Alabama Department of Transportation

Design Bureau Document Management System

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16. Abstract

A GIS-based web portal, referred to as the Alabama Department of Transportation Design Bureau Document Management System (also known as ALDOCS), was developed to centralize document storage, project data, and workflow tracking for ALDOT Design Bureau projects. The system, accessible at https://aldocs.caps.ua.edu, integrates geospatial visualization, CPMS project data, and document management into a single platform to improve efficiency and accessibility for users. The portal enables users to upload, download, and manage documents within structured GDCP workflow steps while maintaining role-based access control. Projects are visualized geographically using GIS-based mapping, including integration of line features and CAD-derived data to improve spatial accuracy. The system also incorporates workflow tracking tools such as Gantt chart visualization, allowing users to monitor project progress and task completion. Additional functionality includes advanced querying capabilities based on project attributes, document types, and geographic selection, as well as integration with existing ALDOT systems to support data synchronization. User roles and permissions were developed to reflect organizational structure, enabling flexible assignment of responsibilities and approvals within workflows. Through iterative development and continuous feedback from ALDOT personnel, ALDOCS evolved into a functional and user-focused platform capable of supporting end-to-end project workflows. ALODCS provides a scalable solution for improving document management, workflow efficiency, and data accessibility across ALDOT operations.

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Executive Summary

A GIS-enabled web-based document management system, referred to as ALDOT Location-Based Document Organization and Collaboration System (ALDOCS), was developed to support the Alabama Department of Transportation Design Bureau. The purpose of this system is to centralize project documentation, streamline workflow processes, and improve accessibility of project data across users and stakeholders.

The platform integrates CPMS project data, geospatial mapping, document storage, and workflow tracking into a single interface. Users are able to query projects, upload and manage documents, and track progress via GDCP workflow steps using tools such as Gantt chart visualization and role-based notifications.

Over the course of the project, the system evolved from an initial prototype to a fully functional application capable of supporting end-to-end project workflows. Key developments included integration of GIS line features, CAD-based mapping, automated document management, workflow configuration, and user role assignment. Continuous collaboration with ALDOT personnel ensured that the system was refined to meet ALDOT operational needs.

The final system provides a scalable and efficient solution for managing complex project data and is positioned for continued implementation and expansion within ALDOT.

1.0 Introduction

The Alabama Department of Transportation (ALDOT) Design Bureau manages a wide range of complex infrastructure projects requiring efficient organization of documents, workflows, and geospatial data. Existing systems lacked the ability to fully integrate these components into a unified platform.

To address these challenges, the Center for Advanced Public Safety (CAPS) along with the University of Alabama developed the Design Bureau document management system, a modern GIS-enabled web portal designed to enhance document storage, workflow tracking, and project visualization. The system, referred to as ALDOCS, which stands for ALDOT Location-Based Document Organization and Collaboration System (ALDOCS), is accessible at: **https://aldocs.caps.ua.edu.**

This platform provides a centralized interface for managing project data, enabling users to access documents, visualize projects geographically, and track workflow progress in a streamlined and efficient manner.

This report summarizes the development, implementation, and outcomes of the ALDOCS project. Figure 1 shows the ALDOCS web portal interface.

