsylvania, Texas, Utah, Washington and Wyoming. Of these state DOTs, eight state DOTs⁶ provided samples of their metadata, which were analyzed to determine the best practice information for the database design section. The sample CRGIS provide here (see Appendix C) presents a database structure that includes the information a state DOT needs to develop a CRGIS without expending valuable financial resources and time⁷ to evaluate the best approach to developing and implementing a CRGIS.

5.1 CRGIS Database Development

The best practice for the initial development of the CRGIS does not identify a single preferred path to develop the CRGIS. The majority of state DOTs (11 of 17 or 65%) developed their CRGIS in conjunction with at least one other agency; only 3 of the 17 state DOTs developed their CRGIS independently while three of the states use a CRGIS that has been developed by the SHPO and which they were not involved with during the development stage. However, given that only 17% of the state DOTs developed their CRGIS independently, the most frequently cited practice was to develop the CRGIS in conjunction with the SHPO or other agency. This approach stems from the fact that it is the SHPO that possesses the cultural resource information for the state,

Developed CRGIS	Count
DOT only	3
SHPO only	3
DOT & SHPO	6
DOT & other agencies	5

⁶ The eight state DOTs providing the metadata to their CRGIS were California, Colorado, Florida, Kentucky, Missouri, North Carolina, Ohio and Washington

⁷ The average time needed to create a CRGIS from start to implementation was 8.6 years, with time estimates given by five state DOTs.

including the previously conducted cultural resource surveys and the location of historic properties.

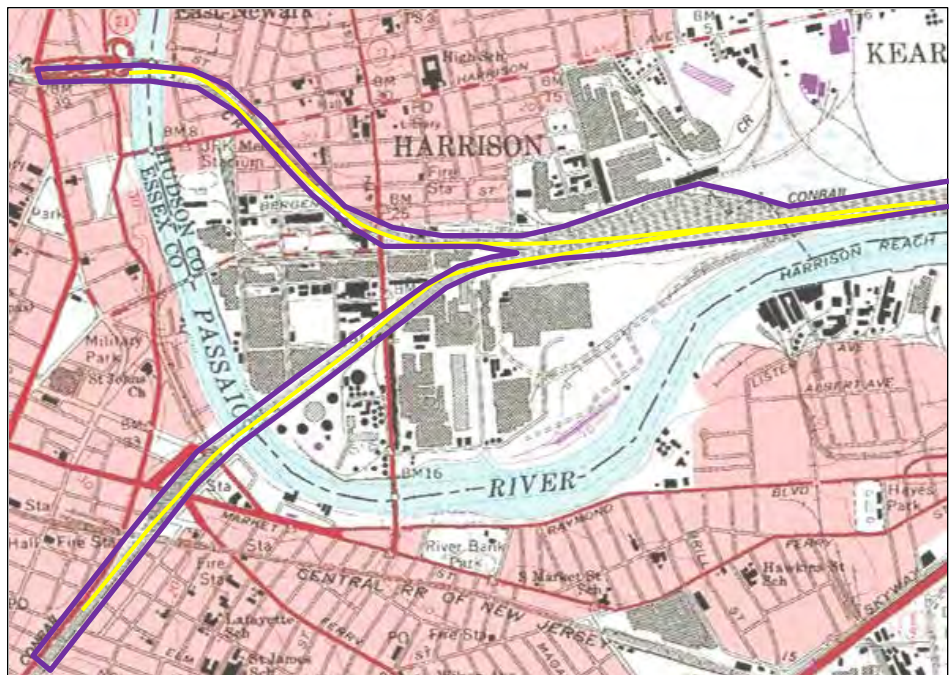
The state DOT is typically the agency that secures funding to put together a CRGIS using the cultural resource information from the SHPO and the state museum (normally the repository of archaeological site file information). The state DOT administered federal funds for 11 of the 17 state DOTs to develop a CRGIS while another 2 state DOTs used several different sources of federal money. Only Ohio DOT relied on state funds to develop the CRGIS while the New Mexico and Wyoming used National Parks Service and Department of Energy, respectively, funds to create the CRGIS. The best way for a state DOT to fund the development of a new CRGIS is secure federal funds, which typically have come from the Federal Highway Administration (FHWA).

The most commonly practiced method to physically create the CRGIS employed taking existing sheets of cultural resource information and scanning them to raster images so that they could be imported to a GIS and digitized, thereby creating the CRGIS. Nearly 70% (11 of 16 state DOTs) of the states answering this question relied on this approach. The remaining state DOTs used existing data and converted that to a CRGIS or employed a consultant to develop the CRGIS.

5.2 CRGIS Database Design

Appendix C provides metadata to a hypothetical CRGIS based upon the metadata provided by the eight state DOTs. The sample CRGIS contains five files that encompass the extent of a database that could be used for those state DOTs that are developing their own CRGIS. The five files are: *cultural resource survey*; *archaeological point*, *archaeological district*, *historic architectural point* and *historic architectural districts*.

The five GIS files are designed to represent vector spatial data with potential links to external raster data. The cultural resource survey, archaeological district and historic architectural districts files are designed as polygon data, meant to cover an area rather than a single point in space. The archaeological point and historic architectural point files are designed to cover a single point in space. It is not necessary to



create a GIS file with polyline data as any linear resource that might fit into a polyline dataset could more accurately be depicted as a polygon shape. For example, a historic rail corridor could be conceptualized as a polyline GIS data file, but the width of the polyline could never be expanded to account for variation in the width of the line as it moves across the landscape. The above figure depicts a linear corridor that could be easily mapped as a polygon (shown in purple); if the corridor had been mapped with a polyline (shown in yellow), the expanded area of the rail line could not be mapped using only a polyline. The more accurate approach would be to use a polygon to cover the spatial complexity of a linear resource and would portray the full spatial extent of the resource.

For the point data files (archaeological point and historic architectural point), these records would be used for archaeological sites or historic architectural resources when only a single spatial coordinate is known for the resource. Similarly, for archaeological sites that were recorded without the aid of surveying information, a point in the spatial database would represent the best location of the archaeological site. The accuracy of the spatial location would be reflected in the data file under the “site_location” field that reflects the relative accuracy of the resource.

Within each file, there are a series of variables that have been selected from the eight state DOTs metadata as representing the most comprehensive information to provide a complete picture of a state’s cultural resource information. Based upon the fact that the majority of the states use some form of ESRI® ArcView GIS software, it is assumed that state DOTs will use ArcView software for the development of and implementation of their CRGIS

Within the metadata that could be used to develop a CRGIS, there are several variables that need to be selected that depend upon the geography of the state. For example the projection system used for the CRGIS is linked to the state when using a State Plane projection system as these projection systems are specific to each state. Some states fit into a single UTM zone and therefore, the choice of the projection system fits better with the UTM projection system rather than State Plane.

The last piece of information to consider when developing the CRGIS is to decide if the CRGIS will contain information beyond simple spatial data. That is, will the CRGIS include links to cultural resource reports, historic resource surveys forms, National Register nomination forms or USGS topographic maps? When initially developing a CRGIS, the task of collecting and synthesizing a vast amount of archaeological site file information and historic architectural resource information could be overwhelming and delay the completion of the CRGIS or worse yet, cause such problems that the CRGIS is never completed. There is a risk that attempting to include all information to the CRGIS from the beginning of development may not yield a complete CRGIS. Instead, it is suggested that once the CRGIS has been developed with the spatial and descriptive information shown in the sample metadata, then links to raster data can be included. Most of the state DOTs that have been using a CRGIS for some time now (Minnesota, Pennsylvania) have only in recent years begun to expand the information available within the CRGIS to include cultural resource reports or historic resource survey forms. Also, the National Park Service has started scanning the National Register nomination forms (<http://nrhp.focus.nps.gov/>). In order to not duplicate efforts that are underway or have been



completed, the state DOTs should link to the scanned information available online through the NPS website, rather than scanning in their own copies of the nomination forms.

Therefore, it is recommended that the initial development of a CRGIS should focus on compiling the substantial amount of spatial data to establish the CRGIS. Once the CRGIS is in place and is working without any problems, then the CRGIS can be expanded to include additional raster data, like cultural resource reports and historic resource survey forms.

5.3 Database Access

The results of the analysis of the state DOT CRGIS show that for half of the DOTs, the data are stored within their own computer servers. The remainder of the DOTs has the CRGIS data on the SHPO server or elsewhere. In order to facilitate updates to the CRGIS, it is recommended that the CRGIS be housed on DOT servers behind a secure firewall that can be directly accessed by only a few individuals. Although access can be granted to researchers that wish to view the data, some problems were found with state DOTs that had their CRGIS housed on other agency's computers. For example, North Carolina DOTs CRGIS was found to have not been updated since it was created. This may be related to the fact that the CRGIS is stored on the server of the consultant that created the CRGIS. The lack of access to the CRGIS hinders North Carolina DOT from updating their CRGIS with new information. Similarly, Minnesota DOT's CRGIS possesses a flaw in the database and updates are difficult to make to the database. If the CRGIS is stored on DOT servers, this ensures that the DOT exercises control of the database and eliminates the potential for errors to be introduced to the CRGIS.

5.4 Implementation of the CRGIS

The goal of creating a CRGIS is to employ the information for use in early project planning and to predict the location of archaeological sites in areas that may be developed at some point in the future. The use of the CRGIS for early project planning can be employed, but this can be done only when the CRGIS has been created and is working without errors. So, the immediate use of the CRGIS will be to record the location of cultural resource information. Once the CRGIS has been created, then early project planning can be used. If after all the effort to create a CRGIS, the data are used simply to store the location of cultural resources, then the full technological capacity of the CRGIS is not being employed. It would be a better use of the time and money expended to create the CRGIS if the data were used in conjunction with DOT for early project development and design.

6.0 Summary and Conclusions

This research program was designed to identify the best practices for the creation of CRGIS for state DOTs that are interested in developing their own CRGIS without expending a considerable budgetary and labor expense. The research conducted for this program has reviewed over 75% of the state DOTs for evidence of CRGIS and found that just over 40% of all state DOTs (21 DOTs in total) have a CRGIS in place. Of the state DOTs with a CRGIS in place, detailed information about the development, structure (including metadata) and use of the CRGIS was received from eight state DOTs. The information provided by the eight state DOTs has been compared to ascertain the best practices for developing a CRGIS for a state DOT that intends to



develop their own CRGIS. The purpose of identifying best practices is to eliminate duplicate processes so that time is well spent rather than recreating what 21 other state DOTs have already created.

To provide a path forward for state DOTs contemplating developing CRGIS, a sample CRGIS dataset has been created for a hypothetical CRGIS using the variables found in common between the state DOTs reviewed for this study. This sample dataset can be used as presented or modified to fit the specific needs of the state DOT. However, using the sample metadata eliminates a significant amount of time that would have been expended to identify the optimal database design that incorporates cultural resources with transportation projects. Based on the results from five state DOTs, the average time needed to create a CRGIS from start to finish was 8.6 years. While the majority of time spent creating the CRGIS would be the actual data collection and input, the development of the CRGIS data structure would still require a significant portion of time. In addition, when entering data into a new GIS dataset, problems with the relationship between different variables may arise that had not been considered during the initial design of the database. Such problems could cause data entry errors in the dataset or require a redesign of the dataset, thereby necessitating a re-start to the data entry stage. Using a dataset that has been developed from previously employed CRGIS eliminates the potential for unforeseen problems to develop during data entry.

One of the purposes behind developing a CRGIS is to streamline the historic preservation compliance process and allow for quicker implementation of roadway improvements rather than subjecting vital transportation projects to significant delays from cultural resource mitigation efforts. Having a CRGIS in place allows the state DOT to design projects that avoid known cultural resources or areas where unknown cultural resource are likely to be encountered. Developing a CRGIS takes time and capital expenditures, but the benefits of having the CRGIS are vastly outweighed by the cost of developing the CRGIS or the cost of a large-scale archaeological mitigation effort that causes a transportation project's schedule to fall far behind. The recommendations and best practices presented in this study represent a path forward for developing and implementing CRGIS for state DOTs that may allow for more efficient project planning and design while creating a useful catalog of known cultural resource information across the state.

7.0 References

Cambridge Systematics, Inc. *Effective Practices for Considering Historic Preservation in Transportation Planning and Early Project Development*, National Cooperative Highway Research Program, Project 25-25, Task 49, Washington, D.C., Transportation Research Board, 2009.

The Louis Berger Group, Inc. *Compendium of Environmental Fieldwork Technologies*, National Cooperative Highway Research Program, Project 25-25, Task 48, Washington, D.C., Transportation Research Board, 2009.

SWCA Environmental Consultants. *National Historic Property Inventory Initiative: Building Capacity to Preserve and Protect Our Cultural Heritage*. Prepared for Preserve America in partnership with the National Association of Tribal Historic Preservation Officers, the National Park Service, the National Council of State Historic Preservation Officers, the Advisory Council on Historic Preservation and the National Trust for Historic Preservation. Broomfield, Colorado, 2009.

Hopkins, Mary M., Christopher Young and Karyn de Dufour. *Data Management in SHPO's, National Conference of State Historic Preservation Officers, Square Table Discussion*. Organized by the Wyoming State Historic Preservation Office. Cheyenne, Wyoming, 2007.

8.0 Acknowledgements and Contributors

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Moore (West Virginia DOT), James Becker (Wisconsin DOT), Julie Francis (Wyoming DOT), Mary Hopkins and Chris Young (Wyoming SHPO).



Appendix A – Sample Agreement between a SHPO and DOT for Development and Maintenance of a Cultural Resource GIS





INTERAGENCY AGREEMENT

between the
STATE OF LOUISIANA
through the
Department of Culture, Recreation, and Tourism
and the
STATE OF LOUISIANA
through the
The Department of Transportation and Development

FOR THE PURPOSES HEREINAFTER SPECIFIED, this Interagency Agreement (IA) is entered into by: (1) the State of Louisiana through the Department of Transportation and Development (DOTD), represented herein by its Secretary and (2) the State of Louisiana through the Department of Culture, Recreation and Tourism (DCRT), represented herein by its Secretary, to serve the public for the purposes hereinafter declared.

WHEREAS, the DCRT includes the Office of Cultural Development (OCD), the Division of Archaeology (DOA) and Division of Historic Preservation (DHP); and, the Office of Cultural Development (OCD), the Division of Archaeology (DOA) and the Division of Historic Preservation (DHP); are separate offices of the the DCRT; and,

WHEREAS, the DOA is responsible for recording, protecting, and sharing information about Louisiana's archaeological resources and for maintaining and collecting data concerning the location of archaeological resources within the State of Louisiana in accordance with the requirements of the National Historic Preservation Act, the Louisiana Archaeological Resources Act and the Louisiana Unmarked Human Burial Sites Preservation Act relative to archaeological sites and finds; and,

WHEREAS, the DHP is responsible for promoting the preservation of Louisiana's significant historic sites, structures, and buildings and for maintaining and collecting data concerning the location of historic resources within the State of Louisiana in accordance with the requirements of the National Historic Preservation Act relative to historic sites; and,

WHEREAS, the DOA and DHP are instrumental in providing information to the State Historic Preservation Officer (SHPO) necessary for compliance with Section 106 of the National Historic Preservation Act (Section 106); and,

WHEREAS, the DOTD is responsible for, among other things, the maintenance and construction of the State highway system and bridges, the State public works infrastructure and managing Federal Aid Programs pursuant to its Stewardship Agreement with the Federal Highway Administration (FHWA); and,

Interagency Agreement
Page 1 of 4

WHEREAS, the DOA and DHP maintain and control information relative to cultural resources. This information is necessary for DOTD's compliance with Section 106 requiring the avoidance of, or minimizing adverse impact to, cultural resources when DOTD is involved in Federal-Aid projects or projects requiring Federal Permits or approvals; and,

WHEREAS, pursuant to Section 106, DOTD provides documentation relative to cultural resources to DOA and DHP; and,

WHEREAS, DOTD uses a Geographic Information Systems (GIS) to store and access data to facilitate its mission; and,

WHEREAS, the DOTD and the DCRT, through the DOA and DHP, wish to work cooperatively and develop a GIS for cultural resources data within the State of Louisiana.

NOW THEREFORE, DOTD and DCRT agree as follows:

ARTICLE I **PURPOSE AND SCOPE**

1.1 The purpose of this Interagency Agreement (IA) is to develop a GIS for cultural resources data within the State of Louisiana that will be shared by DOTD and DCRT (PROJECT).

ARTICLE II **RESPONSIBILITIES OF DOTD**

2.1 DOTD will assist DCRT in designing and creating a GIS for cultural resources data in accordance with the visions and needs of DOA, DHP, DOTD, and the State of Louisiana.

2.2 DOTD will provide the development platform as well as the hardware and software while the system is being designed and developed.

2.3 Access to information stored in the GIS will be provided to DCRT through DOTD domain user guest accounts throughout the duration of the development of this PROJECT.

2.4 DOTD will provide training to DOA and DHP staff in the use and operation of the system during its development and will provide technical support for the databases and systems during the first year of operation.

2.5 Once the GIS is operational, DOTD will deliver the digital databases to DCRT at which time, DCRT will become responsible for the maintenance of the databases.

2.6 DOTD, its successors and assigns shall have access to the GIS and databases for as long as access to the information contained in the system and databases is useful to DOTD in the fulfillment of its duties, obligations and mission. Access to DOTD shall be without charge and for no consideration other than that which is required pursuant to the terms of this IA.

2.7 DOTD will use the information in accordance with all applicable laws and within DOA and DHP guidelines.

2.8 DOTD acknowledges that access to some of this information, including the location of archeological sites, may be restricted by law and not subject to the Freedom of Information Act.

ARTICLE III

RESPONSIBILITIES OF DCRT

3.1 DCRT, through DOA and DHP, will actively seek additional funding from various sources for the establishment and operation of the GIS for cultural resources data.

