

GeoGIS

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16. Abstract GeoGIS is a web-based geotechnical database management system that is being developed for the Alabama Department of Transportation (ALDOT). The purpose of GeoGIS is to facilitate the efficient storage and retrieval of geotechnical documents for ALDOT. The website utilizes a web-based map to search for documents based on the location of the project to which the document is associated. Users can also search for documents based on document attributes. The website is equipped with a document upload page where users can add geotechnical data to GeoGIS. Access to the website is limited to only authorized users with one of four levels of classification: General User, Consultant, ALDOT Engineer, or Administrator, listed in order from lowest level of access to highest. General users are limited to only viewing the site and searching documents. Consultants have the ability to upload data to the GeoGIS database. ALDOT Engineers are charged with the task of approving the uploaded documents and initiating new projects, which allows new projects to be available to receive uploaded documents and be displayed on the GeoGIS map. Administrators have the additional responsibility of managing GeoGIS users. Each level of classification inherits the privileges of each previous level of classification. GeoGIS is improving daily to accommodate new features and improve the overall functionality of the website.					
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CONTENTS

TECHNICAL REPORT DOCUMENT PAGE	iii
LIST OF TABLES	vii
LIST OF FIGURES	ix
EXECUTIVE SUMMARY	xi
CHAPTER 1 INTRODUCTION	2
1.1 Introduction.....	2
1.2 Report Organization.....	4
CHAPTER 2 METHODOLOGY.....	6
2.1 Web-Based GeoGIS Overview	6
CHAPTER 3 RESULTS	22
3.1 Progress Overview	22
3.2 Landslide Layer.....	22
3.3 Optical Character Recognition.....	24
3.4 User Searching	26
3.5 Bridge Card Updates	28
3.5 eDOCS	29
3.6 Deploying a Test GeoGIS in the ALDOT Network Space.....	30

CHAPTER 4 CONCLUSION AND FUTURE WORK.....	32
4.1 Conclusion	32
4.2 Future Work	32
4.2.1 Integrate eDocs into GeoGIS and Transfer the Site.....	32
4.2.2 Continue to populate GeoGIS with Past Projects and Documents	33
REFERENCES.....	34
APPENDIX A GEOGIS USERS GUIDE.....	38
Appendix A	52
Documents Required for GeoGIS	52
Appendix C	59
Abbreviations	59
Appendix D	62
Frequently Asked Questions	62

LIST OF TABLES

Table 1: GeoGIS user types and associated privileges	7
Table 2: Document Types	19

LIST OF FIGURES

Figure 1: GeoGIS Home Page	7
Figure 2: GeoGIS Map Depicting Only Geotechnical Projects	8
Figure 3: Help Tab	10
Figure 4: Project Type Filter	11
Figure 5: Document Tab	12
Figure 6: Document Upload Security Error	18
Figure 7: Bridge Tool.....	Error! Bookmark not defined.
Figure 8: Pile Point Attributes Displayed in Pop-Up Box.....	Error! Bookmark not defined.
Figure 9:Pile Tab.....	Error! Bookmark not defined.
Figure 10: Invalid DIGGS File Error Message	Error! Bookmark not defined.
Figure 11: Atterberg Limit Test One Page View	16
Figure 12: Cone Penetration Test Visualization	17
Figure 13: Landslide Attributes	17
Figure 14: Landslide/Pile Data Entry	17
Figure 15: OCR Text Search.....	17
Figure 16: OCR Search Example.....	17
Figure 17: Search Results Using Left-hand Side Method	17
Figure 18: Search Results Using Control Plus Left-hand Click and Drag Method	17

EXECUTIVE SUMMARY

GeoGIS is a web-based geotechnical database management system that is being developed for the Alabama Department of Transportation (ALDOT). The purpose of GeoGIS is to facilitate the efficient storage and retrieval of geotechnical documents for ALDOT. The website utilizes a web-based map to search for documents based on the location of the project to which the document is associated. Users can also search for documents based on document attributes. The website is equipped with a document upload page where users can add geotechnical data to GeoGIS. Access to the website is limited to only authorized users with one of four levels of classification: General User, Consultant, ALDOT Engineer, or Administrator, listed in order from lowest level of access to highest. General users are limited to only viewing the site and searching documents. Consultants have the ability to upload data to the GeoGIS database. ALDOT Engineers are charged with the task of approving the uploaded documents and initiating new projects, which allows new projects to be available to receive uploaded documents and be displayed on the GeoGIS map. Administrators have the additional responsibility of managing GeoGIS users. Each level of classification inherits the privileges of each previous level of classification. GeoGIS is improving daily to accommodate new features and improve the overall functionality of the website.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Roadway construction projects amass large amounts of preconstruction and construction documents that must be stored for future use. With state departments of transportation (DOTs) conducting numerous roadway projects at one time the amount of documentation needing to be stored quickly becomes overwhelming. Much of this data is generated from geotechnical investigations and contains soil information as well as its location on the earth. Storing this information based on the location could prevent redundant geotechnical investigations of areas that have been explored in the past.

Recently the use of geographic information systems (GISs) has become more prevalent in the engineering community. A GIS has the ability to store and retrieve vast amounts of data and represent that data spatially on a map. A point of strength in a GIS is the ability to perform spatial and non-spatial analysis on data. Spatial analysis is a very powerful tool when used in a system for storing construction documentation. In particular, the storage of geotechnical documents are ideally suited for a GIS. Roadway projects, soil borings, bridge foundations and other features can be represented on a map and all data associated with those features can be stored in a database. Storing data based on location allows for more efficient storage and retrieval of geotechnical data. Geographic information systems also have powerful tools for querying data in order to find information quickly and easily.

A Geotechnical Geographic Information System (GeoGIS) web application has been developed for ALDOT. GeoGIS is populated with thousands of spatially-located geotechnical,

environmental, and materials projects and their associated documents. The number of projects and documents continues to rise as new and historic information is entered into the system. Authorized users can access GeoGIS through the secure web site <https://geogis.caps.ua.edu>, and users are assigned roles which allow for different levels of system functionality. The GeoGIS web application, database tables, GIS data, and geotechnical documents currently reside on secure servers at the Center for Advanced Public Safety (CAPS) at The University of Alabama (UA), but the ultimate goal is to transition this application to ALDOT.

This phase of research has focused on continued site development, the addition of projects and project documentation, and site enhancements based on user feedback and input from the Bureau of Materials & Tests and the Bureau of Computer Services, with the end goal being the transfer of the site to ALDOT servers. When transferred to ALDOT servers, ALDOT will employ the eDocs system and services for the storage of geotechnical documents and files. The services to “put” and “get” documents from eDocs is currently being developed and implemented by ALDOT. Once complete, GeoGIS will employ these services to store and retrieve documents from eDocs. Site improvement and development initiatives have been approved and prioritized by ALDOT. In particular, features integrating ALDOT bridge data, pile data, landslide data and geotechnical engineering file formats including the Data Interchange for Geotechnical and Geoenvironmental Specialists (DIGGS) have been implemented. During this phase of research, the GeoGIS team continued to initialize past projects and upload corresponding environmental, geotechnical, landslide, and bridge documents to create a more complete digitized database of ALDOT projects. The Project Advisory Team continued to support the project to ensure both functional and computational goals of the production site. ALDOT Engineer and Consultant training as well as ongoing user support was provided by UA.

1.2 Report Organization

Chapter 2, Methodology, is an in depth look at the different functionalities of the GeoGIS website and how the different website components work together. Chapter 3 shows the results of this research. In the Results chapter, the various changes to GeoGIS that were made in the current phase of research are discussed, as well as the impact the changes have had on the website. Chapter 4 is made up of Conclusions and Future Work. This chapter discusses conclusions drawn from the GeoGIS project and changes that can be made in future phases of the project. Appendix A is a user's guide intended for ALDOT, consultants, and the University of Alabama staff that will work with GeoGIS in the future.

CHAPTER 2

METHODOLOGY

The overall focus of the GeoGIS project is to assist in the storage and retrieval of preconstruction and construction documents related to geotechnical engineering for the Alabama Department of Transportation (ALDOT). This phase has been focused on continued site development, the addition of projects and project documentation, and site enhancements based on user feedback.

2.1 Web-Based GeoGIS Overview

GeoGIS is a secure online, ESRI-based platform that requires a valid username and password to enter the site. An administrator creates a login username and password for a user, and assigns the user to one of four user types: general user, consultant, ALDOT engineer, and administrator. GeoGIS user privileges are structured as a hierarchy of increasing privileges. A summary of the user types and associated privileges is displayed in Table 1: GeoGIS User Types and Privileges.

A valuable function of GeoGIS is the consultant user type. This user type was created to allow outside consulting agencies to upload documents and view non-sensitive documents related to projects to which they are contributing. A consultant can upload documents, but they cannot approve them. This user type is a powerful feature that can join agencies working towards the same goal, ultimately streamlining the data acquisition and transition process and eliminating waste.

Table 1: GeoGIS user types and associated privileges

User Type	Privileges
General User	view the map, view and retrieve documents and document details, search for documents
Consultant	Privileges listed above, Upload Documents
ALDOT Engineer Administration	Privileges Listed Above, Approve Documents, Initialize Projects
	Privileges Listed Above, User Account Addition/Modification

Once logged onto the secure GeoGIS website, a user will see the homepage displayed in

Figure 1: GeoGIS Home Page.

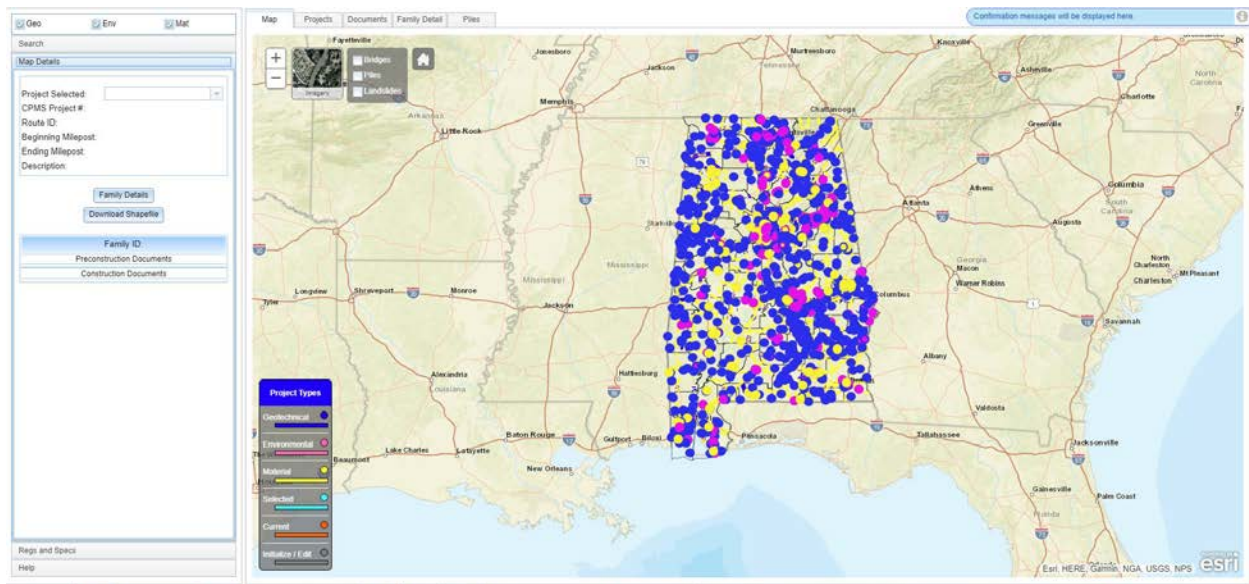


Figure 1: GeoGIS Home Page

The right side of the screen depicts a map and a “Project Types” legend. Project types include: Geotechnical (blue circles), Environmental (pink circles), and Materials (yellow circles). Additionally, the map displays which projects have currently been selected on the map by the user (cyan circles), current projects (orange circles), and projects not yet initialized (gray circles).

Current projects are any projects that have been initialized, meaning that they have a point on the map and/or documents linked to them.

Users can pan across and zoom in or out of the map using their mouse cursor. The map will only show project types the user has specified in their search, such as “only geotechnical projects” as shown in Figure 2: GeoGIS Map Depicting Only Geotechnical Projects. The map automatically zooms to a project number that is specifically input in the search fields. The map default displays data in street view, but a user can select to view aerial imagery views of the map.

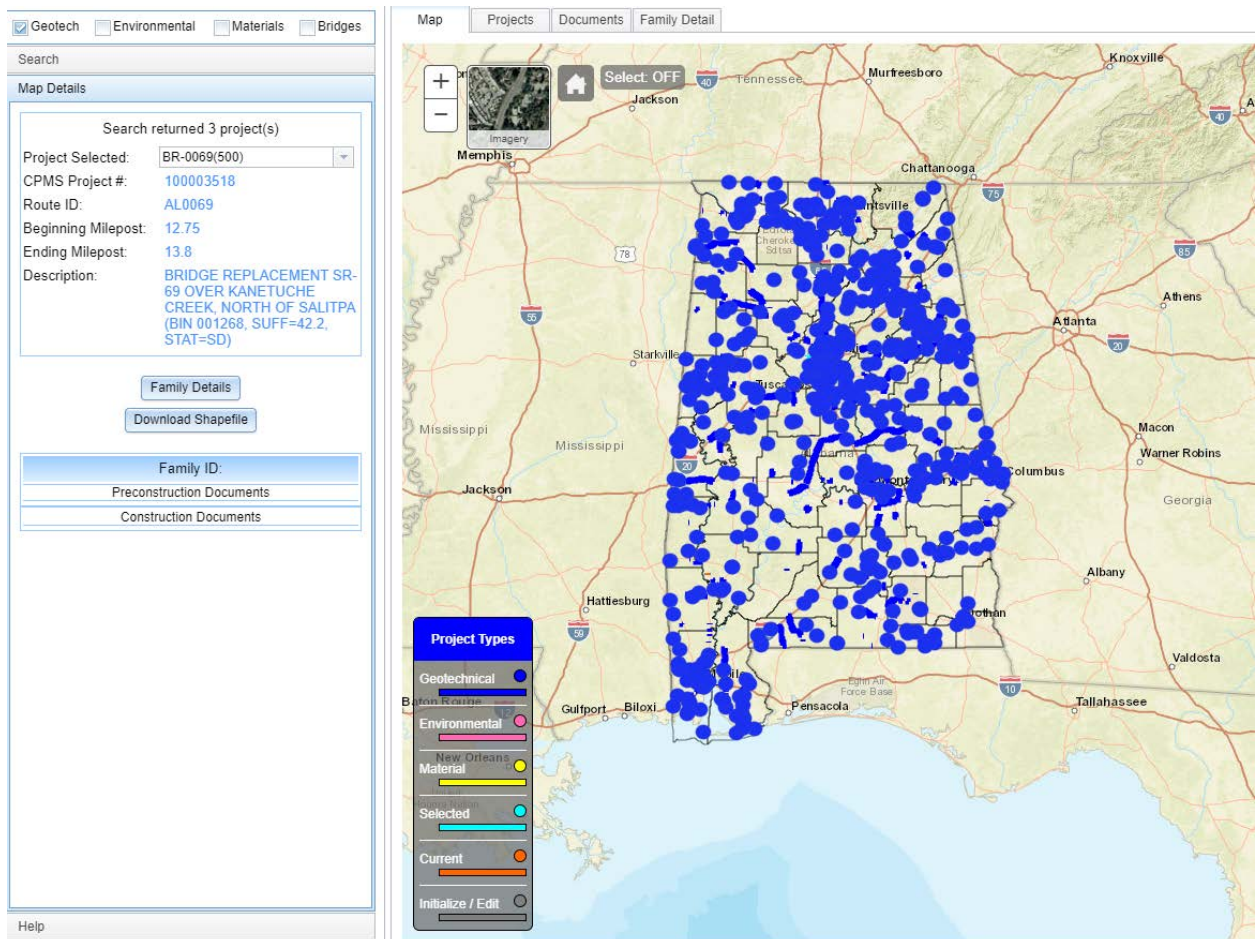


Figure 2: GeoGIS Map Depicting Only Geotechnical Projects

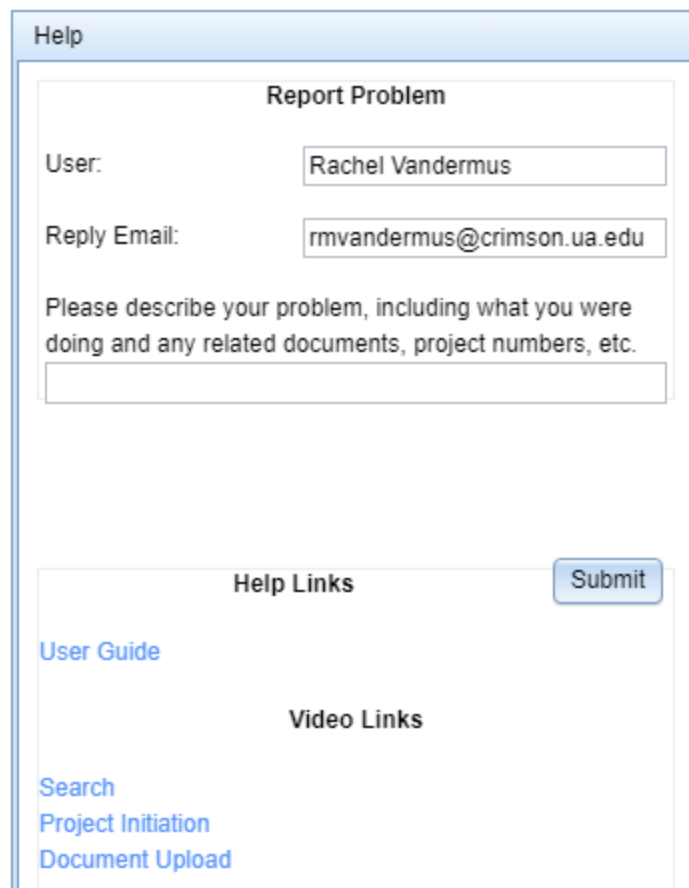
The left side of the screen displays four tabs, including Search, Map Details, Regs and Specs, and Help. The “search” tab has several fields that a user can fill out to quickly narrow their search to a specific project. These fields include: Family ID, CPMS Number (a number associated with ALDOT accounting), County, Route Type, Route Number, Project Number, Project Description, and BIN (Bridge Identification Number). Furthermore, a user can select or unselect the following checkboxes: “I want to initialize a project,” “Only show me my projects,” “Show only my unapproved documents,” and “Apply document related criteria.” If a user cannot find a project by the project number, it is likely the project has yet to be initialized. A project that is not initialized is not displayed on the map and does not currently have any documents associated with it in GeoGIS. The “I want to initialize a project” checkbox needs to be checked, and the search will then direct the user to any projects that fit the search criteria. If a user wants to initialize a project, they will be prompted to place the project on the map. “Only show me my projects” and “Only show my unapproved documents” are beneficial search filters for consultants and ALDOT engineers. These checkboxes allow consultants and ALDOT engineers to focus their searching to include only documents associated with the projects of which they are a contributor. By clicking “Apply document related criteria,” a user will be prompted to select the document types they are interested in finding. This search only returns documents classified in a particular document type. At the bottom of the search tab, there is a total that lists the number of associated projects returned and the number of associated documents returned from the user’s search.

The “Map Details” tab immediately pops up when a project is selected. The tab is a summary of the fields in the Search tab. It lists the project number, CPMS Project Number, Route ID, Beginning Milepost, Ending Milepost, and Project Description, as well as the family

ID. Users can also click a “family details button” to view a summary of the project family and associated documents, or a “download shapefile” button to download the shapefile associated with the project’s scope.

The “Regs and Specs” tab contains links to various pdfs of ALDOT and ADEM regulations and specifications.

The “Help” tab gives the user the ability to report a problem, access a link to the user guide, and access links to helpful videos on how to search, how to initiate a project, and how to upload a document. The help tab can be seen in Figure 3.



The screenshot shows a web interface titled "Help". It features a "Report Problem" section with the following fields: "User:" with the value "Rachel Vandermus", "Reply Email:" with the value "rmvandermus@crimson.ua.edu", and a text area for describing the problem. Below this is a "Submit" button. Underneath the form is a "Help Links" section containing a "User Guide" link. Below that is a "Video Links" section with links for "Search", "Project Initiation", and "Document Upload".

Figure 3: Help Tab

There are several filters that can be used to simplify the document search process. Users can search for and view different kinds of projects by clicking the “Geotech,” “Environmental,”

and “Materials”. checkboxes at the top of the left side of the screen. These options are displayed in Figure 4: Project Type Filter.



Figure 4: Project Type Filter

In the top left corner of the map, the user can toggle on and off additional layers of points for “Bridges”, “Piles”, and “Landslides” as shown in Figure 5.

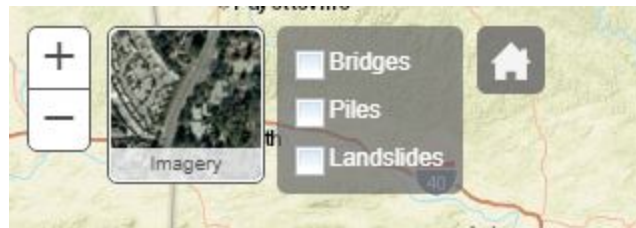


Figure 5: Additional Point Layers

At the top of the map is a series of five tabs: Map, Projects, Documents, Family Details, and Piles. All of the projects associated with the provided search criteria appear under the “Projects” tab on the right side of the screen, and all of the documents that fit the search criteria appear under the “Documents” tab on the right side of the screen. The “Family Details” page lists the document types for both preconstruction and construction documents, and lists the number of documents associated with each type within a project “family.” GeoGIS has document types associated with each project type (geotechnical, environmental, materials). All of the document types are listed in Table 2: Document Types. Different document types exist for

geotechnical, environmental, and materials projects; the documents that correspond to each project type are identified to the right of the document type.

The documents tab associated with a project number’s search is shown in Figure 6:

Document Tab. Each uploaded document displays a thumbnail of the first page of the document, a link to download the document, and a summary of pertinent document information, including: document type, project number, project description, upload date, project ID, Family ID, and a link to a “document details” pop-up. The “document details” pop-up provides additional information for users, including who uploaded the document and who approved the document. Each Microsoft Office document automatically generates a thumbnail of the first page of the document during upload, allowing users to search through GeoGIS quickly, without having to click on each individual document to view a preview of the file. Additionally, there is an “edit documents” button to the right of each document under the “edit documents” column that allows a user with associated privileges to change the document type or intended approver type. When a document has been approved, a check will appear in the checkbox under the “approved” column.

Preview	Document Details	Project ID	Family ID	Edit Documents	Approved
	<p><i>View Document:</i> Scope of Project BR at US-43 at Deadwater Cr BR-2906(107).Fayette.pdf</p> <p><i>Document Type:</i> ALDOT Internal</p> <p><i>Project Number:</i> BR-2906(107)</p> <p><i>Project Description:</i> REPLACE BRIDGE ON SR-18 OVER DEADWATER CK, BINS 000280</p> <p><i>Upload Date:</i> 5/29/2017 9:40:17 AM</p> <p><i>View Details:</i> Document Details</p>	100037644	21173	Edit Document	<input checked="" type="checkbox"/>
	<p><i>View Document:</i> HAZRPT 8.12.02_BR on SR-18 over Deadwater Creek_BR-2906(107)_Fayette.Co.pdf</p> <p><i>Document Type:</i> Other</p> <p><i>Project Number:</i> BR-2906(107)</p> <p><i>Project Description:</i> REPLACE BRIDGE ON SR-18 OVER DEADWATER CK, BINS 000280</p> <p><i>Upload Date:</i> 9/30/2016 7:40:20 PM</p> <p><i>View Details:</i> Document Details</p>	100037644	21173	Edit Document	<input checked="" type="checkbox"/>
	<p><i>View Document:</i> Clearance Letter Reevaluation 1.27.2016 BR on SR-18 over Deadwater Cr BR-2906(107) Fayette.pdf</p> <p><i>Document Type:</i> Clearance Letter</p> <p><i>Project Number:</i> BR-2906(107)</p> <p><i>Project Description:</i> REPLACE BRIDGE ON SR-18 OVER DEADWATER CK, BINS 000280</p> <p><i>Upload Date:</i> 5/29/2017 9:39:40 AM</p> <p><i>View Details:</i> Document Details</p>	100037644	21173	Edit Document	<input checked="" type="checkbox"/>

Figure 6: Document Tab

The “bridge layer,” can be toggled on and off on the GeoGIS map so that ALDOT employees can view the location of bridges and associated information, such as bridge cards. When a user selects a bridge point in GeoGIS, a pop-up box opens that lists important information about the bridge, such as the bridge identification number, what the bridge crosses over or under, what road facilitates the bridge, and the associated CPMS. The bridge identification numbers were provided by ALDOT. Some data, such as the associated CPMS number and what the bridge crosses over or under, is supplied on the bridge card. A bridge card lists important identifying information related to the bridge, including the Bridge Identification Number (BIN), the project number, date, the year the bridge was built, what the bridge passes over or under, sketches of the bridge, and other information related to the bridge’s identity.