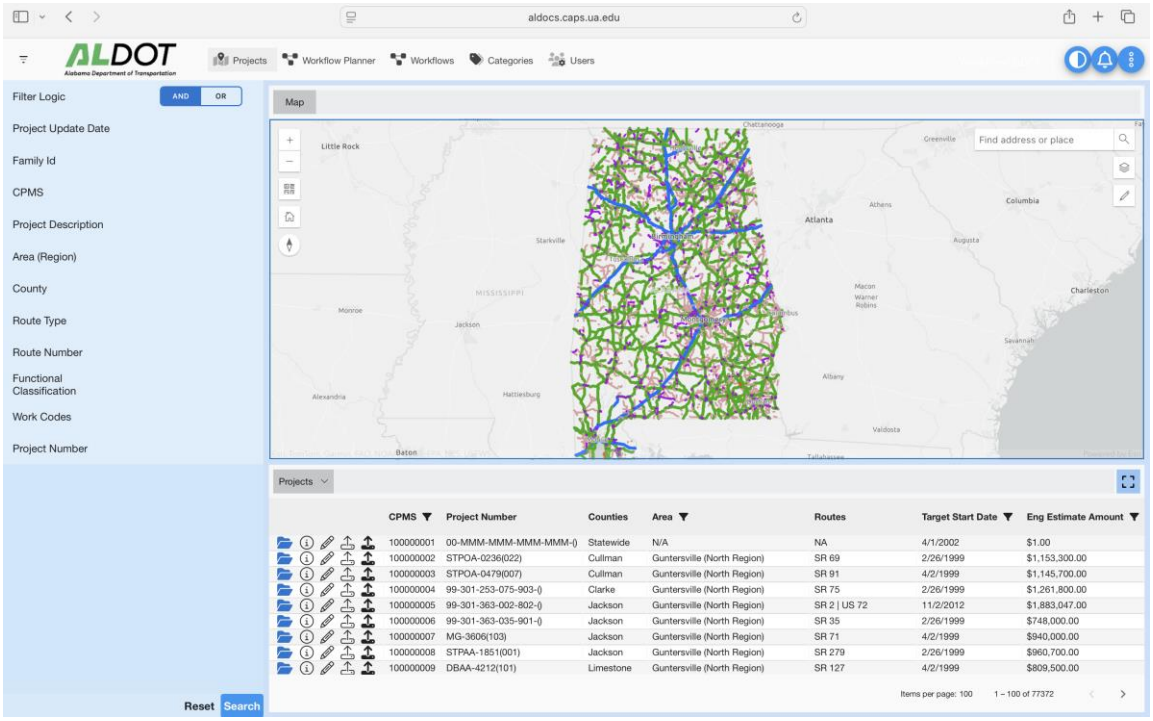


Figure 1. ALDOCS web portal interface showing GIS-based project visualization and document management tools.

2.0 Project Tasks

Task 1: Research Advisory Committee

A Research Advisory Committee (RAC) will be established to provide oversight and guidance throughout the project. The committee will consist of members from ALDOT. An initial kickoff meeting will be held virtually to discuss project schedule, performance assessment, and objectives. Quarterly virtual meetings will be held to present research progress to the RAC and establish action items for the quarter.

Deliverables:

- Research Advisory Committee formed
- Kickoff meeting

Task 2: ALDOCS Development

UA, along with CAPS, will create a geospatial web portal for document storage, management, and querying. This portal will be similar to GeoGIS but will utilize a modern web framework to allow new security features and functionality not currently available in GeoGIS. A new underlying file storage and organization framework will be developed. The RAC will be engaged throughout development of ALDOCS to ensure that user end goals are considered when setting up the framework of the system.

Deliverable:

- New GIS-enabled document management system

Task 3: User Classifications

ALDOCS should be a structured system that allows users of different classifications to perform different operations depending on their use type. ALDOT admin will be able to set different user management levels for ALDOCS. Current user classes, listed in order of increasing control, include:

- Inactive User – no access to ALDOCS
- Standard User – can access regular ALDOCS functions
- Configuration Administrator – can administer workflow configuration for that user's bureau
- User Administrator – can administer user configuration for that user's bureau
- Bureau Administrator – can administer user and workflow configuration for that user's bureau
- Site Wide Administrator – unlimited access to all user and workflow configurations

As the implementation phase continues, consultant-specific roles may be added to allow non-ALDOT employees different levels of access with respect to searching and data visibility.

Deliverables:

- Defined user classes
- Ability to create, update, lock, and delete users

- Ability to create, update, lock, and delete groups and subgroups

Task 4: Project and Document Management

The goal of this task is to enhance the functionality and interface of ALDOCS for project and document management. ALDOCS will be set up with the ability for ALDOT personnel to perform the following tasks: create, edit, and delete projects, approve/reject files, upload/download documents and files, add project types and attributes to documents and files, show projects on a map with color-coded project types or attributes, import documents with optical character recognition (OCR) and search documents based on OCR content.

Deliverables:

- Ability to approve/unapproved files by ALDOT personnel
- Ability to upload/download files
- Ability to add projects, documents, and files
- Ability to add attributes to projects, documents, and files
- Ability to show projects on a map, color-coded by attributes
- Ability to import and employ OCR with input documents
- Ability to search within documents based on OCR content

Task 5: Synchronization

UA will synchronize ALDOCS with existing ALDOT systems and tools to allow interoperability. This synchronization will be executed by tying the new underlying file storage and organization framework into the framework of existing systems and tools. The user classifications of ALDOCS and existing systems will facilitate secure access and data transfer. For example, a project existing in GeoGIS will only be accessible within ALDOCS if those personnel have a GeoGIS user type that is adequate for document viewing and/or editing. When a GeoGIS document is opened in ALDOCS, document attributes created in GeoGIS will be viewable in ALDOCS, and one or all attributes can be transferred as ALDOCS document attributes if desired. Similarly, GeoGIS users will be required to have adequate privileges to view and/or edit ALDOCS projects, documents, and files. ALDOCS will also be synchronized with eGIS to leverage the geospatial roadway network data and attributes available in eGIS. Synchronization will be conducted based on ALDOT project numbers and, if desired, project types within other systems (e.g. GeoGIS Geotechnical, Material, and Environmental project types) to allow for more useful and efficient queries within ALDOCS.

