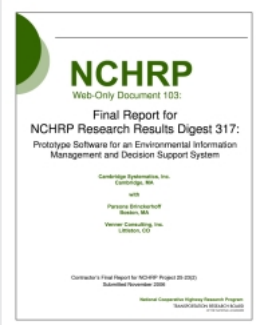


Final Report for NCHRP Research Results Digest 317: Prototype Software for an Environmental Information Management and Decision Support System

DETAILS

0 pages | | PAPERBACK
ISBN 978-0-309-43173-6 | DOI 10.17226/22000

AUTHORS

ACKNOWLEDGMENT

This work was sponsored by the American Association of State Highway and Transportation Officials (AASHTO), in cooperation with the Federal Highway Administration, and was conducted in the National Cooperative Highway Research Program (NCHRP), which is administered by the Transportation Research Board (TRB) of the National Academies.

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

The **National Academy of Sciences** is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. On the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Ralph J. Cicerone is president of the National Academy of Sciences.

The **National Academy of Engineering** was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. William A. Wulf is president of the National Academy of Engineering.

The **Institute of Medicine** was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, on its own initiative, to identify issues of medical care, research, and education. Dr. Harvey V. Fineberg is president of the Institute of Medicine.

The **National Research Council** was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both the Academies and the Institute of Medicine. Dr. Ralph J. Cicerone and Dr. William A. Wulf are chair and vice chair, respectively, of the National Research Council.

The **Transportation Research Board** is a division of the National Research Council, which serves the National Academy of Sciences and the National Academy of Engineering. The Board's mission is to promote innovation and progress in transportation through research. In an objective and interdisciplinary setting, the Board facilitates the sharing of information on transportation practice and policy by researchers and practitioners; stimulates research and offers research management services that promote technical excellence; provides expert advice on transportation policy and programs; and disseminates research results broadly and encourages their implementation. The Board's varied activities annually engage more than 5,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation. **www.TRB.org**

www.national-academies.org

Table of Contents

Note: A summary of this report has been published as *NCHRP Research Results Digest 317* and is available to view or purchase at http://www.trb.org/news/blurb_detail.asp?id=7309.

List of Tables

List of Figures

List of Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ASP	Active Server Pages
CAD	Computer-Aided Design
Caltrans	California Department of Transportation
CAP	Communicating All Promises
CD	Compact Disc
CE	Categorical Exclusion
COTS	Commercial-of-the-Shelf
DOT	Department of Transportation
EA	Environmental Assessment
ECOPAC	Environmental Commitment and Obligations Package for Construction
ECR	Environmental Commitment Record
EEP	Ecosystem Enhancement Program
EIM&DSS	Environmental Information Management and Decision Support System
EIMS	Environmental Information Management System
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	Environmental Protection Agency
ETDM	Efficient Transportation Decision Making
ETS	Environmental Tracking System
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GIS	Geographic Information Systems
GPS	Global Positioning Systems

HPMS	Highway Performance Monitoring System
IIS	Internet Information Services
IDOT	Illinois Department of Transportation
INDOT	Indiana Department of Transportation
ISO	International Standards Organizations
KYTC	Kentucky Transportation Cabinet
MATS	Maintenance Activity Tracking System
MDAC	Microsoft Data Access Components
MDSHA	Maryland State Highway Administration
MMRR	Mitigation Monitoring and Reporting Record
MoDOT	Missouri Department of Transportation
MPL	Mozilla Public License
MPO	Metropolitan Planning Organization
NBI	National Bridge Inventory
NCDOT	North Carolina Department of Transportation
NEPA	National Environmental Protection Act
NOV	Notice of Violation
NPDES	National Pollution Discharge Elimination System
NYSDOT	New York State Department of Transportation
ODBC	Open Database Connectivity
ODOT	Oregon DOT
OLE DB	Object Linking and Embedding for Databases
PDF	Portable Document Format
PEER	Public Entity Environmental Management System Resource
PennDOT	Pennsylvania Department of Transportation
ROD	Record of Decision

SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act
SCOJD	Special Committee on Joint Development
SQL	Structured Query Language
TNC	The Nature Conservancy
TRB	Transportation Research Board
TXDOT	Texas Department of Transportation
URL	Uniform Record Locator
WSDOT	Washington State Department of Transportation
XML	Extensible Markup Language

Acknowledgments

The authors wish to thank the following individuals who provided valuable input and perspectives on designing an environmental information management system during the course of this effort:

The NCHRP Project Managers, Martine Micozzi and Andrew Lemer; all of the members of the NCHRP Project Panel; the FHWA liaison, Constance Hill; the AASHTO liaison, José Aldayuz; and system testers Kathy Harvey and William Carter from the Missouri Department of Transportation.

Summary

The National Cooperative Highway Research Program (NCHRP) 25-23 research initiative was designed to develop and provide important tools to assist transportation and planning agencies in meeting the environmental challenges of today and those to come. This report details the work performed for Phase 2 of the 25-23 initiative. The objective of the project was to design, test, and demonstrate a prototype software program for an environmental information management system (EIMS).

The prototype EIMS developed for this project is a software system that supports environmental management for transportation and planning agencies. This software is designed to support agencies in environmental decision-making throughout the transportation process, from long-range planning through project development, construction, operations, and maintenance. The EIMS is intended to serve as one component of an agency's broader Environmental Management System (EMS).

To develop the EIMS the research team first performed a review of existing practice and systems for environmental management, building upon the research conducted in the first phase of the project. The review found that there is considerable activity in the area of environmental management, including efforts by a number of states in areas such as environmental screening of plans and projects; commitment tracking; document management; and performance evaluation. However, there are relatively few distinct software systems being used to support this work. Typically agencies have undertaken environmental management efforts using general office software, along with Geographic Information Systems (GIS) and document management systems.

The research team reviewed several systems that have been developed to support environmental management in greater detail to inform the design of the EIMS. Section 2 and Appendix A provide additional detail on the findings of the review.

After performing the review, the research team designed and developed the prototype EIMS. The EIMS is an information management system with a web-based user interface, relational database, and map interface. The system supports the following functionality:

Long-Term Planning: Definition of long term plans, and related environmental management data; definition of alternatives associated with long-term plans; management of data related to any environmental analyses performed for a plan alternative and impacts indicated by an analysis; management of public involvement steps and actions for a plan or plan alternative; and association of long-term plans with projects.

Project Development: Definition of projects, and related environmental management data; definition of alternatives associated with projects; management of data related to any environmental analyses performed for a project alternative and impacts indicated by an analysis; management of public involvement steps and actions for a project or project alternative; and association of projects with specific assets.

Asset Definition: Definition of up to three types of assets, such as roads, bridges, and maintenance facilities or other assets; definition of any environmental management data or other data associated with an asset; and association of an asset with map features.

Commitment Tracking: Definition of commitments, and specific actions taken related to a commitment; and association of commitments with a specific plan, project or asset.

Requirements/Best Practices: Definition of specific requirements and/or best practices related to environmental management; grouping of requirements/best practices into sets; and association of plan, project or asset alternatives with a specific requirement/best practice set.

Section 3 details the design of the EIMS, and describes the database design and development environment of the system.

A critical part of the research effort was to test the prototype EIMS. Two agencies, Missouri Department of Transportation (MoDOT) and North Carolina (NCDOT), volunteered to test the system. Section 4 details the selection of the test agencies and test process. In general, the test agencies reported a positive experience with the testing of the EIMS. The test agencies suggested several features and enhancements as a result of the testing process. Following the testing the research team made a series of enhancements to the system based on the testing results.

The report concludes with recommendations for future initiatives. Section 5 describes the additional steps that are recommended to facilitate the transition of the EIMS from a prototype system to a production system that can advance the state-of-the-practice in environmental management in transportation agencies across the U.S. Also, this section recommends an approach for future stewardship of the system. The research team recommends managing the EIMS through the American Association of State Highway and Transportation Officials (AASHTO) Cooperative Software Development Program. Provided sufficient support and resources are available, the recommended stewardship approach offers the most viable model for moving the EIMS into production in multiple transportation agencies consistent with the vision established for the system.

1.0 Introduction

1.1 RESEARCH OBJECTIVES

The National Cooperative Highway Research Program (NCHRP) 25-23 research initiative is designed to develop and provide important tools to assist transportation and planning agencies in meeting the environmental challenges of today and those to come. This report details the work performed for Phase 2 of the 25-23 initiative. The objective of the project was to design, test, and demonstrate a prototype software program for an environmental information management and decision support system (EIM&DSS). As described in NCHRP Report 481, an EIM&DSS is:

"…any system that strives to provide decision makers involved in planning, programming, project development, operations and maintenance for any mode of transportation with the right information and analysis, in the right format, and at the right time to make specific decisions and to continually improve the outcomes of the agency's activities, operations, products, and services when measured in terms of transportation, environmental, social, cultural, and economic factors." (*1*, p. S-1)

The EIM&DSS, also referred to in this report as the Environmental Information Management System (EIMS), is intended to serve as one component of an agency's broader environmental management system (EMS). An EMS incorporates software systems and other elements, such as agency policy, process and practices. The International Standards Organization (ISO) Standard 14001 provides a specification for an EMS, defining the concept as follows:

"the part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy" (*2*, p. 2)

The prototype EIMS developed for this project is a software system that supports environmental management for transportation and planning agencies. This software is designed to support agencies in environmental decision-making throughout the transportation process, from long-range planning through project development, construction, operations, and maintenance. The EIMS is intended to serve as one component of an agency's broader EMS.