3.2 DCRT, through DOA and DHP, will work with DOTD and provide assistance in designing the system.

3.3 DCRT, through DOA and DHP, will provide the data to be entered into the GIS and will be responsible for the quality of that data during and after the development of the GIS.

3.4 Once the database is operational, DCRT, through DOA and DHP, will take ownership of the GIS, and DCRT shall be, thereafter, responsible for its operation and maintenance with assistance from DCRT's Information Services.

3.5 DCRT will provide DOTD, its successors and assigns, with access to the GIS and databases for as long as access to the information contained in the GIS and databases is useful to DOTD in the fulfillment of its duties, obligations and mission, including but not limited to, DOTD and DOTD sponsored projects. Access to DOTD shall be without charge and for no consideration other than that which is required pursuant to the terms of this IA.

ARTICLE IV

MUTUAL RESPONSIBILITIES

4.1 DOTD and DCRT agree to develop a system compatible with the goals and objectives of the Louisiana GIS Council (LGISC).

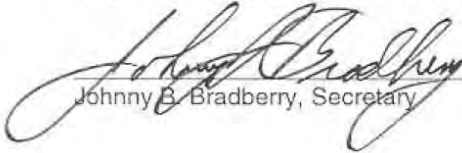
4.2 If it becomes necessary to more specifically delineate DOTD's and DCRT's respective obligations in order to accomplish the overall objective of creating an accurate GIS for cultural resources data within the State of Louisiana, DOTD and DCRT will supplement this agreement.

ARTICLE V
EFFECTIVE DATE AND TERM

5.1 This IA is contingent upon the receipt of sufficient funding to implement the Project at the total cost to be determined and agreed upon by DOTD and DCRT.

5.2 This IA shall become effective when all signatures are affixed herein and shall remain in effect until all terms and conditions contained herein have been met.

Department of Transportation and Development


Johnny B. Bradberry, Secretary


Date: 10/13/04

Department of Culture, Recreation, and Tourism


Angèle Davis, Secretary

Date: 10-5-04

Invited Signatory:


Pam Breau
State Historic Preservation Officer

Date: 10-5-2004

Appendix B – Responses to Detailed Questionnaire Received from State DOTs with CRGIS



1. What GIS program is used for the database? [ESRI ArcGIS 9.3](#)
2. Where is the database located? On a DOT server or some other server? How secure is this server? [Currently of the 12 CalTrans Districts seven \(7\) have TEA Archaeological Roadside Inventories \(ccrd\), which are house on both servers and PC's. All information is password protected \(given to individual users\) and lies behind the CalTrans firewall. So the data is very secure.](#)
3. How is the database accessed? [Data can be accessed either spatially through ArcGIS or forms/tabular through Microsoft Access. Data can either be downloaded directly to a project folder on a PC or the data is all located on the PC. That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?](#)
4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access? [Because of the confidential nature of our data our contention is that the information is not Corporate data and therefore, not accessible outside those involved as Cultural specialists with passwords. Each district has a Data Steward who is responsible for determining who gets a password.](#)
5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated. [Yes the data can be amended. There are a couple of mechanisms, which are variations on the same theme. Any new information is amended by the individual project lead, but it goes through the data steward for QC prior to actually updating the system. Each entry is a separate event, so older information is not deleted and newer information become part of the overall record.](#)
6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database? [The CCRD was initially started 12 or so years ago by Margaret Buss at CalTrans Division of Environmental Analysis, Cultural and Community Studies Office. She found a way to use Transportation Enhancement Act \(TEA\) money to carry out roadside archaeological inventories of rural roads. As such the inventories are limited to non-SHOPP/STIP project areas \(essentially roads that nothing is being done to other than maintenance. It has been our goal to work hand in hand with SHPO and BLM who were creating databases of their own with the intention that someday each system would be able to communicate with the other. Caltrans and BLM both have contributed sums of money to help SHPO in their efforts to get the CHRIS \(SHPO\) system up and running. No positions were created. Data Stewards are archaeologists who have gotten Management approval as 'other duties as assigned.' The database continues to evolve. District 5 and 9 are almost complete, District 1 is now collecting data and District 8 is awaiting CTC vote for funds so they can list the project and get started. Currently HQ is moving towards accessing the necessary funds to move what is essentially a PC based system towards an enterprise system housed in Sacramento. Districts will then access data via a web based module. Ultimately we hope to move away from Access to Oracle or some other larger database management system.](#)
7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project? [Caltrans Cultural and Community Studies Office had identified the need in the early 90s to be able to respond quickly to Maintenance requests and Encroachment Permits on rural roads, both for stewardship responsibilities and for Native American concerns about inadvertant damage to unrecorded sites. The Office Chief, Robert A. Clark, saw an opportunity with the then-new Transportation Enhancement Activities \(TEA\) program to conduct an archaeological inventory of the Caltrans right of way. The work met TEA criteria of being directly related to surface transportation and above & beyond normal work. It](#)

qualified under the Archaeological Research & Planning and Historic Preservation categories. The Caltrans' GIS was not prepared to accept the information, and so a desktop GIS application was developed as part of the inventory effort. Because California has the largest number of miles of any state highway system, the survey/inventory was too expensive to do all at once. Although the inventory was considered as a single statewide project, it has been implemented in successive TEA cycles, district by district, over seventeen years time.

Caltrans, SHPO and several other state & federal agencies had already been talking for some years about trying to develop a joint database, but that ultimately proved too complex a task. Some districts were able to share the inventory information with their regional archaeological information centers, and some of those centers have adopted the desktop GIS application.

8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format? Standard Phase I practices were used for the survey. Records search at the appropriate Information Centers, BLM and Forest Service office, and local repositories of information. This was followed by pedestrian survey along each route identified. Sites identified had a variety of information collected (site boundary, datum, side of road, etc. (I have attached our data dictionary, which you should be able to access); this has a complete listing of information collected, which is rather large. All GIS data was collected using various sub-meter accuracy GPS units. Data collected in the field was then transferred to the GIS specialist who corrected and then exported GPS data in shapefiles and imported in the overall district TEA maps. Because of the use of various accuracy data (USGS Quads, post mile information, and GPS data) all data was visually inspected to ensure that it was located properly when integrated into the spatial data.
7. How was the creation of the database funded? Transportation Enhancement Act (TEA) funding.
 - a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data? Maintenance has been the sole responsibility for the District. Once we move to a web based system the DB will be maintained by the Office of GIS at CalTrans Sacramento office and by the Division of Environmental Analysis, Sacramento. As of yet there has been no creation of a job that specifically handles data integrity. District staff perform QA/QC as part of their project workload.
8. What geographic coordinate system was used for the database? What map units are used in the database? California uses State Plane NAD83, Conus with UTM's.
9. What data standards are used for the database? Internally we have made sure that all spatial data meets our requirement for sub-meter accuracy.
 - a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language). We are aware of the Committees move to standardize metadata and are actively involved in the conversation. Because of our statewide permit with BLM we are required to meet BLM standards when on BLM lands. So by extension we are meeting FGDC standards already.
10. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data? All three types of data are being maintained.
 - a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.
 - b. Does the database contain only cultural resource information or does it also include environmental variables? Cultural resources (including ethnographic areas, built properties, districts, and archaeological sites)

- c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?
11. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.? Several additional types of data are stored either in pdf or photos. All survey reports, DPR 523 forms are stored in pdf format. The CCRD was built with an archaeological bias, which simply means that because of the nature of why the CCRD was built in the first place the concern was for archaeological resources being damaged through either routine maintenance or encroachment permitting.
12. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources? Initially as stated elsewhere it was used as a means of responding quickly to maintenance request to conduct maintenance within the ROW (grubbing or any ground breaking work) in an effort to avoid damaging known archaeological resources. Encroachment permitting also required that we be able to respond to the request to either allow or deny the permit. It has grown, as one might expect since GIS has become more commonplace as a tool for modeling behavior, tracking resources, and early project planning that helps inform project teams of potential sensitivity for archaeological resources.
13. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded? As stated above, we are currently applying for funds to go to a single location web based system. We hope this helps reduce costs to individual districts. Because of the limitations of Access to handle large datasets we will then move to Oracle or some other enterprise system that is better adapted to our needs. Our hope has always been to share information electronically with SHPO. We have accomplished this in District 4 which has this ability with the Northwest Information Center and in District 11 through SANDAG and the South Coast Information Center (CalTrans paid for a computer and placed the system on it in District 4 and contributed funds to SANDAG to help SCIC go electronic). In 1999-2001 the California SHPO seemed to be moving forward and we contributed funds to help digitize USGS quads at the Information Centers with all of their points/lines/polygons. SHPO, due to funding problems scaled back in 2003/2004 and is currently trying to reinvigorate the project. DEA/CSO Sacramento is currently having a Consultant create a Curation DB that will link directly with the CCRD. This new database will help us respond to NAGPRA and other requests about collections. These requests could be to determine if there are human remains, sacred objects, or burial objects that need to be returned to the Tribes, it is a tracking tool for where collections are housed, or it could be used for research purposes such as obtaining information on global warming. The Office of GIS is responsible for all GIS data and therefore will help to maintain. DEA currently funds positions for the OGIS as a means of helping to fund maintenance.

1. What GIS program is used for the database? *Currently use ESRI's ArcView 3.2 with CDOT's Maps2 application but transitioning to ArcView 9.x and CDOT's OTIS (Online Transportation Information System), a collection of several ArcGIS Server web applications that is accessed through an internet browser*
2. Where is the database located? On a DOT server or some other server? How secure is this server? *Located on a secure password-protected internal DOT server (thus only available to DOT staff)*
3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user? *General CDOT staff can access limited CR data (in read-only format, no permission to modify) via an ArcGIS server web application (OTIS) or CDOT's ArcView 3.2 application. The data is created in a MS Access database file then uploaded to the server.*
4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access? *The database is available to general CDOT staff for planning purposes but is not available to the general public. The data can only be modified by a small number of people (about 4 cultural resources staff and 1 GIS unit staff). The decision to allow access to the Access database is made by the Cultural Resources Unit Manager and the GIS Coordinator*
5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? *Yes, by about 5 cultural resources and GIS staff only* What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated *The Cultural Resource Unit staff manually update the MS Access database after each CR survey; the GIS Coordinator converts the MS Access data into GIS format and subsequently uploads the data into the GIS on a roughly quarterly basis. CDOT's MS Access database application has a feature which checks for data duplication and spelling errors, but otherwise data can only be checked manually.*
6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database? *A dedicated position was not created for this effort; the duties were assigned to an existing position. The database was created by CDOT using data initially provided by the Colorado Office of Archaeology and Historic Preservation, as well as internal (CDOT) data; incorporating legacy data (survey results from the last 35 years) into the database remains an ongoing effort.*
7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project? *CDOT Cultural Resources Section staff recognized the need to both catalog the data in a digital manner as well incorporate it into a GIS for broader agency use in project planning. Consultation with other state and federal agencies resulted in valuable advice regarding such an undertaking.*
8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format? *The database was created by determining which data were pertinent, constructing the MS Access application, and then by manual data entry based on original project information and survey report data. Legacy data was not ground truthed or verified; data is corrected as errors are encountered during regular use of the database.*
9. How was the creation of the database funded? *Internal funds*
 - a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data? *Maintenance of the database is a shared responsibility*

of the cultural resources staff and the GIS Coordinator. Regular input of cultural resource survey data into the database is a specific duty assigned to each cultural resources staff; likewise, incorporating the data into the GIS is a specific duty assigned to the GIS Coordinator.

10. What geographic coordinate system was used for the database? What map units are used in the database? *The database utilizes UTM zone 13 N with NAD 1983 datum; measurement is in miles.*
11. What data standards are used for the database?
 - a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language). *We use the FGDC format with XML*
12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data? *Vector data (shape data but not coverage) and SDE feature class (formerly used shp files)*
 - a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database. *The database includes 8 types of information: "survey shape" (linear or spot survey); "route ID" (highway segment ID); "beginning reference point" (milepost); "end reference point" (milepost); "project number" (CDOT project number); "survey results" (positive or negative); "additional information" (misc notes); "site ID" (Smithsonian site numbers). These attributes were chosen because they provide the basic information needed for project planning purposes.*
 - b. Does the database contain only cultural resource information or does it also include environmental variables? *Only cultural resource variables are contained in this MS Access database, although certain environmental variables and numerous other data are accessible through the CDOT web application (OTIS)*
 - c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units? *Not applicable since we only use vector data*
13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.? *No links to other sources of CR data*
14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? *The former (presence/absence).* Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources? *Yes*
15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded? *Data is typically updated on a roughly quarterly basis (although due to the current vacancy of the CDOT Environmental Programs Branch GIS Coordinator position, data hasn't been updated in roughly one year). Maintenance of the database is among the duties of that position and thus funded through that position. There are no immediate changes planned regarding the nature of the CR database, including the addition of additional types of data. The data from the results of new CR surveys are added to the database upon conclusion of each survey. Legacy data is added to the database on an occasional basis, when possible.*

1. What GIS program is used for the database?

ESRI's ArcSDE with Oracle as the RDBMS.

2. Where is the database located? On a DOT server or some other server? How secure is this server?

The database is located at the University of Florida, GeoPlan Center. The database serves FDOT's Efficient Transportation Decision making Process (ETDM). The spatial data is one component of the Florida Geographic Data Library (FGDL). The database is located behind a firewall with several other mechanisms in place to keep the data secure (ex: including restricted IP access).

3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?

There are multiple methods of accessing the database, all internet based. ArcIMS (as an image service) is used as the engine for the map viewer. There are custom java connectors in place that prevent the direct download of data from ArcIMS. Data considered to be publicly available (not sensitive) are freely available for download from a metadata server (<http://www.fgdl.org>).

4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?

There are 2 websites with mapping components that serve the data from the database:

- Secure (username/password) required for the 'business' user base (<http://www.fla-etat.org>).
- Public (<http://etdmpub.fla-etat.org>)

Access and role type to the secure site are determined by FDOT staff based on requests from participating agencies.

5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated

There are mechanisms in place for data upload, however this is just the beginning of the data QA/QC process. New or updated data goes through a formal QA/QC process developed at the GeoPlan Center that allows any given version of a data layer to be differentiated. This process was built to serve the retention requirements and policies of FDOT as determined by FDOT General Counsel.

6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?

The FGDL geospatial database houses over 350 statewide data layers. The effort to create FGDL began in earnest in 1996. The statewide 'Historic and Archaeological' data layers present in the database originate with SHPO through funding provided by FDOT. FDOT was looking for participation from SHPO on the review of proposed projects and in order to actively participate, SHPO had a need to convert their paper site file inventory into a georeferenced database. FDOT funded this digital conversion effort in exchange for their active participation in the process.

7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"

The catalyst for the creation of the FGDL database was the recognized need to develop a standardized database of geospatial data that could be used and accessed by state agencies, researchers and the general public. For the SHPO portion, please see answer to #6.

8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format?

There are currently over 30 different sources of data present in FGDL, these include: Federal, State, Local, private sector and GeoPlan created. Each of the 350 plus datasets have their own standards; data is accepted as the original data steward provides it. If issues are found, the steward is notified. If large errors are found or metadata is missing, the data layer in particular is placed in 'quarantine'. In the case of the SHPO database, SHPO is responsible for the information in its entirety. We update the database once a quarter after they have QA/QC it and verified it for inclusion in our system. Once it passes those internal agency checks, they submit the update/refresh request to us for processing. At which point we go through our normal QA/QC process and notify them of any issues.

9. How was the creation of the database funded?
 - a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data?

SHPO database initially funded through FDOT. Now they accept electronic deliveries of site files support maintenance internally within their agency. They do have folks responsible specifically for the update, maintenance, and integrity of the SHPO databases.

10. What geographic coordinate system was used for the database? What map units are used in the database?

The geographic coordinate system/map projection used for the 'FGDL' database is the official state of Florida Albers Conical Equal Area (HARN). The map units are in meters.

11. What data standards are used for the database?
 - a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language).

For GIS metadata, GeoPlan uses the Federal Geographic Data Committee's Content Standard for Digital Geospatial Metadata (CSDGM), Version 2 (FGDC-STD-001-1998). Metadata is stored in XML format, but is also made available in HTML.

Also included in GeoPlan metadata are the Dataset Topic Categories from the International metadata standard, ISO 19115. These broad topic categories organize the metadata into themes for quick search and retrieval. The FGDC has recommended that these ISO metadata elements be added to FGDC metadata documents to assist in the transition to ISO metadata.

12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?

The FGDL database contains data in vector, raster and image formats.

- a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.

Please see attached zip file which contains both FGDC html and xml versions of seven SHPO data layers. These will contain the attribute definitions for their respective data layers.

- b. Does the database contain only cultural resource information or does it also include environmental variables?

The database is primarily based on environmental data.

- c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?

Raster data (images) in the database range from 1 foot resolution to 30 meter (historic satellite imagery).

Grids range from 10 meter to 100 meter cell size.

13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.?

There is a link accessible through the ArcIMS site to the 'SHPO National Register Site File'.

14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources?

The geospatial data is used as a locational tool, both in terms of potential impact and avoidance. The database is used extensively in the early planning stages of transportation projects.

15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded?

SHPO data updates are provided from the Florida Department of State, Division of Historical Resources on a quarterly basis. See previous answers for other answers.