The bridge tool allows a user to search for a bridge identification number (BIN) and update the following fields: BIN, previous BIN, project number, CPMS number, date, year built, and comments. Users can also upload the corresponding bridge card as an attachment. The bridge tool is a useful resource that is being used to streamline uploading information to GeoGIS for immediate use by ALDOT engineers. Figure 7 displays the simple, easy to understand user interface of the Bridge Tool. To the left of the screen are the fields of information users can update for each bridge. The right side of the screen depicts an interactive map that displays the location of the bridge and the current information GeoGIS houses for that bridge.

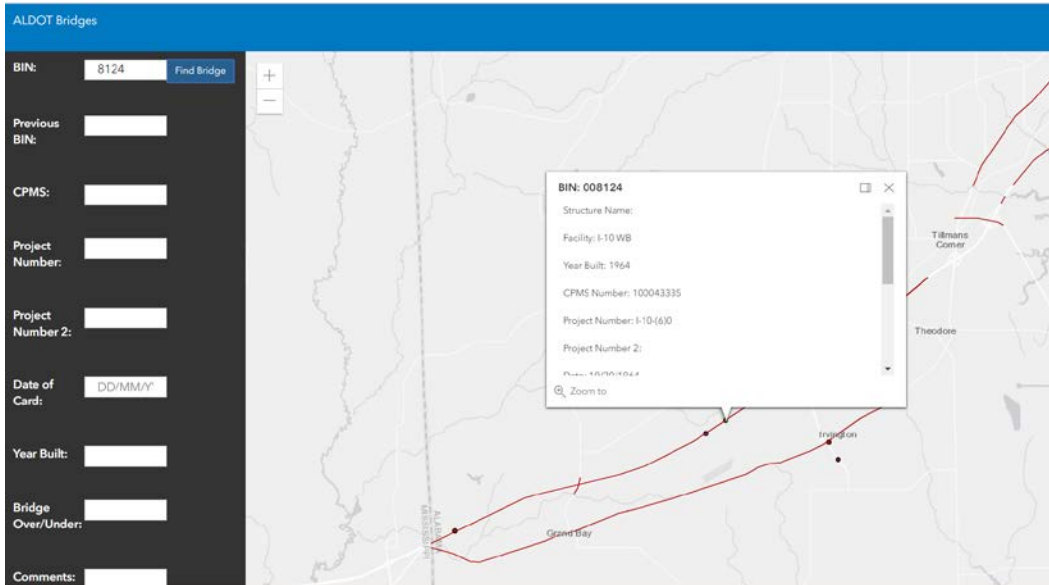


Figure 7: Bridge Tool

The pile layer creates a framework for ALDOT to use to view pile records and add future test piles to the map. Each pile point in the layer has an associated CPMS number and other attributes, and associated documents such as test pile records and boring logs. Each pile has the available attributes: CPMS number, BIN(s), Soil Type at Tip, Soil on Skin, Type, Size, Area, Length, Category, Capacity, Ultimate Capacity, BUZPILE Capacity, and Description. Figure 8 displays a pile point on the map and its attributes in a pop-up box.

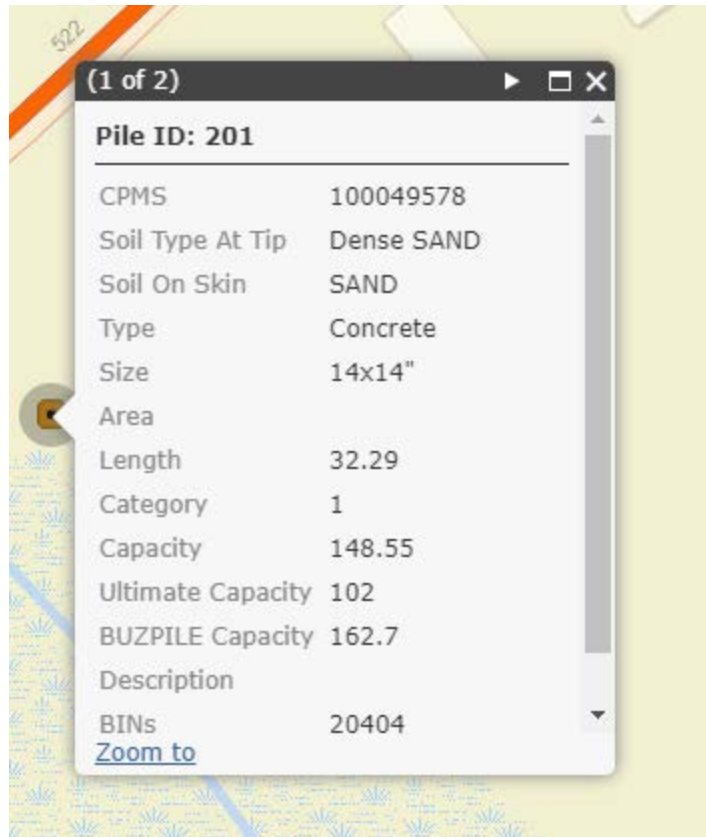


Figure 8: Pile Point Attributes Displayed in Pop-Up Box

The Project tab displays the project associated to the pile, and the Documents tab displays the available documents associated to the pile. Figure 9 displays the new tab and typical attribute data.

File	CPMS #	Soil at Tip	Soil on Skin	Base	Size	BINs
201	100049578	Dense SAND	SAND	Concrete	14x14"	20404
202	100049578	Poorly Graded SAND	SAND	Concrete	24x24"	20404

Figure 9: Pile Tab

GeoGIS has also integrated the DIGGS file format into the web system, to standardize data presentation and provide a useful feature for ALDOT engineers. When DIGGS files are uploaded to GeoGIS, the application updates the document type on upload to reflect the specific

result test type: DIGGS Atterberg or DIGGS CPT. Once the document has been uploaded, the goal is to visualize DIGGS XML files in GeoGIS by listing the tests performed, displaying the test results, and plotting the test results in a simple single page PDF report. These single page PDF reports can be viewed as document thumbnails in the documents tab.

It is important to display the most pertinent information for the two test types in an easy to read view. In a standard Atterberg Limit test, researchers evaluate water content properties of soils, including shrinkage, plastic and liquid limits, to determine the current state of the soil: solid, semi-solid, plastic, or liquid. Researchers perform a liquid limit test by placing a wet soil, with a groove cut through the soil, in a Casagrande cup, and counting the number of blows required to close the groove. The plastic limit is found by rolling a thread of soil and measuring the diameter of the thread before cracks form. To visualize an Atterberg Limit test, GeoGIS created the “one-page view” displayed in Figure 10: Atterberg Limit One Page View.

Liquid Limit Liquid Limit Data

Liquid Limit		
Trial No	Blow Count	Water Content
1	30	53
2	27	62
3	20	77.7
Liquid Limit	25	65.8575
Plastic Limit		
Trial No	Water Content	
1	20	
2	21	
Plastic Limit	20.5	

Figure 10: Atterberg Limit Test One Page View

In a standard cone penetration test, researchers push an instrumented cone, with the tip facing down, into the ground at a controlled rate to determine properties of the soils. Researchers

collect data for the tip resistance, sleeve friction, and pore pressure at hundreds depths. Instead of an Excel sheet composed of hundreds or thousands of rows of data, GeoGIS displays these plots in easy-to-interpret graphics. The cone penetration test “one page view” is displayed in Figure 11: Cone Penetration Test One Page View.

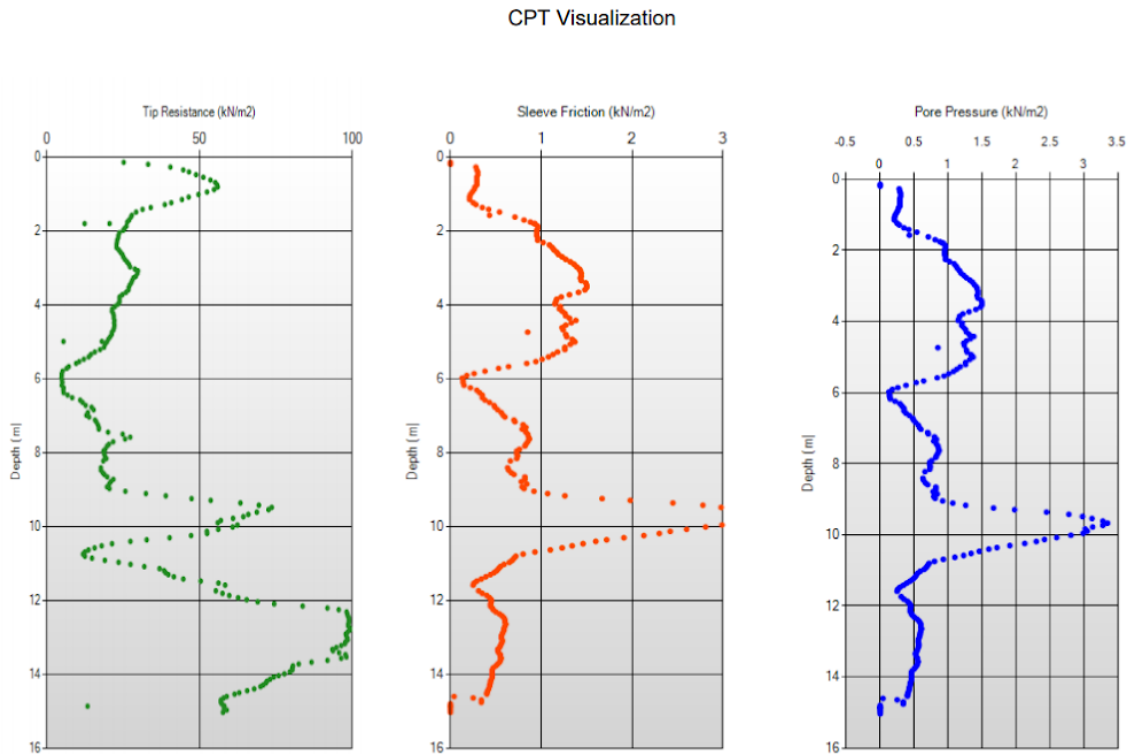


Figure 11: Cone Penetration Test Visualization

Each document intended for upload to the GeoGIS website must abide by requirements for security, resolution, and naming. All paper documents are to be scanned at the highest possible resolution, and all documents are required to have password security protection before upload. To upload a document to a project, a user with associated privileges simply clicks on the “upload documents” button for the associated project on the “projects” tab. This causes a “pending documents” pop-up box to appear on the screen, and a user browses to the location

they have stored the pending document. If a document has not been secured with password security, the GeoGIS system will return an error message to the user, prompting them to update security settings and try to upload the document again. The error message associated with attempting to upload an unsecured document is displayed in Figure 12: Document Upload Security Error.

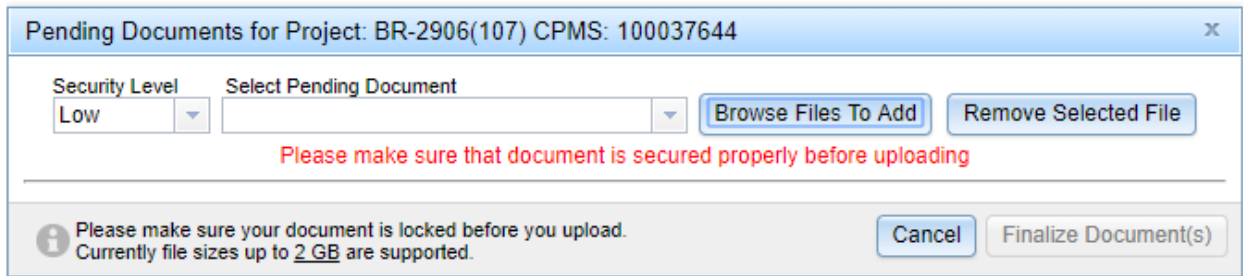


Figure 12: Document Upload Security Error

Table 2: Document Types

Preconstruction	Construction
Correspondence (Geo, Env, Mat)	Test Pile Driving Record (Geo)
Geohydrologic Report (Geo)	Correspondence (Geo, Env, Mat)
Foundation Analysis (Geo)	Field Monitoring (Geo)
Foundation Report (Geo)	Photos (Geo, Env)
Soil Survey (Geo)	Hammer Submittal (Geo)
Materials Report (Geo, Mat)	Signs & Lighting (Geo)
Culvert Report (Geo)	Drilled Shaft Excavation Log (Geo)
Slope Study Report (Geo)	Drilled Shaft Pouring Record (Geo)
Landslide Report (Geo)	Bearing curves (PDA Results) (Geo)
Sinkhole Report (Geo)	Foundation Analysis (Geo)
Retaining Wall Report (Geo)	Bridge Card Image (Geo)
Geotechnical Data (Geo)	Bridge Identification Number (Geo)
Photo (Geo, Env)	Load Test (Geo)
DIGGS (Geo, Env, Mat)	Plan (Geo, Env)
DIGGS Atterberg (Geo, Env, Mat)	DIGGS (Geo, Env, Mat)
DIGGS Cone Penetration Test (Geo, Env, Mat)	Other (Geo, Env, Mat)
ADEM Correspondence (Env)	
ALDOT Internal (Env)	
Hazmat Report (Env)	
Clearance Letter (Env)	
NEPA Documentation (Env)	
Environmental Site Map (Env)	
Preconstruction- Other (Env)	
Other (Geo, Env, Mat)	

Chapter 3 describes the website enhancements as well as the progress made on increasing the amount of data stored in GeoGIS.

CHAPTER 3

RESULTS

The objective of this phase of GeoGIS was to continue the initialization of new GeoGIS projects, continue the upload of new project documents, continue site development, integrate with the ALDOT eDocs document management system, and test a GeoGIS deployment in the ALDOT server space. This section describes the results of these changes in GeoGIS.

3.1 Progress Overview

During this phase, improvements were made in overall site performance and more projects with their associated documents were uploaded to the system. Landslide data was added into GeoGIS, and optical character recognition (OCR) capabilities were integrated into the document search process. This section also includes a summary of the integration of eDOCS, ALDOT's document management system into GeoGIS.

In September 2018 GeoGIS contained 2846 initialized projects. Of these, 1599 were marked as geotechnical-related, 1260 were marked as materials-related, and 476 were marked as environmental-related. In November 2019 GeoGIS contains 3179 initialized projects. Of these, 1647 are marked as geotechnical-related, 1481 are marked as materials-related, and 596 are marked as environmental-related. Also, at latest count in November 2019, there are 14,190 approved GeoGIS documents, which is a 2,929 increase from the 11,261 approved documents in early September 2018.

3.2 Landslide Layer

A landslide layer was created with landslide data from two different databases and added to the map using their latitude and longitude data. The landslide points include the following

available attributes, DDIR, Division, MP Start, MP End, Route Type, Route Number, Ramp, Road Description, Weather, Failure Description, Failure Type, and Severity. The attributes can be displayed in a pop-up box when an individual landslide point is selected as shown in Figure 13.

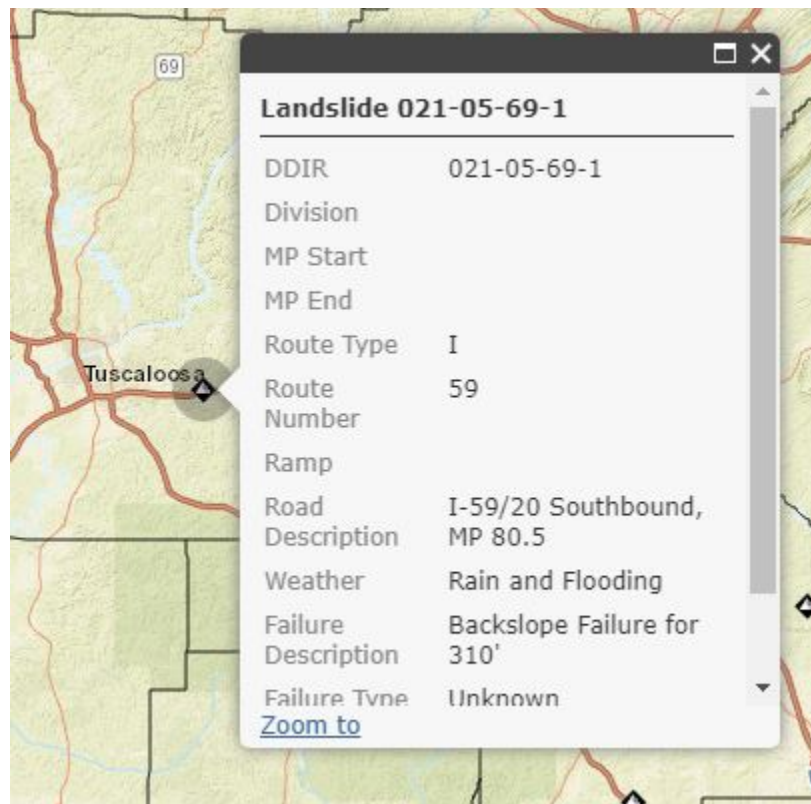


Figure 13. Landslide Attributes

A landslide point can be added the same way a pile point is added, by using the Add Feature tool. To increase the functionality of the Add Feature tool, the ability to click on the map to choose the location of the feature instead of typing in latitude and longitude was also included in this phase of research. When users choose the Add Feature tool they are presented a data entry dialog on the left-hand side of the site, shown in Figure 14. Users enter the landslide or pile data

attributes, then click on the map to populate the latitude and longitude values, and then click the Create button to create the new feature. The new feature is then highlighted on the map.

Add Feature	
<input checked="" type="radio"/> Landslide <input type="radio"/> Pile	
CPMS #:	900000397
DDIR #:	
Division:	
Route Id:	
Route Type:	Select a Route Type ▼
Beginning MilePost:	
Ending MilePost:	
Located:	None ▼
Latitude:	
Longitude:	
Failure Date:	
Weather at Failure:	
Landslide Type:	Fall ▼
Failure Severity:	Road Closed ▼
Rate of Movement:	Slow: Failure occurred over 1 ▼
Failure Location:	Front Slope Failure ▼
Location Description	
Character Count: 0/250	

Figure 14. Landslide/Pile Data Entry

3.3 Optical Character Recognition

The addition of Optical Character Recognition, or OCR, in this phase of the project allows users to search GeoGIS using key words from the document texts. OCR allows key words to be identified for the scanned document. After documents are uploaded to GeoGIS, an OCR process is run on the documents, and key words are saved in the database for each document.. In

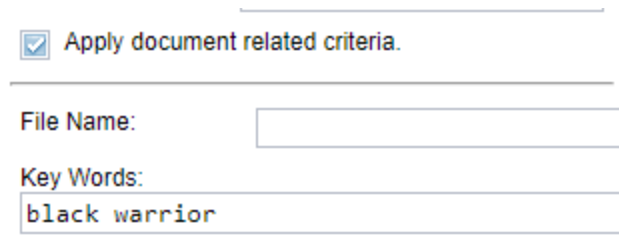
the search window, the user can select the “Apply document related criteria” box and enter key words to search for in the documents as shown in Figure 15. The key words are not case sensitive.

The screenshot displays a search interface with the following elements:

- At the top, three checkboxes are checked: **Geo**, **Env**, and **Mat**.
- A **Search** section contains three unchecked checkboxes: **I want to initialize a project.**, **Only show me my projects.**, and **Show only my unapproved documents**.
- Below these are several input fields: **Family ID:**, **CPMS #:**, **County:** (with a dropdown menu showing "Select a County"), **Route Type:** (with a dropdown menu showing "Select a Route Type"), and **Route #:**.
- The **Project Number:** section includes three sub-fields: **Project Prefix:**, **Project Route ID:**, and **Project Agreement:**, each with its own input box.
- There is a **Project Description:** text area and a **BIN:** input field.
- A checkbox labeled **Apply document related criteria.** is checked.
- Below this is a **File Name:** input field and a **Key Words:** input field.
- Two more checkboxes are present: **Select All Pre-Construction** and **Select All Construction**, both currently unchecked.
- A scrollable list of document types is shown at the bottom, including: (PreCon) ADEM Correspondence, (PreCon) ALDOT Internal, (PreCon) Clearance Letter, (PreCon) Correspondence, (PreCon) Culvert Report, (PreCon) DIGGS, (PreCon) DIGGS Atterberg, (PreCon) DIGGS Compaction Test, (PreCon) DIGGS Cone Penetration Test, and (PreCon) Environmental Site Map.

Figure 15. OCR Text Search

For example, if a user wanted to find documents for projects related to the Black Warrior River, they could search for the words “black warrior” as shown in Figure 16. The search would return documents and their related projects that contain the applied text.



The image shows a search interface with the following elements:

- A checked checkbox labeled "Apply document related criteria."
- A label "File Name:" followed by an empty text input field.
- A label "Key Words:" followed by a text input field containing the text "black warrior".

Figure 16. OCR Search Example

The OCR process doesn't work as well on certain types of documents. Documents with a lot of charts, graphs, and images may cause issues with the OCR process. To allow the user more control over adding key words in these cases, a key words text box was added to the document upload dialog. This allows users to enter key words that will be available even if the OCR process fails.

3.4 User Searching

Over the years many different methods of searching have been implemented in GeoGIS. The original left-hand searching form has always been in place, and several different methods of searching by clicking on the map were introduced over time. As a result, after performing a search using the left-hand form and reviewing those results on the map, users would sometimes inadvertently start a map search and lose the previous search results they were reviewing. In addition, left-clicking on a bridge, pile, or landslide point would inadvertently launch a search.

Searching has been simplified down to two methods on the site: 1) use the Search criteria on the left-hand side with the Search button or 2) hold down the control key while left-clicking

and dragging on the map. Using the search criteria on the left-hand side form yields results shown in Figure 17. The projects returned in the search are highlighted in blue on the map, and the currently selected project is highlighted in orange on the map. Users can change between the projects returned in the search using the “Project Selected” dropdown.

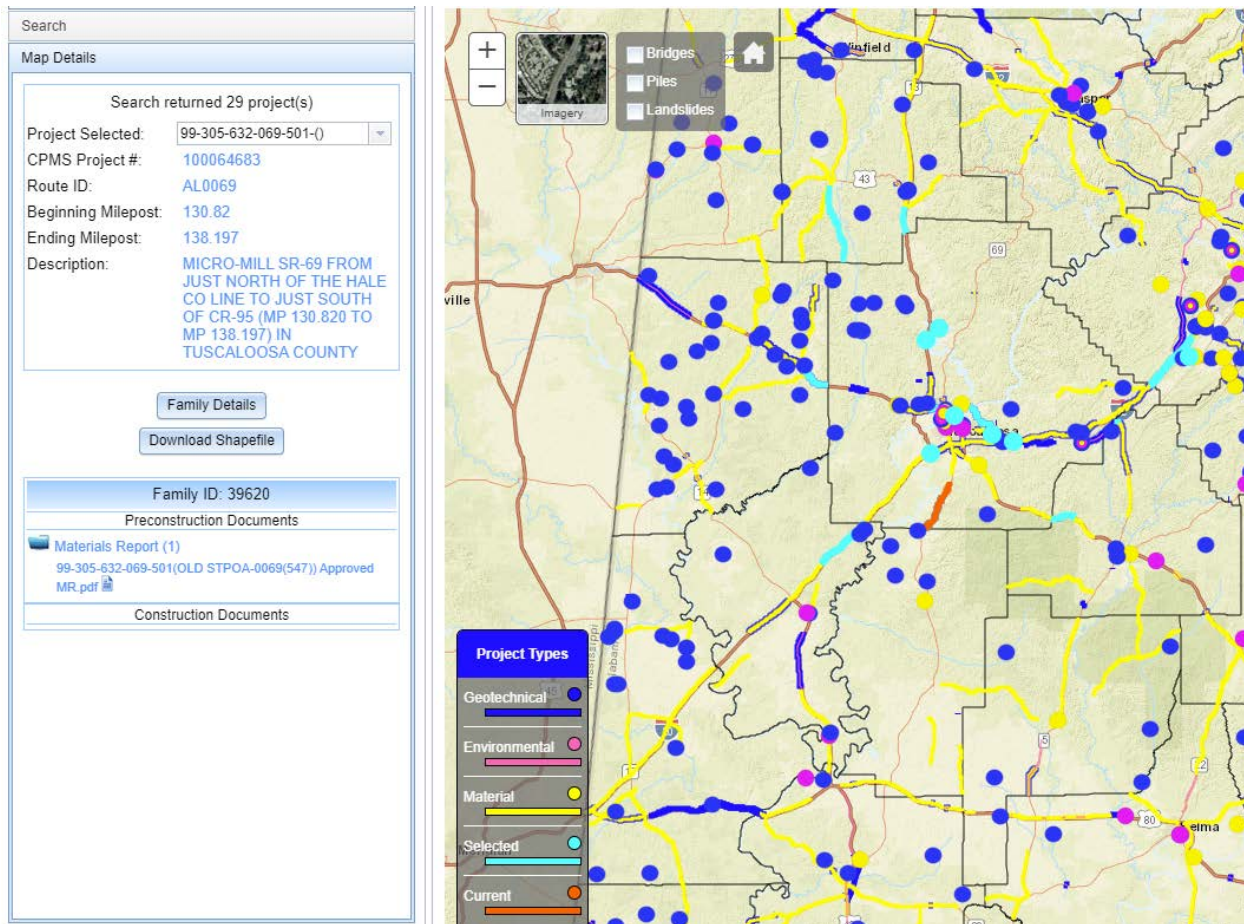


Figure 17. Search Results Using Left-hand Side Method

When users hold down the Control key and left-click and drag their mouse, they can search a particular area on the map. Using this method yields results shown in Figure 18. The area searched on the map is highlighted by the light green square, and the projects resulting from the search are highlighted in blue. Users navigate search results in either case in the same

manner, and the current search results are only cleared by a new Search or with the Clear button on the left-hand search form.