Deliverable:

- Synchronization with existing ALDOT systems and tools

Task 6: Document Querying

UA will provide the ability for ALDOCS users to query projects, documents and files by project number, description, attributes, etc. Additionally, UA will provide geospatial querying through

user-entered latitude and longitude values or selection using map-based polygons drawn by users. Geospatial queries will enable a more efficient workflow for end users.

Deliverable:

- Ability to query projects, documents and files by attributes or location

Task 7: User Training and Documentation

UA will provide training to authorized users on ALDOCS interface, functions and capabilities and they will have access to various instructional documents, e.g., user manual and training videos. Quarterly meetings will be held with ALDOT and their affiliates. These meetings will function as opportunities to update ALDOT personnel on progress and receive feedback on ALDOCS from the various users. The user guide and other instructional documentation will be updated according to user revisions of the site interface and functionality. The proposed work will allow for wider dissemination of project data and analysis to authorized users. Training can be provided at ALDOT through an on-line webinar, and/or through videos that will be accessible to ALDOT employees at any time to watch at their convenience.

Deliverables:

- User manual development and training
- Training videos

3.0 Project Results

The ALDOCS project successfully delivered a functional and scalable document management system. Key results for each project task are summarized below:

Task 1: Research Advisory Committee

The Research Advisory Committee (RAC) structure was successfully implemented through consistent engagement with ALDOT personnel. Weekly and quarterly meetings were conducted the first year to provide updates, gather feedback, and guide development priorities. These meetings played a critical role in shaping system functionality, particularly in areas such as workflow configuration, notification systems, and user interface design. Feedback obtained during these sessions was continuously incorporated into system updates, ensuring alignment with ALDOT operational needs. Bi-weekly small group sessions were conducted throughout the second year to deliver interactive user training and incorporate participant feedback into the system.

Task 2: ALDOCS Development

The ALDOCS platform was successfully developed and deployed as a GIS-enabled web portal for document storage, management, and querying. The system progressed from an initial prototype to a fully functional application capable of supporting end-to-end project workflows.

Major accomplishments include:

- Deployment of the ALDOCS web portal (https://aldocs.caps.ua.edu)
- Development of a modern web-based framework to support improved performance and usability
- Integration of GIS-based project visualization
- Incorporation of CAD-derived features into the map through automated extraction processes
- Incorporated configuration pages for workflows, users, and maintenance items
- Incorporated Gantt chart project view
- Development of document management capabilities

These developments established the foundation of a scalable and robust document management system.

Task 3: User Classifications

A structured user classification system was developed and implemented to manage access control and workflow responsibilities. Current user classes, listed in order of increasing control, include:

- Inactive User – no access to ALDOCS
- Standard User – can access regular ALDOCS functions
- Configuration Administrator – can administer workflow configuration for that user's bureau

- User Administrator – can administer user configuration for that user's bureau
- Bureau Administrator – can administer user and workflow configuration for that user's bureau
- Site Wide Administrator – unlimited access to all user and workflow configurations

Key accomplishments include:

- Implementation of role-based access control for system functionality
- Development of user management tools allowing creation, modification, and assignment of users
- Integration of flexible reviewer roles within workflows, enabling assignment of responsibilities such as Design Manager, Quality Control Engineer, and Requestor
- Added a dedicated ALDOT position configuration page supporting general positions, special positions by area/region or CPMS section number, and bureau/division-tied positions
- Implemented delegate assignment for workflow action tasks, allowing design managers or responsible parties to assign a delegate to upload required documents, with approval/rejection authority retained by the assigning party.

This structure ensures secure access while supporting the operational needs of different user groups. The user and position configuration interfaces are shown in Figures 2 and 3.

