BEST PRACTICES FOR ESTABLISHING AND MAINTAINING STATEWIDE CULTURAL RESOURCES GIS DATABASES
NCHRP 25-25 Task 61

Requested by American Association of State Highway and Transportation Officials (AASHTO)
Standing Committee on Environment

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Purpose of this Study

- Create an inventory of the range of Cultural Resource GIS (CRGIS) databases used by state DOTs nationwide
- Identify and report on the best practices used by state DOTs that have developed CRGIS databases for transportation planning and environmental compliance
- Develop best practices for state DOTs that either
  - are contemplating the development of a CRGIS
  - have begun to develop a CRGIS or
  - are considering updating and enhancing an existing GIS to include cultural resources
- Create a sample GIS data structure using optimal variables found in extant CRGIS.
Task 61 Methodology

1. Review state DOT websites and prior studies for evidence of CRGIS
2. Develop questionnaire for state DOTs to identify the methods used to develop, design and implement the CRGIS
3. Submit questionnaire to state DOTs with CRGIS
4. Summarize results of questionnaire to identify common practices
5. Develop best practices for CRGIS development and create sample database structure for hypothetical CRGIS
Determining DOT CRGIS Involvement

**DOTs with CRGIS (n=14)**
- Involved with the initial development and implementation over several years of a CRGIS that included both archaeological and historic architectural resources
- Covers the entire state
- CRGIS used for early project planning to avoid (or minimize) impacts to cultural resources.

**DOTs without CRGIS (n=36)**
- No evidence of cultural resource GIS on DOT website.
- DOTs that only provided funding to develop the CRGIS and had little to no involvement with the structure of the CRGIS.
All DOTs were sent an email asking each DOT to confirm if their DOT did or did not possess a CRGIS.
### Questions for the State DOTs with CRGIS

#### Database Development
- **Who created it?**
- **Why was it created?**
- **How?**
  - Data source
  - Funding

#### Database Design
- **GIS program used**
- **Data standards**
- **Content/structure**
- **Coordinate system**
- **Other data included**

#### Database Access
- **Where are data stored?**
- **How to access data?**
- **Public access?**
- **Remote updates?**

#### Implementation
- **How used?**
  - Locational
  - Early Project Planning
  - Predictive Modeling

#### Future Plans
- **When to update?**
- **Information to be added**
- **Funding maintenance**
DOTs Providing Metadata to their CRGIS

State with DOT CRGIS

No
Yes

States providing metadata
Results of the Questionnaire

Response summaries grouped into five areas

- CRGIS database development
- CRGIS database design
- Database access
- Implementation of the CRGIS
- Future plans for the CRGIS
CRGIS database design

GIS program used

- ESRI ArcView: 81%
- GeoMedia: 13%
- Mapguide: 6%

Data standards

<table>
<thead>
<tr>
<th>Data standards</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Geographic Data Committee’s Content Standard for Digital Geospatial Metadata (CSDGM)</td>
<td>12 DOTs</td>
</tr>
<tr>
<td>ESRI CSDGM</td>
<td>1 DOT</td>
</tr>
</tbody>
</table>

Content of the CRGIS

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vector data</td>
<td>All CRGIS</td>
</tr>
<tr>
<td>Raster data</td>
<td>USGS Quad maps, Digital orthophotos, Scanned cultural resource reports, National Register nomination forms, Historic resource survey forms</td>
</tr>
<tr>
<td>Grid data – archaeological predictive data</td>
<td>California, Missouri, Minnesota, Washington</td>
</tr>
</tbody>
</table>
CRGIS database access

Where is the database stored?
- DOT: 50%
- SHPO: 25%
- State university: 13%
- Other state agency: 6%
- Consultant: 6%

Access to CRGIS via

<table>
<thead>
<tr>
<th>Method</th>
<th>DOTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password protection</td>
<td>10</td>
</tr>
<tr>
<td>ArcIMS application</td>
<td>6</td>
</tr>
</tbody>
</table>

Image: ESRI
Implementation of CRGIS

- Implementation
  - Locational: 50%
  - Predictive modeling: 25%
  - Project planning: 25%

GIS in the Planning Process

Images: NASA, Agrisoft-Systems, Arizona State University
Sample GIS Database

Five base files to encompass the geodatabase

1. Cultural Resource Survey
2. Archaeological Point
3. Archaeological District
4. Historic Architectural Point
5. Historic Architectural Districts
Structure of Cultural Resource Survey GIS File

- Survey Number
- Title
- Publication date
- Author
- Agency
- Archaeological survey
- Architecture survey
- Length
- Area

- Internal DOT number
- Title of cultural resource survey report
- Year report published
- List of authors
- Agency/institution sponsoring/permitting/funding the project
- YES = survey for archaeological resources
- YES = survey for architectural resources
- ESRI generated value
- ESRI generated value
### Structure of Archaeological Point GIS File