1.2 OVERVIEW OF THE RESEARCH APPROACH

The research effort consisted of the following 11 tasks:

- Task 1 – Existing Practice Summary;

- Task 2 – Design Prototype Software;
- Task 3 – Test and Demonstration Plan;
- Task 4 – Interim Report 1;
- Task 5 – Develop Prototype Software;
- Task 6 – Testing and Demonstration Setup;
- Task 7 – Test Prototype Software;
- Task 8 – Interim Report 2;
- Task 9 – Final Changes to Software;
- Task 10 – Transition Plan; and
- Task 11 – Final Report and Software.

Tasks 1 to 3 were performed in 2004, and the results of these tasks were documented in Interim Report 1, prepared as part of Task 4 (*3*). Following Panel review of Interim Report 1, the research team proceeded with development of the EIMS, and identification of agency testers.

The research team developed the EIMS in 2005. The beta version was released in October 2005. Two agencies, MoDOT and NCDOT, tested the beta version. Interim Report 2 (*4*), prepared as part of Task 8, summarizes the results of Task 5 to 7, including the development and testing of the EIMS. Following Panel review of Interim Report 2, the research team made final changes to the software, prepared the transition plan for the EIMS, and wrote this report.

1.3 CONTENTS OF REPORT

This report is the deliverable for Task 11. It documents the results of all tasks of the research effort, and is organized in the following sections:

Section 2 describes the review of existing practice and systems in environmental management (Task 1).

Section 3 provides an overview of the system, including the changes made to the system since completion of Interim Report 2 (Tasks 2, 5 and 9).

Section 4 presents the test process and results. This section describes the test cases, process, and the results from the test agencies (Tasks 3, 6 and 7).

Section 5 presents recommendations for transition of the prototype EIMS into a production system, and includes recommendations for stewardship of the EIMS (Task 10).

Appendix A provides additional information on representative environmental management initiatives at U.S. transportation agencies.

Appendix B provides the user manual for the EIMS.

2.0 Review of Existing Practice and Systems

Prior to developing the EIMS, the research team conducted a review of existing practice and systems for environmental management. The review was performed to supplement materials developed in the initial phase of the project and documented previously (*1*) and inform the design of the EIMS. The research team focused on identifying examples of specific information management applications and software tools that have been developed – or are under development – by state departments of transportation (DOT) to support agency decision making. In particular, the team sought to identify information technology tools that support DOTs in five functional areas:

- Evaluation of Alternatives and Associated Impacts;
- Project Screening, Programming and Development;
- Support for Maintenance Facilities and Activities;
- Commitment Tracking; and
- Public Involvement.

The following sections summarize the results of the review. Section 2.1 provides an overview of state initiatives in environmental management, Section 2.2 summarizes the state of practice for key functions, Section 2.3 details several representative existing environmental management systems, and Section 2.4 describes available resources for environmental management efforts. A more extensive discussion of this review is documented in this study's interim report (*3*). This summary review highlights the initiatives of several agencies that offer examples of practices in this rapidly evolving area.

There is a growing body of literature documenting state DOT initiatives in the broad area of environmental management. For example, the NCHRP Project 25-25(04) report provides a thorough review of the state of practice in highway construction and maintenance (*5*). The recently completed NCHRP Project 25-22(02) report describes eight technologies in use at some DOTs to incorporate environmental considerations in transportation decisions (*6*). The recently completed NCHRP 8-38 report describes practices related to consideration of environmental factors in long-term planning (*7*). A report by the Environmental Law Institute discusses decision support tools for watershed initiatives (*8*). The findings of these studies are important resources that are not duplicated in this review. It should also be noted that other NCHRP efforts are developing decision support systems for specific environmental purposes. These include decision support system for selection of water quality control best management practices (NCHRP 25-25 (01)), selecting wildlife passage measures (NCHRP 25-

27), and selecting environmentally sensitive bank and erosion control (bioengineering) measures (NCHRP 24-19).

2.1 STATE INITIATIVES IN ENVIRONMENTAL MANAGEMENT

Nearly every U.S. transportation agency (and many Metropolitan Planning Organizations) has undertaken some activities to improve environmental management. The variety of initiatives that have been undertaken by state DOTs in recent years is indicative of the growing importance of effective environmental decision-making. This trend has been encouraged by several drivers in recent years: increased attention to environmental factors in the TEA-21 and ISTEA reauthorization bills, advancements in technology that facilitate the use of environmental data and systems-level planning, an increasing appreciation among transportation practitioners of the complex interactions between transportation infrastructure and ecological systems, and growing public awareness about environmental stewardship. Most recently, passage of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) further "raised the bar" for state DOTs and Metropolitan Planning Organizations (MPOs). In particular, Sections 3005, 3006, 6001, and 6002 require DOTs and MPOs to directly address environmental considerations in the long range planning process, consult with resource agencies, and incorporate environmental data and maps in planning. DOTs and MPOs are working to understand these expanded requirements, and develop the decision support tools necessary to facilitate this integration.

Recent efforts include work in the following areas:

- Establishment of environmental policies and commitments;
- Environmental screening at the long-range planning and pre-programming levels;
- Programmatic agreements with partners and resource agencies;
- Environmental review and compliance tracking;
- Commitment tracking;
- Document tracking and management;
- Interagency and public review processes;
- Watershed- and landscape-level planning and mitigation coordination;
- Tracking maintenance and operations environmental management activities; and
- Performance objectives and evaluation.

Different DOTs have naturally focused on different aspects of environmental decision-making, based on the specific environmental issues they face and their respective priorities for problem-solving and organizational development. Examples of representative environmental management efforts at different U.S. agencies have been compiled and published separately (*3*). Additional information on best practices in environmental management with regard to long-term planning is provided in (*7*). Further, a comprehensive guide to best practices in environmental maintenance is presented in (*5*). Appendix A provides a table summary of examples of environmental information management system efforts undertaken by various state DOTs.

The review found that while there is considerable activity in the area of environmental management, relatively few distinct software systems are being used to support this work. Typically agencies have undertaken environmental management efforts using general office software, along with GIS and document management systems. The following section describes several examples of software system developed specifically to help support environmental management objectives.

2.2 STATE OF PRACTICE FOR KEY FUNCTIONS

The following summarizes the state of practice for the five key functions identified for this software development project. These are:

- Evaluation of Alternatives and Associated Impacts;
- Project Screening, Programming and Development;
- Support for Maintenance Facilities and Activities;
- Commitment Tracking; and
- Public Involvement.

Evaluation of Alternatives and Associated Impacts

A number of DOTs are developing or collaborating in the development of environmental databases and information management systems to enable them to compare alternative program plans or project activities based on a selected set of environmental and other criteria. Many of these systems are focused on evaluating alternatives during the long-range planning process, and take advantage of advanced technologies to facilitate this evaluation at a corridor or watershed scale. The availability of remotely sensed data and Global Positioning Systems (GPS) data along with data from the longer-standing aerial photography, and the ability to model relationships among this data, have greatly enhanced analytical and decision support capabilities, and with that, the ability of the environment to be integrated into system planning. The results of NCHRP 8-38's state DOT and MPO survey indicated that the most commonly used tools for considering environmental factors in transportation planning are

data trend analysis, GIS and overlay mapping, socioeconomic/community impact assessment methods, public or expert surveys, focus groups, and environmental impact models, specifically air quality impact models; of these, GIS was the most widely used tool (*7*, p. 80). GIS enables watersheds, airsheds, and ecoregions to be represented and analyzed on an appropriate scale, along with analysis of secondary and cumulative effects.

Resource agencies and municipal or MPO level collaborations have produced some of the most rigorous alternatives analyses, using robust systems. Interagency workshops and expert panels are increasingly used to identify and prioritize conservation connectivity needs, as demonstrated by Colorado DOT's Shortgrass Prairie Initiative and collaborative rapid assessment techniques. Conservation organizations such as The Nature Conservancy (TNC) have been working with federal, state, university and other biologists on approaches which utilize best available data to develop eco-regional conservation plans. Recent federal legislation requires state wildlife agencies to coordinate the development of State Wildlife Action Plans. These efforts provide an excellent starting point for DOTs to use in transportation plans.