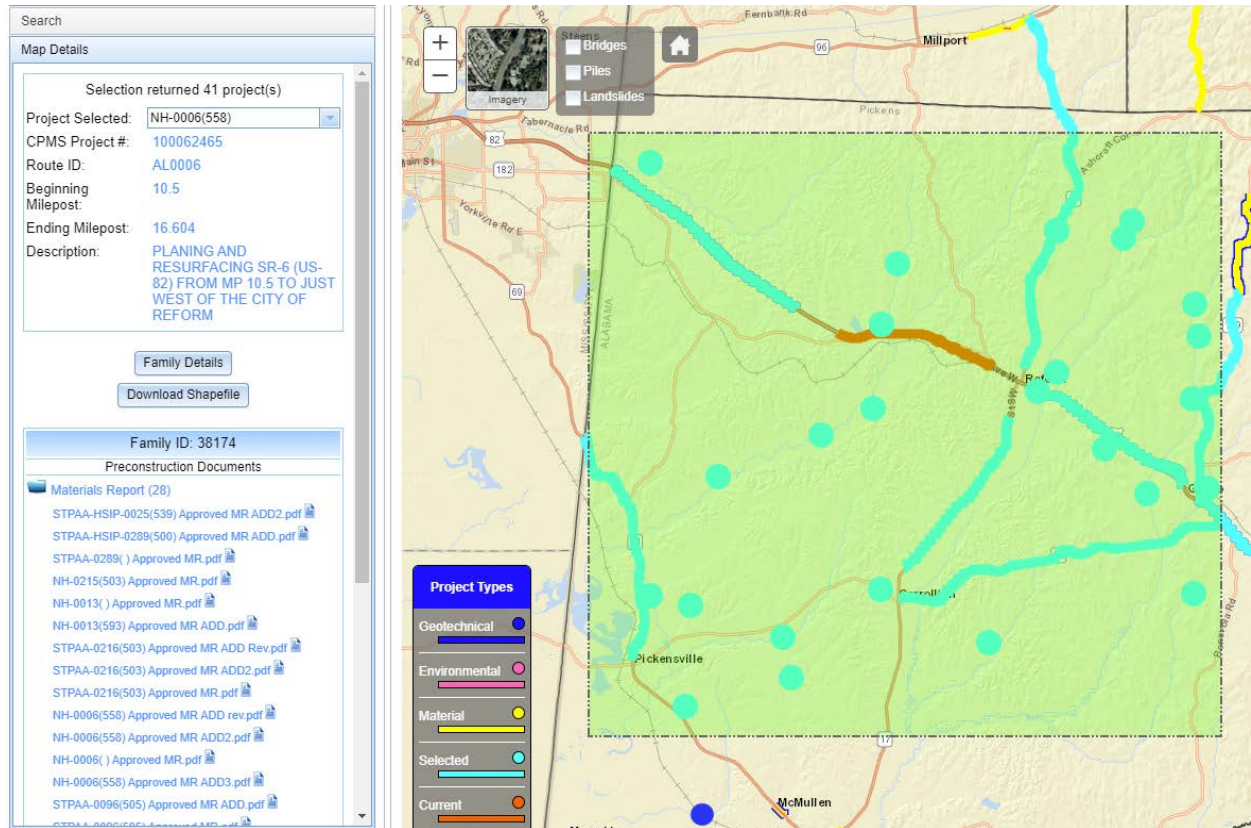


Figure 18. Search Results Using Control Plus Left-hand Click and Drag Method

3.5 Bridge Card Updates

Undergraduate students finished going through the bridge card documents received from ALDOT in order to upload these cards to projects in GeoGIS. As the students reviewed the bridge cards, they found some documents that were not bridge cards. The students documented these instances and uploaded the documents to GeoGIS with their correct document types.

3.5 eDOCS

The eDOCS system is the current document management system employed at ALDOT. As a result, some GeoGIS documents are uploaded to both the GeoGIS application and to eDOCS. In order to eliminate documents being uploaded to both systems, it was suggested that the GeoGIS application upload documents to eDOCS.

In order to accomplish this, the ALDOT IT group, led by Bradley Hall, implemented a set of services that exposes an eDOCS API to the GeoGIS application. The new eDOCS API is a WCF service that contains four functions: upload, download, search, and delete. Upload allows a user to put a document in eDOCS along with a set of meta-data attributes that helps to describe the document. Download allows a user to download a document based on either document name or document number. Search allows a user to search eDOCS documents based on a set of meta-data attributes, and also allows the user to view the meta-data attributes associated with each returned document. Delete allows a user to delete an eDOCS document for a given document number.

The metadata attributes that were selected for the eDOCS documents include the flags for project type (geotechnical, materials, or environmental), project number, project family number, document name, document type(s), associated bridge identification number, and associated counties. These meta-data attributes will continue to be stored in GeoGIS as well as stored with the document in eDOCS. For now, GeoGIS will upload documents to both systems and provide a link to download the document from both the GeoGIS database and the eDOCS system. Eventually, GeoGIS will stop uploading the actual document to the GeoGIS database but will continue to store all document attributes in GeoGIS.

3.6 Deploying a Test GeoGIS in the ALDOT Network Space

UA staff worked with ALDOT IT staff to deploy a test instance of GeoGIS on an ALDOT network server during this phase of the project. There were several considerations that provided challenges with this process, including different network topologies and different security restrictions between the two systems. Initially, the current GeoGIS database was restored on an ALDOT server and the ESRI services were published to allow access to the data. Then, the web application was deployed, modified slightly to accommodate some differences on the ALDOT network, and tested successfully.

Successfully testing GeoGIS in the ALDOT network space was a significant achievement for this phase of the project. When the actual deployment is conducted in the future, there will be several considerations to keep in mind:

- UA currently runs a daily job to read from an XML file provided by ALDOT to keep their local copy of the CPMS table up to date. When GeoGIS is running in ALDOT's space, ALDOT might choose to modify this job to point directly at the CPMS database table instead of using the service.
- GeoGIS currently reads from an ALDOT service when querying shapes for CPMS projects. ALDOT might choose to point directly at these tables once GeoGIS is running in ALDOT's network space.

Some of the ESRI service queries utilize "where" clauses to indicate which shapes to return. Some indications were seen that firewall rules might be causing issues with these queries, and they will need a little more testing to make sure these issues have been resolved.

CHAPTER 4

CONCLUSION AND FUTURE WORK

4.1 Conclusion

This phase of research successfully continued site development, continued the addition of projects and project documentation, and implemented other site enhancements. A landslide layer was included so that ALDOT employees could view the location of landslides and associated documents. OCR text search capabilities were integrated into the search function to allow users to search text in the scanned documents. eDOCS web services were also integrated into the GeoGIS system. The following sections detail future work for the next phase of research.

4.2 Future Work

The main goals of the next phase of this research is the transfer of the site to ALDOT servers and the addition of projects and project documentation, The GeoGIS site will be transferred to ALDOT servers and employ the eDocs system and services for the storage of geotechnical documents and files.

4.2.1 Integrate eDocs into GeoGIS and Transfer the Site

To prepare the GeoGIS HTML5 website for installation at ALDOT, the UA team will work with Computer Services and adjust GeoGIS to facilitate seamless transfer. During monthly GeoGIS meetings, Computer Services will provide input on ALDOT standards and suggest changes to the site. Code and database changes will be made by UA to conform to ALDOT standards. This particular task will be a continuation of the previous phase of this project due to ALDOT changes in document management systems. Now that eDocs has been selected as the

optimal document management system at ALDOT the GeoGIS team will be able to modify GeoGIS to conform to this document management system.

There are ALDOT server/network needs associated with the transition of GeoGIS to ALDOT. ALDOT will provide a standard Windows 2012 (or higher) Server running Internet Information Services 7.0 (or higher) to host the public-facing GeoGIS web site. ALDOT will provide an ESRI/database server running ESRI Server 10.5 (or higher) to host the public-facing map layer services and Microsoft SQL Server 2014 (or higher) to host the supporting database tables. Several nightly maintenance tasks (C#.Net console applications) will need to be installed and scheduled on either server using Windows Task Scheduler.

4.2.2 Continue to populate GeoGIS with Past Projects and Documents

UA will continue expanding project data in GeoGIS by adding past projects. Paper documents in project folders will be retrieved from ALDOT throughout the duration of this research project, and the UA team will digitize and upload the documents to the GeoGIS site. This task will further the functionality of the GeoGIS site by creating a more complete historical record of past projects and documents.

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APPENDIX A
GEOGIS USERS GUIDE

GeoGIS Manual

Version 7.3: 11/26/2019

Table of Contents

1.0 Introduction to GeoGIS	5
2.0 GeoGIS User Types	5
2.1 General Use Type.....	5
2.1.1 Login Page.....	6
2.1.2 GeoGIS Homepage.....	6
2.1.3 GeoGIS Map.....	7
2.1.4 Family Details Page.....	10
2.1.5 Document Details Page.....	12
2.1.6 Search Page.....	12
2.1.7 OCR Search.....	14
2.1.8 Change Password.....	16
2.1.9 User Help Menu.....	17
2.1.10 Regulations and Specifications Tab.....	17
2.2 Consultant User Type.....	19
2.2.1 Document Upload Page.....	19
2.2.2 My Projects Page.....	21
2.3 Engineer User Type.....	22
2.3.1 Document Approval Page.....	22
2.3.2 Project Initiation.....	23
2.4 Administrator User Type.....	25
2.4.1 Administration Page.....	25
3.0 Procedures for Producing Live Documents	29
Step 1: Set Preferences.....	29
Step 2: Create a PDF from the Original Document.....	34
Step 3: Combine Documents.....	36
Step 4: Check/Set Orientation.....	37

Step 5: File Nomenclature.....**37**

Step 6: Review	37
Step 7: Save file to server	37
4.0 Procedures for Scanning Historical Documents.....	38
Step 1: Sign File Out of File Room	38
Step 2: Information that needs to be scanned into GeoGIS.....	38
Step 3: Is the project initiated in GeoGIS?	38
Step 4: Number the pages in the bound document.....	38
Step 5: Scan and Assemble the Physical and Electronic Document.....	38
Step 6: Reconstruct File Folder.....	38
Step 7: Reviewer 1.....	39
Step 8: Reviewer 2.....	39
Step 9: Verification.....	40
Step 10: Reconstruct the File Folder.....	40
5.0 Procedures for Uploading Secure Documents.....	41
Step 1: Check PDF Security Settings.....	41
Step 2: Upload to GeoGIS.....	43
Step 3: Submit Document for Approval.....	44
6.0 Additional Geotechnical Features.....	45
6.1 Bridges	45
6.1.2 Piles.....	46
6.1.3 Landslides.....	47
6.1.4 DIGGS.....	49
6.1.5 Add New Landslide/Pile Features	51
Appendices	
Appendix A: Documents Required for GeoGIS	52

Appendix B: Requirements for Scanned Documents57

Appendix C: Abbreviations59

Appendix D: Frequently Asked Questions.....62

1.0 Introduction

This guide will describe the features of the GeoGIS site, beginning with the privileges granted to General Users, followed by privileges granted to Consultants, ALDOT Engineers, and finally Administrators. Each section of this manual will explain the features associated with each user type. This manual will also explain how to add and edit projects within the GeoGIS webpage using SQL Server and ArcGIS functions. The User Guide was originally written during Phase II of GeoGIS. The User Guide has been updated to keep up with changes to the website during Phase III.

2.0 GeoGIS User Types

GeoGIS is a structured system that allows users of different classifications to perform different operations depending on their user type. There are four user types: general user, consultant, ALDOT engineer, and administrator. These are listed in order of increasing privileges. Each classification has privileges that allow users to perform certain tasks. Each higher classification can perform all the tasks of the lower classifications. The general user can view the map, view and retrieve documents and document details, and search for data. These are the only tasks the general user can perform. The purpose of the consultant user is to allow outside consulting firms and ALDOT employees the ability to upload documents to a temporary storage space where the data awaits approval. The consultant can also view the map, documents, and search the system. The purpose of the ALDOT engineer user is to approve documents. An ALDOT engineer can also upload documents and perform the other tasks related to the lower level users. In addition, the ALDOT Engineer can initiate a project, which places the project on the map and allows documents to be uploaded to the project that has been initiated. The administrator can create or change user names, passwords, and privilege levels for GeoGIS users. The administrator can also initiate projects, as well as perform any action that can be performed by the lower level users.

2.1 General User Type

The GeoGIS website requires a valid login ID and password. Only a user with Administrator status can create a login ID and password. Contact the administrator for a login ID and password. This section will discuss the privileges associated with the general user. A general GeoGIS user is restricted to a “view only” status and therefore cannot edit, add, or delete any information in the system

2.1.1 Login Page

The GeoGIS website is located on a secure server. At the time of this Users Guide, GeoGIS is located at the following link geogis.caps.ua.edu. Navigate to this address using a web browser to bring up the GeoGIS Login Page. Figure 1 below shows the Login Page. Before logging in, the user will be unable to access any feature within the site.

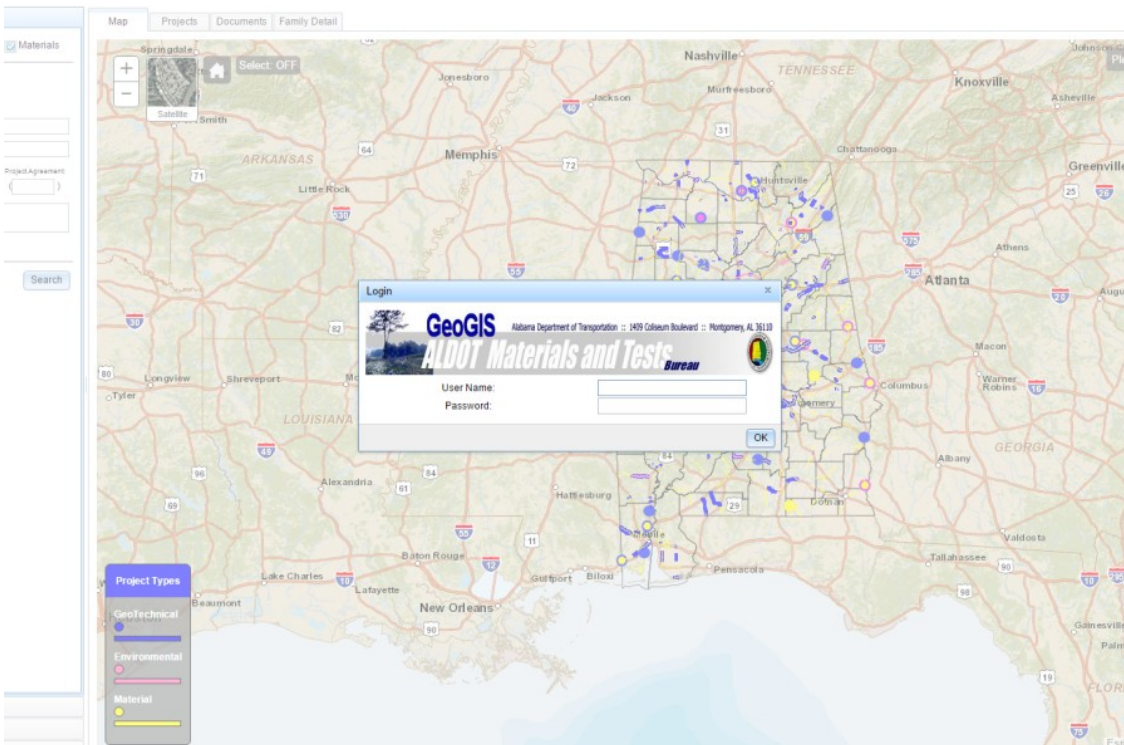


Figure 1

After a valid user name and password is entered, the user can click the Login button and the GeoGIS site will be accessible to the user.

2.1.2 GeoGIS Homepage

The GeoGIS homepage is shown in Figure 2. This page is the starting point for a GeoGIS user. The left hand side of the page contains four tabs that help navigate the user in selecting, editing and uploading projects. These tabs include Search, Map Details, Help, and Regs and Specs. Four more tabs are located at the top of the map. These tabs are windows that display information of selected projects and their locations. The windows included in the site are Map, Projects, Documents, and Family Details. From this page, a user can select any function, but the user can only perform the functions that are within the privileges of the user type.

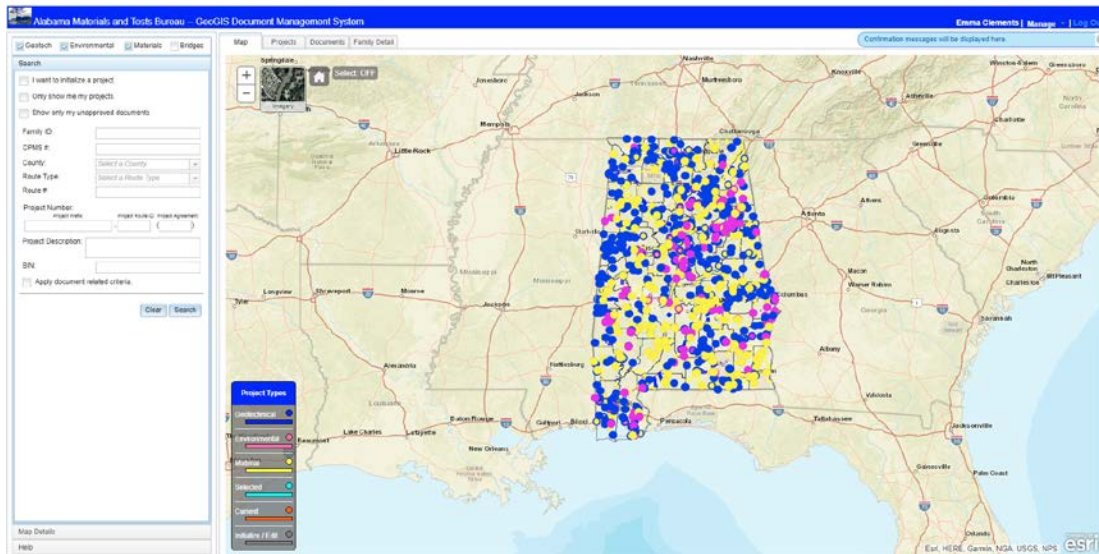


Figure 2

2.1.3 GeoGIS Map

Clicking the Map button will open a new window containing the GeoGIS map. The map initially displays outlines of the counties in Alabama along with geotechnical, environmental and material projects. Figure 3 shows the map for Alabama with all projects displayed.

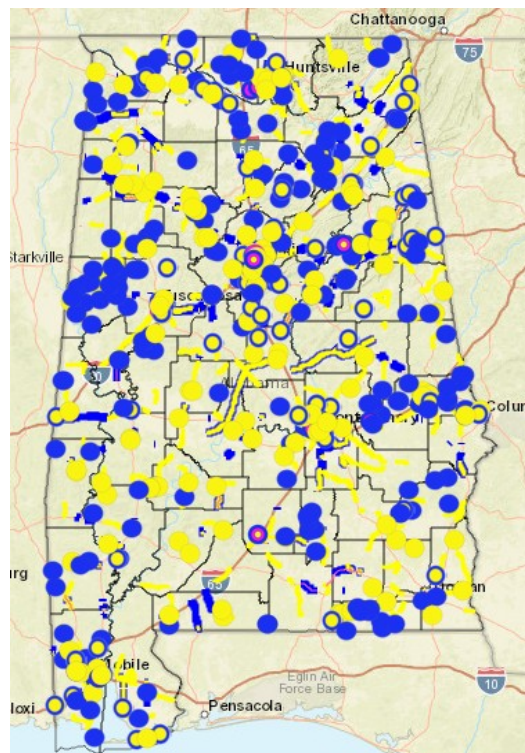


Figure 3

To view a project, the user holds Ctrl and selects the line or point that contains the project of interest. After a selection is made, a project changes color to bright blue (similar to ArcGIS) to notify the selection. A project will display an orange color to signal the current project selected. Furthermore, after a selection is made the project information is displayed on the left hand side of the page in the Map Details tab. A project can also be selected by toggling the select option on at the top of the page and clicking on a point or line or dragging to select multiple projects. After a project is selected by this method, a pop up appears above the point displaying project information. Figure 4 displays the information of a project in Tuscaloosa County.

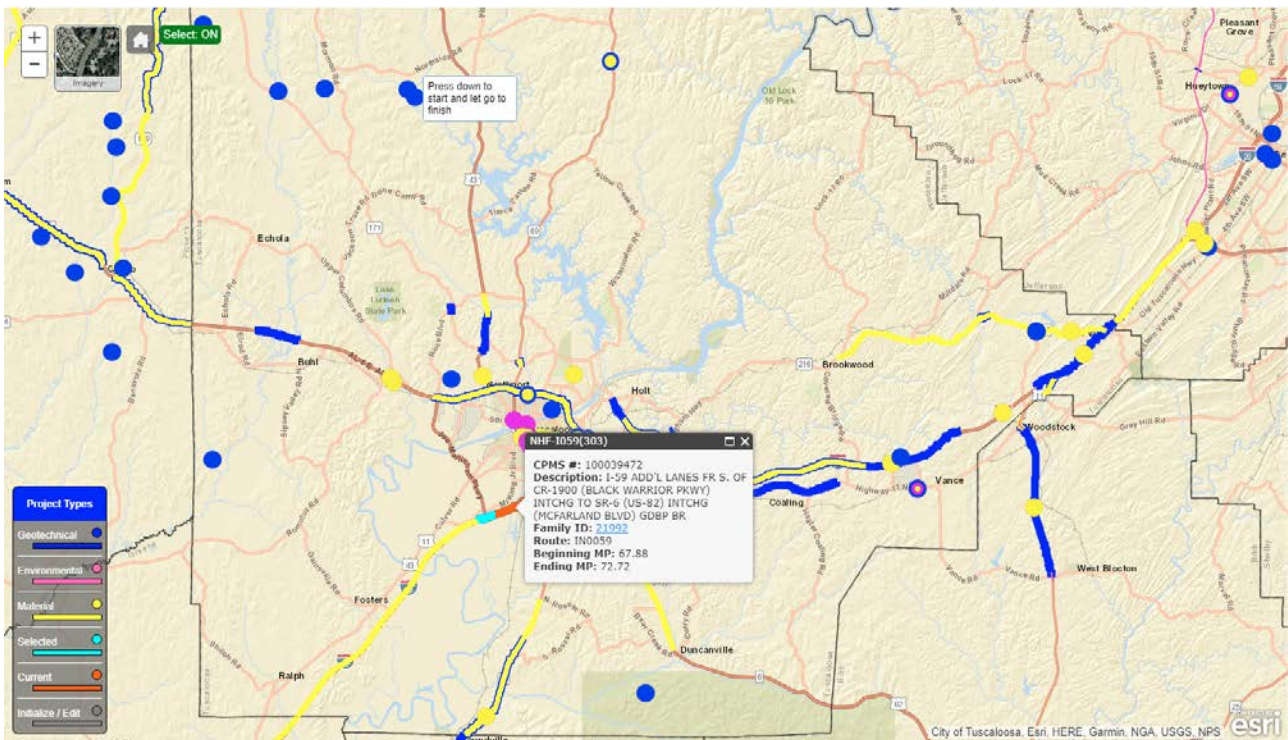


Figure 4

To move around the map, a user can simply click, hold, and move the map to pan (the select option must be "OFF"). Clicking a point on the map will "grab" that point and move the map with the cursor. This will let a user easily locate an area of interest. The "House" button to the upper left of the map allows the user to quickly view the full extent of the state. To the upper left of the map are two adjacent buttons containing addition and subtraction symbols, these buttons contribute to the zoom feature. To zoom in incrementally, the user can click the plus button on top. To zoom out, the user can click the minus button on the bottom.

The quickest way of zooming in and out of the map is by using the mouse wheel. Moving the mouse wheel forward will zoom in to the cursor. Moving the mouse wheel back will return to the original view of the map. The mouse wheel allows quick and accurate zooming, and reduces the need to pan the map. Figure 5 on the next page is a zoomed view of the street map.