1. What GIS program is used for the database?
 - a. The current version of NahrGIS uses Mapguide connecting to shapefiles and Oracle database over ODBC.
 - b. The new version of GNahrGIS to be deployed before end of FY10 utilizes ArcSDE 9.3 and ArcGIS server 9.3.1.
2. Where is the database located? On a DOT server or some other server? How secure is this server?
 - a. The NahrGIS database and web application are hosted on servers within ITOS (Information Technology Outreach Services) at the University of Georgia.
 - b. The servers are housed in a secure server room with limited access controlled by both keypad and biometrics. Connectivity to the database server is restricted to within the ITOS network (no outside connections are allowed). Access to data through the web application is done over SSL and users are required to authenticate to the site to determine levels of access to data.
3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?
 - a. Data is accessed via the internet by using the NahrGIS web application. Direct access to data will be allowed in the future but it will still require authentication. This data will be available via ArcGIS server map services.
<https://www.itos.uga.edu/nahrGIS/>
4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?
 - a. NAHRGIS is open to the general public via the web, however a username/password is required to access archaeological information. The username/password is assigned to professional archaeologists only by request to the Georgia Archaeological Site Files (GASF). Consultants are charged a fee, typically per project, to obtain a username/password.
5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated
 - a. No remote updates are permitted at this time for cultural resources. Currently hard copies of site forms of newly recorded archaeological sites are submitted to GASF. GASF is the entity that updates the archaeological database. There are future plans to allow users to remotely upload new information. The new information would have to be screened by a designated professional before it could be added to the database.
6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?
 - a. The creation of NAHRGIS was a joint effort between GDOT, Georgia Department of Natural Resources, University of Georgia (ITOS), FHWA, and Department of Community Affairs. There was not dedicated position created at GDOT for the development of the GIS application.
7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"

- a. There was a consensus among the joint parties that Georgia could benefit from a resource GIS database to be used as an effective planning tool.
8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format?
 - a. The database was created from various sources. The archaeological database was already created by GASF and was incorporated into NAHRGIS. Historic structure information was gathered from GDNR.
9. How was the creation of the database funded? How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data?
 - a. Phase I and Phase II of NAHRGIS were funded through an FHWA TE grant. Future maintenance of the database will be funded through state funds. ITOS at UGA will be dedicated to upkeep of the database.
10. What geographic coordinate system was used for the database? What map units are used in the database? UTM 16 NAD27
11. What data standards are used for the database?
 - a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language).
12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?
 - a. The Nahrgis system uses Raster and Vector data
 - b. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.
 - c. Does the database contain only cultural resource information or does it also include environmental variables? Ecological resources
 - d. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?
13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.?
 - a. National Register nomination forms are going to be tracked in a future release of GNahrgis, but are not currently.
14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources?
 - a. NAHRGIS is used by resource specialists in early planning stages in an effort to screen the project area for previously recorded resources, assessing probability, and to assess the impacts of projects that would not require new right-of-way. NARGIS is also used as research tool, as copies of digital site forms and some reports are available for download.
15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded?
 - a. Future plans for the database include creating a section of NAHRGIS dedicated to GDOT use only. GDOT would create a database of mitigation sites, Environmentally Sensitive Areas (ESA), and GDOT owned properties. This information would could be accessed and used by anyone in GDOT. There are also plans to add demographic information to

be used by NEPA planners to identify potential EJ communities. Maintenance would be funded through state funds.

Georgia

1. What GIS program is used for the database?
 - a. The current version of Nahrgis uses Mapguide connecting to shapefiles and Oracle database over ODBC.
 - b. The new version of GNahrgis to be deployed before end of FY10 utilizes ArcSDE 9.3 and ArcGIS server 9.3.1.
2. Where is the database located? On a DOT server or some other server? How secure is this server?
 - a. The Nahrgis database and web application are hosted on servers within ITOS (Information Technology Outreach Services) at the University of Georgia.
 - b. The servers are housed in a secure server room with limited access controlled by both keypad and biometrics. Connectivity to the database server is restricted to within the ITOS network (no outside connections are allowed). Access to data through the web application is done over SSL and users are required to authenticate to the site to determine levels of access to data.
3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?
 - a. Data is accessed via the internet by using the Nahrgis web application. Direct access to data will be allowed in the future but it will still require authentication. This data will be available via ArcGIS server map services.
<https://www.itos.uga.edu/nahrgis/>
4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?
 - a. NAHRGIS is open to the general public via the web, however a username/password is required to access archaeological information. The username/password is assigned to professional archaeologists only by request to the Georgia Archaeological Site Files (GASF). Consultants are charged a fee, typically per project, to obtain a username/password.
5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated
 - a. No remote updates are permitted at this time for archaeological resources. Currently hard copies of site forms of newly recorded archaeological sites are submitted to GASF. GASF is the entity that updates the archaeological database. There are future plans to allow users to remotely upload new information. The new information would have to be screened by a designated professional before it could be added to the database. Users can remotely enter historic structures information; however this must be verified by GADNR before being added to the database.
6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?
 - a. The creation of NAHRGIS was a joint effort between GDOT, Georgia Department of Natural Resources, University of Georgia (ITOS), FHWA, and Department of Community Affairs. There was not dedicated position created at GDOT for the development of the GIS application.
7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"

- a. There was a consensus among the joint parties that Georgia could benefit from a resource GIS database to be used as an effective planning tool.
8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format?
 - a. The database was created from various sources. The archaeological database was already created by GASF and was incorporated into NAHRGIS. Historic structure information was gathered from GDNr.
9. How was the creation of the database funded? How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data?
 - a. Phase I and Phase II of NAHRGIS were funded through an FHWA TE grant. Future maintenance of the database will be funded through state funds. ITOS at UGA will be dedicated to upkeep of the database.
10. What geographic coordinate system was used for the database? What map units are used in the database? UTM 16 NAD27
11. What data standards are used for the database?
 - a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language).
12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?
 - a. The Nahrgis system uses Raster and Vector data
 - b. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.

The archaeological database is searchable by up to 49 variables. Multiple variables can be selected to build a query. The results can be viewed in a report format or on a map. The majority of the variables came directly from the GASF Site Form. That is, the database can be queried using any on the entries one would make on the site form, ex. Investigation date, site, number, county, NR status, phase, cultural affiliation, etc.

The historic structures database is searchable by up to 47 variables. These variable come directly from the GADNR historic structures recordation form. Variables include items such as: county, building type, NR eligibility, date of construction, major changes, etc.
 - c. Does the database contain only cultural resource information or does it also include environmental variables? Ecological resources: Ground Water Recharge, Mineral Resources, Threatened and Endangered Species, Hydrography, Conservation, etc.
 - d. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units? Unknown.
13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.?
 - a. National Register nomination forms are going to be tracked in a future release of GNahrgis, but are not currently.
14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources?
 - a. NAHRGIS is used by resource specialists in early planning stages in an effort to screen the project area for previously recorded resources, assessing probability, and to assess the

impacts of projects that would not require new right-of-way. NARGIS is also used as research tool, as copies of digital site forms and some reports are available for download.

15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded?

- a. Future plans for the database include creating a section of NAHRGIS dedicated to GDOT use only. GDOT would create a database of mitigation sites, Environmentally Sensitive Areas (ESA), and GDOT owned properties. This information would could be accessed and used by anyone in GDOT. There are also plans to add demographic information to be used by NEPA planners to identify potential EJ communities. Maintenance would be funded through state funds.

The Indiana Department of Transportation, Cultural Resources Section (INDOT, CRS) does not maintain a statewide GIS database. The Indiana Department of Natural Resources, Division of Historic Preservation and Archaeology (SHPO) maintains a nonspatial database (the Indiana State Historic Architectural and Archaeological Research Database [SHAARD]) containing site form information for archaeological sites and for historic structures and cemeteries, but this is not complete (it is updated as budgetary constraints allow). SHPO also maintains separate GIS shapefiles for archaeological sites, digitized from sites locations hand drawn on 7.5' USGS topographic quadrangles, and for historic structures. However, these contain very little metadata and are not linked to the SHAARD database. SHPO does not maintain a spatial record of archaeological survey areas, only of site locations.

1. What GIS program is used for the database?

INDOT, CRS uses ArcGIS 9.3.1 at our desktop. The Geodatabase is multi-user relational database using Oracle and SDE.

SHPO uses ArcGIS 9.3.1 as well.

2. Where is the database located? On a DOT server or some other server? How secure is this server?

The INDOT database is located on an Indiana state government owned and operated server. The server is not public.

3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?

The SHPO nonspatial database can be accessed by qualified professionals having SHAARD accounts provided by SHPO via the internet. The shapefile with archaeological site information is available to INDOT archaeologists and is accessible in the SHPO office for other users.

4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?
5. The databases are password protected. The SHPO database is accessible to qualified professionals as defined by state and federal laws, and access is granted by SHPO staff.

The INDOT database is restricted to authenticated users. If the data is to be shared with users outside of INDOT, it will need to be exported by an appropriate INDOT employee.

6. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated

The SHPO database can be updated remotely, though the data is placed in a queue for review prior to being accessible to Qualified Professional Archaeologists outside the SHPO office.

INDOT updates are controlled through the ESRI Spatial Database Engine (SDE), which holds edits in add and delete tables and a copy version until reconciled and posted to the default version. INDOT archaeologists have full editing rights to the internal Geodatabase.

7. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?

INDOT has only recently begun storing information about INDOT archaeological survey areas and sites recorded by INDOT in a spatial geodatabase. This database also includes polygons representing previously surveyed areas (digitized from archaeology reports) located within 1.6 km (1 mi) of recent INDOT survey areas. This database is maintained by INDOT GIS staff on a server run by the Indiana Office of Technology (IOT).

INDOT is planning, in cooperation with other state and federal agencies, to assemble these and other data sources into a new statewide archaeological spatial database that includes site boundaries and data with environmental data in order to create a predictive model for prehistoric archaeological site location probabilities. There is currently no specific funding for this project; INDOT archaeology staff are working on it between responsibilities to other projects. As a result, the predictive model remains in the planning stage.

8. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"

The catalyst for the INDOT Geodatabase was an institutional reorganization increasing the size and scope of the Cultural Resource Section at INDOT.

9. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format?

The SHPO SHAARD database was created from archaeological site forms, and the archaeological site shapefiles were digitized from USGS 7.5' topographic quadrangle maps with sites hand-drawn upon them. The sites in the databases are in general not verified.

The INDOT Geodatabase is being completed ad hoc.

10. How was the creation of the database funded?

The SHPO databases were funded in part with funds provided by the Federal Highway Administration through INDOT and other state funding.

- a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data?

The SHPO database is maintained and has various staff members working to upkeep and maintain the integrity of the data.

11. What geographic coordinate system was used for the database? What map units are used in the database?

The SHPO archaeology shapefiles are projected in UTM Zone 16N, but with a combination of NAD 1927 datum and NAD 1983. INDOT GIS data are UTM Zone 16N, NAD 1983.

12. What data standards are used for the database?

- a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language).

13. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?

- a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.
- b. Does the database contain only cultural resource information or does it also include environmental variables?
- c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?

14. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.?

The SHPO and INDOT spatial data do not contain links at this time.

15. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources?

Given the recent availability of the spatial data, INDOT has not made extensive use of them apart from their use in conducting records checks for Section 106 reports. As noted above, INDOT plans to utilize the data to construct a statewide predictive model, in cooperation with other state and federal agencies.

16. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded?

The INDOT database is updated by in-house staff as a by-product of the archaeological investigations that they conduct. The SHPO database is updated by SHPO staff as time and funding allow.

1. What GIS program is used for the database? **ESRI ArcView and ArcInfo.**
2. Where is the database located? **There are two separate databases. The archaeology database is located at the Office of State Archaeology (OSA) located within the University of Kentucky. The historic structures database is located at the Kentucky Heritage Council.**

On a DOT server or some other server? **Other server.**

How secure is this server? **Both databases are located behind State network firewalls.**

3. How is the database accessed? **The databases are accessed by a user ID and password on an ArcIMS.**

That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user? **ArcIMS**

4. Is the database accessible to the general public or is a password required to access the data? **A password is required to access the data.**

If the database is password protected, who can be granted access to the database? **GIS staff at the Office of State Archaeology, Archaeological and Cultural Historic staff at the State Historic Preservation Office, archaeologists who are using the data for academic research, and State and Federal agencies that pay an annual access fee are granted access to the database.**

Who makes the decision as to who can have access? **The Director and the GIS Manager at the Office of State Archaeology determines who can have access to archaeology database. Site Protection Program manager.**

5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? **No.**

By whom? **GIS staff at the Office of State Archaeology and the Kentucky Heritage Council updates the data in the respective offices.**

What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated. **New data is received, reviewed and then entered into a separate data file. It is then checked for errors, and then it is uploaded to the main data bases. The database is updated weekly. Updates are pushed to the ArcIMS sites quarterly.**

6. What agency created the database? **The Office of State Archaeology and Kentucky Heritage Council were responsible for creating both databases.**

The DOT? **No**

The SHPO? **Not really (see question 8).**

A combined effort? **No.**

Was a dedicated position created at the DOT for the explicit creation of the GIS database? **No.**

How long did it take to create the database? **Three years (1997-2000) for the archaeology data base. Four years (2000-2004) for the historic structures database.**

7. What was the catalyst for the creation of the database? **To expedite cultural resources planning and research.**

Did it start with a particular project or need as defined by DOT or the SHPO? **No.**

Was it that other agencies or states had initiated such an effort and you had heard about the project?" **No.**

8. How was the database created? **Via ISTEA funding, OSA, in collaboration with the Kentucky Heritage Council/SHPO, hired University of Kentucky graduate students to digitize site information and archaeological surveys that were then joined to a copy of the mainframe archaeological site and survey data. Archaeological staff from the Kentucky Transportation Cabinet provided minimal input. A similar process was followed for the Historic Structures database.**

What was the source of information for the database? **Paper records of individual site forms and locational data that had been hand drawn on USGS topographic maps.**

Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format? **A sample of the data was subjected to verification exercises. Ground truthing was not conducted.**

9. How was the creation of the database funded? **ISTEA funding.**
- a. How will the database be maintained in the future? **Annual access fees paid by State and Federal agencies and fees charged for required site checks for individual projects.**

Is there an individual dedicated to the upkeep and integrity of the data? **There are individuals dedicated to the upkeep and maintain the integrity of the data. However, those positions are based on soft funds and are not considered permanent.**

10. What geographic coordinate system was used for the database? **Originally UTM NAD 27 Zones 16 and 17. Currently Kentucky Single Zone NAD 83.**

What map units are used in the database? **Originally metric (UTM NAD 27 Zones 16 and 17). Currently US Survey Feet (Kentucky Single Zone NAD 83).**

11. What data standards are used for the database?

- a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language). **FGDC**

12. What is the content of the database? **Vector (shape files).**

Raster (image), vector (coverage/shape) and/or grid data? **Vector (shape files).**

- a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? **For the archaeology, attribute data is a direct replication of the 1970's mainframe data model that stored traditional Kentucky OSA site form information or the Kentucky Heritage Council survey forms.**

What are the variables that form the GIS database? **For archaeology, most variables from the archaeological site registration forms were included. Excluded were site and artifact descriptions. Data was also input from the National Archaeological Database (NADB) for inputting archaeological surveys. For historic structures, the variables on the KHC survey forms were included. Excluded were written descriptions of the sites and photos.**

Please describe the attributes of each variable in the database. **See attached.**

- b. Does the database contain only cultural resource information or does it also include environmental variables? **The database contains only cultural resource information. However, other attributes available to the public and located on Commonwealth servers (eg roads, topographic maps, soils, streams, hillshade, etc) are also included on the IMS.**

- c. What is the resolution of the raster data in dpi or map units? **N/A**

What is the resolution of grid data in map units? **N/A**

13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.? **No**

14. How has the database been utilized by the DOT? **KYTC archaeologists and historic structures staff had access to the databases until July 2008. KYTC stopped funding the updates and staff positions then, and as a result lost access to the data. (KYTC was not considered an owner of the data, just a facilitator of the GIS development). Since then, KYTC staff must to pay for access to the data on a project by project basis.**

As a locational tool (presence/absence) or as a predictive model? **Both as a locational tool and for predictive modeling.**

Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources? **Yes. Data requests are submitted to OSA to determine what areas have been previously examined, to determine if there are any previously recorded sites within the project corridor, and to determine the potential for the presence of unrecorded archaeological sites.**

15. What are the future plans for the cultural resource GIS database? **Changes to archaeological and cultural historic site forms are being considered, especially for the categories that could be generated by the data within the GIS (eg elevation, soils, UTM or Decimal Degrees, distance to water).**

How often are the data updated by the DOT/SHPO? **OSA and KHC update on a daily to weekly basis as reports and site forms come in. That data gets pushed to the ArcIMS sites quarterly.**

What additional information will be included in the database? **Long-term goals are to include links to other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.**

- a. How will the maintenance of the database be funded? **Annual access fees paid by State and Federal agencies and fees charged for required site checks for individual projects. It is hoped that a permanently funded position will be established. There are also considerations being made for cultural resource consultants to pay an annual fee to access the data.**

1. What GIS program is used for the database?
ArcGIS shapefile and related tables.
2. Where is the database located? On a DOT server or some other server? How secure is this server?
Mn/DOT server. Very secure. Users require permissions to access the data.
3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?
The data are accessed by Mn/DOT CRU staff only – loaded into their ArcGIS map files. There is no Internet or ArcIMS access. In next year or so, we hope to have an updated version that will be accessed through an Internet application we are now developing. Access will still be password controlled, and some users will be able to see data only for specific parts of the state. However, SHPO and OSA will have full access and will update this database. It will be the only version of the data and will be up-to-date.
4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?
Password controlled. At present, only CRU staff can see the data. In the future, it will be accessible to SHPO and OSA (who will maintain it instead of their current ACCESS databases), Mn/DOT CRU staff, CRU consultants, THPOs, and anyone else authorized by SHPO or OSA.
5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated
Currently, no. It is very difficult to update the GIS data. SHPO and OSA maintain the data in an ACCESS database. Periodically (every few years) we obtain a copy of the database and convert new records to GIS based on the UTM coordinates reported for properties. We also look for records we have already converted that have changed location data. We have done quite a bit of quality control on the location data, but more is needed. Because SHPO removed a key id that we had inserted into the database to distinguish multiple points for a single site, updates now require determining which location record goes with which point. This is very time consuming, which is why we update the data so infrequently. In the future, we hope to have the data in a geodatabase and accessible via an Internet application. We would declare a moratorium on OSA/SHPO updates to convert the most recent version of the data to GIS, then make it available to OSA/SHPO to edit. We and our consultants would be able to digitize new data into the interface and submit it to OSA/SHPO for approval and inclusion into the statewide database. We would also be able to extract data from the database, make corrections based on our research, and submit those corrected data for inclusion in the database.
6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?
SHPO created the original database in ACCESS format with funding from Mn/DOT. Mn/DOT then took the ACCESS data and converted it to GIS for the Mn/Model project. It did not take very long to create the GIS data, updates are more difficult to automate so they take much more time. Also, we have spent many hours doing quality control on the location data.
7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"

We needed a GIS layer of archaeological sites for the Mn/Model project. We later converted the historic structures database to GIS, since the CRU staff found the archaeological sites layer so helpful.