Project Screening, Programming and Development

A number of DOTs have implemented systems to support more effective project screening and to manage development of individual projects. Florida DOT's Efficient Transportation Decision Making (ETDM) process (described further in Section 2.3) includes two environmental screening stages, one for the long-range plan and another for development of the Transportation Improvement Program. Arkansas Highway Transportation Department, Florida DOT, Pennsylvania DOT (PennDOT, see Section 2.3), Oregon DOT, and Washington State DOT (WSDOT) have each developed systems to support compliance with the National Environmental Protection Act (NEPA) and the permitting process. At California DOT (Caltrans), the District 6 Project Management Division has undertaken a pilot effort to integrate electronic review and circulation of documents during project management. Illinois DOT's Project Monitoring Application enables standardized review and on-line processing of survey request forms. Minnesota DOT is piloting an effort to electronically provide environmental information integrated with graphics, permits and construction guidance for use by designers and in-field personnel. Texas DOT's Environmental Tracking System is a comprehensive system to track projects throughout project development, as detailed further in Section 2.3.

Several states have worked with resource agencies to develop databases of specific ecological factors, targeted species, or cultural features to support environmental review and decision making. For example, PennDOT is working with Pennsylvania State University to develop a fish database for all species statewide. PennDOT has also developed a Cultural Resources Document Tracking system that allows users to access consolidated data on cultural resources. Indiana DOT and the Indiana Geological Survey have compiled a GIS

application for use during when going through the NEPA process during project development, and as a long-range transportation-planning tool.

Support for Maintenance Facilities and Activities

All agencies collect data on pavements and bridges to support federal reporting requirements. Nearly every agency has a maintenance management system (MMS) for tracking maintenance activities, accomplishments, and budgets. Many of these systems have some form data on roadside assets and maintenance facilities, such as through a features inventory. However, generally DOTs do not have complete surveys of classes of assets for their systems, besides that collected for pavements and bridges, much less for environmental aspects.

The Maintenance Activity Tracking System (MATS) is an example of an inventory-based maintenance management system. MATS was jointly developed by the Maine DOT, New Hampshire DOT and Vermont Agency of Transportation. MATS does not contain detailed data on each roadside asset, but instead contains extents of assets along each highway section. Asset types included in the system include: traffic signs, shoulders, signals, fencing, mile markers, guardrails, ditches, culverts, and mowable areas.

As complete inventories are often cost-prohibitive, DOTs will more often assess the current condition of maintained items in the highway system through periodic inspection surveys, samples, and estimates of environmental deficiencies, supplemented by detailed data on selected assets (e.g., on maintenance facilities, culverts, and other critical assets). NCHRP Project 25-25(04) documents state of practice in highway construction and maintenance (*5*).

Commitment Tracking

As of 2002, 20 state DOTs reported having systems for tracking environmental mitigation commitments (*5*, pp. 2-28 - 2-35). In 11 of the 20 cases, the commitment tracking system involves attaching to plans paper copies of the commitments for the project, often called "green sheets". An alternative approach for tracking compliance on projects with substantial environmental mitigation commitments uses an interdisciplinary accountability team to review and report on the status of commitments and report. A number of DOTs, including Texas and Kentucky, have developed systems for tracking environmental commitments through construction. Commitment tracking systems are under development in Arkansas, Maryland, North Carolina, New York, and Virginia as well. The integration of personal handheld computers in the field, wireless data transfer, and precision GPS location information are facilitating more extensive collection of environmental information in the field. WSDOT has put environmental requirements in an inspection format, for use in monitoring implementation of environmental commitments on construction sites. Caltrans District 11 developed a Mitigation Monitoring and Reporting Record (MMRR) that summarizes environmental commitments (including terms and conditions of permits and other approvals) to be completed as part of the

project. Maryland State Highway Administration (MDSHA) has used a commitment tracking system in Microsoft Access for large and environmentally controversial projects such as the Woodrow Wilson Bridge. In the latter case, the database housed 1200+ Record of Decision (ROD) commitments and permit special conditions. Each contract was accompanied by 1:400 scale maps and plans depicting permitted impacts.

Public Involvement

DOTs and their project consultants have developed sophisticated websites to support public involvement, especially on large projects. These examples are many and varied and continue into public tracking of project environmental commitments in some cases. Caltrans' site for the Bay Bridge and the MDSHA's site for the Woodrow Wilson Bridge are some well-known ones, and incorporate extensive environmental commitment tracking components. Florida DOT's ETDM includes correspondence and comment functions to support agency review, dispute resolution, and public input. The City of Reno, Nevada, in cooperation with the Nevada DOT, developed the ReTRAC Mitigation Monitoring Program Report System (ReTRAC.info), an online, non-proprietary resource. ReTRAC.info provides the public with real-time reports on the city's Transportation Rail Access Corridor Project's compliance with Nevada DOT's environmental commitments, and streamlines note-taking and report-writing.

CommentWorks, developed by ICF Consulting and detailed in Section 2.3, has been one of the more widely promoted tools available to facilitate public participation needs. It can be used as a vehicle to solicit and manage public comments via the web and to allow the public to view comments and other materials.

2.3 PROFILES OF REPRESENTATIVE SYSTEMS

In designing the EIMS the research team examined the following systems in greater detail. Each demonstrates implementation of some portion of the functionality envisioned for the EIMS:

Washington State DOT Environmental Workbench: This system is a custom-built GIS application designed to allow transportation agency staff access to a broad range of statewide environmental and natural resource management data for use in scoping projects and identifying potential environmental issues at an overview level. Over 60 GIS environmental and natural resource management data layers are available as ArcView-readable files for easy downloading, overlay, and manipulation to support project planning and delivery. The tool allows users to locate and buffer proposed projects and view environmental layers, with tools linking the maps to state highway video log images.

Texas DOT Environmental Tracking System (ETS): This system tracks projects during project development, focusing on management of NEPA and

environmental permitting requirements prior to construction. Texas DOT design personnel can use the system to determine if all Environmental Permits, Issues and Commitments are addressed in the project plans (*5*, p. 2-34). The system supports saving project documents with the project record. Email notifications alert reviewers when a document has been sent and when the review is completed. The system estimates total process time for environmental clearance, right-of-way, and Plans, Specs and Engineering considering a number of variables, and estimates the letting date for the project.

Florida DOT ETDM Process: Florida DOT, Federal Highway Administration (FHWA), and partner agencies on a state and federal level redesigned the planning, permitting, and project review process to more efficiently and effectively time and incorporate environmental data, project review, and the technical assistance that resource agencies can provide. The resulting ETDM process links land use, transportation, and environmental resource planning, and facilitates early and interactive involvement to produce better and more consensual environmental outcomes. The ETDM allows input of data and information by multiple agencies, and supports interagency review and approval processes. In supporting environmental screening, the system draws on over 400 data layers and increasing process efficiency and consideration of context in planning. The system includes functionality for planning and environmental screening; screening projects for programming; and managing project development. The system is described further in the literature (*9*).

PennDOT Categorical Exclusion/Environmental Assessment (CE/EA) Expert System: PennDOT developed this system to reduce time required to process CE and EA evaluations. The system walks the user through the process performing a CE or EA evaluation, prompts them for required information, and validates the data entered. In addition, the system provides step-by-step directions for performing the evaluations, sample forms, and electronic CE and EA handbooks. The system addresses scoping, identification and documentation of alternatives, evaluation, and re-evaluation processes to help manage information over the life of the project. The system has been expanded to support an electronic review and approval process, including on-line public review of documents and responses to comments.

ICF Consulting CommentWorks: This is a web-based program developed by ICF Consulting to facilitate public comment processes. The program allows the public to electronically submit comments, review other comments, and categorize comments submitted based on key word or comment type searches. The program also allows agency staff to review and respond to comments. Agency reviewers have password protected access and editing rights. CommentWorks allows staff to tracks the status of comments, post messages for team members, analyze answers to comments, and print or export the comments, analyses, and summary reports produced. Agencies interested in using this proprietary software may arrange to have ICF Consulting host the program and

access it via the Internet, or to install, host and run CommentWorks on the agency's own network (*10*).

2.4 RESOURCES FOR ENVIRONMENTAL MANAGEMENT

The wealth of activity at the state and local level related to environmental management is supported by national-level resources for coordination, sharing of best practices, research, and collaboration. These include the following programs and agencies, each of which is an important resource to this project.

AASHTO Center for Environmental Excellence

The AASHTO Center for Environmental Excellence has become a key resource to state DOTs and other transportation and planning organizations interested in building their capacity for environmental stewardship. The Center has established a demonstration program for best practices in environmental stewardship and management, providing a web-based clearinghouse about agencies' environmental initiatives at three levels: program level, project level, and other initiatives. The Center also serves as a clearinghouse for technical support resources.

Federal Highway Administration and Federal Transit Administration

The FHWA and Federal Transit Administration (FTA) provide support to the highway, transit, and planning communities directly, and by providing resources to organizations conducting research, training, and technical support. The FHWA's Environmental Stewardship and Transportation Infrastructure Project Reviews web site provides technical resources to transportation agencies to enhance environmental stewardship and streamline decision-making processes. The FTA is supporting EMS training for large transit agencies.