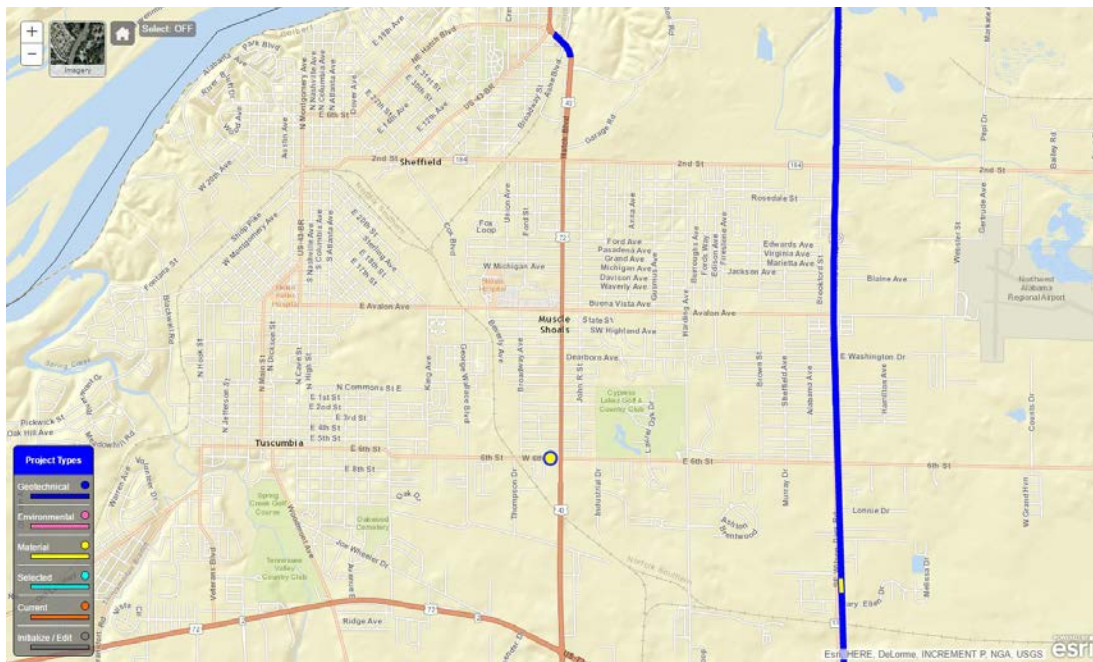


Figure 5

There are two different base map views available in GeoGIS: Streets and Satellite, which are shown in Figure 6 and can be selected by clicking on the street/satellite thumbnail in the top left corner of the map window. Figure 6 (a) shows the street view map layer containing roads, road names, water bodies, and shaded relief. The Satellite layer shown in Figure 6(b) shows a detailed aerial view. All map view options will display the GeoGIS project layers as seen in Figure 6.

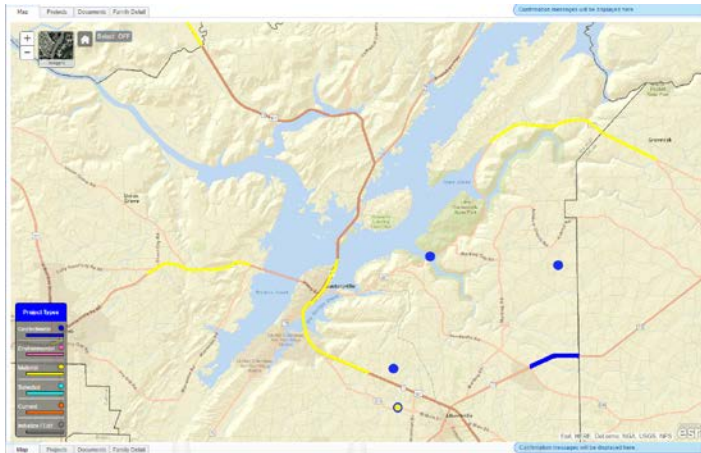


Figure 6(a)

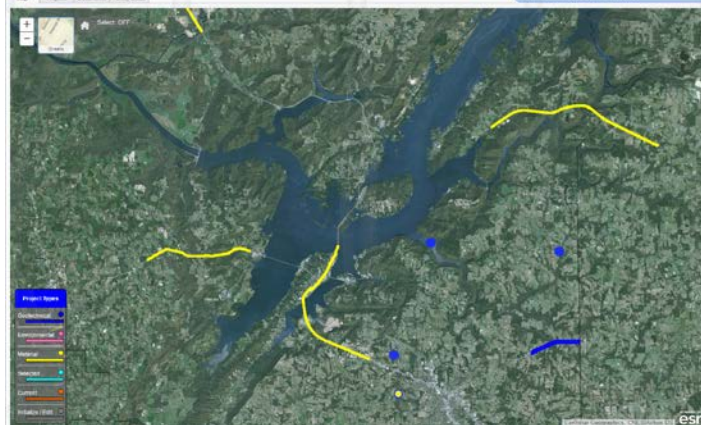


Figure 6(b)

There are seven feature types included in GeoGIS: geotechnical points, geotechnical lines, environmental points, environmental lines, materials points, materials lines, and bridge points. Geotechnical projects are represented by blue features, environmental projects by magenta features, materials projects by yellow features, bridges related to GeoGIS projects by green features, and bridges with no GeoGIS projects by purple features. A project line is used for projects that extend a distance longer than 1/10 of a mile. A project point is used for all other projects. Each set of features for a project represents the location of project data. However, the purpose of GeoGIS is to provide a spatially explicit method for organizing geotechnical documents. To access documents, a user can simply click any of the GeoGIS features on the map for a particular project. Documents for the project will be displayed in the Map Details accordion tab, and family details can be viewed for the project by selecting the Family Details tab or by clicking a link to the window on the Map Details accordion tab.

2.1.4 Family Details Page

The Family Details window, shown in Figure 7, is the main page to access project information and related documents. The page consists of three columns. The left hand column (not the accordion tabs) displays all the projects selected. Each project has a boxed check mark next to its number that allows the user to toggle the project on and off. The middle column displays all documents associated with Preconstruction for all the projects that are selected and toggled on. The right column displays all documents associated with Construction Projects. All documents in both columns are grouped by type. The documents in each document type are grouped by type. Figure 7 displays the Family Details page for an example project. The project number and a short description of the project location are listed under their respected sub-columns. Spanning across the following two columns are Preconstruction Documents and Construction Documents. Each project type has a boxed check mark that allows for toggling on and off for each type. If any type is toggled off, then documents for that type will no longer appear in either Document columns. Figure 7 displays a sample Family ID screen.

Map	Projects	Documents	Family Detail
Family ID: 32932			
Project #	Project Description	Preconstruction Documents	Construction Documents
<input checked="" type="checkbox"/> IM-1059()	RESURFACE I-59 FROM CR-1900 (BLACK WARRIOR PKWY) TO I-359 (EXIT 71)	<ul style="list-style-type: none"> Soil Survey (0) Materials Report (1) <ul style="list-style-type: none"> IM-1059(362) Approved MR ADD4.pdf Slope Study Report (0) Retaining Wall Report (0) Culvert Report (0) Other Geotechnical Reports (0) Geohydrologic Report (0) Geotechnical Data (0) Foundation Analysis (0) Correspondence (0) Photo (0) Foundation Report (0) Landslide Report (0) Sinkhole Report (0) ADEM Correspondence (0) Clearance Letter (0) HazMat Report (0) Environmental Site Map (0) ALDOT Internal (0) Other (0) 	<ul style="list-style-type: none"> Bridge Card Image (0) Bridge Identification Number (0) Hammer Submittal (0) Bearing Curves (PDA Results) (0) Test Pile Driving Record (0) Drilled Shaft Excavation Log (0) Drilled Shaft Pouring Record (0) Load Test (0) Plan (0) Correspondence (0) Photo (0) Field Monitoring (0) Signs & Lighting (0) ALDOT Internal (0) Other (0)

Figure 7

There is one document associated with the example project in Figure 7. The documents are shown in blue, and listed under specific document types. The Family Details page shows a user exactly which documents and documents types are available.

There are several options for a user to use to view a document. Hovering over a specific document on the Family Details page will bring up a thumbnail, as shown in Figure 8 below. The thumbnail view in GeoGIS is a powerful tool to quickly scan through project documents. The ability to thumb through digital documents without opening each document is a common request from document management system users. GeoGIS was specifically designed to contain this valuable functionality.

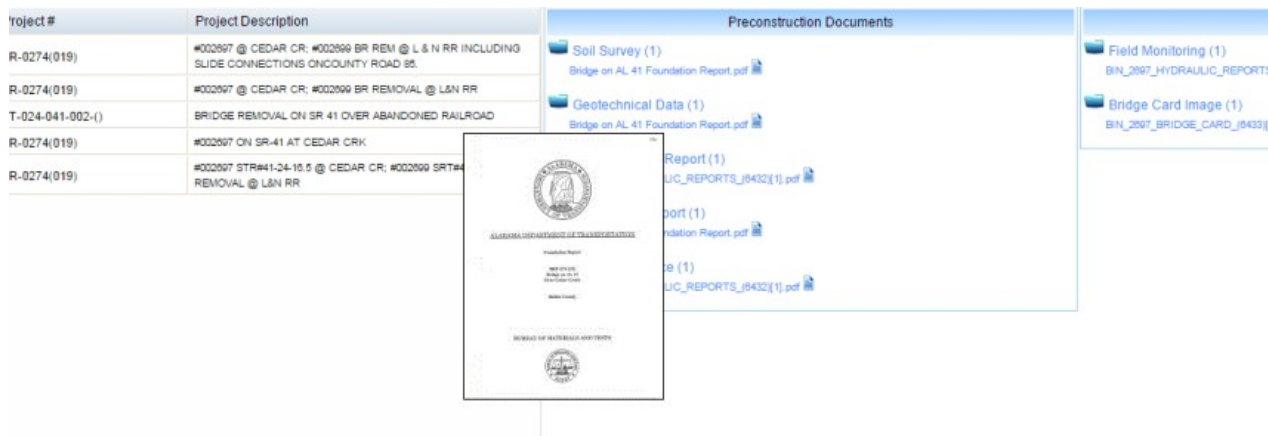


Figure 8

Clicking on a document name will automatically open a pdf file in another tab within the internet browser. Figure 9 displays this completed action.

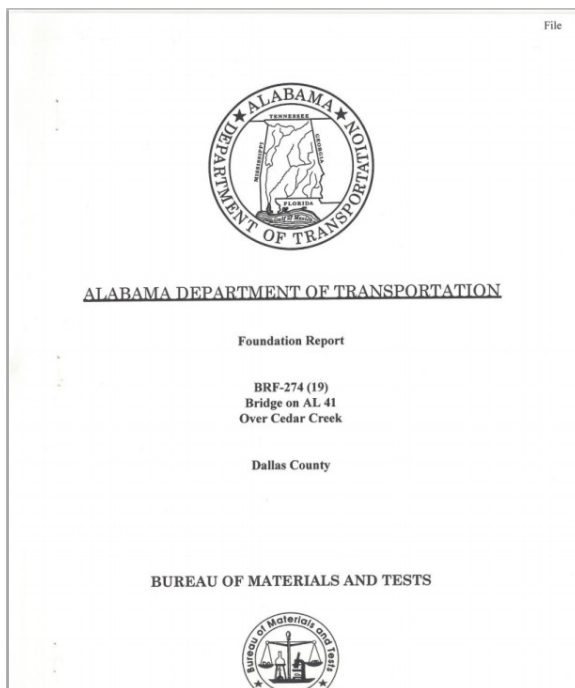


Figure 9

Another way to view a document from the Family Details page is by clicking the information symbol that is displayed beside each document. This will cause the Document Details page to pop up, which is discussed in the following section.

2.1.5 Document Details Page

The document details page lists database information about a document and displays a low resolution image of the document on the left side of the screen. If a document contains more than one page, only the first will appear in the thumbnail. Figure 10 shows the Document Details page for a foundation report. A document can be opened by clicking the name of the document at the right of the Document Details page.

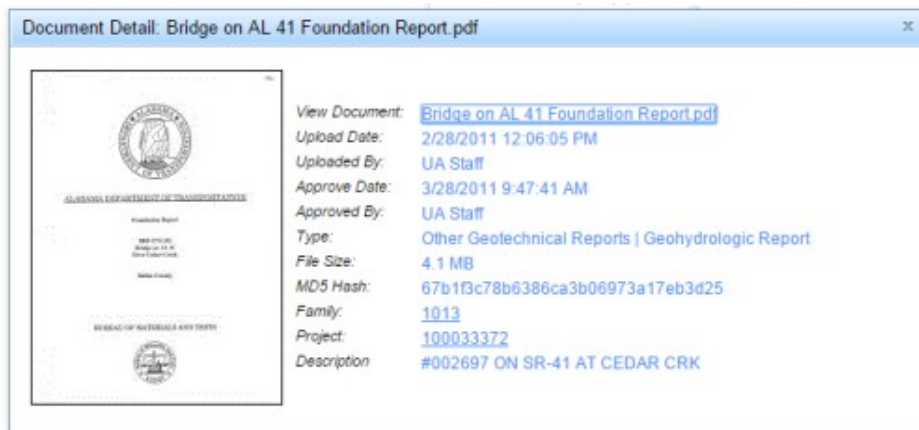


Figure 10

The document details page allows a user to see information such as upload and approval dates, the users that uploaded and approved the document, the type and size of the document, the family and project details.

2.1.6 Search Page

The search accordion tab is designed to allow a user to search the GeoGIS database based on a CPMS number, a document name, a document type, a concatenated project number, any of the fields used in concatenation of the project number, a bridge identification number or any keyword associated with a document or project. Figure 11 shows the GeoGIS search accordion tab.

Geotech
 Environmental
 Materials
 Bridges

Search

I want to initialize a project.
 Only show me my projects.
 Show only my unapproved documents

Family ID:
 CPMS #:
 County: ▼
 Route Type: ▼
 Route #:
 Project Number:
 Project Prefix: - Project Route ID: Project Agreement:
 Project Description:
 BIN:
 Apply document related criteria.

Figure 11

If a user wants to find all documents that are associated with the CPMS Number 100001736, for example, the user enters "100001736" into the text box labeled "CPMS #" on the Search page (shown in Figure 11), and clicks the "Search" button. The results of this search are displayed on the Map Details results page shown in Figure 12.

The screenshot shows the Map Details results page for a search of CPMS Project # 100001736. The page is divided into several sections:

- Search Results:** Shows the search criteria used: Project Selected: 08-0551(244), CPMS Project #: 100001736, Route ID: IN0065, Beginning Milepost: 1.43, Ending Milepost: 2.02, and Description: INTERCHANGE MODIFICATION - I-65/ATSR-16 (US-90), G D B P & BRIDGE.
- Map:** A satellite map showing the project location, with a red line indicating the project route. The map includes labels for streets like Lakeside Ct, Lakeside Dr, Government Blvd, and W. I-65 Service Rd S.
- Project Types Legend:** A legend on the left side of the map showing various project types with corresponding colored circles: Geotechnical (blue), Environmental (green), Material (yellow), Selected (red), Current (orange), and Initialize / Edit (grey).
- Documents List:** A list of documents associated with the project, including "Soil Survey (1)" and "Subs_Compressm1.zip".

Figure 12

The result of the search is a list of documents that met the search criteria. The list contains a thumbnail view of each document, a hyperlink to the document through the document name (which can be used to open the document in PDF format), the document type, the project ID, project number, project description, and links to the Document Details and the Family Details pages. Two documents are shown in Figure 13 as a result of the search based on the CPMS number 100001736. If a user had typed in a project number, all documents associated with that search criteria would have been displayed. Furthermore, the map zooms to the selection to display the actual project.



Preview	Document Details	Project ID	Family ID
	<p><i>View Document:</i> Soils_Compressed.zip</p> <p><i>Document Type:</i> Soil Survey</p> <p><i>Project Number:</i> IM-0651(244)</p> <p><i>Project Description:</i> INTERCHANGE MODIFICATION , I-65ATSR-16 (US-90), G D B P & BRIDGE.</p> <p><i>Upload Date:</i> 12/13/2011 3:42:34 PM</p> <p><i>View Details:</i> Document Details</p>	100001736	541
	<p><i>View Document:</i> Pile_Driving_Records_and_Pile>Loading_Record_09.02.2004 IM-65-1 (244).Mobile.pdf</p> <p><i>Document Type:</i> Test Pile Driving Record</p> <p><i>Project Number:</i> IM-0651(244)</p> <p><i>Project Description:</i> INTERCHANGE MODIFICATION , I-65ATSR-16 (US-90), G D B P & BRIDGE.</p> <p><i>Upload Date:</i> 7/3/2018 4:44:02 PM</p> <p><i>View Details:</i> Document Details</p>	100001736	541

Figure 13

Family ID	Project #	CPMS #	Scope	County	Description	BINs
2714	I-HR-ID-5655(016)	10001137 2	CN	Madison	I-565 FROM EAST END OF INDIAN CREEK BRIDGE TO MADISON PIKE UNDERPASS	
2714	I-5655(017)	10001137 3	PE	Madison	FROM SPACE & ROCKET CENTER TO E OF JORDAN LANE	
2714	I-5655(022)	10001138 8	PE	Madison	>W OF HOLMES AVE TO E OF MEMORIAL PKWY	
2714	I-5655(031)	10001140 0	PE	Madison	I-565 BETWEEN LIMESTONE CO LINE & E OF WALL-TRIANA HWY	
307	HPP-NCPD-TRIMPF-0035(010)	10001661 6	PE	Montgomery	MGM OUTER LOOP - SR-6 (US-231) TO CR-85 (CARTERS HILL RD)	

Figure 14

2.1.7 OCR Search

GeoGIS has an optical character recognition feature that reads each uploaded scanned document, stores a list of pertinent words within the website’s database, and allows users to search for keywords within the documents themselves.

To perform an OCR search, the user needs to access the search pane and select the “Apply Document Criteria checkbox” as shown in Figure 15.

The screenshot shows a search interface with the following elements:

- Filters: Geo, Env, Mat
- Search section:
 - I want to initialize a project.
 - Only show me my projects.
 - Show only my unapproved documents
- Form fields:
 - Family ID:
 - CPMS #:
 - County:
 - Route Type:
 - Route #:
- Project Number:
 - Project Prefix:
 - Project Route ID:
 - Project Agreement:
- Project Description:
- DN:
- Apply document related criteria. (highlighted with a red box)
- File Name:
- Key Words:
- Selection options:
 - Select All Pre-Construction
 - Select All Construction
- Document list:
 - (PreCon) ADEM Correspondence
 - (PreCon) ALDOT Internal
 - (PreCon) Clearance Letter
 - (PreCon) Correspondence
 - (PreCon) Culvert Report
 - (PreCon) DIGGS
 - (PreCon) DIGGS Atterberg
 - (PreCon) DIGGS Compaction Test
 - (PreCon) DIGGS Cone Penetration Test

Figure 15

Then the user enters their desired keywords into the “Key Words” field, as shown in Figure 16, and selects the “search” button. The OCR tool will perform a search of all the important stored words and locate those documents that contain the desired key words.

The close-up shows the following elements:

- Apply document related criteria.
- File Name:
- Key Words:

Figure 16

2.1.8 Change Password

The Change Password feature is designed to allow users to modify personal user accounts. Users can utilize the Change Password feature to change the password associated with personal usernames. The “Change Password” option is located in the top right hand corner of the window. The pop up window is shown in Figure 17.

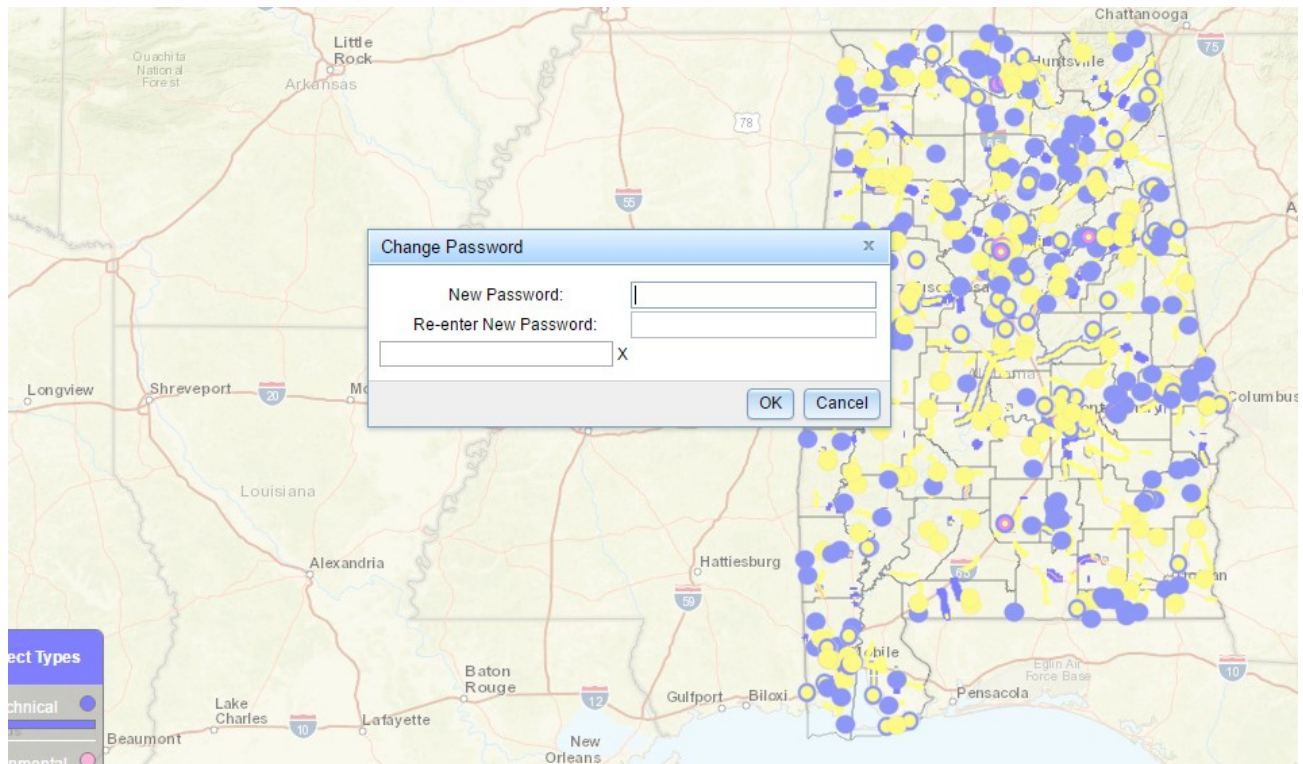


Figure 17

2.1.9 User Help Menu

The help accordion tab provides a number of options for users. Users can report a problem with descriptions in the fields provided. Clicking the “Submit” button sends an email to geogishelp@gmail.com, which is managed by site administrators. Figure 18 shows the Report Problem page. The help accordion tab also includes a number of links that provide helpful information. Clicking “GeoGIS User Guide” will open the GeoGIS User Guide in PDF format. Likewise, clicking on the video links will open a new tab with the video on the selected topic.

The screenshot shows a web interface with three tabs: 'Search', 'Map Details', and 'Help'. The 'Help' tab is active and contains a 'Report Problem' form. The form has three input fields: 'User' with the value 'Ima Admin', 'Reply Email' with the value 'admin@me.com', and a larger text area for the problem description. A 'Submit' button is located to the right of the text area. Below the form are two sections: 'Help Links' with a link for 'User Guide', and 'Video Links' with links for 'Search', 'Project Initiation', and 'Document Upload'.

Figure 18

2.1.10 Regulations and Specifications Tab

The Regs and Specs accordion tab is located on the left side of the Home screen, below the Map Details accordion tab. The Regs and Specs tab provides a hyperlink to ALDOT’s standard drawings list for highway construction, and links to ALDOT’s Specifications for Highway Construction and ADEM regulations that will open in PDF format. The Regs and Specs tab within GeoGIS is depicted in Figure 19.

Search
Map Details
Regs and Specs
<p style="text-align: center;">ALDOT Standard Drawings</p> <p>Standard Drawings</p> <p style="text-align: center;">ALDOT Specifications</p> <p>ALDOT Specifications 2018 ALDOT Specifications 2012 ALDOT Specifications 2008 ALDOT Specifications 2006 ALDOT Specifications 2002 Award and Execution of Contract (State Projects Only) Procurement Time Early Award Cross Slope on HMA Pavements (NHS) Cross Slope on HMA Pavements (non-NHS) Delay Begin Work Date Sign Materials Structural Materials for Traffic Control Devices and Highway Lighting Steel Pile Encasement</p> <p style="text-align: center;">ADEM Regulations</p> <p>General Administration Environmental Management Commission Air Pollution Control Program Scrap Tire Program Uniform Environmental Covenants Program Water Quality Program (NPDES) Water Quality Program (UST) Reclaimed Water Reuse Program Water Supply Program Coastal Program Well Driller Licensing Program Water Division Operator Certification Program State Revolving Fund Programs Solid Waste Program Hazardous Waste Program</p>

Figure 19

2.2 Consultant User Type

The consultant user type was created to allow a user to upload documents, but not approve documents. The consultant user type may include geotechnical firms, contractors, and other agencies that may own or create documents that are important to ALDOT. This user type can provide more efficient upload, since the consultant can upload the document as soon as the document is created, rather than sending the document to ALDOT for upload. The documents uploaded by this user type will still require approval from an ALDOT engineer user with higher GeoGIS privileges. It should be noted that in addition to document upload, a consultant has all the privileges of a general user.

2.2.1 Document Upload Page

The Document Upload pop up is designed to facilitate quick and accurate uploads of geotechnical information by consultants. Figure 20 shows the Document Upload pop up before any information has been entered. To upload documents for a project, the project must exist in GeoGIS and be initiated by an ALDOT Engineer or Administrator. In addition, the user uploading the documents must be assigned to the project by an ALDOT Engineer or Administrator. Once initiated, the project is available for document uploads. Creating a new project in the situation that a project does not exist in GeoGIS is explained in the Administrator User Type section of this Users Guide. The Upload Documents button is located in the Projects window (which can be accessed by the Projects tab at the top of the screen). Once a project is selected, the Upload Documents button is available for use.