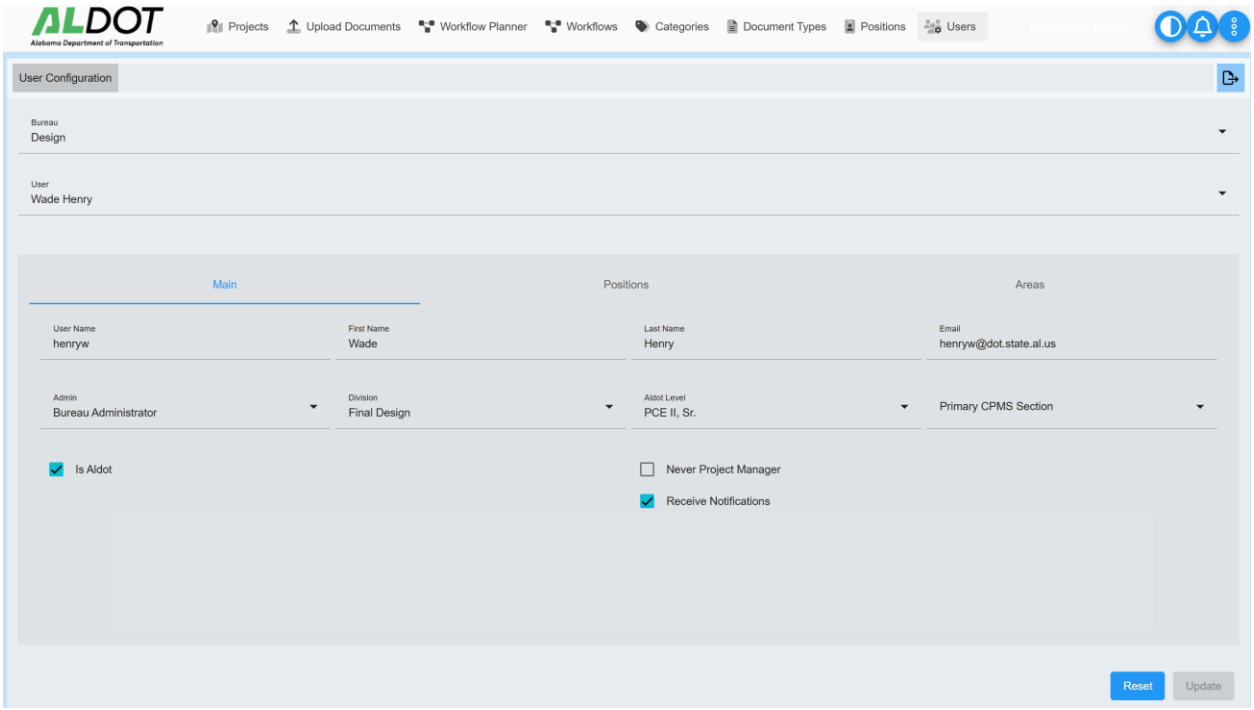


Figure 2. User configuration interface in ALDOCS.

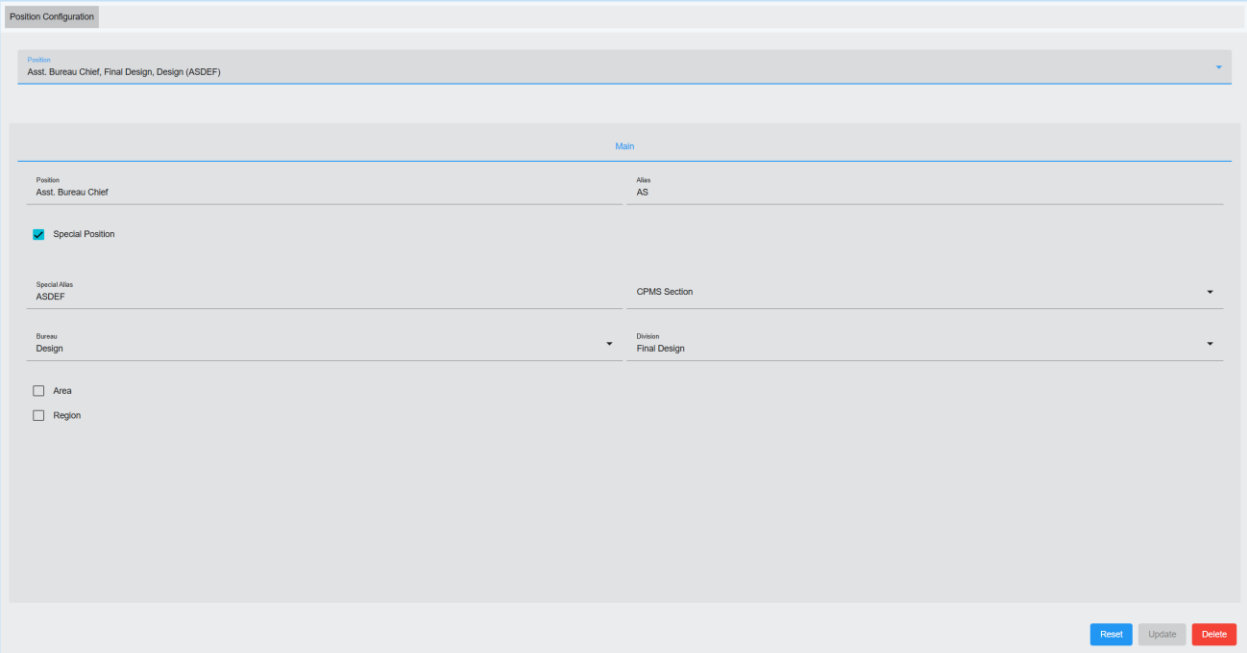


Figure 3. Position configuration interface in ALDOCS.