Environmental Protection Agency

The U.S Environmental Protection Agency (EPA) has worked closely with the U.S. DOT and state transportation agencies, as well as with other public agencies, to build awareness of and capabilities for environmental management. This includes EPA's support of the Public Entity Environmental Management System Resource (PEER) Center (described further below), as well as promoting collaboration and program initiatives at the regional level.

Public Entity Environmental Management System Resource Center

The PEER Center was established and funded by the EPA Office of Water and the Global Environment and Technology Foundation to assist local, county and state governments in implementing environmental management systems. The

PEER Center provides a clearinghouse of information, EMS materials, and best practices, and technical support. Seven Local Resource Centers have been established as part of the PEER Center effort.

In addition to the programs and agencies described above, there exists a wide variety of commercial and public data sources are available for supporting environmental management. Significant sources for regulatory data, geospatial data, and other data are documented separately (3).

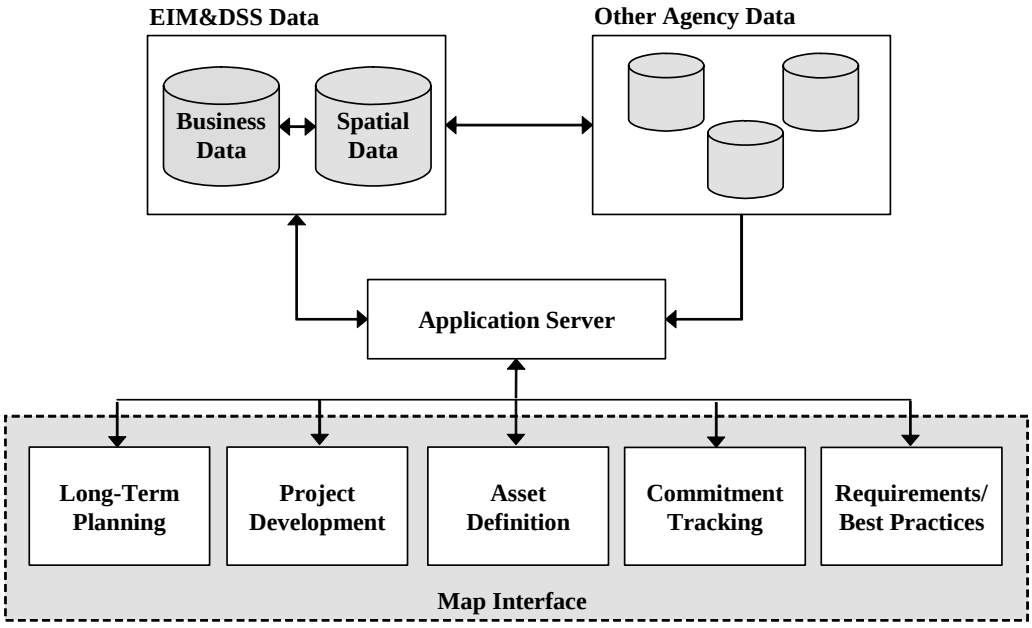
3.0 System Description

The section describes the design of the prototype EIMS. Section 3.1 provides an overview of the design. Section 3.2 details the database design. Section 3.3 discusses the development environment, and Section 3.4 describes the steps in deploying the system.

3.1 DESIGN OVERVIEW

The EIMS is an information management system with a web-based user interface, relational database, and map interface. Figure 3-1 provides an overview of the main components of the system, including the relational database, additional spatial data, application server, user interface and map interface.

Figure 3-1 EIMS Components



The system supports the following functionality:

Long-Term Planning: Definition of long term plans, and related environmental management data; definition of alternatives associated with long-term plans; management of data related to any environmental analyses performed for a plan alternative and impacts indicated by an analysis; management of public involvement steps and actions for a plan or plan alternative; and association of long-term plans with projects.

Project Development: Definition of projects, and related environmental management data; definition of alternatives associated with projects; management of data related to any environmental analyses performed for a project alternative and impacts indicated by an analysis; management of public involvement steps and actions for a project or project alternative; and association of projects with specific assets.

Asset Definition: Definition of up to three types of assets, such as roads, bridges, and maintenance facilities or other assets; definition of any environmental management data or other data associated with an asset; and association of an asset with map features. Note that the limit of three asset types was set during system design to limit the development effort, but is not inherent to the design and could be increased with additional development effort.

Commitment Tracking: Definition of commitments, and specific actions taken related to a commitment; and association of commitments with a specific plan, project or asset.

Requirements/Best Practices: Definition of specific requirements and/or best practices related to environmental management; grouping of requirements/best practices into sets; and association of plan, project or asset alternatives with a specific requirement/best practice set.

In the system one can define document links for all of the items listed above. For example, one can create links to photos of an asset or project site, or link to Portable Document Format (PDF) versions of planning documents or detailed environmental analyses.

Data are shown in the system using list and detail views. In the list views, one can view data on long-term plans, projects, and assets, as well as other environmental features, and select objects for editing using the map. Figure 3-2 illustrates a typical EIMS list view.

Once the user has made a selection from the list view, he or she can see detailed data on the selected item on a detail view. In the detail view the user can edit, save and validate detailed data. Figure 3-3 illustrates a typical detail view. The contents of the detail views (e.g., the fields shown and their organization on the screen) may be configured by a system administrator. From the detail view one can navigate to other list and detail views with related data. For example, when viewing the detail on a project one can navigate to lists of assets, alternatives, commitments and documents associated with the project.