8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format?

UTM coordinates from the SHPO database were used to create a shapefile. There was no ground truthing. Thought ground truthing would be ideal, it would be extremely expensive. Instead, we have relied on evaluating the location data recorded in the database and on hard copy maps for quality control. A set of scripts was run to flag data with apparent location errors – UTM no in the county, quad sheet, or township/range/section reported in database, UTM outside of range of UTMs in Minnesota. This was followed by many hours of trying to correct these errors to the extent possible. If only the county was reported, we made sure the point was somewhere within the county. If township/range/section was reported, we made sure the point was somewhere within that section. When possible, we consulted hard copy maps at the SHPO office. At one point, SHPO had an intern who checked the GIS data against the maps, but he completed only a few counties before leaving. We found that township/range/section was almost as likely to be in error as the UTM coordinates were. We also found some where counties were incorrect. For modeling, we use sites that are accurate to the quarter-quarter section or better. For historic structures, there were often addresses, but not UTMs. If we had address ranges for their counties, we located them by address matching. For areas where we have reviewed projects, we have used Sanborn maps to correct location of structures. There is much more quality control to do, particularly on historic structures. We are hoping that SHPO and OSA will be able to help with this once the data are accessible through our upcoming Internet application. We also hope that by their mapping of locations in GIS using this application, we will avoid future errors.

9. How was the creation of the database funded? By Mn/DOT.
 - a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data?

In the future, the data will be maintained through our Internet application by SHPO and OSA, with help from Mn/DOT and consultants who submit new data or corrections to existing data. See #5 above.

10. What geographic coordinate system was used for the database? What map units are used in the database?

UTM meters, NAD 83, UTM zone 15 extended to include the small portions of zones 14 and 16 at the western and eastern margins of the state.

11. What data standards are used for the database?

- a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language).

We use the Minnesota state standards for metadata, which were adapted from the FGDC standard. Metadata are in HTML format.

12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?

Data consist of points (site centroids) in shapefile format. We hope in the future to incorporate lines and polygons as much as possible. We now collect line and polygon data from our consultants as well as points.

- a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.

While converting the data and performing quality control, we use the shape files ARCHPTS.SHP and HISTPTS.SHP. Their tables include some fields from the SHPO/OSA databases and some we have added for quality control. When the data are ready to put on the server for CRU staff use, we remove most of the quality control and location data fields and join the shape files to the property data to create ARCHSITES.SHP and HISTSTRUCT.SHP. I have attached the metadata for these four shape files to the e-mail.

- b. Does the database contain only cultural resource information or does it also include environmental variables?

The only environmental data come from fields already in the SHPO/OSA databases.

- c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?

We do not maintain the properties data in raster format. For modeling we convert the data to 30 meter grids.

13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.?

Those data are in the SHPO/OSA databases, but they are accessed by one-to-many or many-to-many relates that would be difficult for CRU staff to set up. They can view these data in the SHPO MS ACCESS forms. When the data are converted to a geodatabase, we hope to provide views of these data.

14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources?

All of the above. Originally, we used the data to indicate presence of archaeological sites for modeling (random points represented absence). CRU staff use both the predictive model and the site locations when reviewing projects. If significant sites are present, they work with the project planner/project manager to avoid the sites or minimize the effects.

15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded?

We plan to update the data and put it into a geodatabase that will be accessible to Mn/DOT, OSA, SHPO, and other authorized users via an Internet application. SHPO/OSA update the ACCESS data almost daily. Mn/DOT updates the GIS data periodically. With the Internet application, all SHPO/OSA updates will be done directly in the GIS data. Mn/DOT will have access to these data, so will always see the most current data but have no update responsibility. However, Mn/DOT is developing the Internet application and will be maintaining it. Prior to converting the data to GIS, SHPO, OSA, and Mn/DOT will refine the database design. Several new fields will be added, including site depth. We may also begin to record site boundaries, instead of points, for large sites.

1. What GIS program is used for the database?

ESRI ArcGIS – currently using version 9.3

2. Where is the database located? On a DOT server or some other server? How secure is this server?

The database is housed at the Missouri Department of Natural Resources – SHPO office.

The server is very secure with access limited to only key DNR GIS and SHPO personnel

3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?

Data is access via ArcIMS at the SHPO. SHPO provides MoDOT and several other partners with frequent and periodic updates that are used for remote access.

4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?

The database is not available to the general public. Passwords are required even for those having access to the data. To be granted access requires the requester to be either a professional archaeologist or an official representative of a cooperating agency. To be granted access also requires the individual or agency to sign an MOU with the SHPO that states professional use and confidentiality requirements and requiring future sharing of archaeological data. The decision to grant or deny access typically is made by the SHPO although other cooperating agencies may be consulted in some situations.

5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated

Updates to the database are made on a weekly basis and are made at the SHPO office and by SHPO and DNR GIS specialists. Quality of the data is reviewed by SHPO archaeological staff and at times by professional archaeologists at MoDOT. Potential changes to the database are reviewed by DNR GIS staff prior to any update to minimize potential corruption issues.

6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?

The database was created through a combined agency effort. Agencies involved included MoDOT, FHWA, DNR, and the Missouri Department of Conservation. These agencies worked out the kinds of data to be captured. MoDOT and FHWA then provided funding to hire a GIS contractor to develop the actual database structure and enter most of the data. Through several time, additional agencies including The US Army Corps of Engineers and the National Forest

Service have contributed funding and/or data to add to the archaeological site database. No dedicated position was established by any agency for creating the database although funding was provided to the GIS contractor. Additional data are still being entered. The initial interagency planning meetings to the conclusion of the GIS contractor's contract spanned approximately 4 years.

7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"

The original catalyst for the creation of the database was a number of difficulties that agencies and consultants were having both accessing site data and reporting site data with the manager of the earlier statewide archaeological site survey. These difficulties occurred over a period of time and with involved a number of projects. The state already had a computerized database but it was not GIS-based. MoDOT, FHWA and the SHPO started the GIS-based statewide database.

8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format?

The kinds of data to be included in the database were established through a number of interagency meetings and steering committee meetings. Once the basic nature of the database was determined, a GIS consultant was hired on a multiyear contract to create the database itself and enter site data. Data in the original non-GIS statewide database was not made available so MoDOT and the SHPO had to recompile the site data from a variety of sources including data contained in CRM reports, files of the various cooperating agencies, and information provided by consulting archaeologists. The data was not ground truthed. A subsequent contract was provided to an outside archaeological-GIS consultant to verify approximately 20% of the GIS data. In addition, MoDOT and SHPO staff have conducted additional verifying of the data as staff is available.

9. How was the creation of the database funded? How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data?

The creation of the database was funded by MoDOT, Missouri Dept. of Conservation, FHWA, US Army Corps of Engineer, and the US National Forest Service. The SHPO provided staff time to assist with its creation. MoDOT has provided additional funds to verify some of the data. DNR has committed to maintain the database in the future. A SHPO has dedicated part of an FTE, an intern when available, in addition to the involvement of its IT and GIS staff to maintain the data.

10. What geographic coordinate system was used for the database? What map units are used in the database?

The geographic coordinate system is GCS – North America NAD 83, Zone 15. USGS topographic maps are used in addition to UTM's.

11. What data standards are used for the database? Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language).

Data comply with DGDC CSDGM standards.

12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?
- What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.
 - Does the database contain only cultural resource information or does it also include environmental variables?
 - What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?

The content of the database include all three kinds of data.

- The database currently is restricted to attributes relating to archaeological sites and Section 106 survey limits. Selection of the attributes was based on trying to capture data that had been previously recorded as well as data that would be meaningful in Section 106 activities and archaeological research. Attributes refer to spatial, descriptive, and environmental considerations of the site. The site form and its attributes is available at: <http://www.dnr.mo.gov/forms/780-1927.htm>

The current database is restricted to archaeological sites and the limits of Section 106 project limits. The SHPO hopes to create additional databases for architectural resources than may be linked or added to the archaeological site database.

- The database includes a variety of environmental variables.
- Resolution of all forms of data is based on USGS 1:24,000 topographic maps.

13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.?

The SHPO currently maintains a variety of databases including NRHP-listed properties and cultural resource reports and locations of projects. Additional databases are planned. There currently are no direct links to any of the additional databases

14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources?

MoDOT typically uses the database as a location tool to determine the presence, absence or proximity of previously reported archaeological sites. The database is used extensively during

early project development activities to avoid or minimize potential effects. Thus far the data has not been specifically used for predictive models.

15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded?

Future plans are to continue to update and verify the data in the archaeological GIS database. Updates are made by the SHPO on a weekly basis. It is unlikely that additional attributes will be added to the current archaeological database since approximately 20,000 sites are already entered. Expectations in the original interagency agreements were that other agencies would provide funds for a GIS contractor to work on the database while DNR would provide staff effort to maintain it. Should significant maintenance activities be required in the future, it is likely that the partnering agencies will discuss additional means to fund these activities.

1. What GIS program is used for the database? **ArcGIS**
2. Where is the database located? **Server supported by state IT department.** On a DOT server or some other server? How secure is this server? **Access with a password is only provided to state permitted archaeologists or researchers.**
3. How is the database accessed? **Web-based.** That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?
4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access? **Access with a password is only provided to state permitted archaeologists or researchers. State and federal laws prohibit the disclosure of site locations to the public.**
5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? **No. A new design is now being developed that MAY include the ability to upload new information by users.** By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated **Currently as reports are submitted to the Archaeological Records Management Section for curation, the staff enters data into database and ArcIMS.**
6. What agency created the database? **The Archaeological Records Management Section received a NPS grant to initially develop NMCRIS.** The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? **No.** How long did it take to create the database? **Unknown**
7. What was the catalyst for the creation of the database? **Unknown** Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"
8. How was the database created? What was the source of information for the database? **Original paper records curated at the Archaeological Records Management Section.** Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format? **No. Data is updated/corrected as sites are updated.**
9. How was the creation of the database funded? **My understanding is was created with the monies from a NPS grant.**
 - a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data? **As part of the state Archaeological Records Management Section, their staff is dedicated to the upkeep and integrity of the data.**
10. What geographic coordinate system was used for the database? **UTM NAD 1927** What map units are used in the database?
11. What data standards are used for the database?
 - a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language). **Unknown**
12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?
 - a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database. **Unknown**
 - b. Does the database contain only cultural resource information or does it also include environmental variables? **Only cultural resources information.**

- c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?
13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.? [The database provides an activity number for the particular cultural resource project/report. NR/SR and historic architecture documents are stored at the SHPO's office.](#)
14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? [Both](#) Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources? [The MapServer provides site locations and previous survey limits. Performing a search via the MapServer is standard to assist in determining level of effort.](#)
15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded? [Funding comes from state and federal agencies and private cultural resource contractors that utilize the database.](#)

The Archaeological Records Management Section (ARMS) of the Historic Preservation Division of the Department of Cultural Affairs maintains the New Mexico Cultural Resource Information System (NMCRIS). This statewide database and GIS is used by all state agencies. All archaeological contractors are also required by statute to consult NMCRIS as part of their pre-field checks. All federal agencies within the state consult NMCRIS, though some also maintain their own cultural resource geodatabases. ARMS is currently working with an IT vendor to develop a new, enhanced version of NMCRIS (tentatively call eNMCRIS) which will include enhancements such as online forms and online GIS editing. This system will utilize newer GIS software and different system architecture. Consequently, some of these questions will have two answers – one to reflect the current NMCRIS and a second for the planned functionalities of eNMCRIS.

1. What GIS program is used for the database? The NMCRIS System utilizes ArcSDE tied to an Oracle database (with eNMCRIS we will be moving to ArcGIS Server and MS SQL Server)
2. Where is the database located? Server supported by the state Dept. of Information Technology (DoIT). On a DOT server or some other server? How secure is this server? Requires a user name and password, has fairly standard firewall, etc. – DoIT would be able to provide more details.
3. How is the database accessed? Web-based using an ArcIMS server. That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user? The NMCRIS MapService includes an extract tool which will clip out GIS features based upon the extent of the viewer's screen and export those features as a zipped file which the user may download to their local machine.
4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access? Access requires a username and password which is only provided to state permitted archaeologists or researchers with an active ARMS user agreement. State and federal laws prohibit the disclosure of site locations to the public.
5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? Currently, remote users (i.e. contractors) can register surveys and sites using Oracle forms. During registration the user creates the record and enters a handful of key fields. Registration of a new site also generates a proxy circle on the sites layer of the GIS. Survey shapes are not created by the user. The bulk of the tabular data entry and the heads-up digitization of the *real* site and survey shapes are done by ARMS staff once the paper records have been through the review process and submitted to ARMS for permanent storage.
(With eNMCRIS, the outside users will be able to fill out the complete site and survey forms online and print them out for submittal. All the relevant fields will be captured in the eNMCRIS SQL Server database. Outside users will also be able to create and edit their own site and survey shapes in the GIS – either by uploading shapefiles from their local machines or by digitizing on screen through our website (ArcGIS Server technology)).
6. By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated. Currently, quality assurance is built into the process in the respect that almost all data entry and GIS work is done by ARMS staff. All ARMS staff are themselves experienced archaeologists.
(With eNMCRIS we are working with our IT vendor to develop as many safeguards as possible for the new system. For instance, contractors will only have access to the records and GIS features that their firm created. They will not be able to edit records/shapes created by other firms. ARMS will also continue to do quality assurance on every record that is submitted. On the GIS side, features will be color-coded to distinguish “provisional” shapes from those that have been verified by ARMS staff.
7. What agency created the database? The Archaeological Records Management Section received a NPS grant to initially develop NMCRIS. The DOT? The SHPO? A combined effort? Was a

dedicated position created at the DOT for the explicit creation of the GIS database? **No.** How long did it take to create the database? **Creation of the current system predates my employment at ARMS, but I believe the development took about 18 – 20 months. (If roll out of eNMCRIS happens June 30th as expected, its development will also have taken roughly 18 months).**

8. What was the catalyst for the creation of the database? **Unknown** Did it start with a particular project or need as defined by DOT or the SHPO? **NMCRIS was conceived and initiated by the then director of ARMS. (Development of eNMCRIS was spurred by problems of data currency in the current system. The very high volume of CRM work in New Mexico (20 – 30,000 activities per year) has overwhelmed the ability of the ARMS staff to enter all the data in a timely fashion. A substantial backlog – 3 yrs or more – has developed. This backlog erodes the effectiveness of the current system as a management tool. Since eNMCRIS will collect most data from the contractor at the time of creation, the new system should offer near real-time data. Was it that other agencies or states had initiated such an effort and you had heard about the project?” No. The current system was developed in 1999 – 2000. It’s my understanding that it was one of the first (if not *the* first) systems of its kind. (The eNMCRIS system has some precedence – Vermont SHPO has web-based GIS, and several states already use a more basic version of CRM Tracker).**
9. How was the database created? What was the source of information for the database? **Original paper records curated at the Archaeological Records Management Section. Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format? Verification is largely the purview of the land managing agencies which review the work done on their lands, as well as the SHPO. ARMS staff members rely on their experience to correct any obvious errors – usually inconsistencies within the forms themselves, but they are limited by their inability to actually “see” the resources.**
10. How was the creation of the database funded? **Creation of NMCRIS was largely funded by an NPS grant. (Development of eNMCRIS is being funded by a state appropriation)**
 - a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data? **As part of the state Archaeological Records Management Section, their staff is dedicated to the upkeep and integrity of the data.**
11. What geographic coordinate system was used for the database? **UTM NAD 27 (with eNMCRIS, all records/features will be reprojected into UTM NAD 83** What map units are used in the database? **Meters**
12. What data standards are used for the database?
 - a. Federal Geographic Data Committee’s (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language). **FGDC standards**
13. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data? **Editable layers (sites, surveys, state register districts, etc.) are vector-based as are most base layers (PLSS, Quad Grid, etc.). The only raster layer in the current system contains the background DRG’s (eNMCRIS will follow the same general schema, except that 1-m aerial photographs will also be offered as a map service.)**
 - a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database. **Sorry, detailing all this would be much too time consuming. Our GIS is tied through spatial views to multiple Oracle tables with literally hundreds of fields. If you have more specific questions, I’d be happy to answer them individually.**
 - b. Does the database contain only cultural resource information or does it also include environmental variables? **For the most part, only cultural resources information. Currently only archaeological sites and surveys and NR/SR properties. (eNMCRIS will**

broaden this scope to include historic architecture). The archaeological site tables in Oracle do contain some “site setting” fields such as vegetation zone, topographic setting, etc.