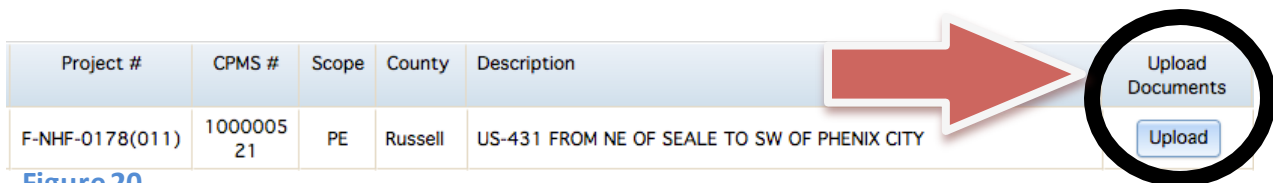


Figure 20

Once the Document Upload Button has been activated and clicked, a pop up box appears that allows the user to browse for files to add and also removed documents from the selection. Figure 21 displays the pop up box. Consultant and ALDOT Engineer user types can only upload documents to their assigned projects.

Once the appropriate documents are selected for

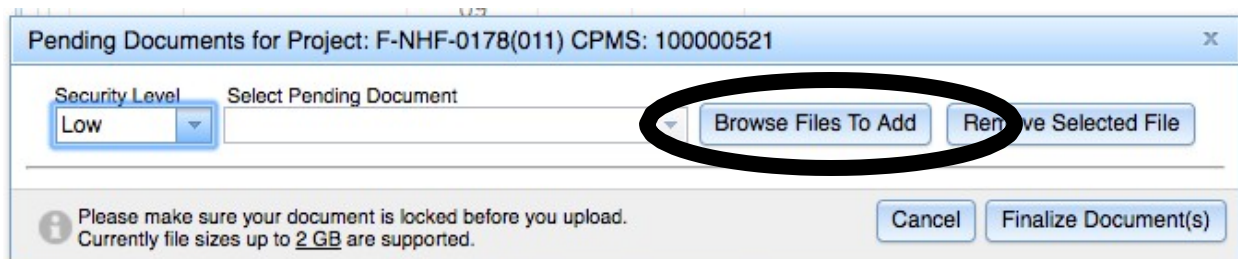


Figure 21

upload, the pop up box extends allowing the user to input information concerning the documents type.

A thumbnail of the document is also created for the user to view before uploading. To specify which document type is being entered into GeoGIS, select either the Preconstruction or Construction buttons, and then check the boxes of all the document types that apply. The document types that are available correspond to the type of project that was initiated. If a document type is grayed out, that means that the corresponding project type was not selected when the project was initiated. As discussed previously, the uploaded documents can be viewed on the Family Details page; however, documents cannot be viewed on the Family Details page until they have been approved by an ALDOT engineer. The Document Approval page is only available to an ALDOT engineer user type or the site administrator. Once all the correct information has been entered, the Finalize Document(s) button finishes the upload process. Figure 22 displays a document ready for upload.

The screenshot shows a web interface for managing documents. At the top, a blue header bar reads "Pending Documents for Project: F-NHF-0178(011) CPMS: 10000521". Below this, there are several form elements:

- Security Level:** A dropdown menu set to "Low".
- Select Pending Document:** A dropdown menu set to "ALDOT CORRES 7.2.92. US-431 from NE".
- Buttons:** "Browse Files To Add" and "Remove Selected File".
- Intended Approver Type:** A dropdown menu set to "Geotechnical".
- Document Type:** Radio buttons for "Preconstruction" (selected) and "Construction".
- Document List:** A list of document types with checkboxes, including:
 - (PreCon) Geotechnical Data
 - (PreCon) ADEM Correspondence
 - (PreCon) Clearance Letter
 - (PreCon) Correspondence
 - (PreCon) Culvert Report
 - (PreCon) DIGGS
 - (PreCon) DIGGS Atterberg
 - (PreCon) DIGGS Compaction Test
 - (PreCon) DIGGS Cone Penetration Test
 - (PreCon) Environmental Site Map
 - (PreCon) Foundation Analysis
 - (PreCon) Foundation Report
 - (PreCon) Geohydrologic Report
 - (PreCon) ALDOT Internal
 - (PreCon) GINT
- Comments:** A text input field.
- Footer:** An information icon and text: "Please make sure your document is locked before you upload. Currently file sizes up to 2 GB are supported." and two buttons: "Cancel" and "Finalize Document(s)", with the latter circled in black.

Figure 22

On the document upload page, users can also include comments about a document by typing in the document comment box. The comment can include anything the user wants, and words within the comment are searchable in the search accordion tab.

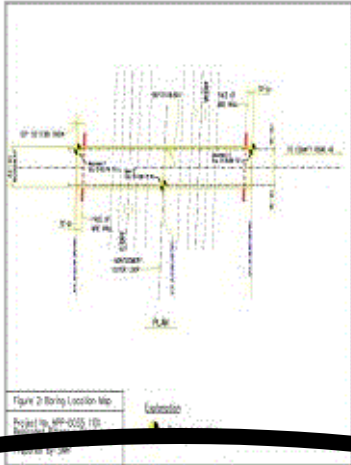
For example, an engineer may want to include a map of boring locations for a project. There is not a document type for boring locations, and since borings pertain to foundations, the best place to store this document is within the Foundation Report document type. Including a comment will help the engineer find the document again in the future. Figure 23 depicts a document ready for upload to GeoGIS with a comment in the document comment box.

Pending Documents for Project: HPP-NCPD-TRIMPF-0035(010) CPMS: 100016616

Security Level: Low | Select Pending Document: Boring Location Map HPP-0035(10) Montg

Browse Files To Add | Remove Selected File

Intended Approver Type: Geotechnical | Document Type: Preconstruction Construction



- (PreCon) Geotechnical Data
- (PreCon) ALDOT Internal
- (PreCon) Culvert Report
- (PreCon) DIGGS
- (PreCon) DIGGS Atterberg
- (PreCon) DIGGS Compaction Test
- (PreCon) DIGGS Cone Penetration Test
- (PreCon) Foundation Analysis
- (PreCon) Foundation Report
- (PreCon) Geohydrologic Report
- (PreCon) Correspondence
- (PreCon) GINT
- (PreCon) Landslide Report
- (PreCon) Materials Report
- (PreCon) Other

Comments: Boring locations

Please make sure your document is locked before you upload. Currently file sizes up to 2 GB are supported.

Cancel | Finalize Document(s)

Figure 23

2.2.2 MyProjects

The box labeled “Only show me my projects” is designed to assist a consultant or ALDOT Engineer in rapidly finding documents that the consultant uploaded. The box is included in the search accordion tab underneath the “I want to initialize a project” box. The box can be toggled on in the Search tab to display search results that belong specifically to the consultant. Figure 24 displays the checked toggle box.

The screenshot shows a search interface with the following elements:

- At the top, four checkboxes are visible: Geotech, Environmental, Materials, and Bridges.
- Below this is a "Search" section with three checkboxes:
 - I want to initialize a project.
 - Only show me my projects. (This checkbox is highlighted with a dashed border in the image.)
 - Show only my unapproved documents
- Below the checkboxes are several input fields:
 - Family ID: [text input]
 - CPMS #: [text input]
 - County: [dropdown menu with "Select a County" text]
 - Route Type: [dropdown menu with "Select a Route Type" text]
 - Route #: [text input]
 - Project Number: [text input]
 - Project Description: [text input]
 - BIN: [text input]
- At the bottom, there is a checkbox: Apply document related criteria.

Figure 24

Once the My Projects box has been toggled on, the consultant can use the Map Details accordion tab or view the Family Details of the selected projects to view documents belonging to that specific user.

2.3 ALDOT Engineer User Type

The ALDOT Engineer user type is designed for ALDOT personnel to initiate projects and approve documents if the documents are valid for specific projects within GeoGIS. The ALDOT Engineer has all the privileges of a consultant and general GeoGIS user and can also initiate projects and approve documents. The next section describes the Document Approval and Project Initiation pages.

2.3.1 Document Approval Page

An uploaded document cannot be viewed in GeoGIS until the document has been approved. Figure 25 shows the Approval box located in the Documents window.

Family ID	Edit Documents	Approved
541	<input type="button" value="Edit Document"/>	<input checked="" type="checkbox"/>

Figure 25

ALDOT Engineer and Administrator user types are able to search for projects and approve documents within the projects by toggling the check mark in the Approved box. Furthermore, both of these types can edit documents for projects by selecting the Edit Documents Button seen in Figure 25. Once selected, the Edit Documents pop up window appears. In the editing window, an engineer can correct any mistakes concerning the documents. The Edit Documents pop up window is shown in Figure 26.

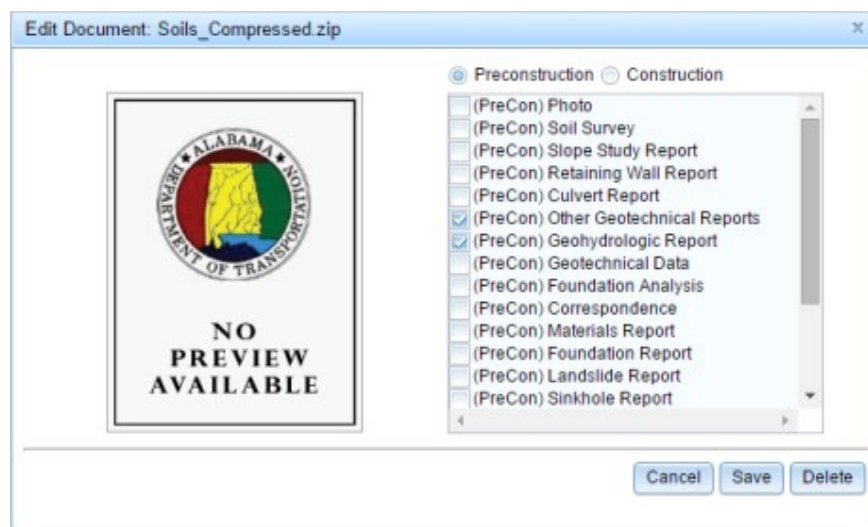


Figure 26

2.3.2 Project Initiation

The Project Initiation function is available to users with an ALDOT Engineer classification or higher. This page allows projects to be shown on the map and enables documents to be uploaded to the project. To begin initializing projects, a search for uninitialized projects must be conducted. In the Search accordion tab, the boxed checkmark labeled “I want to initialize a project” filters the search results to include only those projects that have yet to be initialized. Figure 27 displays this check box.

Geotech
 Environmental
 Materials
 Bridges

Search

I want to initialize a project.

Only show me my projects.

Show only my unapproved documents

Family ID:

CPMS #:

County:

Route Type:

Route #:

Project Number:

Project Prefix: Project Route ID: Project Agreement:

- ()

Project Description:

BIN:

Apply document related criteria.

Figure 27

Once the search action is performed, a list of uninitialized projects will appear in the Projects window. ALDOT Engineer and Administrator user types will be able to initialize projects with the Initialize button located in the right hand column. Figure 28 displays this button.

Confirmation messages will be displayed here.									
Family ID	Project #	CPMS #	Scope	County	Description	BINs			Project Type
10004	BCP 04-26-82-(-)	100021820	PE	Bibb	BIBB COUNTY COMMISSION (BCP-04-26-82)			Initialize	...
10004	BRZ-0400(003)	100011646	CN	Bibb	#037-04-031Z OVER CAFFEE BRANCH AT WOODSTOCK			Initialize	...
10005	RS-0404(101)	100005425	CN	Bibb	CO RD 16 FROM SR-25 AT PONDVILLE TO CO RD 1			Initialize	...
10005	BCP 04-25-82-(-)	100021821	PE	Bibb	BIBB COUNTY COMMISSION (BCP-04-25-82)			Initialize	...
10006	OLC-004-000-001-(-)	100029275	CN	Bibb	CO RD 27 FR CAHABA RIVER BRIDGE TO OLD HIGHWAY NO. 5			Initialize	...
10006	OLC-004-000-002-(-)	100029276	CN	Bibb	VARIOUS BIBB COUNTY ROADS			Initialize	...
10006	BCP 04-27-82-(-)	100021822	PE	Bibb	BIBB COUNTY COMMISSION (BCP-04-27-82)			Initialize	...
10007	BCP 04-28-82-(-)	100021823	PE	Bibb	BIBB COUNTY COMMISSION (BCP-04-28-82)			Initialize	...
10007	BRZ-0400(009)	100011652	CN	Bibb	#010-04-017X OVER SHULTZ CRK			Initialize	...
10008	BRZ-0400(007)	100011650	CN	Bibb	#042-04-064Z OVER BEAVER DAM CRK NEAR BIBB MILL			Initialize	...
10008	BRZ-0400(005)	100011648	CN	Bibb	#014-04-0045Z OVER LICKLOG CREEK			Initialize	...
10008	BCP 04-29-83-(-)	100021824	PE	Bibb	BIBB COUNTY COMMISSION (BCP-04-29-83)			Initialize	...
10008	BRZ-0400(006)	100011649	CN	Bibb	#015-04-046Z OVER BRANCH NEAR PONDVILLE			Initialize	...
10009	BRZ-0400(008)	100011651	CN	Bibb	#003-04-027Z OVER AFFONEE CRK			Initialize	...
10009	BCP 04-30-84-(-)	100021825	PE	Bibb	BIBB COUNTY COMM (BCP-04-30-84)			Initialize	...
10009	BRZ-0400(010)	100011653	CN	Bibb	#022-04-059Z OVER SANDY CREEK			Initialize	...
1001	BR-0264(005)	100002975	RW	Lamar	>REPL BR ON US-278ATTURKEY CR, MP 4.35 BIN #001817 STR #118-38-4.3			Initialize	...
1001	BR-0264(005)	100002977	PE	Lamar	BIN #001817 ON US-278ATTURKEY CRK			Initialize	...

Figure 28

Once the Initialize button is selected, the Initialize Project accordion tab automatically opens. The user can then enter information related to the project type, the users that are assigned to the

project, and the point shape (whether it be a line or a point) representing the project. If there is not a line or point representing the project, then the initializer must enter the point manually. This can be done by zooming into the location of the project. Figure 29 shows the Initialize Project accordion tab.



Figure 29

Once the appropriate information is entered and a point has been placed, the initialize project button at the bottom of the accordion tab will complete the action. Immediately following the project initialization, the map will zoom to the project point and the family details window will display whatever documents are associated with newly initialized project(s).

2.4 Administrator User Type

An administrator user has all the privileges available to an ALDOT Engineer, Consultant, or a general GeoGIS user, plus additional management privileges. The main privilege of the administrator is the ability to create, retire, and modify user names, passwords, and user types. A GeoGIS user must contact the administrator to create a user name and password.

2.4.1 Administration Page

The Administration page allows an administrator to create and edit users. Administration features include manage user and historic document features. These can be accessed through the

Manage Users button located in the top right hand corner of the site. Figure 30 displays the Manage Button.



Figure 30

The Manage Users button allows the administrator to edit the existing users of the site. Once selected, the button initiates a separate pop up window with user information. Figure 31 shows the initial Manage Users window.

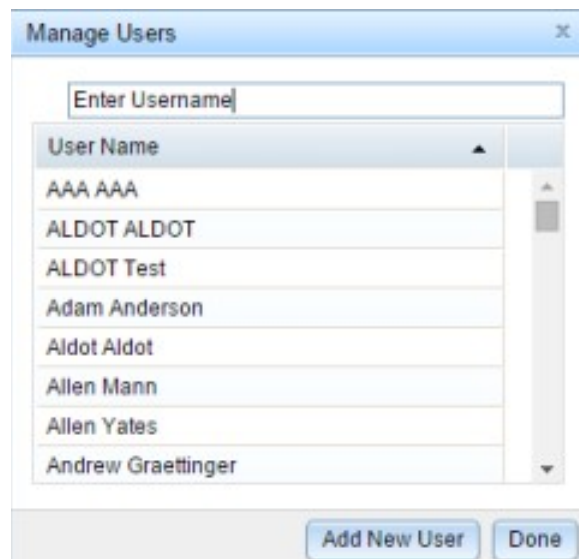


Figure 31

To add users, select the Add New User button. Another pop up window will replace the existing Manage Users Window and provide blank fields for new user information to be filled out. To add the user select the Add User button once all fields are appropriately filled out. Figure 32 displays this New User Window.

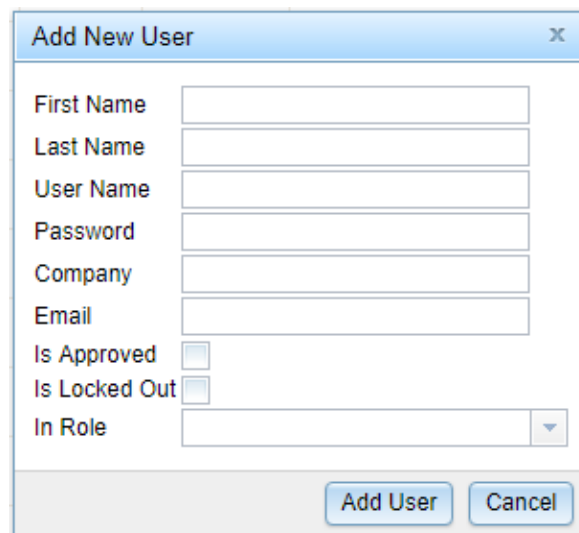
A window titled 'Add New User' with a close button (x) in the top right. It contains several form fields: 'First Name', 'Last Name', 'User Name', 'Password', 'Company', and 'Email', each with a corresponding text input box. Below these are two checkboxes: 'Is Approved' and 'Is Locked Out', both of which are currently unchecked. At the bottom is a dropdown menu labeled 'In Role'. At the bottom right of the window are two buttons: 'Add User' and 'Cancel'.

Figure 32

User information can be updated by an administrator through the Manage Users button. Once selected, the Manage Users pop up box appears displaying a full list of users. Users can be searched for using the search option. The administrator can alter a range of information specific to the user. User information can only be altered after a username has been selected. This selection will initiate an additional pop up containing the user's current information. This feature is displayed in Figure 33.

User Details	
First Name	John
Last Name	Smith
User Name	
Change Password	<input type="checkbox"/>
Company	JS Co.
Email	jsco@me.com
Is Active	<input type="checkbox"/>
In Role	test

Figure 33

Once the appropriate adjustments have been made to the user, the Update User button will save the adjustments within the site. The Done button will conclude the Manage Users feature of GeoGIS.

Users can also be retired. The GeoGIS system does not remove users from the site entirely, but rather restricts their access to the site through retirement. Users can be retired through the edit user function displayed above. Retired users will have the "Is Active" box unchecked. This feature acknowledges work done by a specific user, but restricts further involvement with the site. Figure 34 displays an inactive user.

User Details	
First Name	John
Last Name	Smith
User Name	
Change Password	<input type="checkbox"/>
Company	JS Co.
Email	
Is Active	<input type="checkbox"/>
In Role	test

Figure 34

Administrators can also create Historic Projects. These are projects that have either been completed or discontinued but still have documents of value associated with them. Only administrators have the ability to create Historic Projects.

Some projects may not have a CPMS number yet. An engineer may choose to upload documents from a project to GeoGIS before a CPMS number is created. This type of project does not need to be classified as a historic project. As such, there is a checkbox located in the “Create Historic Project” pop up box. By clicking this checkbox, a user can go back and remove the temporary project later, after the project has received a CPMS. Figure 35 displays the Create Historic Project pop up box.

The screenshot shows a web-based form titled "Create Historic Project". The form includes the following fields and controls:

- CPMS #:** Text input field containing "900000200".
- Project Number:** A composite field with three sub-inputs: "Project Prefix", "Project Route ID", and "Project Agreement".
- Route Id:** Text input field.
- Route Type:** Dropdown menu with the selected option "Select a Route Type".
- Family Id:** Text input field.
- Beginning** and **End Post:** Text input fields.
- Temporary Project:** A checkbox, which is circled in black in the image.
- Project Description:** A large text area for entering project details.
- Character Count:** A status indicator at the bottom of the description area showing "0/250".
- Buttons:** "Cancel", "Create", and "Initialize" buttons are located at the bottom right of the form.

Figure 35

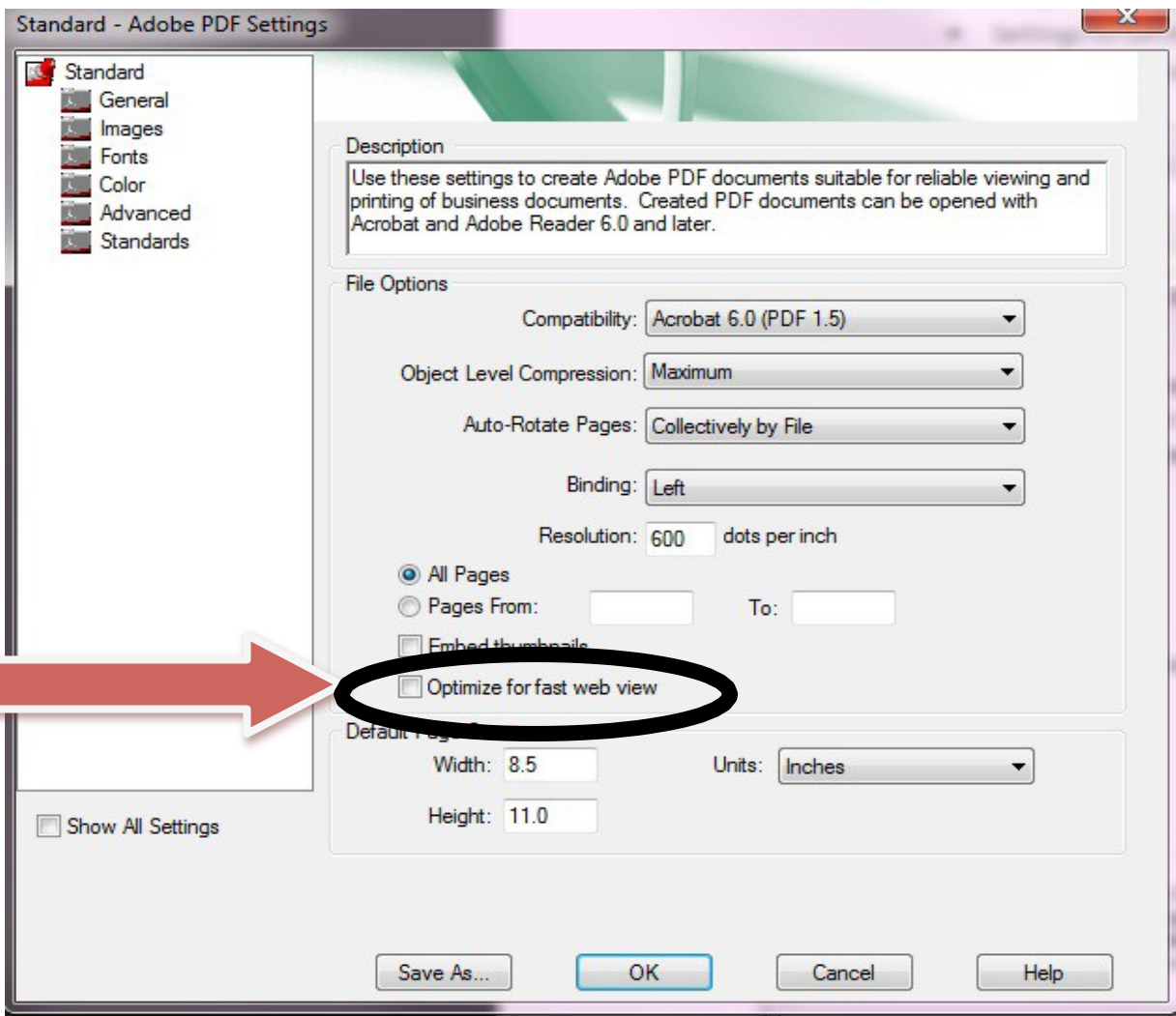
3.0 Procedures for Producing Live Documents

3.1 Step 1: Set Preferences

You will need to set up your preferences for Microsoft Word, Microsoft Excel, and Adobe Acrobat Professional to be able to combine live documents. The preferences that need to be set are searchable document, dots per inch (dpi) resolutions, page size, and optical character recognition (OCR). These preferences are required to meet our minimum standard requirements for live documents.