Figure 3-2 Sample EIMS List View

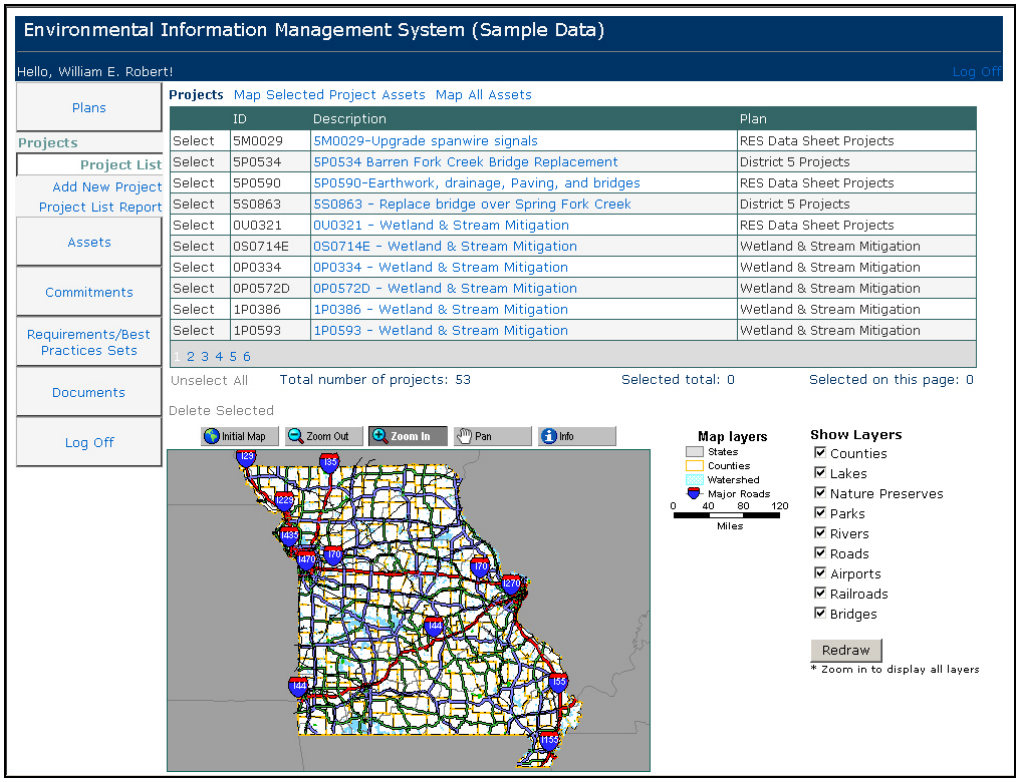


Figure 3-3 Sample EIMS Detail View

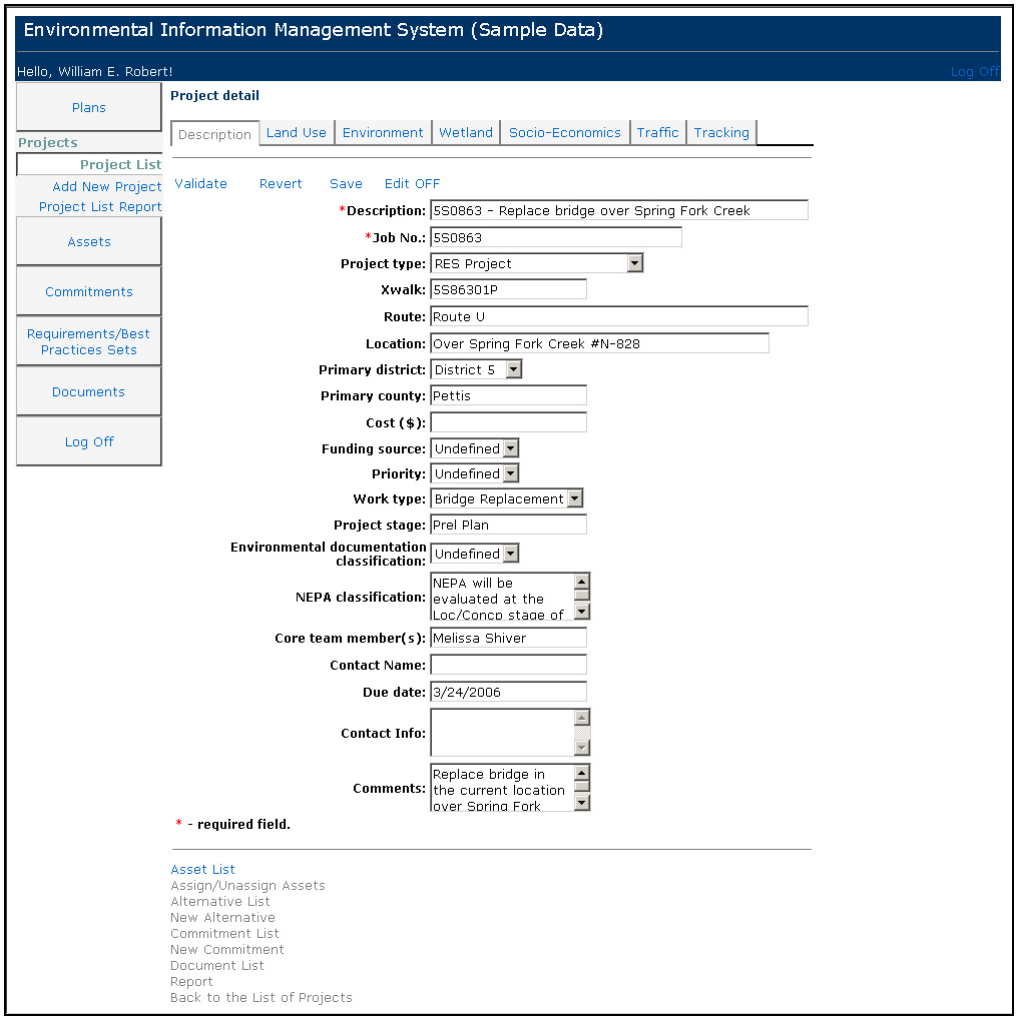
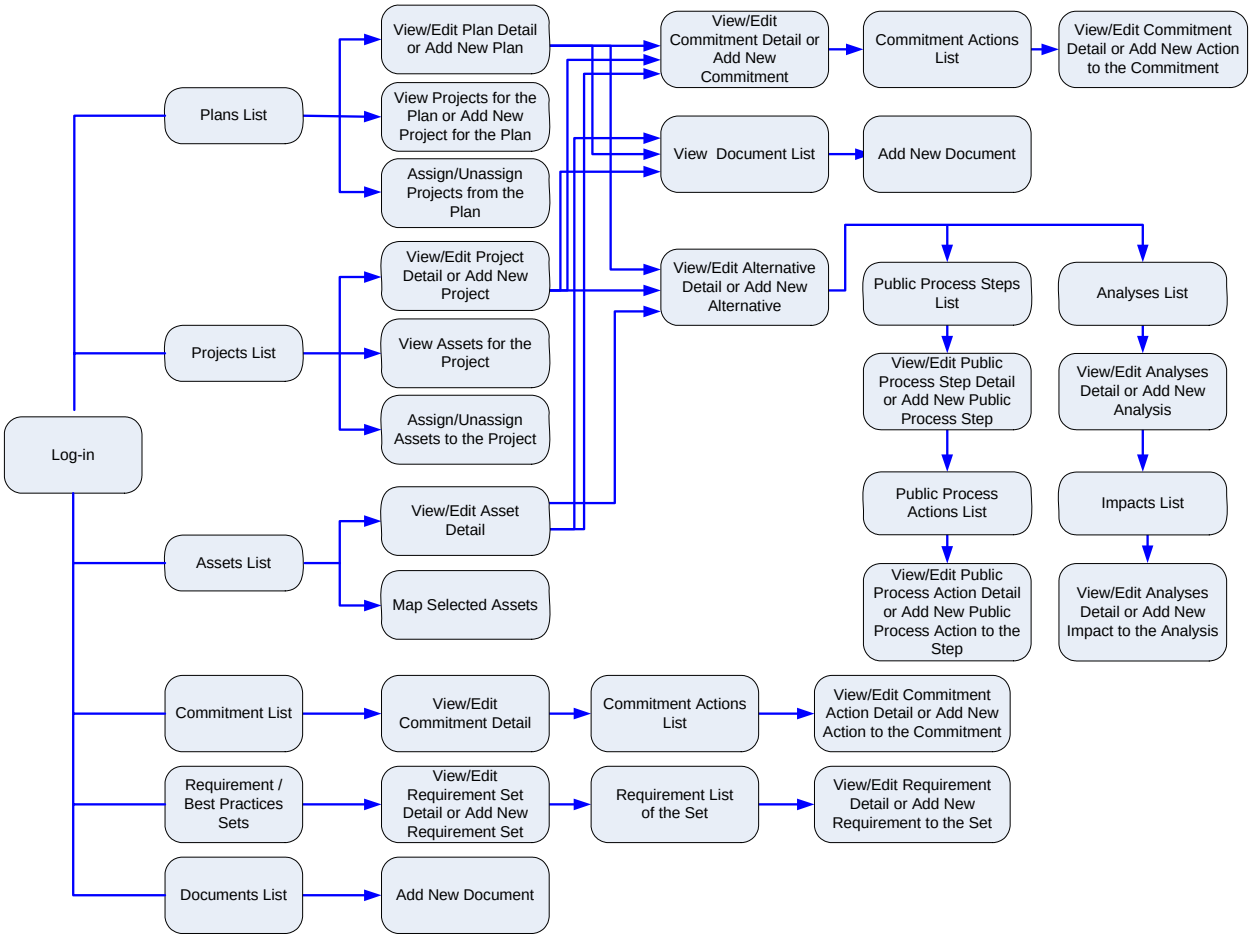


Figure 3-4 details the organization of the user interface. The figure shows a box for each screen in the application, with paths for navigating through the system indicated with arrows. Note that certain navigation paths are omitted from the figure for simplicity.

Figure 3-4 User Interface Organization



3.2 DATABASE DESIGN

This section describes the conceptual data model of the EIMS database. The database contains tables for each of the important entities in the system, including plans, projects, assets (such as maintenance facilities or other physical assets), and alternatives. The conceptual data model shows what these entities are and describes how they are related. For instance, it shows that every alternative may relate to one plan, project or asset, that one plan may contain a number of projects, that one commitment may map to a number of commitment actions, and so forth.

An important aspect of the database is that it is designed to provide maximum flexibility in defining the attributes of each entity. That is, for a given installation, one will be able to define exactly what attributes each entity has, and

these attributes can be defined differently from one agency to another. The attributes associated with each entity type are stored in the table entity_attribute_descriptors, and the data for each attribute are stored in the table entity_attribute_values.