- c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units? Resolution of the DRG’s is whatever was available from USGS in 2000. I suspect it’s 4 m, but I’m not sure. (The aerial photos served up in eNMCRIS will have 1 m resolution).
14. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.? The current NMCRIS provides the user with pdf reports containing most of the activity (report) and archaeological site data contained in the Oracle database. Architectural data currently exists only in hardcopy form. (eNMCRIS development will include a parallel historic architecture database that will offer the same pdf reports for architecture. A full scanning and document management system proved to be beyond the project budget).
15. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Both Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources? The MapServer provides site locations and previous survey limits. Performing a search via the MapServer is standard to assist in determining level of effort.
16. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded? See the info above on eNMCRIS. Funding comes from:
 - a. User fees paid by archaeological contractors for each activity registration
 - b. HPF funds provided by the NPS
 - c. Data-sharing agreement with various federal agencies
 - d. State funds allocated to the Historic Preservation Division

1. What GIS program is used for the database?
[Microsoft's Access/ArcIMS](#)
2. Where is the database located? On a DOT server or some other server? How secure is this server?
[Currently the GIS database is housed on a consultant's server. NC Department of Cultural Resources/OSA maintains a traditional database for full site information. They are secured servers.](#)
3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?
[ArcIMS via password.](#)
4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?
[The archaeology data is secure and requires a password. Public access is not granted. Access is limited to the Office of State Archaeology, NCDOT staff archaeologists and contracted application developers/consultants.](#)
5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated
[No, this is not currently available. The GIS data is static and has not been actively updated for several years now. The management plan calls for regular, quarterly or semiannual updates with a well-defined protocol for entering data, checking it and then releasing newly updated versions.](#)
6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?
[It was a joint effort between NCDOT, OSA and the DCR, largely funding by NCDOT efforts. A large development team worked together. OSA provided many staff hours with our consultants. The effort was lengthy transferring data and survey areas, plus a robust QC/QA process. No, NCDOT did not create a dedicated position for creation of the GIS database, but it is a swell idea, even if time-limited until the bulk of the work is completed. Maintenance could then be the task of folks that previously worked on paper maps.](#)
7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"
[NCDOT sought to create a method of considering archaeological cultural resources earlier in the NEPA process, especially on large, multiple corridor projects like bypasses. Use of a robust predictive model for prehistoric sites was a good solution. It required development of a spatial database.](#)
8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format?
[An older, traditional database \(dBase or Universe?\) maintained by OSA was migrated into Access and paper forms were entered. Paper USGS quad maps maintained by the OSA were scanned, geographically corrected and registered, then certain features \(sites, surveys, 'no survey' areas, some historic landmarks \(schools, churches, etc\) were digitized. Sites were associated with the Access database to transfer limited information into data fields. Dozens of environmental factors were associated with each site and complex calculations were completed to determine which of those factors were statistically significant.](#)

A large scale survey at nearly 100% coverage was conducted to help to test the veracity of the data and results of the predictive model. Otherwise, ground truthing was not widely conducted; the geographical data is only as accurate as the quad maps.

9. How was the creation of the database funded?

FHWA with matching State funds.

- a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data?

The databases, especially the traditional types, are maintained by the DCR's OSA and HPO. No staff has been assigned, thus, while the data is assumed to be in perfect shape, it has not been updated.

10. What geographic coordinate system was used for the database? What map units are used in the database?

North Carolina State Plane, NAD 83. Meters/feet.

11. What data standards are used for the database?

- a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language).

Metadata.

12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?

All three for the predictive model. The database by itself relies on vector data primarily, backed by raster files.

- a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.

The database focuses on archaeological sites and locations reviewed for CRM compliance (recommended for survey, no survey recommended, intensive survey completed). Fields were populated with data that was easily transferable from Access. Basic data only, such as site number, cultural affiliation, etc.. No pictures were included, however hundreds of historic maps were scanned and stretched into place – very useful for identifying potential historic sites and roads, even though the accuracy can be a bit off. There are ways to work in both a GIS and a traditional database to view geographic and complete 'site forms.'

- b. Does the database contain only cultural resource information or does it also include environmental variables?

For the Archaeological Predictive Model a great deal of environmental data was statistically tested to identify which environmental variables were most useful. Only selected data was implemented into the delivered project.

- c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?

10-30 meter grid, generally.

13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.?

Not actual links, but some references to these other sources may be included.

14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources?

APM: yes, also as a predictive model, though the tool is underutilized. The original intention is to provide early information and insight for NEPA, and to help guide alternative selection while factoring other concerns, too. It is a great tool for reviewing previous archaeological work and suggesting both if a intensive survey is warranted, and if so, where the most likely spots will be.

15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded?

NCDOT intends to take ownership and maintenance of the GIS-based database and archaeological predictive model in an ESRI product that is more current and supported. We seek to increase internal training and usage of this planning tool, and have regular updates. Some of the archaeological site data to be updated can be incorporated into individual scopes of work so that project APEs and site location data is available for each survey.

1. What GIS program is used for the database?

ANSWER: GeoMedia GIS, by Intergraph

2. Where is the database located? On a DOT server or some other server? How secure is this server?

ANSWER: The data resides on “internal, ODOT only” servers. This data has no external exposure outside of ODOT Central and District offices. The data is in a “read only” environment.

3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?

ANSWER: This data is ONLY available to internal ODOT offices and only if the office has internal administrative rights to see the data in their regular directory structure. The ability to map various servers, drives and directories is controlled. There is no internet serving this data, there is an intranet to serve the data, but this is more of a “beta” and not used very frequently for whatever unknown reason.

4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?

ANSWER: Cultural Resources Data is not available to the public through ODOT. The Ohio State Historic Preservation Office (OSHP) is the owner, keeper and custodian of the data. The OSHP DOES grant access to the data on their website with a username/password protocol. ODOT funded the digitizing of the datasets; as a result, ODOT has perpetual access and copies of all datasets. The agreement between ODOT and OSHP includes a “confidentiality clause” that gives ODOT use, but not distribution rights. OSHP reserves the right to control who accesses the data outside of ODOT. This setup has been emulated with other agencies datasets, such as the “Natural Heritage Data Base” of Threatened and Endangered Species from the ODNR (Ohio Dept. of Natural Resources)

5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated.

ANSWER: No, the ODOT system is manually updated on a quarterly basis, by the GIS Coordinator for ODOT’s Office of Environmental Services. The data is manually verified for “consistency”. Each dataset is time stamped and kept as a complete archival copy, pre-update.

ODOT receives notice of FTP access to, or DVD copies of, all OSHP datasets on an annual or as needed basis. All notices go through the Assistant Environmental Administrator of the Cultural Resources Section for ODOT’s Office of Environmental Services and the GIS Coordinator for the Office of Environmental Services is cc’d on this written (or e-mailed) notice. The GIS Coordinator for the Office of Environmental Services, physically downloads the datasets and completes a systemic QA/QC of each dataset for locational and data format and structural consistency.

6. What agency created the database? The DOT? The OSHP? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?

ANSWER: ODOT funded the OSHP to build the datasets into a GIS useable format. It was very much a combined effort between ODOT and OSHP. Since 1998, ODOT has funded a number of projects related to the development of this GIS system at the OSHP,

which has included some temporary staff to work on this data conversion effort. The initial data conversion was funded for about 3 years in individual funding agreements. Though the level of financial investment has lessened since the original development was accomplished, ODOT continues to work with the OSHPO in each fiscal year to improve existing data and/or to add new data layers. The process has been on-going and evolving as new data layers are developed and funding is made available.

7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the OSHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"

ANSWER: The catalyst was ODOT's effort to streamline our NEPA and Section 106 processes. A lot of time was spent traveling from ODOT to the OSHPO offices for research on each project. The OSHPO wanted to modernize their data collection, in an effort to conserve storage space and to make the files more readily available, while protecting the physical integrity of the documents. The OSHPO lacked funding to accomplish this goal. ODOT had a funding mechanism, and was able gain departmental approval to initiate this process with the OSHPO. It was a win-win situation for both the OSHPO and ODOT. This has fostered an excellent working relationship with the OSHPO and perpetual access to data, without leaving our offices. We are unaware of any other State or Federal agencies in Ohio who have tried to do something similar with the Ohio OSHPO. When ODOT first looked into this in the late '90's, we looked at how similar systems and processes had been set up in Minnesota and Indiana. ODOT is very aware that all other agencies in Ohio have benefitted from our investment in this system. It was never considered and was never an issue for ODOT to do this for "ODOT only" use. We have a lot of partners with other agencies; again it is all a win-win for ODOT's transportation program.

8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format?

ANSWER: The source data were the original documentation submitted for each site from consultants, developers/builders, other agencies, etc.... ODOT did and still does submit the vast majority of newly documented sites....ODOT didn't have much input in ground truthing/verification. In the beginning, the data was just keyed in and accepted "as is". As positional errors or other errors were discovered, ODOT would notify the OSHPO of our findings. The corrections would be noted in our version of the dataset, as "provisional", until the findings were accepted by OSHPO. As we received quarterly updates, the "provisional's" became "permanent" improvements to the data....a constant feedback loop and updates between ODOT and OSHPO. This has really helped professional relationships between OSHPO and ODOT Office of Environmental Services Cultural Resources Section personnel. This joint effort helped engender more trust, respect and understanding between ODOT and OSHPO.

9. How was the creation of the database funded?

ANSWER: Originally, As an SPR (State Planning and Research) funded research project to help streamline the NEPA process.

- a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data?

ANSWER: Currently, the Office of Environmental Services GIS Coordinator is in charge of upkeep and data integrity. No plans have been developed to change this so far.

10. What geographic coordinate system was used for the database? What map units are used in the database?

ANSWER: The original coordinate given in the original documents was a mix of UTM, State Plane Ohio North and Ohio South, NAD 83 and NAD 27, feet and meters....the data was finally standardized to State Plane, Ohio South, NAD 83, feet, with all of the other measures and projections etc, kept as attributes in the DB. GeoMedia allows you to switch projections, datum and units “on the fly”, without needing to stop and re-project the entire dataset, as ARCGIS did.

11. What data standards are used for the database?

- a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language).

ANSWER: Standards were set by OSHPO and from the enclosed documentation they followed FGDC Content Standards for Digital Geospatial Metadata.

12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?

ANSWER: Raster and Vector, no GRID data.

- a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.

ANSWER: When OSHPO developed the dataset, the DB attribution was taken directly from the original source documents to accommodate all of the various types of documents and depth of information provided to the OSHPO. As a Consequence, the DB has in excess of 220 columns of attributes for the Archaeological sites and approximately 150 columns of attributes for the Historic Sites. This data is appended with approximately 20 additional columns in the ODOT database to accommodate specific web links to PDF versions of the original documentation or PDF's of addenda and other specific calculations performed in the ODOT GIS.

- b. Does the database contain only cultural resource information or does it also include environmental variables?

ANSWER: There are numerous environmental variables included in the original DB from OSHPO. Including elevation, distance from water bodies, land cover/vegetation, soil types, glaciations, etc...

- c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?

ANSWER: The “raster” data is actually PDF versions of the original reports filed with OSHPO. If maps or pictures or aeriels or other imagery were part of the original or addenda, it is scanned at whatever sheet size it was originally, at a 200 DPI resolution...no GRIDS in our dataset.

13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.?

ANSWER: Yes, all of the above as either internet URL's or as a directory link to a PDF of the document or pictures, etc.

14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources?

ANSWER: Used as a primary locational screening tool in the planning stages ODOT's transportation development process for transportation projects. In addition to ODOT's standard highway and bridge program, ODOT also processes bicycle/pedestrian projects, Transportation Enhancement Projects, transit, rail, and lake and river port projects.

15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/OSHPO? What additional information will be included in the database? How will the maintenance of the database be funded?

ANSWER: It is ODOT/OES' intent is to go toward more of a "predictive model" use of the data, as well as the locational and general information tools the system provides. ODOT is only aware of OSHPO's ongoing plans for the database to the extent of project/database improvement proposals that OSHPO submits to ODOT/OES annually. Additional layers are being developed by OSHPO and shared with ODOT for comments and refinement. Some of the developed layers so far include a "Previously Surveyed Areas" of Archeological sites and also for Historic/Architecture resources, as well as Historic Bridges and identification of bridges for future evaluation of historic importance. Other layers included in recent years are properties with an existing "Determination of Eligibility" for the National Register of Historic Places, sites and districts listed on National Register of Historic Places, historic canal systems, cemeteries and churches, etc.

Funding these OSHPO improvements to the GIS system from the ODOT side is dependent on operational needs, goals and availability of funds. OSHPO is a quasi-state agency and is funded separately by the State of Ohio and other sources. Maintenance of the datasets at ODOT has been the job of the ODOT/OES GIS Coordinator. No plans have been discussed to change this setup.

1. What GIS program is used for the database?

Geomedia

2. Where is the database located? On a DOT server or some other server? How secure is this server?

The database and system are housed on a PennDOT server behind a VERY secure firewall.

3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?

The system is accessed on the net. See crgis.state.pa.us

4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?

All data except archaeological site locations, archaeological site recorders, and land owners is publically accessible. Password protected access to the protected data is granted by the Pa SHPO office to archaeological consultants or researchers who meet 36 CFR 61. They must sign a waiver agreeing to protect the locational and other restricted data before they are issued a password.

5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? **No.** By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated

New data are directly added regularly by the SHPO staff to the DOT GIS servers.

6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?

The database is a cooperative effort between the SHPO and DOT, with much of the technical programming work done by DOT consultants. There is no dedicated CRGIS position at DOT. Development of our system began over a decade ago and is continuously refined as needs arise and funds become available.

7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"

The CRGIS was born from a need for DOT regional staff and consultants state-wide to get instantaneous access to the SHPO historic and archaeological site records and for the SHPO to protect and archive the hard-copy sources of those data. DOT and the SHPO co-developed the system that supports the databases and layers that comprise the GIS, with the SHPO as the owners and managers of the data, and DOT as the owner/manager of the system.

8. How was the database created? What was the source of information for the database? **The data were first digitized into a stand-alone database beginning in the 1980's, from paper records, some of them more than 50 years old. The electronic data were converted to GIS in the 90's.** Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format? **No.**

9. How was the creation of the database funded? **FHWA SPR funds, COE Mitigation Commitment money, and some State DOT funds.**
 - a. How will the database be maintained in the future? **Dot staff and consultants will continue to maintain the database, SHPO staff will maintain and add data.** Is there an individual dedicated to the upkeep and integrity of the data? **Yes.**
10. What geographic coordinate system was used for the database? **GCSNAD1983** What map units are used in the database? **Meters.**
11. What data standards are used for the database?
 - a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language). **Uncertain. Will try to followup with the DOT GIS Staff.**
12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data? **Vector.**
 - a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database. **The database has an extensive attribute table and data dictionary, and there are dozens of variable fields recorded for a variety of resource types.**
 - b. Does the database contain only cultural resource information or does it also include environmental variables? **Yes**
 - c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units? **N/A**
13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.? **Yes.**
14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? **Primarily as a locational tool, with increasing use for predictive modeling.** Is the database used in the early planning/stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources? **Just beginning to be used for planning and programming.**
15. What are the future plans for the cultural resource GIS database? **Wider distribution and increasing capacity.** How often are the data updated by the DOT/SHPO? **Constantly.** What additional information will be included in the database? **In the near to mid future; linera resources (historic RR and canals), historic structures survey reports, historic cemeteries, State-designated historic districts, historic forts and military sites.** How will the maintenance of the database be funded? **Through inter-agency partnerships including DOT/FHWA and OSM.**

PREAMBLE: Texas' Statewide Database is termed the Texas Historic Sites Atlas. It includes archeological sites as well as historic sites, NR properties and districts, Historic Markers, Cemeteries, and a variety of other data. It was developed and is maintained by the Texas Historical Commission (THC), which also serves as our SHPO. I will try to answer the questions as best I can, but the ultimate authority is Daniel Julien, who can be reached at daniel.julien@thc.state.tx.us.

TxDOT has also developed several GIS tools to aid decision making and facilitate coordination, including the Texas Historic Overlay and the Houston-PALM. These latter tools do not seem to be the subject of this questionnaire and are not addressed further.

1. What GIS program is used for the database?

A. I believe the database is currently running under an ArcIMS server. It was originally developed under a different system and ported over in the mid-2000's.

2. Where is the database located? On a DOT server or some other server? How secure is this server?

A. The Atlas is not "ours", although it was originally developed under TxDOT supervision through two transportation enhancement awards, one under ISTEA and a second refined under TEA-21. The agency responsible for the development and maintenance is the Texas Historical Commission (THC; also serves as our SHPO). The server is at THC. Contact Dan Julien at the above address for technical details regarding server security.

3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?

A. The Atlas is accessible over the internet only.

4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?

A. There are two different parts of the Atlas: a public site with historical data, and a completely separate site with archeological data. The historical side is open, while the archeological data is password protected. THC issues cultural resource credentials which include CRM library and Atlas privileges. THC rules restrict access to archeological data to professional archeologists.

5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated

A. Updating occurs at the Texas Archeological Research Laboratory at the University of Texas at Austin (TARL), which is the repository for state site records. It is then transferred periodically to THC where the server is updated. I cannot speak to the technical details.

6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?

A: TxDOT's primary role was to manage the interagency agreement through which the ISTEA and TEA-21 project funds were administered. TxDOT did not create a dedicated position for this purpose. THC developed and maintained the Atlas. The transportation enhancement awards played out over approximately 10 years from the mid-1990's to the mid-2000's

7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"

A: As I understand it, the original idea was to create a sites database for purposes of CRM compliance and for research purposes. However, they quickly learned that because the database was only a transcription of the survey-level site records, attributes such as site age and cultural affiliation were unreliable, and the research tool goal was abandoned. Although revisit forms do exist, site records are not updated to reflect the outcome of investigations, and there is still no database of sites that have been found eligible for NRHP. The primary purpose of the Atlas is to allow on-line record searches and keep people from all over the State from having to travel to Austin to do file reviews at TARL.

8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format?

A: The Atlas is a digital version of the State's site record and survey record database, maintained by TARL. The Atlas is tied to (and accessible through) GIS display of locational data on a seamless USGS topo base. It was created by transcription of the existing records, and creation of a uniform format for new records. The data is only as good as the source records. There were originally many transcription errors (one common cause: face value acceptance of UTM's furnished with the submitted records), but these are being gradually identified and corrected.

9. How was the creation of the database funded?

a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data?