3.1.1 Microsoft Word:

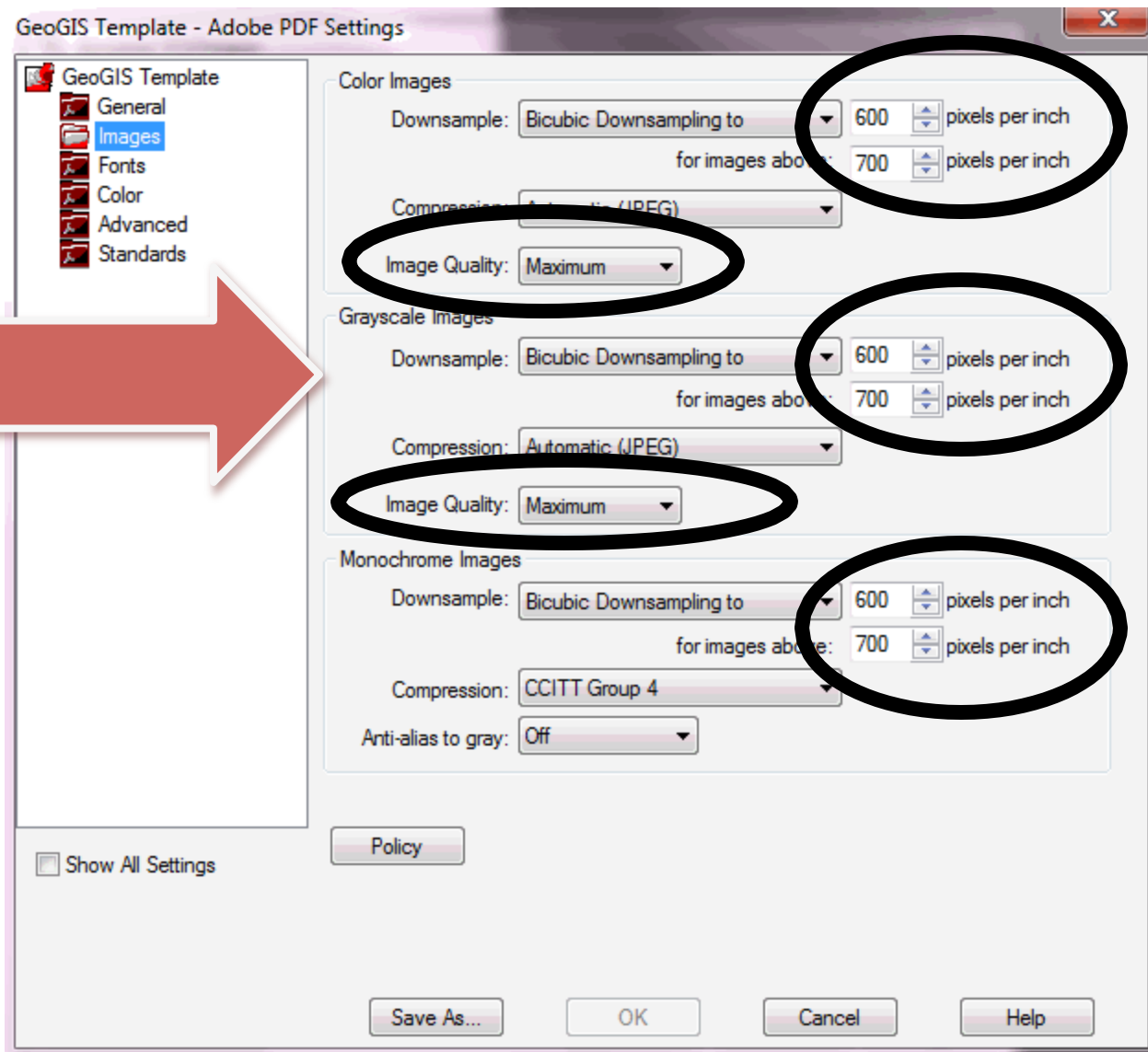
- Searchable Document
 - No preferences will need to be set as Microsoft automatically makes their documents searchable.
- DPI Resolutions
 - Click the **“Acrobat Tab”** on the main menu of Microsoft Word.
 - Click the **“Preferences Tab”** and then click **“Advanced Settings”**
 - Uncheck the **“Optimize Fast Web View”**



Step 1: Set Preferences (cont.)

Microsoft Word (cont.):

- DPI Resolutions (cont.)
 - Click the **“Acrobat Tab”** on the main menu of Microsoft Word. (cont.)
 - Next click the **“Images tab”** under the Standard Tab.
 - The downsample for Color, Grayscale, and Monochrome Images should be changed to **600 pixels per inch for images above 700 pixels per inch**. Also change the image quality to **“Maximum”** under the Color and Grayscale Images section.



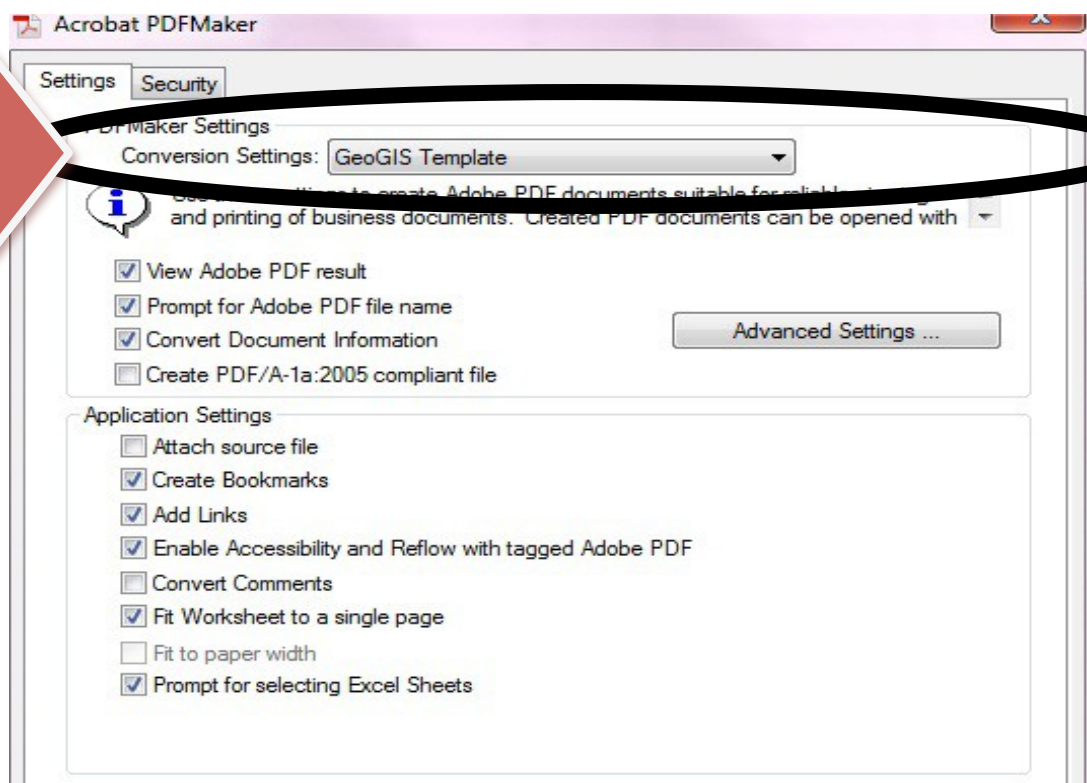
Step 1: Set Preferences (cont.)

Microsoft Word (cont.):

- DPI Resolutions (cont.)
 - ▮ Then click the **“Save As”** tab at the bottom of the screen. You will need to save this template for future use in other Microsoft office programs. I would suggest saving it as **“GeoGIS template”**. Once you have saved the template click the **“Ok”** button.
- Page Size
 - Microsoft programs automatically sets the paper size.
- OCR
 - No preferences need to be set.

3.1.2 Microsoft Excel:

- Searchable Document
 - No preferences will need to be set as Microsoft automatically makes their documents searchable.
- DPI Resolutions
 - Click the **“Acrobat Tab”** on the main menu of **“Microsoft Excel”** and then click **“Preferences”**.
 - Click the **“Conversion Settings”** menu and click **“GeoGIS Template”** (or what you named your template in Microsoft Word).



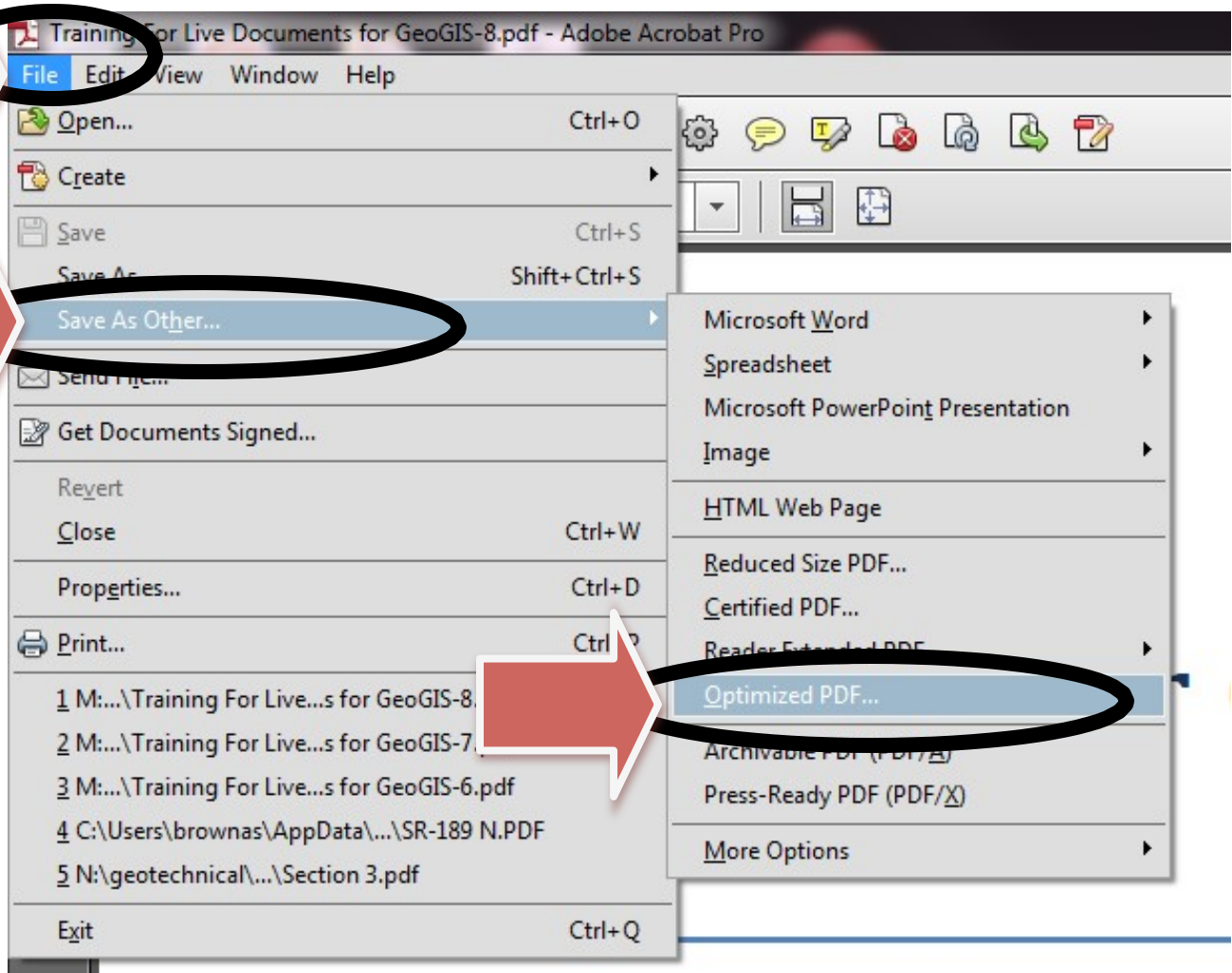
Step 1: Set Preferences (cont.)

Microsoft Excel: (cont.)

- Verify that all settings under the Acrobat tab are still set correctly as stated under the Microsoft Word Section on page 5 and 6.
- Page Size
 - Will vary for each document.
- OCR
 - No Preferences will need to be set.

3.1.3 Adobe Acrobat:

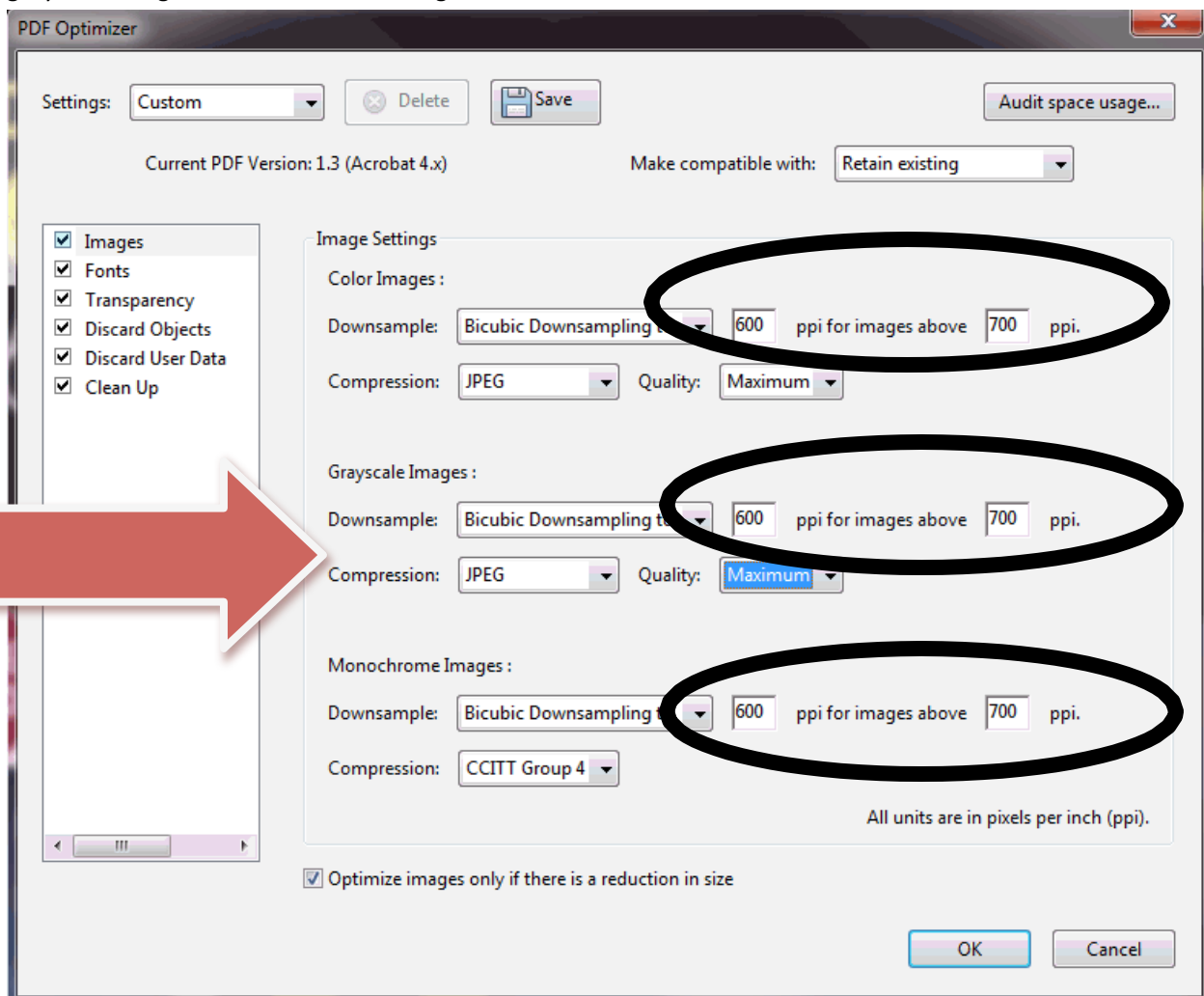
The only preference that needs to be set in Adobe Acrobat is the PDF Optimizer. To access the PDF Optimizer tool, open up a document in Adobe Acrobat. Go to “File”, then to “Save As Other”, then to “Optimized PDF”.



Step 1: Set Preferences (cont.)

Adobe Acrobat: (cont.)

Once the “**Optimized PDF**” screen has opened, you need to change the “**downsample**” images for Color, Grayscale, and Monochrome to “**600 ppi for images above 700 ppi.**” The quality for color images and grayscale images will need to be changed to “**Maximum**”



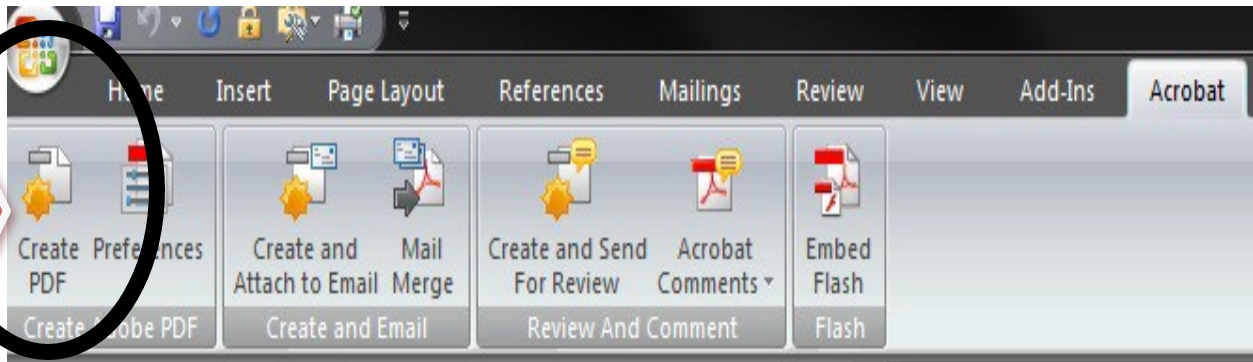
You can also save these settings in the PDF Optimizer screen. Click the “**Save**” button on the top left of the PDF Optimizer screen.

3.2 Step 2: Create a PDF from the Original Document

For a list of documents that need to be converted and uploaded to GeoGIS please see **Appendix A**.

3.2.1 Microsoft Word and Excel

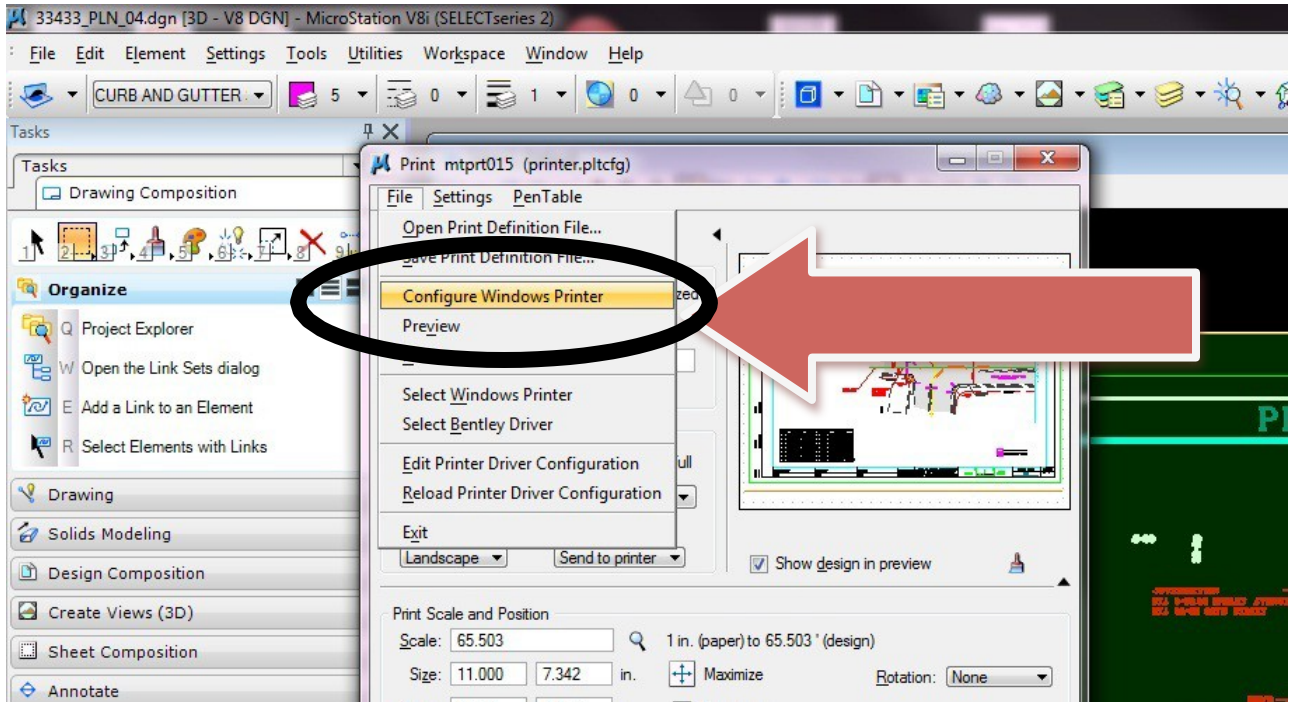
- Click the **“Acrobat Tab”** and then click **“Create PDF”**.



- Make sure to check the location of where the document will be saved.
- Once the PDF has been created, Adobe should automatically open the document.

3.2.2 Microstation

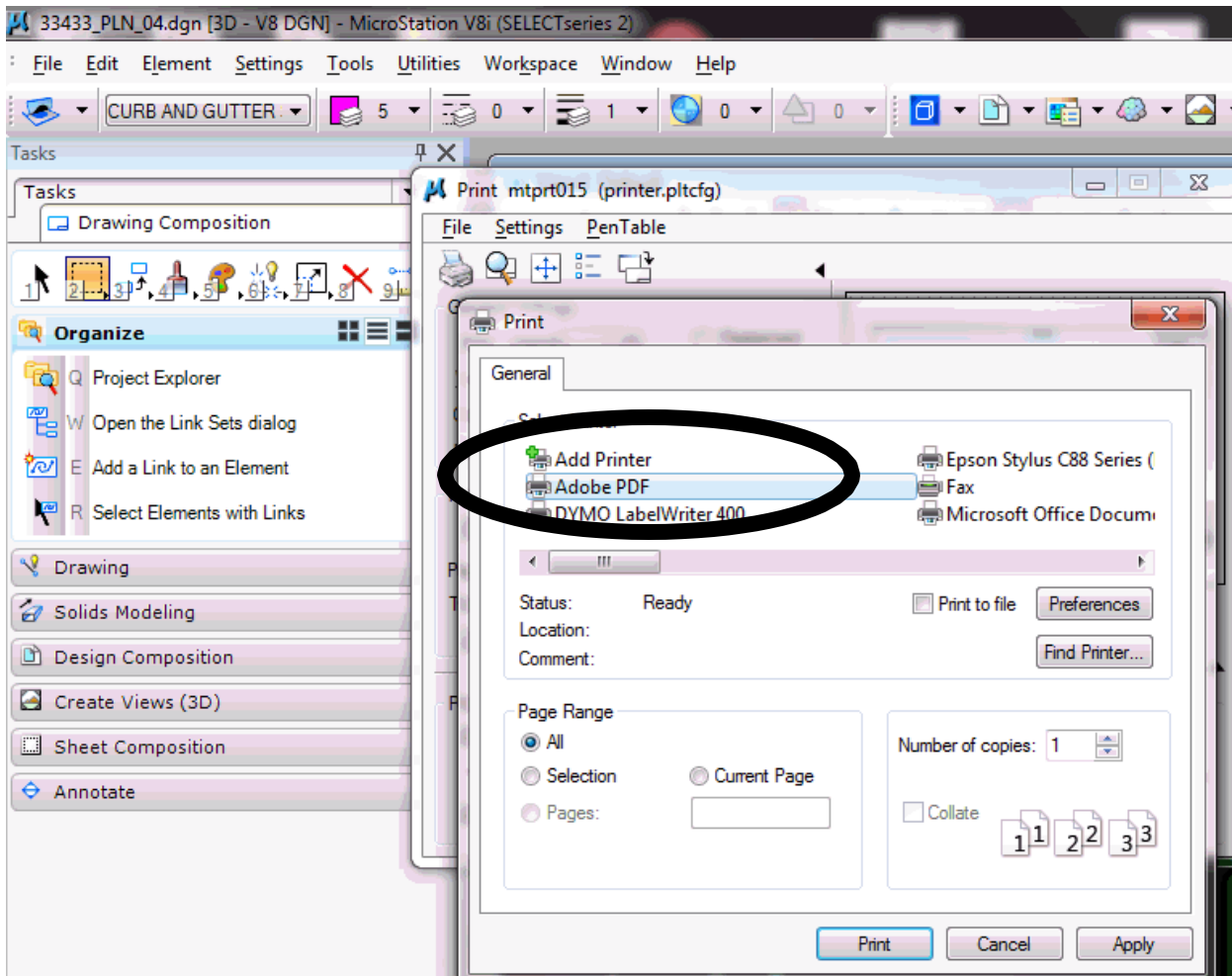
- Open up the file that needs to be converted to PDF.
- Next, place **“a fence”** around the drawing that needs to be converted to PDF.
- Once the fence is placed, you will then select **“File Tab”** and then click **“Print”**.
- Make sure your paper size is correct.
- Then select the **“File Tab”** and click **“Configure Windows Printer”**.



Step 2: Create a PDF from the Original Document (Cont.)

Microstation (Cont.)

- Next, select the **“Adobe PDF”** and click **“Print”**, adjust scale if necessary, and then click **“Print”** again.