Task 4: Project and Document Management

Significant progress was made in developing comprehensive project and document management capabilities within the system. The platform enables users to manage documents directly within structured workflow steps and provides tools for tracking project progress.

Major accomplishments include:

- Implementation of document upload and download functionality within workflow steps
- Integration of attachments directly into GDCP workflow steps
- Development of automated document association and classification features
- Implementation of document approval and review workflows
- Development of document visualization features, including thumbnail previews
- Creation of Gantt chart functionality to support workflow tracking and project monitoring
- Development of a consultant upload page providing a streamlined interface for consultants to submit documents against assigned workflow steps

These features significantly improved document organization and reduced manual processes. The project edit dialog, workflow step configuration, project details and workflow task views, document upload page, and Gantt chart visualization are shown in Figures 4 through 8.

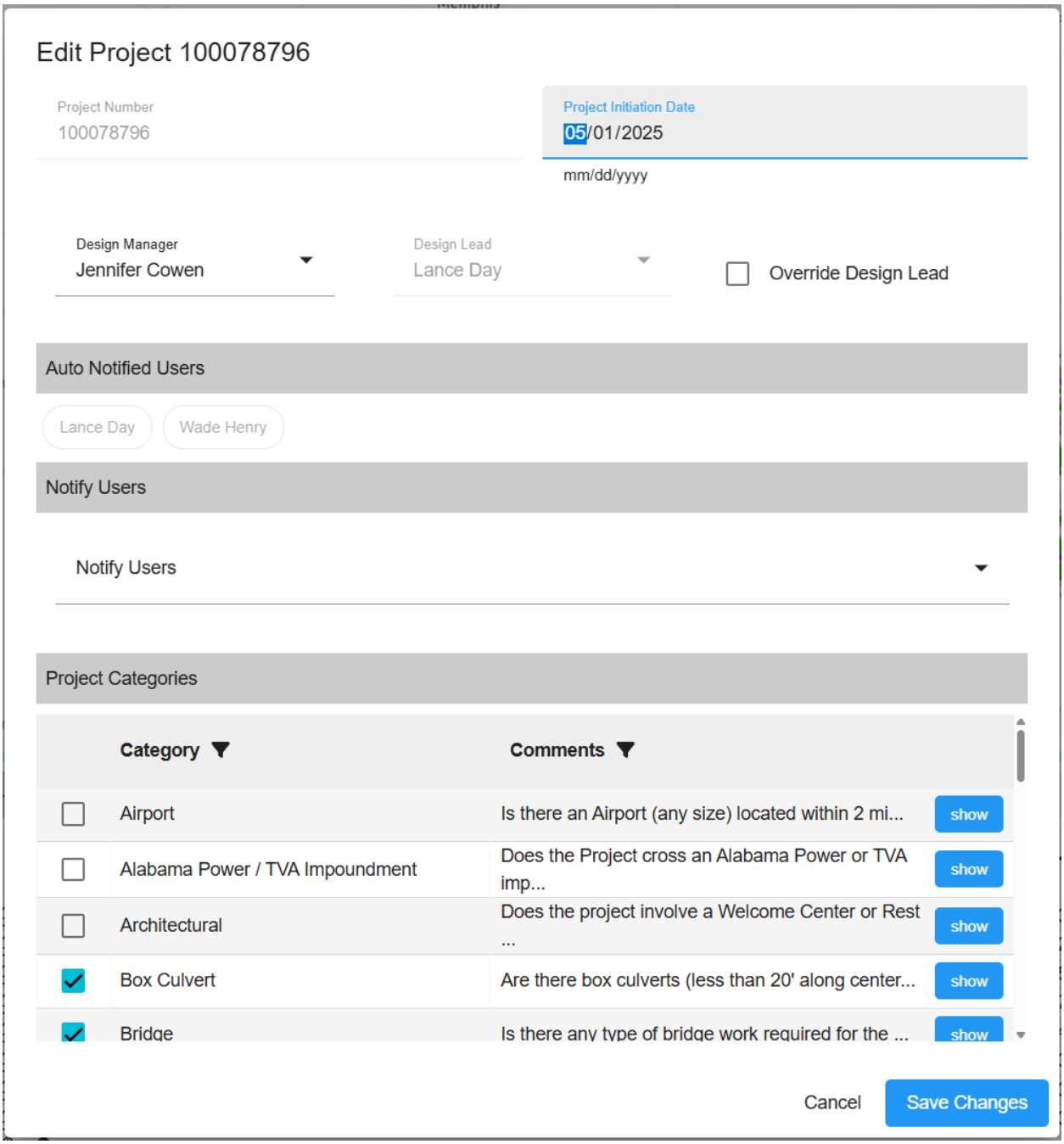


Figure 4. Project edit dialog in ALDOCS.

