GeoGIS
GIS for Geotechnical Engineering Projects

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Outline

- Introduction and History
- Overview of the GeoGIS Website
- Results
- Future Work
DOTs from across the country have amassed large amounts of data, now try and find it.
Introduction

• The Alabama DOT realized their need for a document management system after a major bridge accident.

• Materials and Tests Bureau was very interested in a GIS based system for geotechnical engineering information.
Prototype GeoGIS application was developed on a desktop

Data from 8 projects containing 18 bridges in 7 counties were collected and entered into the GeoGIS

4 features were displayed on the map:
- project lines, bridges, foundations, and soil borings

Each feature was hyperlinked to a project page that in-turn linked to scanned documents.
GeoGIS History

- Success of the Desktop GeoGIS lead to the development of a Web-Based GeoGIS
- Increase in the amount of data in the On-line GeoGIS
- Added a Materials and Environmental layer
- Currently supporting GeoGIS users and increasing functionality
• GeoGIS is an online geotechnical database designed to store and retrieve preconstruction and construction engineering data

• Security is a concern; therefore, off-the-shelf user authentication was included in the website

• Similar homepage for each user type
User Types

1 General User
   • Search the Website for Documents
   • View the Map
   • View the a listing of project documents
   • View and Download Documents

2 Consultant
   • Inherits all General User privileges
   • Uploading Documents

3 ALDOT Engineer
   • Inherits all Consultant privileges
   • Approves Documents
   • Initiates Projects

4 Administrator
   • Inherits all ALDOT Engineer privileges
   • Manages user accounts
Construction Project Management System (CPMS) Table

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Common Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJ_REF_ID</td>
<td>CPMS Number</td>
<td>Unique identifier of project phase</td>
</tr>
<tr>
<td>RT_ID</td>
<td>Route Id</td>
<td>Route on which a project is located</td>
</tr>
<tr>
<td>BEG_MP</td>
<td>Beginning Milepost</td>
<td>Beginning milepost of project</td>
</tr>
<tr>
<td>END_MP</td>
<td>Ending Milepost</td>
<td>Ending milepost of project</td>
</tr>
<tr>
<td>SCPE_ID</td>
<td>Scope</td>
<td>Phase of project</td>
</tr>
<tr>
<td>FA_PREFX_I</td>
<td>Prefix</td>
<td>Concatenate to create a project number</td>
</tr>
<tr>
<td>FA_RT_ID</td>
<td>Route Id</td>
<td></td>
</tr>
<tr>
<td>FA_AGRET_N</td>
<td>Agreement Number</td>
<td></td>
</tr>
<tr>
<td>PJ_FAMLY_I</td>
<td>Family Id</td>
<td>Number assigned to all projects on a route</td>
</tr>
<tr>
<td>PJ_DS</td>
<td>Project Description</td>
<td>Description of work performed</td>
</tr>
<tr>
<td>Initiated</td>
<td>Project initiation</td>
<td>Flag column for project initiation (0,1)</td>
</tr>
</tbody>
</table>

- Most functions in GeoGIS key off of the CPMS table.
General User Functionality

• Map
  • Allows users to search for documents based on the project location, county, or coordinates
  • Pan and zoom tools to aid the user in finding a project
General User Functionality

- Three views
  - Street view
  - Topo view
  - Imagery
General User Functionality

- Map
  - Clicking a county zooms to that county and draws all projects within the county
General User Functionality

- Six Layers
  - Geotechnical Lines and Points
  - Environmental Lines and Points
  - Materials Lines and Points
- All projects under ½ mile long are points
General User Functionality

Search

- Users can search CPMS number, keyword in project description, or keyword in document name
- Clicking the document name will prompt a download
- Search results can take the user to the document details page or the family details page
Family Details Page
- Documents are divided into two categories
  - Preconstruction
  - Construction
- Documents are then further divided into subcategories
General User Functionality

Family Details Page

- Hovering over a document will bring up a low resolution thumbnail image
- Clicking a document name will prompt the user to download the document
General User Functionality

Document Details Page

- Clicking the information icon will take the user to the Document Details page.
- Lists general information and a low resolution image of the document.
Consultant Functionality

Document Upload

- Search for the correct project

- Select the correct project and click “Begin Uploading”
Consultant Functionality

Document Upload

- Browse for documents
- Add documents to the upload page
- Assigns document types
- Multiple document types can be added to each document
- Multiple documents can be uploaded simultaneously
- Submit documents
Consultant Functionality