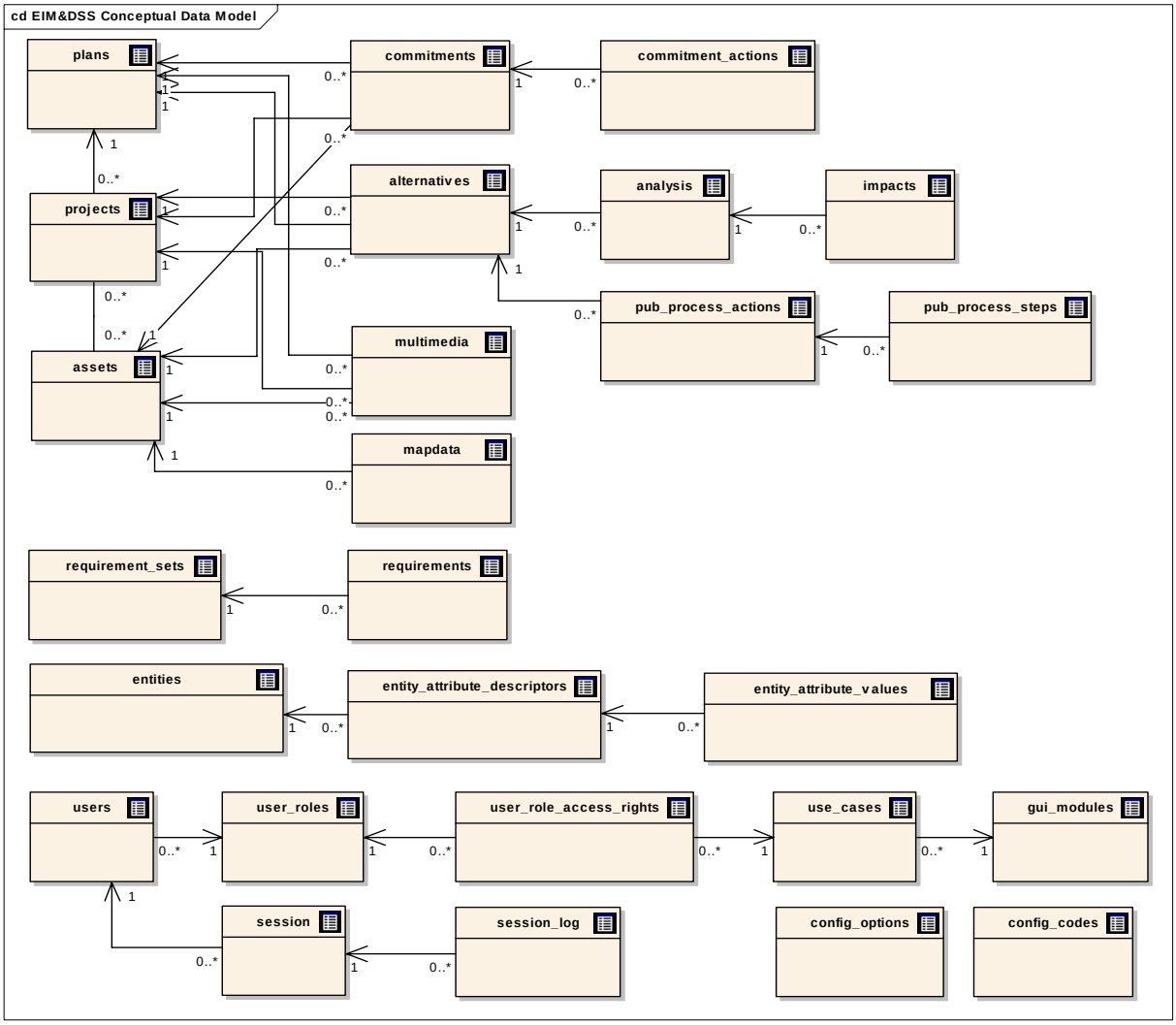
Table 3-1 below describes the tables in the EIMS database. Figure 3-5 is a conceptual data model of the EIMS database. Note that the table and figure are intended primarily for database designers interested in the details of the EIMS database and do not detail how the system would fit within the existing set of systems in place at an agency.

Table 3-1 EIMS Database Tables

Table Name	Description
Data Tables	
assets	Contains one record for each asset. Assets are flexibly defined, and can include roads, bridges, facilities, and/or other physical assets.
projects	Contains one record for each project. All projects must be associated with a plan, and can be associated with one or more assets.
plans	Contains one record for each plan. Each plan can be associated with one or more projects.
alternatives	Contains one record for each alternative. Users can define one or more alternatives for each asset, project, or plan. For instance, users can define an alternative maintenance strategy for an asset, an alternative project, or an alternative long-term plan.
commitments	Contains one record for each commitment associated with a plan, project, or asset. For instance, a project might include commitments to local residents to restore wetlands.
commitment_actions	Contains one record for each action associated with a commitment. Each commitment can be associated with zero or more actions.
requirement_sets	Contains one record for each requirement or best practice set. The sets could include environmental, economic, and/or safety requirements or best practices. Each alternative can be associated with one set, while a set can be associated with one or more alternatives.
requirements	Contains one record for each requirement or best practice in a set. Each requirement/best practice must be associated with a set.
analyses	Contains one record for each analysis associated with an alternative. Each analysis must be associated with an alternative, while each alternative can include zero or more analyses. For instance, a project alternative may be associated with air quality, wetlands, noise and/or other analyses.
impacts	Contains one record for each impact associated with an analysis. Each impact must be associated with an analysis, while an analysis may include zero or more impacts.
pub_process_steps	Contains one record for each public process steps associated with an

	alternative. Public process steps include conducting public meetings, responding to public queries and/or public process elements. Each step must be associated with an alternative, while an alternative may be associated zero or more public process step.
pub_process_actions	Contains one record for each action related to a public process step. Each action must be associated with a public process action, while a public process step may include zero or more actions.
mapdata	Contains one record for each geographic data record associated with an asset.
multimedia	Contains one record for each multimedia document associated with any of the records in the other entities in the database. The document can be represented as a file location or a URL.
entities	Contains one record for each entity represented in the conceptual data model, including assets, projects, plans, alternatives, commitments, commitment_actions, requirement_sets, requirements, analyses, impacts, pub_process_actions, and pub_process_steps.
entity_attribute_descriptors	Contains one record for each attribute of each entity in the entities table. System administrators can flexibly define the attributes for each entity.
entity_attribute_values	Contains one record for each instance of each attribute for all entities for which attributes have been defined by the system administrator.
System Tables	
config_options	Contains one record for each configurable option in the EIMS.
config_codes	Contains one record for each code value defined for fields that can only take on a predefined set of values.
users	Contains one record for each user defined in the EIMS. Each user must be assigned to a user role.
user_roles	Contains one record for each user role defined in the EIMS database.
user_role_access_rights	Contains one record for each access right assigned to a user role. Each user role access right must be assigned to a use case.
use_cases	Contains one record for each use case defined for the EIMS. Each use case must be assigned to a GUI module.
gui_modules	Contains one record for each GUI module.
session	Contains one record for each session initiated by a user.
session_log	Contains one record for each event logged for each session.

Figure 3-5 EIMS Conceptual Data Model



3.3 DEVELOPMENT ENVIRONMENT

The EIMS is a thin-client application developed using the latest generation of Microsoft technology, including C# and ASP.NET. The EIMS was developed in Microsoft Visual Studio and relies upon the Microsoft .NET Framework.

The EIMS is intended to be deployed as a web-based application running on Windows Server 2003 with the Microsoft Internet Information Services (IIS) web server. In this environment, the system is accessible from any Windows machine using Microsoft Internet Explorer.

The prototype EIMS incorporates a Commercial-of-the-Shelf (COTS) map server sufficient for demonstrating and evaluating the functionality of the product. For the prototype version, the TransCAD map server was used. The map server uses

the spatial data exported from an agency's GIS into the format that is most efficient for the COTS map server. In the production version of the system it is anticipated that agencies integrating their spatial data with the EIMS will need to have a map server with a web map service and web feature service compliant with Open GIS Consortium specifications.

The system supports Business Objects' Crystal Reports for reporting. Aladdin Enterprises' Ghostscript is used to generate PDF reports. PDF reports are displayed using Adobe Acrobat Reader.

The EIMS database, including business logic, is developed in Structured Query Language (SQL) using Microsoft SQL Server. Database connectivity is provided through Microsoft Data Access Components (MDAC), including Object Linking and Embedding for Databases (OLE DB) and Open Database Connectivity (ODBC, used by the report engines).

3.4 STEPS IN DEPLOYING THE EIMS

The EIMS installation CD is available upon request from NCHRP. Although the software is available free of charge, the EIMS requires the following commercially-available software, which an agency installing the system must purchase and install separately:

- Windows Server 2003;
- Microsoft SQL Server;
- Microsoft Internet Explorer;
- Adobe Acrobat Reader;
- TransCAD Maptitude; and
- Crystal Reports Developer XI.

The basic steps in installing and configuring the system are as follows:

- Install the prerequisite software packages listed above;
- Install the EIMS. The system will be installed with a sample database;
- Configure the EIMS database. Typically an agency will want to establish their own set of attributes for plans, projects, assets and other items stored in the database;
- Import agency data into the EIMS database;
- Import geospatial data files into TransCAD and configure TransCAD to customize the map views in the EIMS;
- Customize the reports using Crystal Reports. Sample reports are provided for use with the sample database. An agency may customize these or develop new reports for use with the system; and

- Configure system and database security.

Additional details on the installation process are included on the EIMS installation CD.

4.0 Testing Process

This section summarizes the testing performed for the EIMS, and the results of the testing. Section 4.1 provides an overview of the testing process. Section 4.2 details the selection of test agencies. Sections 4.3 and 4.4 describe the testing performed by MoDOT and NCDOT, respectively. Section 4.5 summarizes the agency testing results.

4.1 TESTING OVERVIEW

Prior to developing the EIMS the research team developed a test plan and a set of test cases. The EIMS test cases are listed in Table 4-1. For each test case the table includes a description, the testing procedure and expected results. The test cases were developed to provide comprehensive coverage of all functionality planned for the system. In using the EIMS, one would typically perform a number of the operations described in the table.