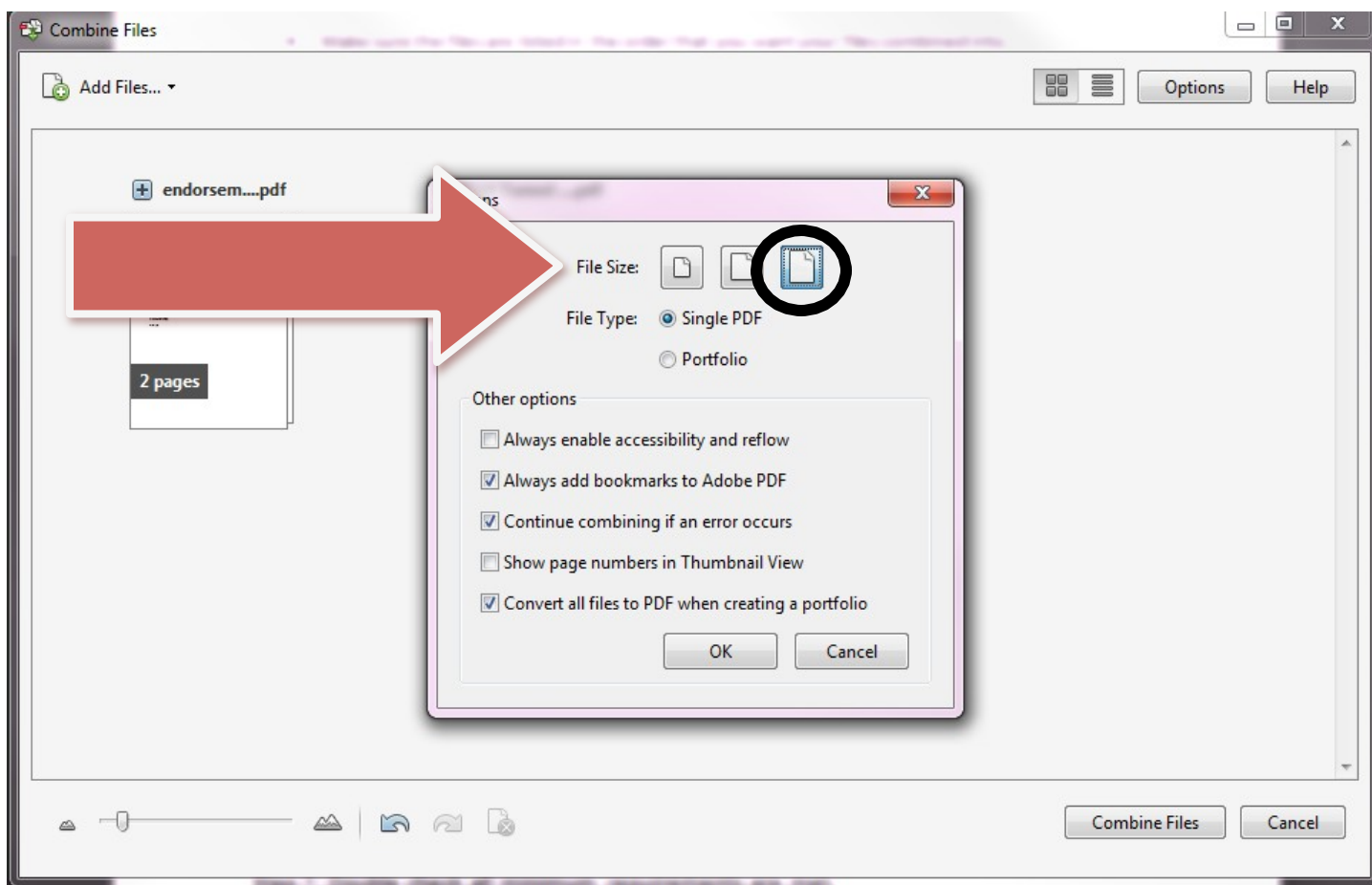
- The **“Save PDF File As”** screen will pop up and you will need to save the PDF document in the correct location.

For any documents that need to be scanned, please see Appendix B.

3.3 Step 3: Combine Documents

3.3.1 Adobe Acrobat

- Open Adobe Acrobat, click the file menu and then hover over **Create PDF**. Click **“Combine Files into a Single PDF”** and then click **“Add Files”**.
- Select the files that you want to combine into a single PDF.
- Make sure the files are listed in the order that you want your files combined into.
- Your file size needs to be set at **“Maximum”**. To make sure your file size is at maximum, click the **“Options Button”**, and then click the **“third option”** for file size.



- Click **“OK”** and then click **“Combine Files.”**

3.4 Step 4: Check/Set Orientation

Check the pages in the document for correct orientation. The top of the page needs to be at the top of the screen. If the pages are not correct, then the orientation needs to be corrected.

3.5 Step 5: File Nomenclature

A file nomenclature system has been set up by the GeoGIS Committee. The file name needs to include the Type of Document, Description, Project Number, and County. The GeoGIS committee has decided on two options for naming files. One option is to spell the entire file name out and the other option is to use abbreviations in case the file name is too long.

Examples for the two options are listed below:

- Bridge Foundation Report for Bridge Replacement on SR-145 over Yellow Leaf Creek
BR-412 (10) Chilton
- BFND RPT for BR on SR145 over Yellow LeafCRK BR412 (10) Chilton
 - a. **Appendix C** contains a list of abbreviations for document types.

3.6 Step 6: Review

Make sure that all minimum requirements have been met in **Steps 1---6** and **Appendix B**.

3.7 Step 7: Save file to server

Save the document in the correct place for your Region/office.

4.0 Procedures for Scanning Historical Documents

The Scanner is responsible for Steps 1 - 6.

4.1 Step 1: Sign File Out in File Room

- Sign out the file/box from the file room.
- Use the sign out sheet to sign out the files.

4.2 Step 2: Information that needs to be scanned into GeoGIS

- Pull out the documents that need to be scanned in based on the *Documents Required for GeoGIS* located in *Appendix A*.
- If there are multiple documents of the same report, please use the best document that is available.

4.3 Step 3: Is the project initiated in GeoGIS?

- Check and see if the project is initiated in GeoGIS.
- If the project is initiated in GeoGIS, check to see if any documents that were pulled in Step 2 are already in GeoGIS.
- If the project is not initiated in GeoGIS, please contact the appropriate personnel, listed on Page 43, to have the project initiated.

4.4 Step 4: Number the pages in the bound document

- Before you unbind the report, count the number of pages in the document.
- Next you will need to number the bottom right corner of the back page of the document with a yellow highlighter.
 - This will ensure that the document stays in the original order.
 - For example, label the back of the page 1/24, 2/24, etc.
 - If the document is double-sided just label the bottom right hand corner of each page.
- If the document already has page numbers, then skip this step.

4.5 Step 5: Scan and Assemble the Physical and Electronic Document

- Review *Requirements for Scanned Documents* located in *Appendix B*

4.6 Step 6: Restructure File Folder

- Restructure the file folder in chronological order, most current documents at the top.
- The scanned documents that need to be reviewed should be clipped together in the file folder.

4.7 Step 7: Reviewer 1

Once the Scanner has reconstructed the file folder, he or she will give the folder to Reviewer 1. Reviewer 1 will be responsible for making sure that all the requirements were met that are outlined in

Requirements for Scanned Documents located in ***Appendix B***.

- If all the requirements were met, then Reviewer 1 will give the folder to Reviewer 2.
- If all requirements were not met, then the Reviewer 1 will email the Scanner notifying them that all of the requirements were not met and which documents will need to be fixed.
- Once the Scanner has fixed the documents, then he or she will give the documents back to Reviewer 1.
- The Scanner will need to make sure that the file is labeled revision 1 if the document needs to be corrected. This will allow Reviewer 1 to review the initial document with the revised document. For Example:
 - a. Original File Name: Bridge Foundation Report for Bridge Replacement on SR---145 over Yellow Leaf Creek BR---412 (10) Chilton
 - b. Revised File Name: Revision 1 Bridge Foundation Report for Bridge Replacement on SR---145 over Yellow Leaf Creek BR---412 (10) Chilton
 - c. Revised File Name (Abbreviated): REV 1 BFND RPT for BR on SR---145 over Yellow Leaf CRKBR---412 (10) Chilton
- If the Scanner has multiple revisions to one file then add A, B, C, etc. after Revision 1 to the file name.

4.8 Step 8: Reviewer 2

Once Reviewer 1 has checked to ensure that all documents meet the ***Requirements for Scanned Documents*** located in ***Appendix B***, then Reviewer 1 will give all documents to Reviewer 2 for their review. Reviewer 2 will be responsible for making sure that all the requirements outlined in ***Requirements for Scanned Documents*** located in ***Appendix B*** were met.

- If all the requirements were met, then Reviewer 2 will then notify the scanner that the document is ready to be uploaded to GeoGIS.
- If all of the requirements were not met, then the Reviewer 2 will email the Scanner, copying the Reviewer 1, notifying them that all of the requirements were not met and which documents will need to be fixed.

Step 8: Reviewer 2 (cont.)

- Once the Scanner has fixed the documents, then the scanner will give the documents to Reviewer 2 again so they can check the corrections.
- The Scanner will need to make sure that the file is labeled revision 2 if the document needs to be corrected. This will allow Reviewer 2 to review the initial document with the revised document. For Example:
 - a. Original File Name: Bridge Foundation Report for Bridge Replacement on SR-145 over Yellow Leaf Creek BR-412 (10) Chilton
 - b. Revised File Name: Revision 2 Bridge Foundation Report for Bridge Replacement on SR-145 over Yellow Leaf Creek BR-412 (10) Chilton
 - c. Revised File Name (Abbreviated): REV 2 BFND RPT for BR on SR-145 over Yellow Leaf CRKBR-412 (10) Chilton
- If the scanner has multiple revisions to one file then add A, B, C, etc. after Revision 2 to the file name.

4.9 Step 9: Verification

- Once the document has been uploaded, by the Scanner, to GeoGIS, the Verifier will be responsible for logging into GeoGIS and approving the document.
- The verifier should only approve documents actually meeting or exceeding minimum requirements.
- The Verifier will be responsible for saving a copy of the document onto the server

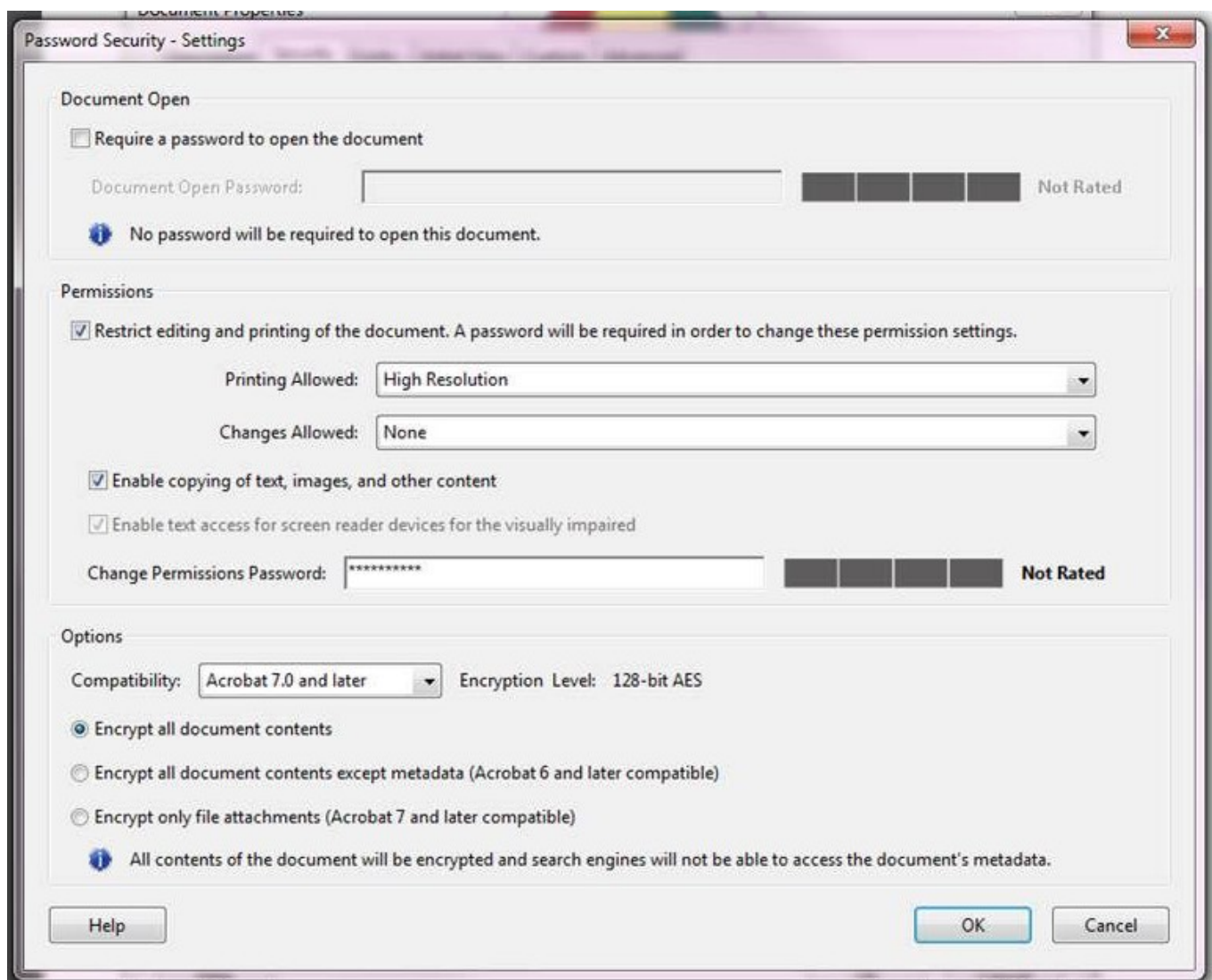
4.10 Step 10: Reconstruct the File Folder

- Once the document has been approved in GeoGIS by the Verifier, the Verifier will give the file folder back to the Scanner to reconstruct the file folder. Once the file folder has been reconstructed, then the Scanner will file the folder in the file room and sign the file back in on the sign-out sheet.

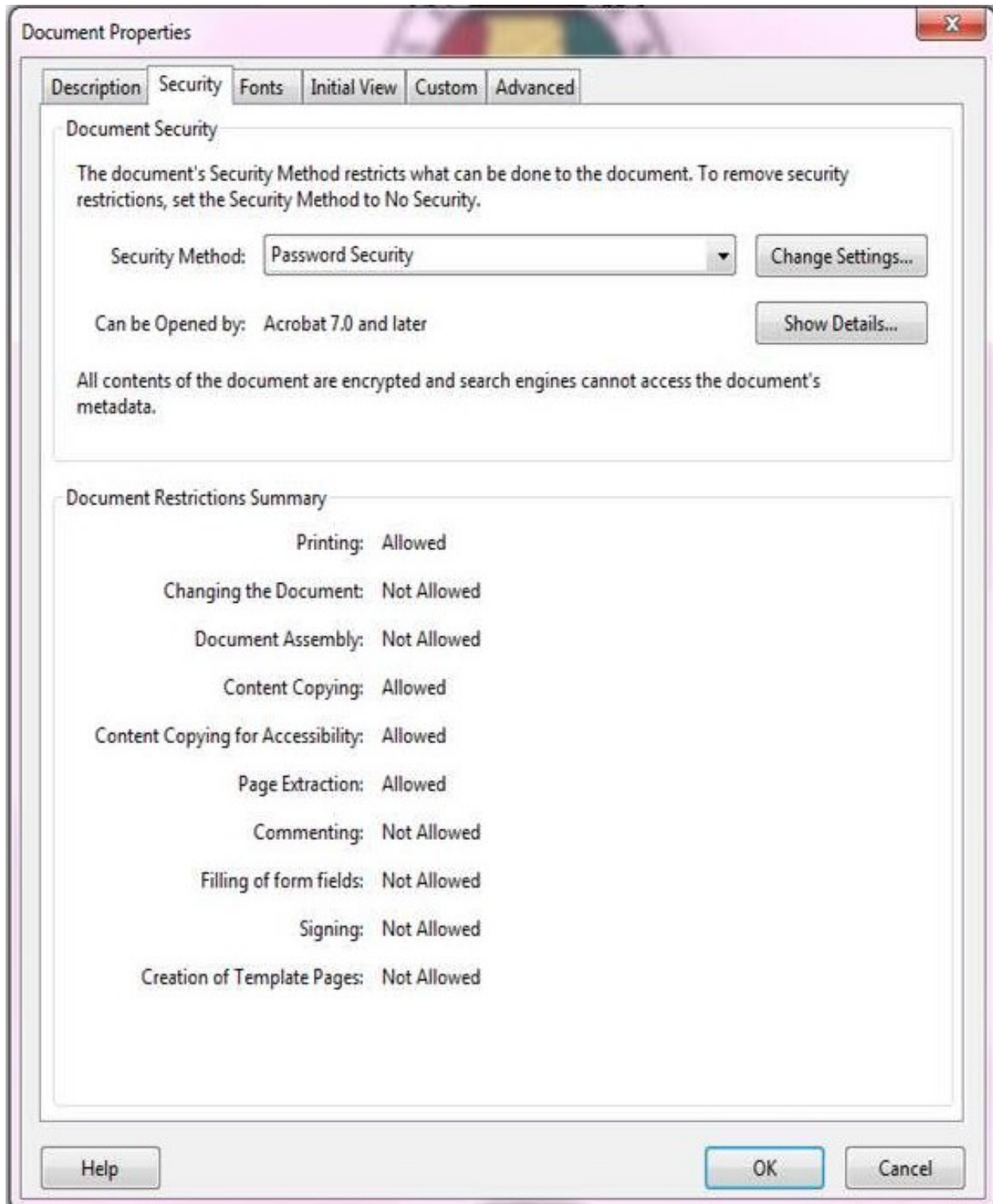
5.0 Procedures for Uploading Secure Documents

5.1 Step 1: Check PDF Security Settings

- Go to File Menu in Adobe Acrobat and click “Properties”
- Click “Security Menu”
- Click the drop down box for Security Method and choose “Password Security”
- The password security settings need to look like the following below:
 - Under the Permissions settings, please click “Restrict Editing and printing of the document. A password will be required in order to change these permission setting.”
 - Under the Printing Allowed drop down menu click “High Resolution”
 - Click “Enable copying of text, images, and other content”
 - Change the Permissions Password—these are specific to the type of document being uploaded

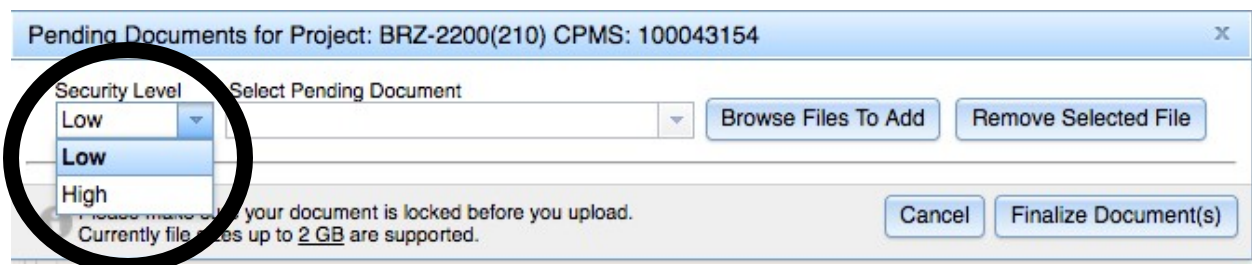


- The document properties will need to look like this once the security settings have been saved:



5.2 Step 2: Upload to GeoGIS

- Login to GEOGIS. (geogis.caps.ua.edu)
- Search for the project the documents will be uploaded to in the “**Project Number**” search bar.
 - a. If you are not authorized to upload the project, please contact the following for:
 - " Hazardous Materials Projects-- Hope Gwin at (334) 206-2292 or by email at gwina@dot.state.al.us.
 - " Geotechnical Projects-- Matt Revell at (334) 206-2257 or by email at revells@dot.state.al.us.
 - " Materials Projects-- John Jennings at (334) 206-2314 or by email at jenningsj@dot.state.al.us .
- Once you have approval to upload the document or if you are already authorized, click the “**Upload**” button under the “**Upload Documents**” column.
 - a. Refer to Section 2.2.1 for more detailed instructions
- “**Browse Files To Add**” and once the file has been chosen click the “**Open**” button.
- Once the file has been opened, choose a “**Security Level**”.
 - b. “**Low**” is standard ALDOT security settings for the document
 - c. “**High**” adds additional copy restrictions to the document.



- It is also necessary to choose an “**Intended Approver Type**” based on the type of document being uploaded.

Pending Documents for Project: BRZ-2200(210) CPMS: 100043154

Security Level: Low

Select Pending Document: Bridge Location Plan & Profile 8.5.05, BR c

Browse Files To Add Remove Selected File

Intended Approver Type: Geotechnical

Document Type: Preconstruction Construction

(PreCon) Landslide Report
 (PreCon) ALDOT Internal
 (PreCon) Culvert Report
 (PreCon) DIGGS
 (PreCon) Foundation Analysis

5.3 Step 3: Submit document for approval

- When the correct settings have been chosen, select a **“Document Type”** appropriate to the document (more than one type can be chosen), and then click **“Finalize Document”**.

Please make sure your document is locked before you upload. Currently file sizes up to 2 GB are supported.

Cancel Finalize Document(s)

- If an error message like the one below is displayed, return to the PDF and check that all settings and the permissions password are correct before attempting to re--upload the document.

Pending Documents for Project: BRF-0013(502) CPMS: 100003193

Select pending document:

Browse Files To Add Remove Selected File

Please make sure that document is secured properly before uploading

- Once you have submitted the document, the Approver will receive an email to approve your document. Once the document has been approved, you will receive notification from GeoGIS, that the document has been approved.

6.0 Additional Geotechnical Features

6.1 Bridges

GeoGIS stores spatial information about all of the bridges in the state of Alabama. To turn the bridge layer on, select the “bridges” checkbox located on the map page, as shown in Figure 36. A purple bridge dot represents a bridge that does not currently have a bridge card associated with it, while a green bridge dot represents a bridge that has a bridge card associated with it. Selecting a green bridge dot will open a pop-up box that contains all of that bridge’s information, such as the features the bridge intersects and the bridge’s location, as well as a link to the associated bridge card, as shown in Figure 37.

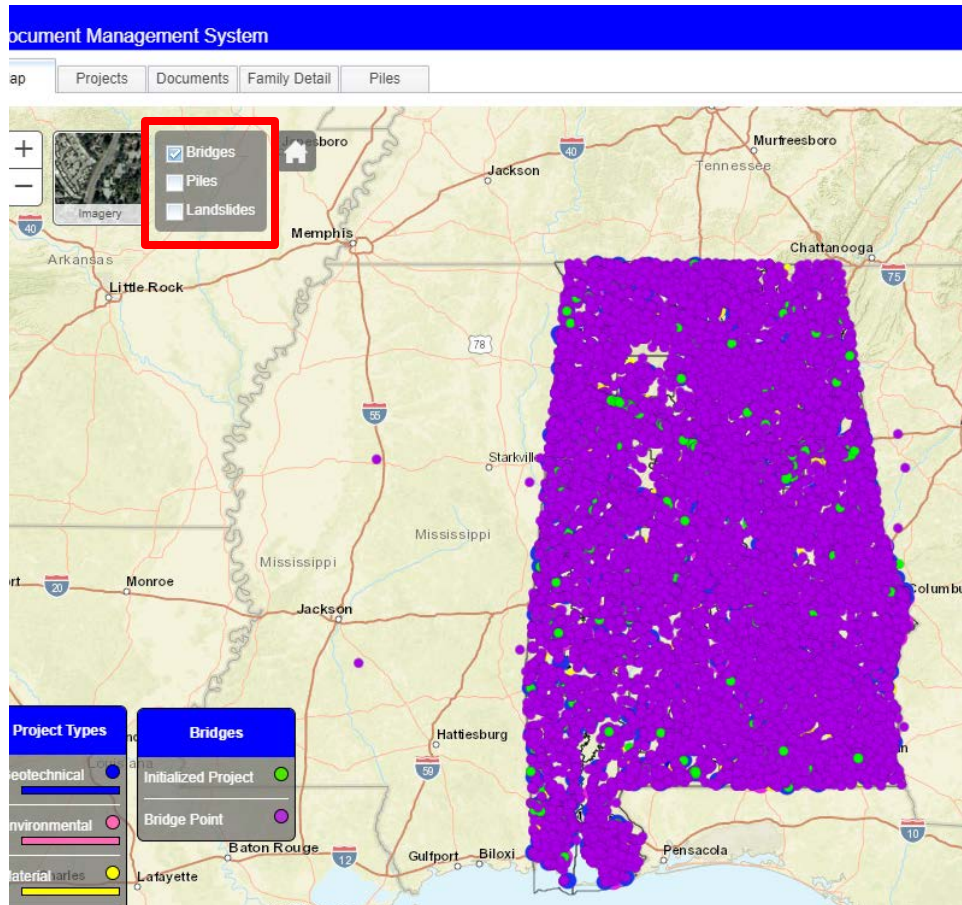


Figure 36



Figure 37

6.2 Piles

GeoGIS stores information about deep pile foundations throughout the state of Alabama. By storing spatial and attribute information about piles, users can complete searches to easily retrieve pile information and establish trends.

To turn on the pile layer, users should toggle on the “pile” checkbox located on the GeoGIS map. The checkbox will turn on the location of all the piles whose information is entered into GeoGIS, as shown in Figure 38. By clicking on a pile dot, a pop up box will be displayed that lists the associated attributes with a pile, as shown in Figure 39.