A: The creation was funded by Transportation Enhancement funds (ISTEA and TEA-21). TxDOT is not involved in ongoing maintenance.

10. What geographic coordinate system was used for the database? What map units are used in the database?

A: I cannot speak to this. I suggest you contact Dan Julien at the above address.

11. What data standards are used for the database?

a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language).

A: I cannot speak to this. I suggest you contact Dan Julien at the above address.

12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?

A: The display includes point and polygon symbols representing sites and polygons representing surveyed areas displayed on a topo raster (DRG) base map.

What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.

A. The Atlas site data is a digital version of the physical site file at TARL (in practice, supplementary data present in the physical file is often not included). Site forms have been transcribed, and in most cases site sketch maps have been scanned and attached. The site forms elicit information regarding site constituents, the site's setting, the site's condition, and management recommendations. In addition, the survey areas plotted in the Atlas are associated with information on the sponsoring agency, year of survey, and Texas Antiquities Permit number under which the survey was conducted (if known or applicable). Only surveys done under a Texas Antiquities Code permit (primarily those on land owned or controlled by the state or a political subdivision of the state) are shown.

Does the database contain only cultural resource information or does it also include environmental variables?

A: Only cultural resource information, except to the extent that environmental information is included in the site file.

What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?

A: The raster data is standard USGS DRG data at appropriate scales. For more information, please talk to Mr. Julien.

13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.?

A: Yes, as described above. Access to PDF versions of associated reports is also available for reports produced within the last year or so.

14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources?

A: The Atlas is used as a substitute for physical file searches at TARL. Due to the previously-noted data limitations, the Atlas primarily provides information regarding the possible presence or absence of recorded sites within a project's area of potential effects. Informal predictive modeling can be done with Atlas data in some instances, but the Atlas is not designed for this purpose.

15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded?

A: I cannot speak to this. I suggest you contact Dan Julien at the above address.

1. What GIS program is used for the database?

SQL Server, ArcGIS, ArcSDE, ArcGIS Server

2. Where is the database located? On a DOT server or some other server? How secure is this server?

State Department of Technology Services, virtual servers

3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?

ArcSDE database connection is available to authorized agency personnel. All other users access data through an authenticated web application using ArcGIS Server technology.

4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?

Basic information about historical structures is available to the general public. Access to Archaeological data is restricted by Utah's Government Records Access and Management Act. Permissions are granted through individual agency to agency record sharing agreements. Access is managed by username and password.

5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated.

Custom tools allow for uploading desktop authored data. Tools currently only available to staff at the Utah Division of State History. The web application will have authoring tools that allow end users to create new data directly over the web. Quality is managed by tracking record status through a QA/QC review cycle.

6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?

The GIS database was created by the Utah Division of State History (SHPO) in 1993 in partnership with multiple state and federal agencies. Agency partners have varied dramatically between 1993 and 2010. The only current contributors are the Bureau of Land Management and the USDA NRCS. No dedicated positions have ever been established for the maintenance of the GIS database. The Division of State History has an Archaeology Records Manager who assumes responsibility for the GIS database, but this position existed prior to the creation of the GIS database and is therefore not dedicated to that task.

7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?

I don't know. That was a long time ago and I wasn't here. ISTEA funds made a lot of progress possible between 1995 and 1998. BLM CRDSP funds have been very helpful since 1998 to present. I suppose it has been a combination of necessity and opportunity.

8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format?

Most data prior to 2002 was digitized off of paper USGS quadrangles 1:24,000. No systematic ground truthing has been done, although user-reported corrections based on field surveys do provide opportunities for continuous improvement.

9. How was the creation of the database funded?

The original database creation was funded with an enhancement grant from the Utah Department of Transportation. The most recent iteration has been funded mostly by Utah Division of State History/ Department of Community and Culture appropriations. Supplemented by agency contributions over the years such as BLM CRDSP, FHWA, NRCS, DOD, NPS, SITLA, USFS, DWR, BOR, State Parks.

- a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data?

The upkeep of the data is far too large of a task for one individual. The long term plan is to distribute data entry responsibilities to end users, with verification being done by reviewing agencies and State History staff.

10. What geographic coordinate system was used for the database? What map units are used in the database?

UTM NAD 83

11. What data standards are used for the database?

- a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language).

GIS data complies with proposed FGDC standard for transmittal of cultural resources GIS data. Tabular site data is in accordance with the Intermountain Antiquities Computer System (IMACS) data standard.

12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?

- a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.

See proposed FGDC data standard

- b. Does the database contain only cultural resource information or does it also include environmental variables?

See IMACS documentation

- c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?

Data is intended to be viewed at approximately 1:24,000. Precision and accuracy varies with each feature. Feature level metadata provides information on precision and accuracy.

13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.?

Summary data on reports, architectural site forms, archaeological site forms. Future plans to include photographs and scanned documents.

14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources?

UDOT uses the data in the early planning stages to avoid or minimize the effects.

15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded?

Data are updated daily. Additional information in the next 10 years will include related documentary materials such as scanned documents, photographs, drawings, etc. Maintenance

of the database will be funded by Department of Community and Culture appropriation, BLM CRDSP, intermittent agency contributions, and possibly user charges.

Utah

1. What GIS program is used for the database?

ESRI ArcView GIS v9.3/ ArcSDE

2. Where is the database located? On a DOT server or some other server? How secure is this server?

GIS and tabular data provided by SHPO (Department of Archaeology and Historic Preservation) is housed on a WSDOT server running ArcSDE with all other corporate data. Access to the server is protected through network authentication, read/ write privileges are granted by database administrators.

3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user?

The data is accessed through a ArcSDE connection from the ArcGIS Desktop environment, WSDOT has developed a custom data viewer, Workbench, from which users granted access based on their network authentication, can locate and load the sensitive cultural resource spatial and tabular data. WSDOT Cultural Resource Specialists/ Archaeologists may access live data through a secure web portal, WISAARD, from the SHPO website as well.

4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access?

WISAARD access is granted by SHPO to Professional Archaeologists meeting the Secretary of Interior Standards. Users may view and print GIS/ Tabular data and scanned documents but do not have the ability to download information.

Access through WSDOT Workbench in ArcGIS is restricted by login credentials- users are granted permissions at the network level and authenticated against the database. The Datasharing agreement with the SHPO stipulates who within WSDOT is allowed access to the GIS/ Tabular records. This includes but is not limited to CR Specialists/ Archaeologists.

5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated

Quarterly updates of GIS/ Tabular data are provided for Archaeological and Historic site information, Cultural Resources Survey Reports, Historic Property Inventory sites and National and State Register Listed sites through an FTP site hosted by SHPO. WSDOT GIS staff retrieves this information and updates the Feature Datasets with the new data. CR Specialists/ Archaeologists check to verify the data has been updated in the system. Access to scanned documents and current GIS data is provided on the fly through the WISAARD site.

SHPO Cultural Resource GIS staff continually update the GIS/ Tabular records and scanned documents as new information becomes available. This information is available live through the WISAARD web portal. Updates are run each day to post new and updated information out on the WISAARD site. QA/QC occurs as the information is populated against the hardcopy records and with each quarterly update for accuracy.

6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database?

SHPO created the dataset and related databases from paper records with funding assistance from various state agencies including WSDOT. This funding helped secure a position at SHPO to populate and maintain the Cultural Resource GIS System. Incorporating all paper records,

scanning documents and building the various components, including the web portal WISAARD has taken about 10 years.

7. **What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project?"**

A need was identified to assist in early identification and planning around site locations to protect resources from impacts by Transportation related projects. This was not a need unique to WSDOT, however, other state agencies had a vested interest in acquiring this information in digital format for inclusion in their own systems.

8. **How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format?**

Data was collected from primary source documents including cultural resource survey reports, National/ State Register Nominations, Archaeological Site Forms, HABS/ HAER documents, Historic Property Inventory forms and in some cases- GIS data provided by other State, Federal agencies, local governments and Tribes.

9. **How was the creation of the database funded?**

WSDOT provided funding (TEA-21) to assist in the development and maintenance of the SHPO Cultural Resource GIS system.

- a. **How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data?**

WSDOT maintains a Datasharing Agreement with SHPO stipulating SHPO will provide WSDOT with quarterly updates of all Archaeological and Historic site information, including but not limited to all GIS and tabular records, scanned documents and related databases. SHPO employs, at the moment, 3 dedicated staff (Cartographers) to update and maintain the Cultural Resources GIS system. Information is updated and added as it becomes available.

10. **What geographic coordinate system was used for the database? What map units are used in the database?**

NAD 83 HARN, Washington State Plane South, Feet.

11. **What data standards are used for the database?**

SHPO has established reporting guidelines and standards to maintain consistency and integrity of the data. Archaeological sites and surveys must be mapped on a USGS 24K Quadranagle and submitted in PDF form to import into the digital records database. Historic Property Inventoried sites must be recorded and uploaded to the statewide Historic Property Inventory Database. All records submitted must meet the mapping standards required by SHPO to be incorporated into the Cultural Resource GIS System.

- a. **Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language).**

SHPO adheres to the FGDC metadata standards and format.

12. **What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data?**

Archaeology sites, National/ State Register Sites and Districts and Cultural Resource Surveys are provided in vector format, point/ line and polygon featureclass. SHPO, with contributions by WSDOT, generated a statewide archaeological predictive model as grid data.

- a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.**

Archaeology Sites/ District Data Model: point/ line/ polygons

Site ID- Smithsonian Trinomial

Site Type- Coded list of site types (historic and precontact) generated by SHPO

Date Recorded- Date the site was recorded

Site Description- Text field providing a short description of the site type, artifacts, age and dimensions

Temp Site #- Site Number, other than the Smithsonian Trinomial

Rejected Site Form – (Yes/No), if the site form has been rejected by SHPO based on missing or incomplete site documentation

Reason for Rejection- Coded list of reasons for the site form rejection

Contact Method- Email or Voicemail to submitter notifying of rejection and requesting further information

Submitter Name and Contact Information- Email/ Phone and Name

Date Rejected

Cultural Resource Survey Reports Data Model: point, line, polygons

NADB- The NADB # assigned

Title- Report Title

Date- Report Date

Authors Name- First and Last Name of the Primary Author

Performing Agency- Agency/ Consulting Company performing the work and authoring the report

Sponsoring Agency- Agency sponsoring the work/ report

Contract # - Contract # associated with the project

Report #- Number assigned to the report by the Performing Agency

Date Created- Record Creation Date

Document Type- Coded list of document types generated by SHPO

Stored- County the survey was conducted (1st listed if multiple)

Digitizing Method- Method by which the survey was mapped in GIS

Notes- Text field used to capture additional information/ comments

National/ State Register Listed Sites/ Districts Data Model: point, line, polygons

Name- Common Name of Register listed property

Other Name- Alternative property name

Address- Street Address of listed property

City- (or vicinity to a City)

Site ID- Smithsonian Trinomial assigned to the resource

Listing Information

Date Listed

Listing Status (Washington Heritage Register/ National Register)

Level of Significance (Local/ State/ National)

Significance- Type of Significance (multiple)

Historic Function- Original intent/ function of property

Classification- Property Classification and Description

Multiple- Does the Property contribute to a Multiple Property Listed Site

Number of Properties Listed- Total # of Properties listed

Building Information

Builder

Architect

Style Type- Design Style/ Classification

Other Details/ Comments

Location Details

UTM Coordinates (Feet)

County Location

Photos

Uploaded Photos- Image and File Path to Image

b. Does the database contain only cultural resource information or does it also include environmental variables?

The database contains only attributes and location information pertaining to the site location and type. This data is compared against environmental variables in GIS. The Statewide Archaeology Predictive Model contains information on identified cultural resources and environmental variables.

c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?

The Predictive model is a 30m grid.

13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.?

The Archaeology sites/ Cultural Resource Surveys and National/ State Register listed properties are mapped in GIS and linked through a Join/ Relate to the tabular data in Access. In addition, users may access the scanned images of site forms, survey reports, national register nominations, HABS/ HAER documentation and historic property inventory forms through WISAARD.

14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources?

WSDOT CR Specialists/ Archaeologists have been utilizing the GIS and scanned images as reference material to identify known site location and determine the potential for unknown sites within proposed project areas. The data are used as early in the planning stages of the project as the cultural resources team is brought onto the project, which is typically in initial planning stages.

15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded?

SHPO maintains the dataset and related databases, these are updated as information becomes available and will continue to provide WSDOT datacuts on a quarterly basis as well as provide CR Specialists/ Archaeologists access online through WISAARD. WSDOT would like to, in the future, link the internal Cultural Resources Project Tracking Database to the GIS data for ease of use.

Washington

1. What GIS program is used for the database? ESRI ArcGIS /MS Sequel Server
2. Where is the database located? On a DOT server or some other server? How secure is this server?
The production data system is housed in the Wyoming Cultural Records office on several servers. They are protected by a Juniper firewall and monitored by the SHPO systems administrator. These servers are not accessible outside the SHPO office to the University of Wyoming and are not visible to the outside world on the Internet. The web systems are housed at the University of Wyoming data center which is a state-of-the-art facility. Servers are located in a secure server room, monitored by keycard and fingerprint access. These servers are within the University of Wyoming firewall and are monitored by UW IT.
3. How is the database accessed? That is, are the data accessed via the Internet only on an ArcIMS server or can the data be downloaded directly by a remote user? Julie can access the database through an ArcMIS map server, which is currently being revised using MS Silverlight and ArcGIS. SHPO maintains a secure https site so agencies who have the ArcGIS technology can download the GIS database and upload edits and new information.
4. Is the database accessible to the general public or is a password required to access the data? If the database is password protected, who can be granted access to the database? Who makes the decision as to who can have access? The database is password protected; only professionals (agency, consultants, academic researchers, students with a legitimate need) can access. Users must accept an agreement spelling out terms of use of the data-confidentiality, etc. SHPO makes the decision as to who can access the information. All queries are logged and monitored. Users can lose privileges if they violate the user agreement.
5. Can the database be remotely updated so that new information (new cultural resource surveys, identified archaeological sites or NR-eligible historic architectural resources) can be included? By whom? What mechanisms are in place to ensure the quality of the database is not corrupted by any updates? Please describe the process by which the database is updated. Currently WYDOT does not have the technology to update the database, however their consultant, the Office of the Wyoming State Archaeologist has the ability to update the template Geodatabase and submit it to WYCRO for addition to the master records. SHPO staff review and approve all new additions to the database and GIS. SHPO does QC on all records included in the master data.
6. What agency created the database? The DOT? The SHPO? A combined effort? Was a dedicated position created at the DOT for the explicit creation of the GIS database? How long did it take to create the database? SHPO created the database in a combined effort with BLM, other large federal land managing agencies, and secondary efforts from WYDOT which is a comparatively minor player in cultural resource management in Wyoming. The system was first developed in the late 1970's, GIS was added in 1999, and in 2004 the GIS was converted from a shapefile system to a geodatabase. In 2008, the GIS was upgraded to an ArcSDE database which allows for more efficient editing, updating and distribution to users. This effort will be on-going as technology evolves and systems change. The development of the associated attribute database was primarily funded under a grant from the Department of Energy (DOE).
7. What was the catalyst for the creation of the database? Did it start with a particular project or need as defined by DOT or the SHPO? Was it that other agencies or states had initiated such an effort and you had heard about the project? Energy development was the catalyst - and Wyoming was one of the leading states in developing a statewide database.
8. How was the database created? What was the source of information for the database? Were the data subjected to ground truthing/verification exercises before the database was accepted in its current format? The database was developed in the late 1970's by a couple of graduate students at the University of Wyoming. As technologies changed, and as data capabilities expanded, more information was added to the system. The major creation of GIS data occurred between 1999 and 2004 with the DOE project. BLM has recently funded three full-time positions for five years to

create GIS for the Rawlins and Buffalo Field office. WYDOT support a full-time position and SHPO prioritizes all of the WYDOT projects. Currently approximately 55% of the known cultural resources and 60% of the associated inventories are included in the GIS system.

9. How was the creation of the database funded? Funding from a variety of agencies, grants, and user fees.
 - a. How will the database be maintained in the future? Is there an individual dedicated to the upkeep and integrity of the data? The Wyoming Cultural Records Office, a section of the WYSHPO maintains the information. There are three-full time permanent staff, 6 contract employees, and 4 half-time students who work on the information daily.
10. What geographic coordinate system was used for the database? What map units are used in the database? Latitude/Longitude is the base coordinate system, and it is projected to UTM NAD83 on the Internet Map Server. Data is collected using UTM NAD83, however SHPO stores everything in Lat/Long so that it is easily projected to any coordinate system.
11. What data standards are used for the database?
 - a. Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM); ISO 19115 Geographic Information; or xml (eXtensible Markup Language). Standards can be found at: <http://wyoshpo.state.wy.us/Forms/index.asp>
12. What is the content of the database? Raster (image), vector (coverage/shape) and/or grid data? The cultural resources spatial data is basically shape data stored in an SDE format. We also use image data for display purposes.
 - a. What specific information is contained in the database and why were these attributes chosen for a cultural resource GIS database? What are the variables that form the GIS database? Please describe the attributes of each variable in the database.
 - b. Does the database contain only cultural resource information or does it also include environmental variables? Only cultural resources
 - c. What is the resolution of the raster data in dpi or map units? What is the resolution of grid data in map units?