Table 4-1 EIMS Test Cases

Case	Description	Procedure	Expected Result
1	Login	• Launch the EIMS • Enter user name • Enter password	The EIMS should open, showing the navigation bar and welcome screen.
2	View, edit and define plans	• Navigate to plans • Select a plan from the list • View detailed data on a plan • Revert to the list of plans • Define a new plan • Edit detailed data	A list of plans should be shown. Selecting a specific plan should show detailed data for the plan. Defining a new plan should show the detail form. After it has been added, the new plan should be added to the list.
3	Create a plan alternative	• Navigate to plans • Select a plan from the list • Create a new alternative • Edit detailed data • View list of plan alternatives	A list of plans should be shown. Selecting a specific plan should show detailed data for the plan. Defining a new alternative should show the detail form. After the alternative is created it should be added to the list.
4	View, edit and define projects	• Navigate to projects • Select a project from the list • View detailed data on a project • Revert to the list of projects • Define a new project	A list of projects should be shown. Selecting a specific project should show detailed data for the project. Defining a new project should show the detail form. After it has been added, the new project should be added to the list.

		• Edit detailed data	
5	View projects using a map	• Navigate to projects • Select projects from the list • Map the projects • Select projects on the map • Update the list from the map	Mapping projects from the list should show the selected projects on the map. Updating the list from the map should refresh the list indicating those projects selected on the map.
6	Link projects to plans	• Navigate to projects • Select a project from the list • View detailed data on the project • Assign the project to a plan	A list of projects should be shown. Selecting a specific project should show detailed data for the project. A field should be shown for defining the plan to which the project is assigned.
7	Link projects to assets	• Navigate to projects • Select a project from the list • Choose to link the project to assets • Select assets • Link to the project • Navigate to projects • Select the project • Map the project	A list of projects should be shown. Selecting a specific project should show detailed data for the project. When linking a project to assets, the asset list should be shown, and it should be possible to select the assets linked to the project. Once the link has been made, showing the project on the map should highlight the assets to which the project is linked.
8	Create a project alternative	• Navigate to projects • Select a project from the list • Create a new alternative • Edit detailed data • View list of project alternatives	A list of projects should be shown. Selecting a specific project should show detailed data for the project. Defining a new alternative should show the detail form. After the alternative is created it should be added to the list.
9	View, edit and define assets	• Navigate to maintenance (assets) • Select an asset from the list • View detailed data on an asset • Edit detailed data	A list of assets should be shown. Selecting a specific asset should show detailed data for the asset.
10	View assets using a map	• Navigate to assets • Select assets from the list • Map the assets • Select assets on the map • Update the list from the map	Mapping assets from the list should show the selected assets on the map. Updating the list from the map should refresh the list indicating those assets selected on the map.
11	Create a maintenance alternative	• Navigate to maintenance (assets) • Select an asset from the list • Create a new alternative • Edit detailed data • View list of maintenance	A list of assets should be shown. Selecting a specific asset should show detailed data for the asset. Defining a new alternative should show the detail form. After the alternative is created it should be added to the list.

		alternatives	
12	View and edit alternatives	• Navigate to alternatives • Select a plan, project or maintenance alternative from the list • Edit detailed data	A list of alternatives should be shown. Selecting a specific alternative should show detailed data for the alternative.
13	View, edit and define requirements/best practices for an alternative	• Navigate to requirements/best practices • Select a requirement set • View requirements for the set • Define a new requirement • Navigate to alternatives • Select an alternative • Select the requirement set edited previously for the alternative • View the requirements for the alternative	A list of requirement and best practice sets should be shown. Selecting a set should show the requirements/practices for the set. Defining a new requirement should show a requirements detail form. When the requirements are shown for an alternative, the list of requirements from the set view previously should be shown.
14	View, edit and define analyses and impacts for an alternative	• Navigate to alternatives • Select an alternative • Choose to see analyses for the alternative • Define a new analysis • Choose to see impacts for the analysis • Define a new impact	A list of alternatives should be shown. Selecting a specific alternative should show detailed data for the alternative. Choosing to see analyses should show the analyses for the alternative. Defining a new analysis should show a detail form. Choosing to see impacts for the analysis should show a list of impacts, if any have been defined. Defining a new impact should show a detail form.
15	View, edit and define commitments and commitment actions for an alternative	• Navigate to alternatives • Select an alternative • Choose to see commitments for the alternative • Define a new commitment • Choose to see actions for the commitment • Define a new action	A list of alternatives should be shown. Selecting a specific alternative should show detailed data for the alternative. Choosing to see commitments should show the commitments for the alternative. Defining a new commitment should show a detail form. Choosing to see actions for the commitment should show a list of actions, if any have been defined. Defining a new action should show a detail form.
16	View, edit and define public process steps and actions for an alternative	• Navigate to alternatives • Select an alternative • Choose to see public process steps for the alternative • Define a new step • Choose to see actions for the step	A list of alternatives should be shown. Selecting a specific alternative should show detailed data for the alternative. Choosing to see public process steps should show the steps for the alternative. Defining a new step should show a detail form. Choosing to see actions for the step should show a list of

		• Define a new action	actions, if any have been defined. Defining a new action should show a detail form.
17	Link assets to map features	• Navigate to maintenance (assets) • Select an asset from the list • View detailed data on an asset • Select the map feature to which the asset is mapped • Navigate back to the asset list • Map the asset	A list of assets should be shown. Selecting a specific asset should show detailed data for the asset, and should allow for editing the map feature with which the asset is associated. After a map feature has been assigned, mapping the asset should show the associated map feature.
18	View, edit and define multimedia document links	• Navigate to alternatives • Select an alternative • Choose to see links for the alternative • Choose to create a link for the alternative • Navigate to a document on a mappable network drive and select • Click on the link	A list of alternatives should be shown. Selecting a specific alternative should show detailed data for the alternative. Choosing to see links should show multimedia document links for the alternative. Choosing to create a new link should show a window for browsing to the link. Clicking the link should launch the linked document.

As the development process proceeded the research team performed unit, component, integration and regression testing in accordance with the test plan. The research team performed comprehensive testing on the alpha version of the system. Issues found with the alpha version were logged in the team's online issue tracking system and reported to the Panel. Fixes to issues identified in the alpha release were addressed in the beta version.

Concurrently with developing the system, the research team identified agencies interested in testing the beta version of the EIMS, as detailed in Section 4.2. Test data were prepared as described in Section 4.3 and 4.4. Beta test results are detailed in Section 4.5. Following the beta testing a final set of fixes and enhancements was made under the Panel direction based on the testing results.

4.2 SELECTION OF TEST AGENCIES

Candidate testers for the EIMS were identified by the Panel, and through publicizing the project, such as through a web meeting at the beginning of the project hosted by the North Carolina State University Center for Transportation and Environment and announcements at selected Transportation Research Board (TRB) committee meetings at the TRB Annual Meeting in January 2005. The research team provided each agency that indicated an interest in the system with an overview presentation, and coordinated with the Panel to determine the final set of test agencies. Prior to committing to participate in testing, agencies were asked to verify the following requirements:

- The agency needed to have data available to use for testing, or be willing to generate test data. Data needed for the system included plan, project and/or maintenance facility data, alternatives to be considered for the plans, projects or facilities, and additional details. If the map interface was to be used, the agency needed to export a specified set of files with geospatial data, including at least one layer with asset data.
- The agency needed to be willing to provide its test data to the research team for testing. The research team loaded the data into a EIMS database stored on the contractor's server accessible to the research team and the agencies performing testing.
- The agency needed to have staff willing to meet with the research team to prepare for testing, and to participate in the test process. The research team estimated that approximately 120 hours of staff time was required by each agency to prepare for and participate in the testing.
- The staff at the agency needed to be willing to execute the tests described in the test plan related to at least one of the primary areas of functionality the system will support: long-range transportation planning, project development and/or maintenance. Further, the testers needed to be willing to document the results of their testing.

A total of six agencies indicated an interest in testing the EIMS. Ultimately, two agencies, MoDOT and NCDOT, made written commitments to test the system. Both of these agencies provided test data and fully participated in testing the system.

4.3 MoDOT Testing

The research team met with MoDOT staff at MoDOT's offices in Jefferson City on June 15, 2005 to review the alpha version of the EIMS, discuss MoDOT's current environmental management system, and to review their data requirements for the beta version of the EIMS. The highlights of this discussion included:

- Commitment Tracking: MoDOT expressed an interest in using the EIMS to track project commitments from the early stages of project development through construction and maintenance and to make this information accessible to multiple departments within MoDOT. Specific requirements included:
  - Tracking of standard commitments made on all projects (such as the commitment to the Department of Natural Resources to replace trees) need to become part of the best management practices, as well as a commitment tracking database.
  - Identification of project constraints (such as burial ground locations or utilities) also need to be identified and tracked through this database, and associated with the overall project as well as a particular alternative.

  - Tracking of Notices of Violation (NOV) issued by other state agencies to identify the number issued as well as the status, location, and issue associated with each NOV.

- Sources of Data: Several specialized databases exist or were in development within MoDOT, such as tracking of wetlands mitigation, right-of-way assets, GIS, environmental data, and cultural data. Additional potential sources of data for the EIMS included MoDOT systems, such as the Statewide Transportation Improvement Program and Project Status.
- Document Management/Links – MoDOT expressed an interest in using the EIMS to link relevant documents to projects and other entities defined in the system. Ultimately MoDOT intends to implement a formal document management system, and presumably would explore linking its document management system to its environmental management data.