My Projects

- Displays all assigned projects
- Selecting a project shows uploaded documents
  - Pending
  - Approved

<table>
<thead>
<tr>
<th>Family ID</th>
<th>Project #</th>
<th>CPMS #</th>
<th>Scope</th>
<th>BIN #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1072</td>
<td>BRF-0013(502)</td>
<td>100003193</td>
<td>CN</td>
<td>81332-23.4</td>
<td>REPL BIN 003035 (13-32-23.4) OVER NORFOLK SOUTHERN RR RAILROAD INVOLVEMENT</td>
</tr>
<tr>
<td>10771</td>
<td>NHF-0101(517)</td>
<td>100004047</td>
<td>PE</td>
<td>6724 6725 18379</td>
<td>SR-200 ADD LANES FROM SR-21 TO SR-74 (US-278)</td>
</tr>
<tr>
<td>14535</td>
<td>NCPD-HPP-STPOAF-1065(332)</td>
<td>100005073</td>
<td>PE</td>
<td>10914 INTERCHANGE ON I-65 @ CR-24 E OF TANNER</td>
<td></td>
</tr>
<tr>
<td>12788</td>
<td>BR-0075(511)</td>
<td>100040787</td>
<td>PE</td>
<td>2723 10598</td>
<td>&quot;REPL BIN 002723 - SR-75 OVER SCARHAM CREEK (SUFF = 55.0, STAT = 2)&quot;</td>
</tr>
</tbody>
</table>

Pending Documents
- "STPOA-001 MR.pdf" Uploaded By: jevins at 7/14/2014 3:48:20 PM
- "BR-0091.pdf" Uploaded By: jevins at 8/6/2014 11:50:33 AM

Approved Documents
- "BR-0014F __ R SS.pdf" Uploaded By: jevins at 5/15/2014 2:58:47 PM
ALDOT Engineer Functionality

Document Approval

- ALDOT engineers approve all uploaded documents
- ALDOT Engineer can edited document data or delete a document
Project Initiation

- Search for a project to initiate
- Select project to be initiated

**Project Initiation**

**Search Projects for Initiation**

Family ID: 
CPMS #: 
BIN #: 
Description Keyword: 
Project #: 
Project Prefix: 
Project Route ID: 
Project Agreement #: 

Search Project(s)

**Project Initiation**

<table>
<thead>
<tr>
<th>Family ID</th>
<th>Project #</th>
<th>CPMS #</th>
<th>Scope</th>
<th>BIN #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>23136</td>
<td>BR-0009</td>
<td>100041415</td>
<td>PE</td>
<td>2627</td>
<td>SR-9 REPLACE BRG BIN 002627, OVER LITTLE HILLABEE CREEK, 1.0 MILE SOUTH OF MILLERVILLE. (SUFF=19.5, STAT=SD, 2001 HBRRP LIST)</td>
</tr>
<tr>
<td>23136</td>
<td>BR-0009</td>
<td>100041416</td>
<td>CN</td>
<td>2627</td>
<td>SR-9 REPLACE BRG BIN 002627, OVER LITTLE HILLABEE CREEK, 1.0 MILE SOUTH OF MILLERVILLE. (SUFF=19.5, STAT=SD, 2001 HBRRP LIST)</td>
</tr>
</tbody>
</table>
ALDOT Engineer Functionality

Project Initiation

- Consultants and ALDOT engineers are assigned to a project.
- Once the project is initialized, it will appear on the GeoGIS map and be available for uploaded documents.
- An automatic email is generated.

![Project Initiation](image-url)
Administrator Functionality

Create/Edit/Delete Users

- New users can be created with a valid email address
- Users can also be edited or deleted once they are in the system
- Users have the ability to change personal passwords and email addresses
GeoGIS Architecture

MS-SQL Server Relational Database

SQL

ESRI ArcGIS Server, ArcSDE, and a RDBMS

ESRI Flex Map API

Hummingbird

Hyperlink

GeoGIS Web Client

Javascript

Map Extension
Results

- 912 projects initialized
  - 598 Geotechnical
  - 450 Materials
  - 11 Environmental
- 5096 documents uploaded
Conclusions & Future Work

- GeoGIS has been deployed and is currently being used by over 70 ALDOT Engineers and Consultants
- Increase data availability through Environmental, Materials, and Historic Geotechnical documents
- Link to Plans Library and GIS services at ALDOT
- Convert the site and map to HTML 5 for use on mobile devices and alignment with ALDOT Enterprise GIS
GeoGIS Web Site

http://geogis.caps.ua.edu/Login.aspx