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOT ID</td>
<td>Internal DOT reference number</td>
</tr>
<tr>
<td>Site Name</td>
<td>Archaeological site name</td>
</tr>
<tr>
<td>Site Number</td>
<td>Smithsonian site number: ## XX ##</td>
</tr>
<tr>
<td>USGS Map</td>
<td>USGS Quad map(s) containing the site</td>
</tr>
<tr>
<td>City/Town</td>
<td>Municipality containing the archaeological site</td>
</tr>
<tr>
<td>County</td>
<td>County</td>
</tr>
<tr>
<td>Tax Parcel Block</td>
<td>Block</td>
</tr>
<tr>
<td>Tax Parcel Lot</td>
<td>Lot</td>
</tr>
<tr>
<td>UTM Coord X</td>
<td>Or other coordinate system</td>
</tr>
<tr>
<td>UTM Coord Y</td>
<td>Or other coordinate system</td>
</tr>
<tr>
<td>UTM Zone</td>
<td>Or other coordinate system reference zone</td>
</tr>
<tr>
<td>Address</td>
<td>Address</td>
</tr>
<tr>
<td>Site Type</td>
<td>Prehistoric or Historic</td>
</tr>
<tr>
<td>Cultural Affiliation</td>
<td>Archaeological culture affiliated with the site</td>
</tr>
<tr>
<td>NR Evaluation</td>
<td>NR Evaluation – Yes or No &amp; Eligibility Criteria</td>
</tr>
<tr>
<td>Date NRHP</td>
<td>Date listed on the NRHP</td>
</tr>
<tr>
<td>Date State Register</td>
<td>Date listed on the State Register</td>
</tr>
<tr>
<td>Site Location</td>
<td>Refers to relative accuracy of the site location</td>
</tr>
<tr>
<td>Human Remains</td>
<td>“Present” or “Absent”</td>
</tr>
</tbody>
</table>
Structure of Archaeological District GIS File

- **DOT ID** → Internal DOT reference number
- **Site Name** → Archaeological site name
- **Site Number** → Smithsonian site number: ## XX ##
- **USGS Map** → USGS Quad map(s) containing the site
- **City/Town** → Municipality containing the archaeological site
- **County** → County
- **Tax Parcel Block** → Block
- **Tax Parcel Lot** → Lot
- **UTM Coord X** → Or other coordinate system
- **UTM Coord Y** → Or other coordinate system
- **UTM Zone** → Or other coordinate system reference zone
- **Address** → Address
- **Site Type** → Prehistoric or historic
- **Cultural affiliation** → Archaeological culture affiliated with the site
- **NR Evaluation** → NR Evaluation – Yes or No & Eligibility Criteria
- **Date NRHP** → Date listed on the NRHP
- **Date State Register** → Date listed on the State Register
- **Site Location** → Refers to relative accuracy of the site location
- **Human Remains** → “Present” or “Absent”
Structure of Historic Architectural Point GIS File

- **DOT ID**: Internal DOT reference number
- **Site name**: Historic resource name as on the survey form
- **USGS Map**: USGS Quad map(s) containing the resource
- **City/Town**: Municipality containing the historic resource
- **County**: County containing the historic resource
- **Tax Parcel Block/Lot**: Block/Lot containing the historic resource
- **UTM Coord X/Y/Zone**: Or other coordinate system
- **Address**: Address of the historic resource
- **Period significance**: Time period of significance for the resource
- **Description**: Brief description of the resource
- **NR Evaluation**: NR Evaluation – Yes or No & Eligibility Criteria
- **Date NRHP**: Date listed on the NRHP
- **Date State Reg**: Date listed on the State Register
- **Site Location**: Refers to relative accuracy of the site location
- **Destroyed**: YES/NO
- **Architect**: Name of the architect who designed the resource
- **Year Built**: Year of construction
- **Style**: Architectural style or period describing the resource
- **Exterior Fabric**: Prominent exterior fabric
- **Function**: Use of function of the resource
Structure of Historic Architectural District GIS File

- DOT ID
  - Internal DOT reference number
- Site name
  - Historic district name as recorded on survey form
- USGS Map
  - USGS Quad map(s) containing the historic district
- City/Town
  - Municipality containing the historic district
- County
  - County
- Tax Parcel Block
  - Block
- Tax Parcel Lot
  - Lot
- UTM Coord X
  - Or other coordinate system
- UTM Coord Y
  - Or other coordinate system
- UTM Zone
  - Or other coordinate system reference zone
- Address
  - Address
- Period significance
  - Time period of significance of the historic district
- Description
  - Brief description of the historic district
- NR Evaluation
  - NR Evaluation – Yes or No & Eligibility Criteria
- Date NRHP
  - Date listed on the NRHP
- Date State Register
  - Date listed on the State Register
- Site Location
  - Refers to relative accuracy of the historic district’s location
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Questions???