Detailed content and descriptive information can be found at:
<http://www.gnomon.com/DOEPumpIII/FinalCombinedReport.pdf>

13. Besides spatial data, are there links to any other sources of cultural resource information within the database, such as cultural resource reports, National Register nomination forms, HABS/HAER documentation, state historic architectural resource survey forms, etc.? Yes – approximately 95% of all associated documents have been scanned into a PDF format and are served on the web.
14. How has the database been utilized by the DOT? As a locational tool (presence/absence) or as a predictive model? Is the database used in the early planning stages of new roadwork projects to avoid or minimize the effect of the proposed project to cultural resources? I use the database on a daily basis for project specific information to determine if areas have been previously surveyed, known cultural resources in project areas, to determine what level of investigations are needed, etc. Yes - we do use it in project planning and project development.
15. What are the future plans for the cultural resource GIS database? How often are the data updated by the DOT/SHPO? What additional information will be included in the database? How will the maintenance of the database be funded? We plan on adding a more robust architectural data system in the future. We currently do not support any type of spatial analysis on the web. Agencies use this data for watershed analysis and that would be good to add at some point in the future. The data is updated daily, copied to the Internet nightly, and https copies are refreshed nightly for download to agencies who have that capability.

Appendix C – Sample Metadata for Hypothetical CRGIS



Cultural_resource_survey

Metadata also available as

Metadata:

- [Identification Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Identification_Information:

Citation:

Citation_Information:

Originator: Insert state DOT information here

Publication_Date: Unknown

Title: Cultural_resource_survey

Geospatial_Data_Presentation_Form: vector digital data

Online_Linkage: insert state DOT website here, if appropriate

Description:

Abstract: Previously completed cultural resource surveys

Purpose:

Collection of areas where cultural resource surveys have been conducted within the state.

Supplemental_Information:

Spatial reference for the dataset should be specific to the state and not using a continental reference system. State DOTs are equally split between state plane coordinate systems and UTM coordinate systems for their GIS. Use of one or the other coordinate system will be dependent upon the geography of the state and which system better represents the geographic extent of the state.

Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: unknown

Currentness_Reference: publication date

Status:

Progress: In work

Maintenance_and_Update_Frequency: As needed

Spatial_Domain:

Bounding_Coordinates:

West_Bounding_Coordinate:

REQUIRED: Western-most coordinate of the limit of coverage expressed in longitude.

East_Bounding_Coordinate:

REQUIRED: Eastern-most coordinate of the limit of coverage expressed in longitude.



North_Bounding_Coordinate:

REQUIRED: Northern-most coordinate of the limit of coverage expressed in latitude.

South_Bounding_Coordinate:

REQUIRED: Southern-most coordinate of the limit of coverage expressed in latitude.

*Keywords:**Theme:*

Theme_Keyword_Thesaurus: GIS

Theme_Keyword:

GIS, cultural resource management, field survey, archaeological, historic architecture

Access_Constraints: For internal state DOT use only or as allowed.

Use_Constraints:

The locations of previously conducted cultural resource surveys may reveal the location of archaeological sites. Therefore, the information contained in this data layers are for resource management, law enforcement, and research purposes only. Most state laws protect archaeological remains on state owned and controlled lands and most states have laws in place that protect human burial sites on all lands. Insert state law reference as appropriate.

*Point_of_Contact:**Contact_Information:**Contact_Organization_Primary:*

Contact_Organization: Insert state DOT information here

Native_Data_Set_Environment:

Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 3; ESRI ArcCatalog 9.3.1.3500

Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: G-polygon

Point_and_Vector_Object_Count: 0

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Map_Projection:

Map_Projection_Name: Lambert Conformal Conic

Lambert_Conformal_Conic:

Standard_Parallel: 20.000000

Standard_Parallel: 60.000000

Longitude_of_Central_Meridian: -96.000000

Latitude_of_Projection_Origin: 40.000000

False_Easting: 0.000000

False_Northing: 0.000000

Planar_Coordinate_Information:

Planar_Coordinate_Encoding_Method: coordinate pair



*Coordinate_Representation:**Abscissa_Resolution:* 0.000100*Ordinate_Resolution:* 0.000100*Planar_Distance_Units:* meters*Geodetic_Model:**Horizontal_Datum_Name:* North American Datum of 1983*Ellipsoid_Name:* Geodetic Reference System 80*Semi-major_Axis:* 6378137.000000*Denominator_of_Flattening_Ratio:* 298.257222*Vertical_Coordinate_System_Definition:**Altitude_System_Definition:**Altitude_Resolution:* 0.000100*Altitude_Encoding_Method:*

Explicit elevation coordinate included with horizontal coordinates

*Entity_and_Attribute_Information:**Detailed_Description:**Entity_Type:**Entity_Type_Label:* Cultural_resource_survey*Attribute:**Attribute_Label:* OBJECTID*Attribute_Definition:* Internal feature number.*Attribute_Definition_Source:* ESRI*Attribute_Domain_Values:**Unrepresentable_Domain:*

Sequential unique whole numbers that are automatically generated.

*Attribute:**Attribute_Label:* SHAPE*Attribute_Definition:* Feature geometry.*Attribute_Definition_Source:* ESRI*Attribute_Domain_Values:**Unrepresentable_Domain:* Coordinates defining the features.*Attribute:**Attribute_Label:* Survey_number*Attribute_Definition:* Internal DOT number*Attribute:**Attribute_Label:* Title*Attribute_Definition:* Title of the cultural resource survey report*Attribute:**Attribute_Label:* Publication_date*Attribute_Definition:* Year report published*Attribute:**Attribute_Label:* Author*Attribute_Definition:* List of authors*Attribute:**Attribute_Label:* Agency

Attribute_Definition:

Agency (federal, state or local), institution, private individual/company sponsoring/funding/permitting the cultural resource work.

Attribute:

Attribute_Label: Archaeological_survey

Attribute_Definition:

"YES" indicates survey investigated archaeological resources within the survey area.

Attribute:

Attribute_Label: Architecture_survey

Attribute_Definition:

"YES" indicates survey investigated historic architectural resources within the survey area

Attribute:

Attribute_Label: SHAPE_Length

Attribute_Definition: Length of feature in internal units.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Positive real numbers that are automatically generated.

Attribute:

Attribute_Label: SHAPE_Area

Attribute_Definition: Area of feature in internal units squared.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Positive real numbers that are automatically generated.

Distribution_Information:

Resource_Description: Downloadable Data

Metadata_Reference_Information:

Metadata_Date: 20100723

Metadata_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Insert state DOT information here

Contact_Address:

Address_Type:

REQUIRED: The mailing and/or physical address for the organization or individual.

City: REQUIRED: The city of the address.

State_or_Province: REQUIRED: The state or province of the address.

Postal_Code: REQUIRED: The ZIP or other postal code of the address.

Contact_Voice_Telephone:

REQUIRED: The telephone number by which individuals can speak to the organization or individual.

Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998

Metadata_Time_Convention: local time

Metadata_Extensions:

Online_Linkage: [<http://www.esri.com/metadata/esriprof80.html>](http://www.esri.com/metadata/esriprof80.html)

Profile_Name: ESRI Metadata Profile



archaeological_points

Metadata also available as

Metadata:

- [Identification Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Identification Information:

Citation:

Citation Information:

Originator: Insert DOT information here

Publication Date: Unknown

Title: archaeological_points

Geospatial Data Presentation Form: vector digital data

Online Linkage: insert state DOT website information here, if appropriate

Description:

Abstract: Data set of archaeological sites expressed as a single point.

Purpose:

Summary of the known and recorded archaeological sites within a state for use by the state DOTs

Supplemental Information:

Spatial reference for the dataset should be specific to the state and not using a continental reference system. State DOTs are equally split between state plane coordinate systems and UTM coordinate systems for their GIS. Use of one or the other coordinate system will be dependent upon the geography of the state and which system better represents the geographic extent of the state.

Time Period of Content:

Time Period Information:

Single Date/Time:

Calendar Date: unknown

Currentness Reference: publication date

Status:

Progress: In work

Maintenance and Update Frequency: As needed

Spatial Domain:

Bounding Coordinates:

West Bounding Coordinate:

REQUIRED: Western-most coordinate of the limit of coverage expressed in longitude.

East Bounding Coordinate:



REQUIRED: Eastern-most coordinate of the limit of coverage expressed in longitude.

North_Bounding_Coordinate:

REQUIRED: Northern-most coordinate of the limit of coverage expressed in latitude.

South_Bounding_Coordinate:

REQUIRED: Southern-most coordinate of the limit of coverage expressed in latitude.

Keywords:

Theme:

Theme_Keyword_Thesaurus: GIS

Theme_Keyword: Archaeology, GIS

Access_Constraints: For internal state DOT use only or as allowed.

Use_Constraints:

The locations of archaeological sites contained in this data layers are for resource management, law enforcement, and research purposes only. Most state laws protect archaeological remains on state owned and controlled lands and most states have laws in place that protect human burial sites on all lands. Insert state law reference as appropriate.

Point_of_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Insert DOT information here

Native_Data_Set_Environment:

Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 3; ESRI ArcCatalog 9.3.1.3500

Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Entity point

Point_and_Vector_Object_Count: 0

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Map_Projection:

Map_Projection_Name: Lambert Conformal Conic

Lambert_Conformal_Conic:

Standard_Parallel: 20.000000

Standard_Parallel: 60.000000

Longitude_of_Central_Meridian: -96.000000

Latitude_of_Projection_Origin: 40.000000

False_Easting: 0.000000

False_Northing: 0.000000

Planar_Coordinate_Information:

Planar_Coordinate_Encoding_Method: coordinate pair

Coordinate_Representation:

Abcissa_Resolution: 0.000100



Ordinate_Resolution: 0.000100
Planar_Distance_Units: meters
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1983
Ellipsoid_Name: Geodetic Reference System 80
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257222
Vertical_Coordinate_System_Definition:
Altitude_System_Definition:
Altitude_Resolution: 0.000100
Altitude_Encoding_Method:
 Explicit elevation coordinate included with horizontal coordinates

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: archaeological_points

Attribute:

Attribute_Label: OBJECTID

Attribute_Definition: Internal feature number.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain:

Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute_Label: SHAPE

Attribute_Definition: Feature geometry.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Coordinates defining the features.

Attribute:

Attribute_Label: DOT_ID

Attribute_Definition: Internal DOT reference number

Attribute:

Attribute_Label: Site_name

Attribute_Definition:

Archaeological site name, using the most commonly referenced name for the site.

Attribute:

Attribute_Label: Site_number

Attribute_Definition:

The Smithsonian Institution, as a federal agency, worked in many states at the same time or in sequence. Due to their work in multiple states, a simple unified inventory numbering system was created to maintain systematic control over all collected data. This unified numbering system was personified in the trinomial number that is familiar today. Each state was sorted alphabetically and numbered from 1 to 48 (i.e., Hawaii and Alaska were added later). This number became the first part of the trinomial. Each county in a

given state was given a 2 or 3-letter abbreviation that would be used as the second part of the trinomial system. Then as each new site was added to the inventory, it was given a number in sequence from 1 to infinity within that county; the third part of the trinomial (e.g., 35LA16).

Attribute:

Attribute_Label: USGS_map

Attribute:

Attribute_Label: City_Town

Attribute:

Attribute_Label: County

Attribute:

Attribute_Label: Tax_parcel_Block

Attribute:

Attribute_Label: Tax_parcel_Lot

Attribute:

Attribute_Label: UTM_coord_X

Attribute_Definition: Or other coordinate system value

Attribute:

Attribute_Label: UTM_coord_y

Attribute_Definition: Or other coordinate system value

Attribute:

Attribute_Label: UTM_Zone

Attribute_Definition: Or other coordinate system reference zone

Attribute:

Attribute_Label: Address

Attribute:

Attribute_Label: Site_type

Attribute_Definition:

Defines site type - prehistoric or historic. Additional site type subvariables should be employed to further divide the type of site between historic and prehistoric sites.

Attribute:

Attribute_Label: cultural_affil

Attribute_Definition:

Archaeological culture or subculture affiliated with the archaeological site. The affiliation may be restricted to a single time period or it may include multiple affiliations, so there should be sub-cultural affiliation fields available for multicomponent sites.

Attribute:

Attribute_Label: NR_eval

Attribute_Definition:

Evaluation of the resource's eligibility for inclusion on the National Register of Historic Places. This is a yes or no entry followed by the NRHP eligibility criterion used for listing on the NRHP.

Attribute:

Attribute_Label: date_NRHP

Attribute_Definition:

Date the resource was listed on the NRHP. No date is included if the resource is not listed on the NRHP.

Attribute:

Attribute_Label: date_state_reg

Attribute_Definition:

Date the resource was listed on the state register. No date is included if the resource is not listed on the state register.

Attribute:

Attribute_Label: site_location

Attribute_Definition:

Refers to the relative accuracy of the site's geographic locational information. If the site has been recorded by professional or archaeological surveying methods, then value would be "SURVEYED". If the locational data are not the result of surveyed data, then value will be "GENERAL", indicating the site location is within the general area depicted in the GIS.

Attribute:

Attribute_Label: human_remains

Attribute_Definition:

If the site contains evidence of human remains, either derived from an actual burial site or isolated human remains, then value would be "PRESENT." If no evidence of human remains, then value is "ABSENT."

Distribution_Information:

Resource_Description: Downloadable Data

Metadata_Reference_Information:

Metadata_Date: 20100723

Metadata_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Insert state DOT information date

Contact_Address:

Address_Type:

REQUIRED: The mailing and/or physical address for the organization or individual.

City: REQUIRED: The city of the address.

State_or_Province: REQUIRED: The state or province of the address.

Postal_Code: REQUIRED: The ZIP or other postal code of the address.

Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998

Metadata_Time_Convention: local time

Metadata_Extensions:

Online_Linkage: <<http://www.esri.com/metadata/esriprof80.html>>

Profile_Name: ESRI Metadata Profile

archaeological_district

Metadata also available as

Metadata:

- [Identification Information](#)
- [Data Quality Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Identification_Information:

Citation:

Citation_Information:

Originator: Insert state DOT here

Publication_Date: Insert publication date here

Title: archaeological_district

Geospatial_Data_Presentation_Form: vector digital data

Online_Linkage: Insert state DOT website with link to data, if appropriate

Description:

Abstract:

Data set of archaeological sites expressed as a polygon or district, not as a single point.

Purpose:

Summary of the known and recorded archaeological sites within a state for use by the state DOTs

Supplemental_Information:

Spatial reference for the dataset should be specific to the state and not using a continental reference system. State DOTs are equally split between state plane coordinate systems and UTM coordinate systems for their GIS. Use of one or the other coordinate system will be dependent upon the geography of the state and which system better represents the geographic extent of the state.

Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: unknown

Currentness_Reference: publication date

Status:

Progress: In work

Maintenance_and_Update_Frequency: As needed

Spatial_Domain:

Bounding_Coordinates:

West_Bounding_Coordinate:



REQUIRED: Western-most coordinate of the limit of coverage expressed in longitude.

East_Bounding_Coordinate:

REQUIRED: Eastern-most coordinate of the limit of coverage expressed in longitude.

North_Bounding_Coordinate:

REQUIRED: Northern-most coordinate of the limit of coverage expressed in latitude.

South_Bounding_Coordinate:

REQUIRED: Southern-most coordinate of the limit of coverage expressed in latitude.

Keywords:

Theme:

Theme_Keyword_Thesaurus: GIS

Theme_Keyword: Archaeology, GIS

Access_Constraints: For internal state DOT use only or as allowed.

Use_Constraints:

The locations of archaeological sites contained in this data layers are for resource management, law enforcement, and research purposes only. Most state laws protect archaeological remains on state owned and controlled lands and most states have laws in place that protect human burial sites on all lands. Insert state law reference as appropriate.

Point_of_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Insert state DOT here

Native_Data_Set_Environment:

Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 3; ESRI ArcCatalog 9.3.1.3500

Data_Quality_Information:

Lineage:

Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: G-polygon

Point_and_Vector_Object_Count: 0

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Map_Projection:

Map_Projection_Name: Lambert Conformal Conic

Lambert_Conformal_Conic:

Standard_Parallel: 20.000000

Standard_Parallel: 60.000000

Longitude_of_Central_Meridian: -96.000000

Latitude_of_Projection_Origin: 40.000000

False_Easting: 0.000000



False_Northing: 0.000000
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 0.000100
Ordinate_Resolution: 0.000100
Planar_Distance_Units: meters
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1983
Ellipsoid_Name: Geodetic Reference System 80
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257222
Vertical_Coordinate_System_Definition:
Altitude_System_Definition:
Altitude_Resolution: 0.000100
Altitude_Encoding_Method:
 Explicit elevation coordinate included with horizontal coordinates

Entity_and_Attribute_Information:

Detailed_Description:
Entity_Type:
Entity_Type_Label: archaeological_district
Attribute:
Attribute_Label: OBJECTID
Attribute_Definition: Internal feature number.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
 Sequential unique whole numbers that are automatically generated.
Attribute:
Attribute_Label: SHAPE
Attribute_Definition: Feature geometry.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Coordinates defining the features.
Attribute:
Attribute_Label: DOT_ID
Attribute_Definition: Internal DOT reference number
Attribute:
Attribute_Label: Site_name
Attribute_Definition:
 Archaeological district name, using the most commonly referenced name for the site.
Attribute:
Attribute_Label: Site_number
Attribute_Definition:

The Smithsonian Institution, as a federal agency, worked in many states at the same time or in sequence. Due to their work in multiple states, a simple unified inventory numbering system was created to maintain systematic control over all collected data. This unified numbering system was personified in the trinomial number that is familiar today. Each state was sorted alphabetically and numbered from 1 to 48 (i.e., Hawaii and Alaska were added later). This number became the first part of the trinomial. Each county in a given state was given a 2 or 3-letter abbreviation that would be used as the second part of the trinomial system. Then as each new site was added to the inventory, it was given a number in sequence from 1 to infinity within that county; the third part of the trinomial (e.g., 35LA16).

Attribute:

Attribute_Label: USGS_map

Attribute:

Attribute_Label: City_Town

Attribute:

Attribute_Label: County

Attribute:

Attribute_Label: Tax_parcel_Block

Attribute:

Attribute_Label: Tax_parcel_Lot

Attribute:

Attribute_Label: UTM_coord_X

Attribute_Definition: Or other coordinate system value

Attribute:

Attribute_Label: UTM_coord_y

Attribute_Definition: Or other coordinate system value

Attribute:

Attribute_Label: UTM_Zone

Attribute_Definition: Or other coordinate system reference zone

Attribute:

Attribute_Label: Address

Attribute:

Attribute_Label: Site_type

Attribute_Definition:

Defines site type - prehistoric or historic. Additional site type subvariables should be employed to further divide the type of site between historic and prehistoric sites.