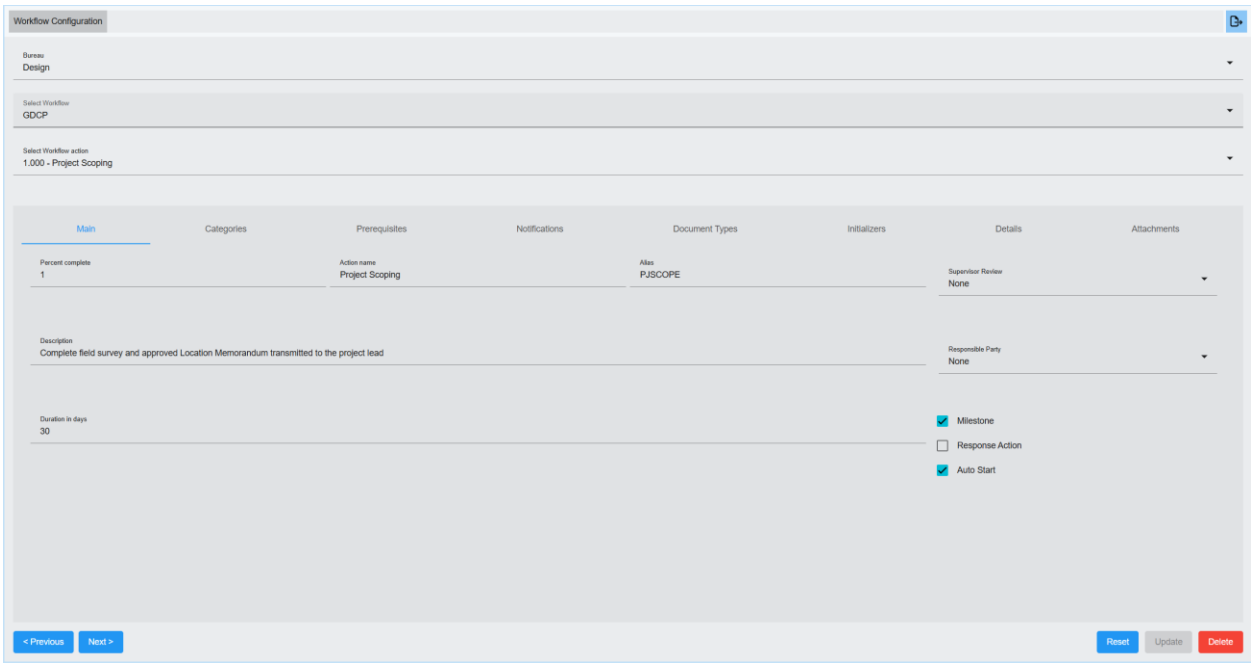


Figure 5. Workflow step configuration in ALDOCS.