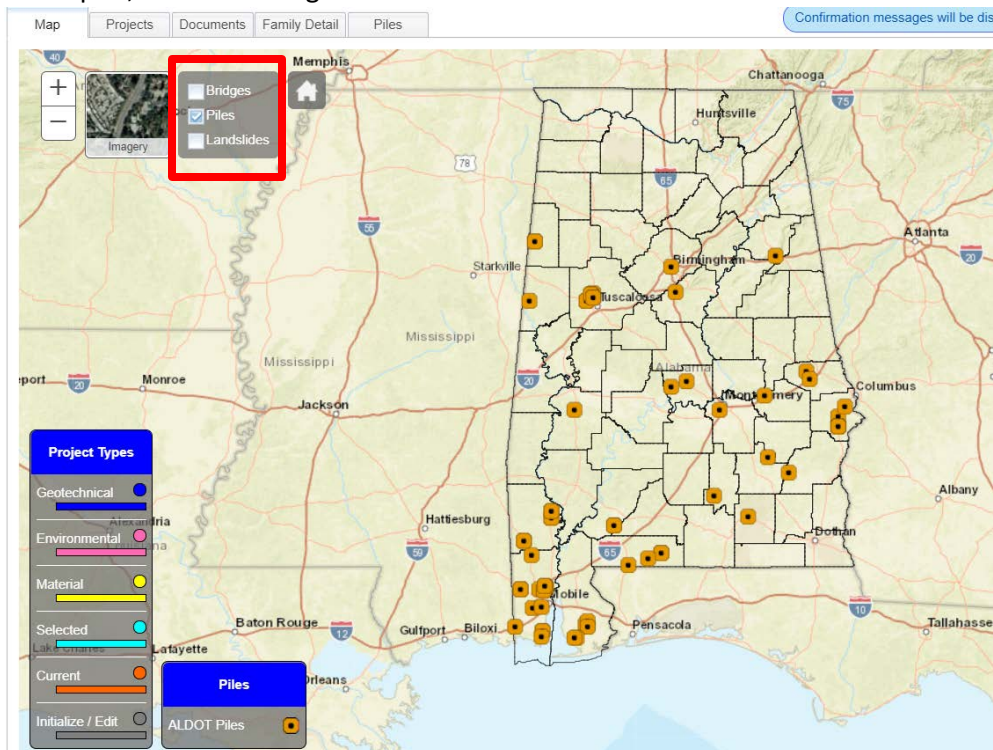


Figure 38

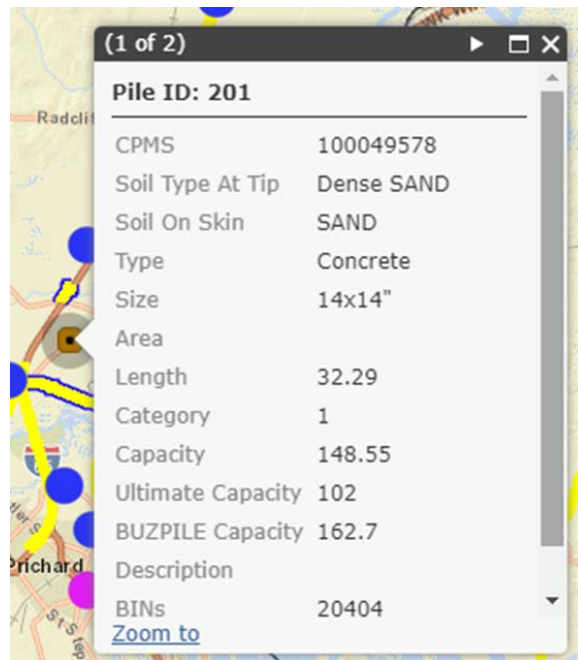


Figure 39

6.3 Landslides

GeoGIS stores information about landslides that have occurred throughout the state of Alabama. By storing spatial and attribute information about landslides, users can complete searches to easily retrieve landslide information and establish trends.

To turn on the landslide layer, users should toggle on the “landslide” checkbox located on the GeoGIS map. The checkbox will turn on the location of all the landslides whose information are entered into GeoGIS, as shown in Figure 40. By clicking on a landslide dot, a pop- up box will be displayed that lists the associated attributes with a landslide, as shown in Figure 41.

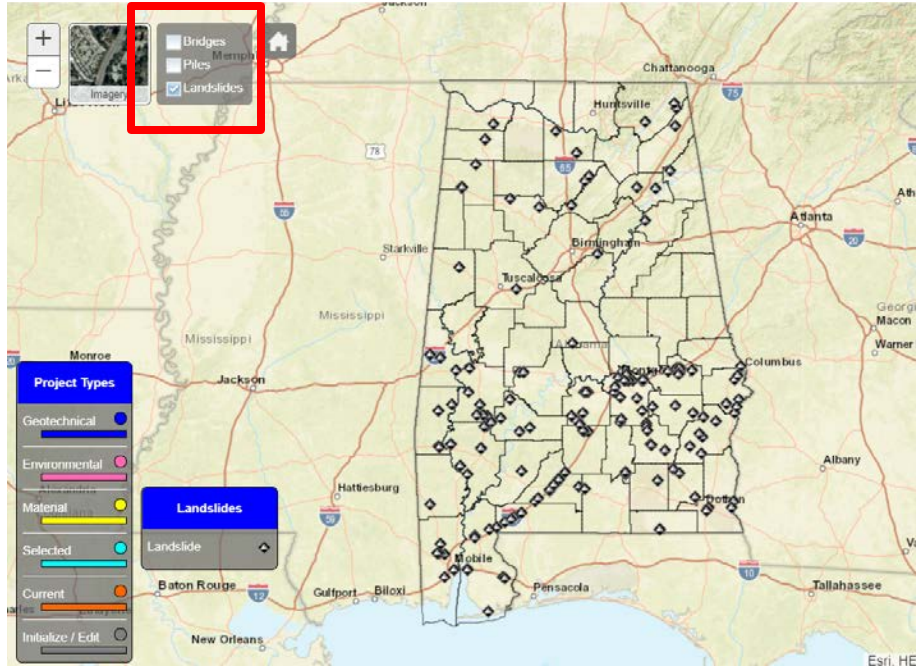


Figure 40



Figure 41

6.4 DIGGS

Geotechnical engineering professionals perform tests and gather an abundance of data every day. Typically, engineering companies have different formats for displaying pertinent information, which are tailored to the focuses of each company. Although this method works for individual companies, when data is transferred among companies, states, or other agencies, the variety of display formats and standards can be problematic, since most software packages are unlikely to have the means to understand all data formats. Data Interchange for Geotechnical and Geoenvironmental Specialists (DIGGS) is a data transfer format that is a solution to this problem. DIGGS provides a standard international format for transferring geotechnical data. While GeoGIS is a file-based system, functionality was added to verify, store and display DIGGS data.

The DIGGS data format was incorporated into the web system. DIGGS files for an Atterberg limits test, cone penetration test, and compaction test were generated. A user simply uploads the XML file to the associated project within GeoGIS, as shown in Figure 42. The DIGGS validation tool was incorporated into the GeoGIS system to verify the DIGGS format of uploaded files and check for errors before files are accepted into the site. If the format of the file is invalid based on the DIGGS format, GeoGIS alerts the user that the file is an invalid DIGGS file, as shown in Figure 43.

The DIGGS XML contains test type tags, such as “Atterberg Limits Test” or “Cone Penetration Test,” and on upload, GeoGIS reads these tags to determine what test the DIGGS file represents.

EDIT DOCUMENT x

DIGGSExample2.XML

Preconstruction Construction

Liquid Limit	
Liquid Limit Data	
Wp	Wl
20	40
30	50
40	60
50	70
60	80
70	90
80	100

- (PreCon) Geotechnical Data
- (PreCon) ADEM Correspondence
- (PreCon) Clearance Letter
- (PreCon) Correspondence
- (PreCon) Culvert Report
- (PreCon) DIGGS
- (PreCon) DIGGS Atterberg
- (PreCon) DIGGS Cone Penetration Test
- (PreCon) Environmental Site Map
- (PreCon) Foundation Analysis
- (PreCon) Foundation Report
- (PreCon) Geohydrologic Report
- (PreCon) ALDOT Internal
- (PreCon) HazMat Report

Intended Approver Type
Geotechnical

Cancel Save Delete

Figure 42

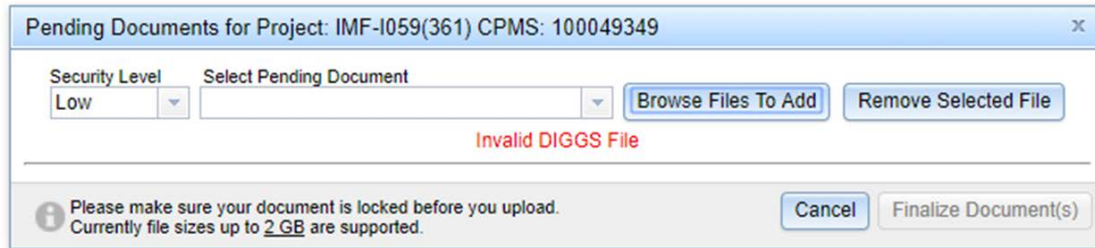


Figure 43

GeoGIS automatically generates an easy to understand PDF view, in a chart or graph format, of the data within the XML file. An example of the Atterberg Limits PDF view is shown in Figure 44. This PDF view also serves as the thumbnail preview for the document.

Atterberg Limits

Liquid Limit		
Trial No	Blow Count	Water Content
1	30	53
2	27	62
3	20	77.7
Liquid Limit	25	65.8575
Plastic Limit		
Trial No	Water Content	
1	20	
2	21	
Plastic Limit	20.5	

Figure 44

6.4.1 Add New Landslide/Pile Features

The GeoGIS Website contains the functionality to add new Landslide/Pile features to the site. Landslide and Pile features can be added by accessing the Manage menu in the top right corner of the site and selecting Add Feature as shown in Figure 45.

Figure 45

Selecting the Add Feature button will activate the Activate New Feature window shown in Figure 46. From this window, the radio buttons can be used to select whether the feature is a Landslide or a Pile feature. The remaining fields can then be populated with the relevant feature information. In order to locate the feature, the user can enter the latitude and longitude into the appropriate fields or click on the map to place the feature.

The screenshot shows a web application window titled "Add New Feature" with a close button (x) in the top right corner. At the top, there are two radio buttons: "Landslide" (selected) and "Pile". Below this is a form with the following fields:

- CPMS #: 900000317
- DDIR #: d
- Division:
- Route Id:
- Route Type: Select a Route Type (dropdown menu)
- Beginning MilePost:
- Ending MilePost:
- Located: None (dropdown menu)
- Latitude:
- Longitude:
- Failure Date:
- Weather at Failure:
- Landslide Type: Fall (dropdown menu)
- Failure Severity: Road Closed (dropdown menu)
- Rate of Movement: Slow: Failure occurred over months (dropdown menu)
- Failure Location: Front Slope Failure (dropdown menu)

Below the form is a section titled "Location Description" with a large empty text area. At the bottom of the window, there is a "Character Count: 0/250" indicator and two buttons: "Cancel" and "Create".

Figure 46

Appendix A

Documents Required for GeoGIS

Documents Required for GeoGIS

Environmental Documents

<u>Document</u>	<u>Example</u>	<u>Document Type in GeoGIS</u>
Clearance Letters	CLEARLTR 3.3.02	Clearance Letter
Hazmat Report	HAZRPT 4.11.13 Preliminary Investigation Reports Secondary Investigation Reports Environmental Assessment Reports Site Assessments Re-evaluation Reports Closure Reports ALDOT CORRES containing soil samples/testing	Hazmat Report
ADEM Correspondences	ADEM CORRES 6.4.91 No Further Action Letter	ADEM Correspondences
Site Maps/Photos	Site Map	Environmental Site Map/Photos
NEPA Reports/Correspondence	Finding of No Significant Impact Environmental Impact Statement	NEPA Documentation
HazMat Notification Forms	HazMat Notification Forms 11.2.06 Sites 1-3	Pre-Construction Other
Miscellaneous Documents		Misc. Documents

*Occasionally the correct document classification label does not show up when initially uploading the document. If this occurs, mark it as "Pre-Construction HazMat Report" or as another document type, click save, and then once the upload is complete, click "Edit Document" and the correct classification should appear. Then the document can be reclassified and saved again.

Documents Required for GeoGIS (cont.)

Geotechnical Documents (Preconstruction)

<u>Document</u>	<u>Example</u>	<u>Document Type in GeoGIS</u>
Original Request	Original Request 11.3.05 SR-9 (US-231) from Charles AVE to Knight ST STPOA-0009(504) Elmore Co	Correspondence
Geohydro Report	Geohydro RPT CR-2214 Robertson Branch PCP-55-06-17 () Pike	Geohydrologic Report
Hydraulic Report	Hydraulic RPT Waterway Blvd over Cotton Ck Site 2 ST-002-999-004 Baldwin	Geohydrologic Report
Calculations	Calculations_rev1_BR SR229 Tallapoosa Rvr_BR0229(500)_Elmore	Foundation Analysis
Scour Analysis	Scout Analysis 3.21.01 CR on CR-43 over Yellow Leaf CRK ACGBBRZ-1100(204) Chilton Co	Geohydrologic Report
Bridge Report	BFND_RPT-Final(18Jun15)_BR CR85 Mortar Crk_ACBR61038-ATRP(007)_Autaga	Foundation Report
Soil Survey & Materials Report	SSVYMR_SR135 Roundabout_99-409-022-135-502_Baldwin	Soil Survey & Materials Report (Both Categories)
Culvert Report	CVT_FND_RPT_ADDLL US82 From SR69-Rice Mine Rd_NH0006(564)_Tuscaloosa	Culvert Report
Slope Study Report	SLP RPT SR-180 Relocation ST-002-180-010 Baldwin	Slope Study Report
Landslide Report	LS Correction RPT on I-59 SB at MP 49.2 99-405-690-000-53 Greene Addendum 1	Landslide Report
Sinkhole Report	Sinkhole Report SR 133 from S of Norfolk Southern RR Br to 700 ft S of Avalon Avenue STPAA-8829(600) Colbert Co	Sinkhole Report
Retaining Wall Report	Retaining Wall Report for SR-158 Ext. from Lott Rd to Schillinger Rd NHF-0158(902) Mobile Co	Retaining Wall Report
Soil Test Data Report	SOIL TEST RSLT_BR SR77 Norfolk S RR_BR0077(500)_Talladega	Geotechnical Data
Addendums	Addendum 1 - LS Correction RPT on I-59 SB at MP 49.2 99-405-690-000-513 Greene	Match appropriate report type
Well Reading/ Inclinometer Reading	Passive Pressure Diagram_Lighting INT_SR180 Gulf Bay Rd_STPAA-0180(501)_Baldwin	Geotechnical Data

Photo	Photos BR over Hatchechubbee and Highlog Creek on ST-26 BR-0026(501) Russell Co	Photo
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Documents Required for GeoGIS (cont.)

Geotechnical Documents (Construction)

<u>Document</u>	<u>Example</u>	<u>Document Type in GeoGIS</u>
Pile Driving Records	Pile Driving Records 2.2.00 BR over Chestnut CRK on CR-7 BRZ-1100(032) Chilton Co	Test Pile Driving Record
Construction Memos	Memo from M&T 6.23.06 BR on Tallapoosa on SR-229 BR-0229(500) Elmore Co	Correspondence
Field Monitoring	NHF-443() ADDENDUM 2 NHF8510(7) US231 MEMORIAL PARKWAY MAINLINE OVER MAX LUTEHER DRIVE	Field Monitoring
Photos	Bent 6 SBL 002	Photos
Hammer Submittal	Hammer Submittal 9.6.01 Bridge Replacement on CR-64 at Eightmile Creek BR-0213(200) Baldwin Co	Hammer Submittal
Signs & Lighting Report	Lighting Pole FND RPT for Lighting IMP on I20-59 at SR-28 (Exit 17) ST-060-I59-001 Sumter	Signs & Lighting
Drilled Shaft Excavation Log	Drilled Shaft Excavation Log 03	Drilled Shaft Excavation Log
Drilled Shaft Pouring Record	BIN 17156 DRILLED SHAFT (22714)[1]	Drilled Shaft Pouring Record
Bearing Curves/ PDA Results	Bearing Curve 7.18.03 Bridge Replacements ACGBBRZ-0200(206) Baldwin Co	Bearing Curves (PDA Results)
Shaft Load Test	Shaft Load Test Widening of SR 133 from S of Norfolk-Souther RR Bridge to 700 S of Avalon Dr STPAA	Foundation Analysis
Other		Other

Documents Required for GeoGIS (cont.)**Material Documents**

<u>Document</u>	<u>Example</u>	<u>Document Type in GeoGIS</u>
MaterialsReport	IM-1020(354) Approved MR	MaterialsReport
Other		Other

Appendix B

Requirements for Scanned Documents

Requirements for Scanned Documents

Anything below these requirements would require prior approval.

1. DPI Resolutions
 - a. Scanning Resolutions
 - i. All historic boring logs/drawings must be scanned in at 600 dpi unless an electronic format is available.
 - ii. All other documents must be scanned in at 600 dpi.
2. Paper Documents
 - a. Use the best paper document available.
 - i. If there are multiple copies of the same document, use the original document if it's available.
 - b. The scanned document must have good clarity.
 - i. The scanned document must be legible.
 - ii. The scanned document cannot have speckles if at all possible.
 - iii. The scanned document must have background uniformity such that lines and gray areas due to scanning are minimized.
 - c. The scanned document cannot be skewed more than a $\frac{1}{4}$ of an inch.
 - i. Review of the scanned document should not require the use of a ruler or other appurtenances to determine the amount of skew. Please see the attached document for examples
 - d. The scanned document must have correct orientation.
 - i. The top of the page needs to be at the top of the screen. If the pages are not correct, then the orientation needs to be corrected. Click on the page thumbnail bar to the right of the screen and right click on the thumbnail(s) you want to rotate.
 - e. The scanned document pages must maintain the original order as the paper document.
 - f. Bookmarks are not required but if you use them, then there cannot be more than 10 per report unless otherwise approved.
3. File Naming
 - a. The files need to be named as listed below.
 - i. Type of Document, Date (if given), Project Number, County
 - ii. EXAMPLE: Bridge Foundation Report 09272013 BR-412(10) Chilton
 - iii. EXAMPLE: BFND RPT 09272013 BR-412(10) Chilton
 - Appendix C contains a list of abbreviations for document types. There are two options for naming files:



ALABAMA DEPARTMENT OF TRANSPORTATION

1409 Coliseum Boulevard, Montgomery, Alabama 36110

Bureau of Materials and Tests

3700 Fairground Road, Montgomery, Alabama 36110

Phone (334)206-2200 FAX (334)264-6263



Kay Ivey
Governor

John R. Cooper
Transportation Director

July 15, 2019

James D. Brown, P.E.
West Central Region Engineer
OFFICE

ATTN: Mr. David Kemp, P.E.
Pre-Construction Engineer

RE: Project No.: NH-HSIP-0006()
CPMS No.: 100070183
Materials Report
Resurfacing of SR-6 (US-82)
From SR-215 to Duncanville School Road
MP 55.147 to MP 60.327
Tuscaloosa County

Dear Mr. Brown:

Attached you will find a materials report which gives the Region's recommendations for the design and construction of the above referenced project. After reviewing this information it is being forwarded with the approval of this Bureau.

Sincerely,

Scott W. George, P.E.
Materials and Tests Engineer

BY 
John P. Jennings, P.E.
State Materials Engineer

JPJ/jpj

cc: Mr. Chris Strickland, P. E.
Mr. Stacey Glass, P.E.
Mr. Skip Powe, P. E. (with attachment)
Mr. Paul Beard, Quality Control Engineer
FHWA
Project File
File

Appendix C

Abbreviations

Abbreviations

Abutment=ABUT	Drawing(s)=DWG
Addendum=ADD	Drilled Shaft or Drilled Shafts=DS
Additional=ADDL	Drilled Shaft Excavation Log=DSEL
ADEM Correspondences=AEMCORRES	Drilled Shaft Installation Plan=DSIP
Avenue=AVE	Drilled Shaft Pouring Record=DSPR
Bearing Curves=BC	Drive=DR
Birmingham Northern Beltline=BNB	East, East of, Eastern=E
Boring=BOR	Eastbound=EB
Boulevard=BLVD	Exit Number=Exit
Bridge=B	Extension=EXT
Bridge/Building Foundation=BFND	Falling Weight Deflectometer=FWD
Bridge Identification Number=BIN	Foundation=FND
Bridge Replacement=BR	Hammer Submittal=HMR
Bridge Widening=BWDN	Hazmat Report=HAZRPT
Build Up=BU	Highway=HWY
Buzpile/WBuzpile=BUZ	Improvements=IMP
Buzpile/WBuzpile Results=BUZRSLT	Intersection=INT
Calculations=CALC	Interstate=I
Centerline=CL	Kansas City=KC
Clearance Letter=CLEARLTR	Laboratory=LAB
Cone Penetration Test=CPT	Landslide=LS
Correspondence=CORRES	Lane(S)=L
Corridor=CORR	Left=LT
County=CNTY	Letter=LTR
County Line= COL	Materials Report=MR
County Road or County Roads=CR	Mile Marker=MM
Creek=CRK	Mile Post=MP
Culvert=CVT	Modifications=MOD
Division=DIV	North, North of, Northern=N

Abbreviations (cont.)

Northbound=NB	Sinkhole=SINK
Original, Originals=ORIG	Site Soil Profile=SSP
Overpass=OP	Slope Study= SLP
Pavement=PVMT	Soil Survey=SSVY
Pile Driving Record=PDR	Soil Survey and Materials Report=SSVYMR
Railroad=RR	South, South of, and Southern=S
Recommendations=REC	Southbound=SB
Relief=RLF	Standard Penetration Test=SPT
Replace or Replacement=R	State Road or State Route=SR
Report=RPT	Station(s) or Stationing=STA
Request=REQ	Stream=STR
Results=RSLT	Street=ST
Resurfacing=RES	Summary=SUM
Retaining Wall=RW	Traffic=TRF
Revised or Revision=REV	Underpass=UP
Right=RT	Version=VER
Right of Entry=ROE	West, West of, or Western=W
Right of Way=ROW	Westbound=WB
River=RVR	Widen, Widening=WDN
Road=RD	

Appendix D

Frequently Asked Questions

Concerning documents to be scanned:

➤➤ What documents should I scan, and which should I not?

To Scan	Do Not Scan
<ul style="list-style-type: none"> • Clearance letters • Any Reports • ADEM Correspondences • HazMat Site Notification Forms from design bureau (some are separated into sites, but they can be scanned together into one file) • Site maps or photos • Project Descriptions • Design Hearing Plans • Scope of Work • Correspondence concerning the allocation of work to contractors (without mention of money) 	<ul style="list-style-type: none"> • Chronology of Events • Plans • Any invoices or documents containing consultant monetary information • Plan-In-Hand memos • PS&E memos

Concerning searching for projects in GeoGIS:

➤➤ What should I do if the project does not come up when I search for it?

If the project can't be found by searching for the full project name, try searching with only the numbers given (leaving out the STPAA, NHF, BR, etc. designation), and the county of the project. If the project still cannot be found, refer to the question below.

➤➤ What should I do if no CPMS number is found for the project?

If the project cannot be found through either of the methods listed above, then it will need to be uploaded and initialized as a historical project.

➤➤ If the project does not specify a number—for example, HES-62()—and I can only find projects HES-62(11) and HES-62(12) in my search, what projects do I upload the documents to?

Often during environmental work there is not an agreement number assigned to the project as ALDOT is performing a corridor study. When searching for the project, consider the description found in the documents you scanned. If it matches the description of either HES-62(11) or HES-62(12), then the document can be uploaded to that project. If the description of the project matches none of the available ones, then it's possible it is a historical project and will need to be uploaded as such.

Concerning initializing in GeoGIS:

- If I am initializing a project and it's not already designated on the map, what do I do?

It is important to place the project in the correct location. To do this, follow the steps below:

1. Read the project description found on the GeoGIS website or in documents you scanned.
 - a. If a business, highway exit, or other designated place is mentioned, you can use Google maps to search for and locate the specific place.
 - b. If only a road, a bridge, or another obscure/unknown location are mentioned, then you will need to find a map of Alabama counties, locate the one in which your project is located, and scroll to it on Google Maps.
2. From there, you can search for certain roads, rivers, and intersections. Once you have located the area (and you are sure that it is correct), you can place a point and initialize the project. If you have doubts about the location you have found, then refer to the question below.

- What should I do if I am unsure about or can't find the project location on the map when I'm attempting to initialize it?

If the location cannot be found, the user will need to contact the administrator.

- If the project description states that the work covers a certain distance (i.e. "From CR-25 to CR4") and the project is not already marked, how do I place a line on the map?

Currently, users cannot place lines on the map, only dots. A missing line on the map when a user is attempting to initialize a project means that data is missing in the CPMS table (and on the ALDOT service that holds data for the GeoGIS website) for the project, and it will have to be corrected. For now, if you can find where the project is located, place the point at the beginning of that location on the map.

- How should I initialize the project on the map if it covers multiple locations/roads in an area?

At this point, there is no way to plot multiple locations for a project, so it is best to choose the first location and place the point there.

Concerning uploading and classifying documents:

- How do I proceed with uploading if the documents that I scanned are listed under two project numbers—for example, BR---5406(102) & (103)?

In this case, the documents will need to be uploaded to both projects.