Attribute:

Attribute_Label: cultural_affil

Attribute_Definition:

Archaeological culture or subculture affiliated with the archaeological site. The affiliation may be restricted to a single time period or it may include multiple affiliations, so there should be sub-cultural affiliation fields available for multicomponent sites.

Attribute:

Attribute_Label: NR_eval

Attribute_Definition:

Evaluation of the resource's eligibility for inclusion on the National Register of Historic Places. This is a yes or no entry followed by the NRHP eligibility criterion used for listing on the NRHP.

Attribute:

Attribute_Label: date_NRHP

Attribute_Definition:

Date the resource was listed on the NRHP. No date is included if the resource is not listed on the NRHP.

Attribute:

Attribute_Label: date_state_reg

Attribute_Definition:

Date the resource was listed on the state register. No date is included if the resource is not listed on the state register.

Attribute:

Attribute_Label: site_location

Attribute_Definition:

Refers to the relative accuracy of the site's geographic locational information. If the site has been recorded by professional or archaeological surveying methods, then value would be "SURVEYED". If the locational data are not the result of surveyed data, then value will be "GENERAL", indicating the site location is within the general area depicted in the GIS.

Attribute:

Attribute_Label: human_remains

Attribute_Definition:

If the site contains evidence of human remains, either derived from an actual burial site or isolated human remains, then value would be "PRESENT." If no evidence of human remains, then value is "ABSENT."

Attribute:

Attribute_Label: SHAPE_Length

Attribute_Definition: Length of feature in internal units.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Positive real numbers that are automatically generated.

Attribute:

Attribute_Label: SHAPE_Area

Attribute_Definition: Area of feature in internal units squared.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Positive real numbers that are automatically generated.

Distribution_Information:

Resource_Description: Downloadable Data

Metadata_Reference_Information:

Metadata_Date: 20100723

Metadata_Contact:



Contact_Information:

Contact_Organization_Primary:

Contact_Organization:

REQUIRED: The organization responsible for the metadata information.

Contact_Person: REQUIRED: The person responsible for the metadata information.

Contact_Address:

Address_Type:

REQUIRED: The mailing and/or physical address for the organization or individual.

City: REQUIRED: The city of the address.

State_or_Province: REQUIRED: The state or province of the address.

Postal_Code: REQUIRED: The ZIP or other postal code of the address.

Contact_Voice_Telephone:

REQUIRED: The telephone number by which individuals can speak to the organization or individual.

Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998

Metadata_Time_Convention: local time

Metadata_Extensions:

Online_Linkage: <<http://www.esri.com/metadata/esriprof80.html>>

Profile_Name: ESRI Metadata Profile

historic_architectural_point

Metadata also available as

Metadata:

- [Identification Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Identification Information:

Citation:

Citation Information:

Originator: Insert state DOT information here

Publication Date: Unknown

Publication Time: Unknown

Title: historic_architectural_point

Geospatial Data Presentation Form: vector digital data

Online Linkage: insert DOT website information here, if appropriate

Description:

Abstract:

Data set of historic architectural resources expressed as a single point.

Purpose:

Summary of the known and recorded historic architectural districts within a state for use by the state DOTs

Supplemental Information:

Spatial reference for the dataset should be specific to the state and not using a continental reference system. State DOTs are equally split between state plane coordinate systems and UTM coordinate systems for their GIS. Use of one or the other coordinate system will be dependent upon the geography of the state and which system better represents the geographic extent of the state.

Time Period of Content:

Time Period Information:

Single Date/Time:

Calendar Date: unknown

Currentness Reference: publication date

Status:

Progress: In work

Maintenance and Update Frequency: As needed

Spatial Domain:

Bounding Coordinates:

West Bounding Coordinate:



REQUIRED: Western-most coordinate of the limit of coverage expressed in longitude.

East_Bounding_Coordinate:

REQUIRED: Eastern-most coordinate of the limit of coverage expressed in longitude.

North_Bounding_Coordinate:

REQUIRED: Northern-most coordinate of the limit of coverage expressed in latitude.

South_Bounding_Coordinate:

REQUIRED: Southern-most coordinate of the limit of coverage expressed in latitude.

Keywords:

Theme:

Theme_Keyword_Thesaurus: GIS

Theme_Keyword: Cultural resource, historic architecture, historic properties

Access_Constraints: For internal state DOT use only or as allowed.

Use_Constraints:

The locations of historic districts contained in this data layers are for resource management, law enforcement, and research purposes only. Most state laws protect historic districts on state owned and controlled lands. Insert state law reference as appropriate.

Point_of_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Insert state DOT information here

Native_Data_Set_Environment:

Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 3; ESRI ArcCatalog 9.3.1.3500

Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Entity point

Point_and_Vector_Object_Count: 0

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Map_Projection:

Map_Projection_Name: Lambert Conformal Conic

Lambert_Conformal_Conic:

Standard_Parallel: 20.000000

Standard_Parallel: 60.000000

Longitude_of_Central_Meridian: -96.000000

Latitude_of_Projection_Origin: 40.000000

False_Easting: 0.000000

False_Northing: 0.000000

Planar_Coordinate_Information:

Planar_Coordinate_Encoding_Method: coordinate pair



*Coordinate_Representation:**Abscissa_Resolution:* 0.000100*Ordinate_Resolution:* 0.000100*Planar_Distance_Units:* meters*Geodetic_Model:**Horizontal_Datum_Name:* North American Datum of 1983*Ellipsoid_Name:* Geodetic Reference System 80*Semi-major_Axis:* 6378137.000000*Denominator_of_Flattening_Ratio:* 298.257222*Vertical_Coordinate_System_Definition:**Altitude_System_Definition:**Altitude_Resolution:* 0.000100*Altitude_Encoding_Method:*

Explicit elevation coordinate included with horizontal coordinates

*Entity_and_Attribute_Information:**Detailed_Description:**Entity_Type:**Entity_Type_Label:* historic_architectural_point*Attribute:**Attribute_Label:* OBJECTID*Attribute_Definition:* Internal feature number.*Attribute_Definition_Source:* ESRI*Attribute_Domain_Values:**Unrepresentable_Domain:*

Sequential unique whole numbers that are automatically generated.

*Attribute:**Attribute_Label:* SHAPE*Attribute_Definition:* Feature geometry.*Attribute_Definition_Source:* ESRI*Attribute_Domain_Values:**Unrepresentable_Domain:* Coordinates defining the features.*Attribute:**Attribute_Label:* DOT_ID*Attribute_Definition:* Internal DOT reference number*Attribute:**Attribute_Label:* Site_name*Attribute_Definition:*

Historic resource name as recorded on the historic resource inventory/survey form.

*Attribute:**Attribute_Label:* USGS_map*Attribute:**Attribute_Label:* City_Town*Attribute:**Attribute_Label:* County*Attribute:*

Attribute_Label: Tax_parcel_Block

Attribute:

Attribute_Label: Tax_parcel_Lot

Attribute:

Attribute_Label: UTM_coord_X

Attribute_Definition: Or other coordinate system value

Attribute:

Attribute_Label: UTM_coord_y

Attribute_Definition: Or other coordinate system value

Attribute:

Attribute_Label: UTM_Zone

Attribute_Definition: Or other coordinate system reference zone

Attribute:

Attribute_Label: Address

Attribute:

Attribute_Label: Period_significance

Attribute_Definition:

The time period of significance for the district. The date range can span several periods, so subfields may be required for multiple periods of significance.

Attribute:

Attribute_Label: Description

Attribute_Definition: Brief description of the resource

Attribute:

Attribute_Label: NR_eval

Attribute_Definition:

Evaluation of the resource's eligibility for inclusion on the National Register of Historic Places. This is a yes or no entry followed by the NRHP eligibility criterion used for listing on the NRHP.

Attribute:

Attribute_Label: Criteria_of_significance

Attribute:

Attribute_Label: date_NRHP

Attribute_Definition:

Date the resource was listed on the NRHP. No date is included if the resource is not listed on the NRHP.

Attribute:

Attribute_Label: date_state_reg

Attribute_Definition:

Date the resource was listed on the state register. No date is included if the resource is not listed on the state register.

Attribute:

Attribute_Label: site_location

Attribute_Definition:

Refers to the relative accuracy of the resource's geographic locational information. If the site has been recorded by professional surveying methods, then value would be "SURVEYED". If the locational data are not the result of surveyed data, then value will

be "GENERAL", indicating the site location is within the general area depicted in the GIS.

Attribute:

Attribute_Label: destroyed

Attribute_Definition:

"YES" or "No" to indicate if the historic resource has been destroyed.

Attribute:

Attribute_Label: architect

Attribute_Definition:

Name of the architect, designer, builder, landscape architect, or artist responsible for design of the building, structure, or object being documented. No entry indicates that this information is not known.

Attribute:

Attribute_Label: year_built

Attribute_Definition:

The year of actual construction, as documented or estimated. A "C" indicates the year given is only roughly known or estimated. A blank value for this field indicates that this information is not known.

Attribute:

Attribute_Label: style

Attribute_Definition:

Architectural style or period which best describes the historic resource.

Attribute:

Attribute_Label: exterior_fabric

Attribute_Definition:

Prominent exterior fabric used on the resource. A blank value for this field indicates that this information is not known.

Attribute:

Attribute_Label: function

Attribute_Definition:

Use or function of the resource. A blank value for this field indicates that this information is not known.

Distribution_Information:

Resource_Description: Downloadable Data

Metadata_Reference_Information:

Metadata_Date: 20100723

Metadata_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Insert state DOT information here

Contact_Address:

Address_Type:

REQUIRED: The mailing and/or physical address for the organization or individual.

City: REQUIRED: The city of the address.

State_or_Province: REQUIRED: The state or province of the address.

Postal_Code: REQUIRED: The ZIP or other postal code of the address.

Contact_Voice_Telephone:

REQUIRED: The telephone number by which individuals can speak to the organization or individual.

Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998

Metadata_Time_Convention: local time

Metadata_Extensions:

Online_Linkage: <<http://www.esri.com/metadata/esriprof80.html>>

Profile_Name: ESRI Metadata Profile

historic_architectural_districts

Metadata also available as

Metadata:

- [Identification Information](#)
- [Data Quality Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Identification_Information:

Citation:

Citation_Information:

Originator:

REQUIRED: The name of an organization or individual that developed the data set.

Publication_Date:

REQUIRED: The date when the data set is published or otherwise made available for release.

Title: historic_architectural_districts

Geospatial_Data_Presentation_Form: vector digital data

Online_Linkage: \\mtn-fs-01\eo_data\users\zdavis\4467\best practices.mdb

Description:

Abstract:

Data set of historic architectural districts expressed as a ploygon or dsitrect.

Purpose:

Summary of the known and recorded historic architectural districts within a state for use by the state DOTs

Supplemental_Information:

Spatial reference for the dataset shoulud be specific to the state and not using a continental refernce system. State DOTs are equally split between state plane coordinate systems and UTM coordinate systems for their GIS. Use of one or the other coordinate system will be dependent upon the geography of the state and which system bettwe represents the geographic extent of the state.

Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: unknown

Currentness_Reference: publication date

Status:

Progress: In work

Maintenance_and_Update_Frequency: As needed



Spatial_Domain:

Bounding_Coordinates:

West_Bounding_Coordinate:

REQUIRED: Western-most coordinate of the limit of coverage expressed in longitude.

East_Bounding_Coordinate:

REQUIRED: Eastern-most coordinate of the limit of coverage expressed in longitude.

North_Bounding_Coordinate:

REQUIRED: Northern-most coordinate of the limit of coverage expressed in latitude.

South_Bounding_Coordinate:

REQUIRED: Southern-most coordinate of the limit of coverage expressed in latitude.

Keywords:

Theme:

Theme_Keyword_Thesaurus: GIS

Theme_Keyword: Cultural resource, historic architecture, historic districts

Access_Constraints: For internal state DOT use only or as allowed.

Use_Constraints:

The locations of historic districts contained in this data layers are for resource management, law enforcement, and research purposes only. Most state laws protect historic districts on state owned and controlled lands. Insert state law reference as appropriate.

Point_of_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Insert state DOT information here

Native_Data_Set_Environment:

Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 3; ESRI ArcCatalog 9.3.1.3500

Cross_Reference:

Citation_Information:

Publication_Date: Unknown

Publication_Time: Unknown

Geospatial_Data_Presentation_Form: atlas

Online_Linkage: insert state DOT website information, if appropriate

Data_Quality_Information:

Lineage:

Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: G-polygon

Point_and_Vector_Object_Count: 0

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:



*Planar:**Map_Projection:**Map_Projection_Name:* Lambert Conformal Conic*Lambert_Conformal_Conic:**Standard_Parallel:* 20.000000*Standard_Parallel:* 60.000000*Longitude_of_Central_Meridian:* -96.000000*Latitude_of_Projection-Origin:* 40.000000*False_Easting:* 0.000000*False_Northing:* 0.000000*Planar_Coordinate_Information:**Planar_Coordinate_Encoding_Method:* coordinate pair*Coordinate_Representation:**Abcissa_Resolution:* 0.000100*Ordinate_Resolution:* 0.000100*Planar_Distance_Units:* meters*Geodetic_Model:**Horizontal_Datum_Name:* North American Datum of 1983*Ellipsoid_Name:* Geodetic Reference System 80*Semi-major_Axis:* 6378137.000000*Denominator_of_Flattening_Ratio:* 298.257222*Vertical_Coordinate_System_Definition:**Altitude_System_Definition:**Altitude_Resolution:* 0.000100*Altitude_Encoding_Method:*

Explicit elevation coordinate included with horizontal coordinates

*Entity_and_Attribute_Information:**Detailed_Description:**Entity_Type:**Entity_Type_Label:* historic_architectural_districts*Attribute:**Attribute_Label:* OBJECTID*Attribute_Definition:* Internal feature number.*Attribute_Definition_Source:* ESRI*Attribute_Domain_Values:**Unrepresentable_Domain:*

Sequential unique whole numbers that are automatically generated.

*Attribute:**Attribute_Label:* SHAPE*Attribute_Definition:* Feature geometry.*Attribute_Definition_Source:* ESRI*Attribute_Domain_Values:**Unrepresentable_Domain:* Coordinates defining the features.*Attribute:**Attribute_Label:* DOT_ID

Attribute_Definition: Internal DOT reference number

Attribute:

Attribute_Label: Site_name

Attribute_Definition:

Historic district name as recorded on the historic district inventory/survey form.

Attribute:

Attribute_Label: USGS_map

Attribute:

Attribute_Label: City_Town

Attribute:

Attribute_Label: County

Attribute:

Attribute_Label: Tax_parcel_Block

Attribute:

Attribute_Label: Tax_parcel_Lot

Attribute:

Attribute_Label: UTM_coord_X

Attribute_Definition: Or other coordinate system value

Attribute:

Attribute_Label: UTM_coord_y

Attribute_Definition: Or other coordinate system value

Attribute:

Attribute_Label: UTM_Zone

Attribute_Definition: Or other coordinate system reference zone

Attribute:

Attribute_Label: Address

Attribute:

Attribute_Label: Period_significance

Attribute_Definition:

The time period of significance for the district. The date range can span several periods, so subfields may be required for multiple periods of significance.

Attribute:

Attribute_Label: Description

Attribute:

Attribute_Label: NR_eval

Attribute_Definition:

Evaluation of the resource's eligibility for inclusion on the National Register of Historic Places. This is a yes or no entry followed by the NRHP eligibility criterion used for listing on the NRHP.

Attribute:

Attribute_Label: Criteria_of_significance

Attribute:

Attribute_Label: date_NRHP

Attribute_Definition:

Date the resource was listed on the NRHP. No date is included if the resource is not listed on the NRHP.

*Attribute:**Attribute_Label:* date_state_reg*Attribute_Definition:*

Date the resource was listed on the state register. No date is included if the resource is not listed on the state register.

*Attribute:**Attribute_Label:* site_location*Attribute_Definition:*

Refers to the relative accuracy of the resource's geographic locational information. If the site has been recorded by professional surveying methods, then value would be "SURVEYED". If the locational data are not the result of surveyed data, then value will be "GENERAL", indicating the site location is within the general area depicted in the GIS.

*Attribute:**Attribute_Label:* SHAPE_Length*Attribute_Definition:* Length of feature in internal units.*Attribute_Definition_Source:* ESRI*Attribute_Domain_Values:**Unrepresentable_Domain:* Positive real numbers that are automatically generated.*Attribute:**Attribute_Label:* SHAPE_Area*Attribute_Definition:* Area of feature in internal units squared.*Attribute_Definition_Source:* ESRI*Attribute_Domain_Values:**Unrepresentable_Domain:* Positive real numbers that are automatically generated.

*Distribution_Information:**Resource_Description:* Downloadable Data

*Metadata_Reference_Information:**Metadata_Date:* 20100723*Metadata_Contact:**Contact_Information:**Contact_Organization_Primary:**Contact_Organization:* Insert state DOT information here*Contact_Address:**Address_Type:*

REQUIRED: The mailing and/or physical address for the organization or individual.

City: REQUIRED: The city of the address.*State_or_Province:* REQUIRED: The state or province of the address.*Postal_Code:* REQUIRED: The ZIP or other postal code of the address.*Contact_Voice_Telephone:*

REQUIRED: The telephone number by which individuals can speak to the organization or individual.

Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata*Metadata_Standard_Version:* FGDC-STD-001-1998

Metadata_Time_Convention: local time

Metadata_Extensions:

Online_Linkage: <<http://www.esri.com/metadata/esriprof80.html>>

Profile_Name: ESRI Metadata Profile