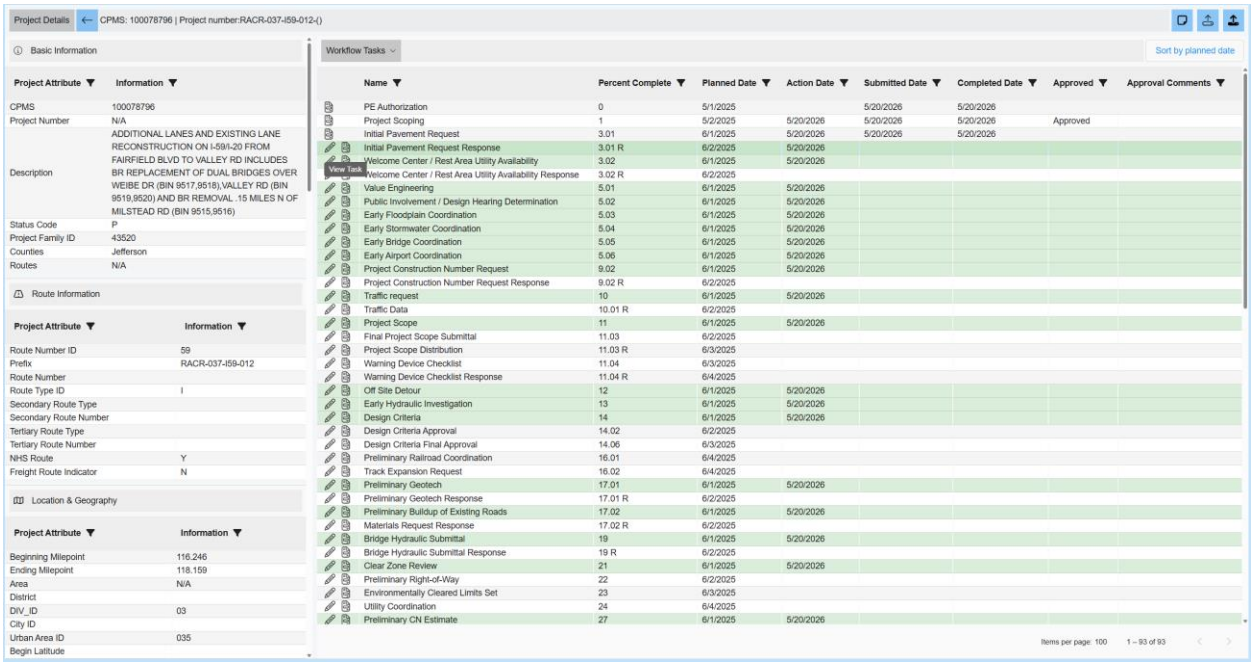


Figure 6. Project details page with workflow tasks shown in ALDOCS.

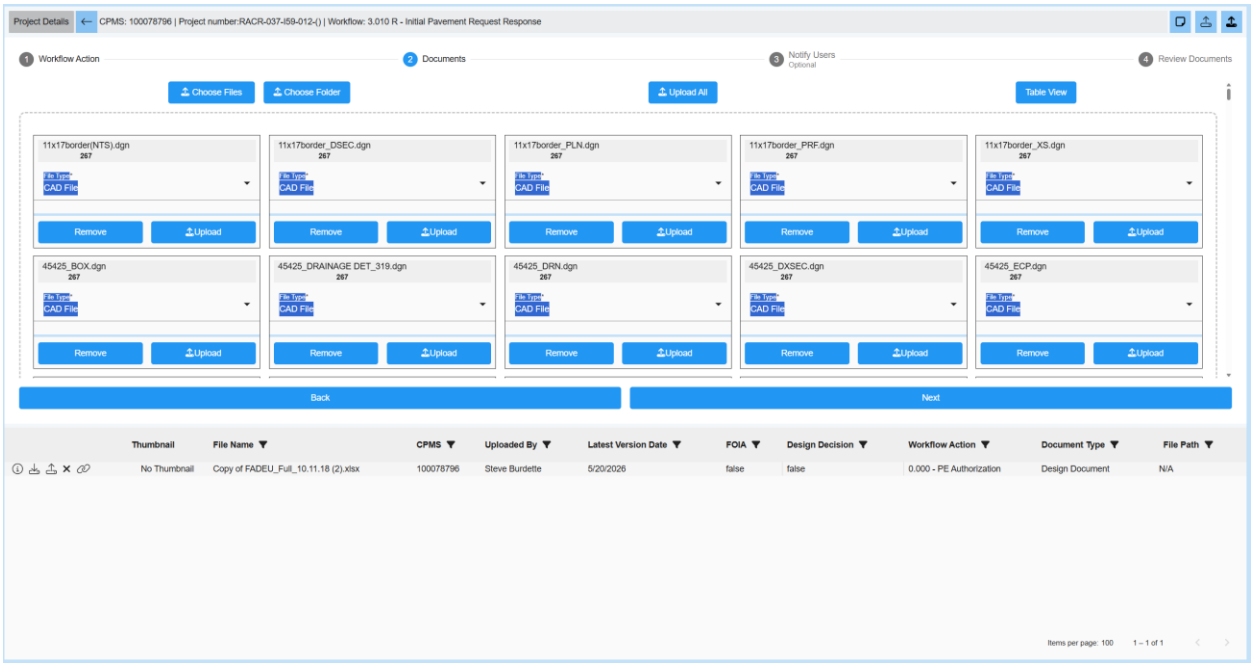


Figure 7. Document upload page in ALDOCS.

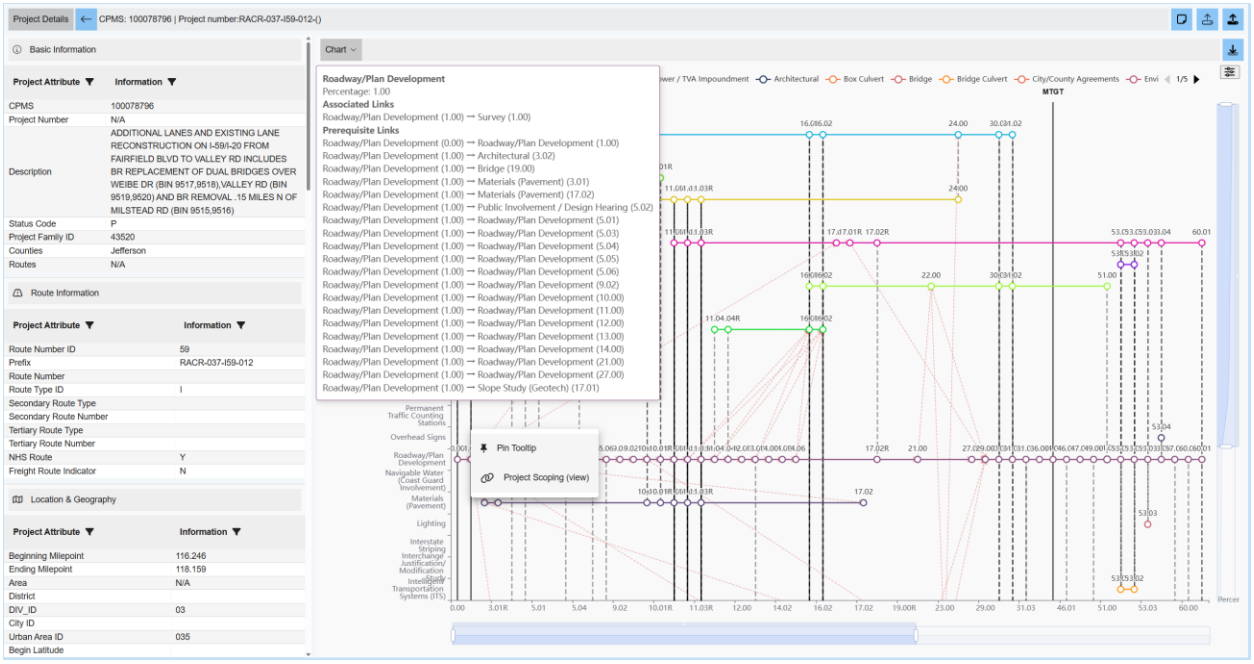


Figure 8. Project details page with Gantt chart in ALDOCS.

Task 5: Synchronization

Substantial progress was made toward synchronizing ALDOCS with existing ALDOT systems to enable interoperability.

Key accomplishments include:

- Integration of CPMS data into the system to support project tracking
- Incorporation of GIS data and roadway network information for enhanced project visualization
- Establishment of project-based linking using ALDOT project numbers and attributes

These efforts ensure compatibility with existing systems and improve data accessibility. Future compatibility efforts will focus on ALDOT SharePoint integration.

Task 6: Document Querying

Advanced querying capabilities were successfully implemented to allow efficient retrieval of project and document data.

Key accomplishments include:

- Development of search functionality based on many different attributes:
    - Project Update Date
    - Family ID
    - CPMS project number
    - Project Description
    - Area/Region
    - County
    - Route Type
    - Route Number
    - Functional Classification
    - Work Codes
    - Project Number (prefix, route ID, agreement)
- Implementation of geospatial querying using map-based selection tools

These tools enhance user efficiency by enabling rapid access to relevant data.

Task 7: User Training and Documentation

User training and support were incorporated throughout the project to facilitate adoption and effective use of the system.

Key accomplishments include:

- Conducted system demonstrations and feedback sessions with ALDOT personnel

- Incorporated user feedback into interface and functionality improvements
- Established the foundation for user manuals and training materials
- Supported knowledge transfer through ongoing collaboration with users

These efforts contributed to improved usability and readiness for broader implementation.

IMPLENTATION PLAN

ALDOCS is currently in pilot deployment within the ALDOT Design Bureau, with extensive testing planned in collaboration with the Design Bureau and the Materials and Testing Bureau prior to rollout. Near-term development efforts include continued improvement of workflow action configuration to more fully express notifications, document types, and responsible parties for each step; enhancement of Gantt chart output to better communicate project status; generation of example documents for key milestone steps to illustrate system capabilities; testing of the Microsoft Graph API to evaluate future SharePoint integration; and continued expansion of both in-app and email-generated notifications. Future deployment goal will be to transition ALDOCS from CAPS servers to ALDOT servers. As testing matures and the system is refined to meet operational needs, a phased rollout to additional bureaus is anticipated. The scalable architecture of ALDOCS supports long-term expansion across ALDOT and positions the platform for future enhancements including advanced reporting, expanded GIS functionality, and potential interoperability with external agency systems.

4.0 Conclusions

The ALDOCS project successfully achieved its objective of developing a centralized, GIS-enabled document management system for ALDOT. The resulting platform, ALDOCS (**https://aldocs.caps.ua.edu**), provides a comprehensive interface for managing project documentation, visualizing geospatial data, and tracking workflow progress.

Through iterative development and continuous collaboration with ALDOT personnel, the system evolved into a practical and user-focused tool capable of improving efficiency and coordination across design workflows. The platform is well-positioned for continued refinement and broader implementation within ALDOT operations.

5.0 ACKNOWLEDGEMENTS

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