Data Preparation

MoDOT provided the research team with the following test data on projects, plans commitments, and GIS mapping. In addition, the research team obtained data on bridges and highways for input to the prototype system. The test data listed below were incorporated into the EIMS database for the agency:

- Resource database for District 5 projects provided through a set of 74 Microsoft Excel files;
- Data on wetland and stream mitigation sites (coded as projects and "other assets" in the EIMS database, but not included in the map views) provided in a Microsoft Excel file and a Microsoft Access database;
- Wetland monitoring reports provided in a variety of data formats;
- Commitment data for selected District 5 projects provided as Microsoft Word files;
- Highway inventory data through a Microsoft Access database with the state's Highway Performance Monitoring System (HPMS) data;
- Bridge inventory data through the state's National Bridge Inventory (NBI) file;
- Geospatial data provided either as shape files, or downloaded as shape files by the research team from the MISDIS site;
- NOV database provided as a Microsoft Access database;
- 404 Permits database provided as a Microsoft Access database;
- Database on federal aid projects provided as a Microsoft Access database; and
- Sample data on "Red Light" projects provided as a PDF file.

4.4 NCDOT TESTING

The research team coordinated with NCDOT to obtain test data on projects, assets, plans and GIS mapping for input to the beta version of the EIMS. Discussions with NCDOT transportation and environmental planners identified two major initiatives within NCDOT which EIMS could support:

- NCDOT is implementing an environmental streamlining process to integrate long range planning and project development. Several databases and processes will need to be merged, which ideally would include documents, spatial data, non-spatial data, web access, business processes, financial and project management data, and resource and commitment data.
- NCDOT is in the process of developing online procedures manual.

Data Preparation

NCDOT provided the following data that were included in the EIMS database for the agency:

- Highway inventory data through the state's HPMS file;
- Bridge inventory data through the state's NBI file; and
- Extensive set of geospatial data files provided in TransCAD and/or through shape files.

4.5 TESTING RESULTS

The test cases described previously were used for comprehensive testing of all major system functionality. Prior to testing, the research team coordinated with the test participants at the agencies to review the test cases, test procedures and subsequent documentation of the test results. Testing was performed between November and December 2005. The research team communicated with each test agency during the beta test period to discuss progress on testing and any issues that arose during the test process. Table 4-2 summarizes the results of the testing for each agency.

The research team interviewed the test participants following the testing at a meeting at NCDOT's offices in Raleigh on December 14, 2005 and in a web conference call with MoDOT on December 15, 2005. These discussions focused on soliciting reactions to the prototype system, reviewing the test results, identifying difficulties with the test cases, and exploring suggestions for future development of the EIMS.

Table 4-2 Summary of Test Results

Case	Description	NCDOT Test Results	MoDOT Test Results
1	Login	This procedure works as described.	This task works as described although it opens to the Plans page.
2	View, edit and define plans	This procedure works as described.	This task works as described.
3	Create a plan alternative	This procedure works as described.	This task works as described.
4	View, edit and define projects	This procedure works as described. It would be beneficial to have a date for the traffic counts and number of accidents. Under the tracking tab, it would be beneficial to have the date of the latest CTP/ Thoroughfare plan for the area in which the project is located.	This task works as described.
5	View projects using a map	Was unsuccessful showing projects from the list on the map. The selection of a project does not show up as a selected feature in the map.	Was unsuccessful showing projects from the list on the map.
6	Link projects to plans	Confused about missing data in required fields, such as bridge inspection completed in 1901. Add units to indicate feet or meters.	Could not find where the project links to a plan in the detailed data.
7	Link projects to assets	When Info button was selected for area of map where no information existed, error message resulted.	Was able to link an asset to a project but could not determine if it was highlighted on the map.
8	Create a project alternative		This task works as described.
9	View, edit and define assets	Expand types of assets	This task will work as described if maintenance assets are added. (No data on maintenance assets were provided).
10	View assets using a map		This task works as described.
11	Create a maintenance alternative		This task works as described.
12	View and edit alternatives		This task works as described.
13	View, edit and define requirements/best practices for an alternative		First four procedures went well. When navigated to alternatives, could not find new requirement previously edited.
14	View, edit and define analyses and impacts for an alternative		This task works as described.

15	View, edit and define commitments and commitment actions for an alternative		This task works as described.
16	View, edit and define public process steps and actions for an alternative		This task works as described.
17	Link assets to map features		This task works as described.
18	View, edit and define multimedia document links		This task works as described.

One or both of the test agencies reported having difficulty with the following test cases:

- Test Case 5 – View projects using a map;
- Test Case 6 – Link projects to plans;
- Test Case 7 – Link projects to assets; and
- Test Case 13 – View, edit and define requirements/best practices for an alternative.

These test cases were demonstrated and discussed in the follow-up interviews with the agencies and the outcome of each is summarized below:

Test Case 5 - View projects using a map: The prototype system was designed to incorporate basic mapping functionality to support selection, display of data, and basic spatial analyses. It was assumed that agencies implementing the EIMS would continue to use their GIS for more specialized applications. The test agencies reported that the mapping function was difficult to use and links to projects or plans did not appear to work. When the research team reviewed these results with the test agencies, the mapping function was demonstrated to work properly; however, it required zooming in and out to view the project elements, which was not apparent to the test agencies. Further improvements were made to the mapping functionality in finalizing the system.

Test Case 6 - Link projects to plans: Missing data for required data fields caused automatic entry of misleading or incorrect information (e.g., missing dates were populated as "January 1, 1901"). The Panel directed the research team to review the test database provided with the system to eliminate fields for which test data were not available.

Test Case 7 - Link projects to assets: Test participants reported that while they could link an asset to a project, they could not determine if it was highlighted on the map. When the "Info" button was selected, an error message was received. Further improvements to this functionality were made in finalizing the system.

Test Case 13 - View, edit and define requirements, best practices for an alternative: Test participants were successful in navigating to requirements/best practices, selecting requirements, viewing requirements and defining new requirements. However, testers were unable to associate requirement sets and alternatives as described in the test case. Further investigation revealed that the software was working as intended, but that this particular test case was poorly defined.

Summary Evaluation

In general, the test agencies reported a positive experience with the testing of the EIMS. Specific comments received from the test agencies on the overall system performance and applicability of the system to their business practices included:

- Flexible and easy to use;
- Extensive applications;
- Environmental specialists could input and retrieve data quickly;
- Little training is needed;
- The system could be managed by each district; and
- A single integrated system would enhance environmental management.

The test agencies suggested several features and enhancements as a result of the testing process. Based on the test results and under the direction of the Panel, the research team made the following enhancements to the system following the beta testing:

- Added an additional introduction screen to facilitate system navigation;
- Added online help;
- Improved the mapping functionality to steamline coordination with the list views and remove errors generated when clicking the "Info" tool;
- Integrated the EIMS with Crystal Reports to allow for generating reports based on items selected in the system, and developed sample list and detail reports; and
- Improved the sample database.

Additional enhancements that should be considered for a future, production EIMS are discussed in Section 5.

5.0 Recommended Future Initiatives

The prototype EIMS is a workable system that provides much of the functionality needed to support environmental management for a transportation agency. However, it is a prototype system, and the product of a broad-based research effort. This section describes the additional steps that are recommended to facilitate the transition of the EIMS from a prototype system to a production system that can advance the state-of-the-practice in environmental management in transportation agencies across the U.S. Section 5.1 discusses a set of enhancements that would improve the system and make it an even more valuable tool for environmental management. Section 5.2 recommends an approach for future stewardship of the system, needed for ensuring that a mechanism is in place for providing leadership and support for future enhancements, as well as ongoing support.

5.1 RECOMMENDED EIMS ENHANCEMENTS

The testing described in Section 4 helped identify the strengths and weaknesses of the EIMS, identify software bugs that were fixed in the final version of the system, and demonstrate the need for further enhancement of the system. The following enhancements, if incorporated into the EIMS, would significantly improve the functionality of the system and improve its ability to support environmental management:

- **Establish user roles and permissions.** The security model in the prototype EIMS is quite simple. Users can be given permission to view data in the system, or view and update data. The production version of the system should be enhanced to support increased security based on definition of user roles. Each role definition would contain a set of permissions that specify what data could be viewed and edited, and whether users with the role should receive notifications of data updates. A user would then be granted a particular role. For instance, users outside an agency may be granted permission to see selected data items on a project, and granted permission only to add new comments. The security could be further enhanced through creating user groups that further specify geographic or administrative groupings for the data a user can see (e.g., the data for a particular district or county).
- **Improve the map interface.** The map interface in the prototype system allows the user to display a selected set of assets, projects or plans on the map, and to select assets using the map. Also the map shows additional layers of environmental features that may be useful when viewing and

editing data in the system. This functionality, though extensive, leaves room for further enhancement. Agencies testing the system felt it would be valuable to add support for additional COTS map viewers besides the TransCAD viewer used for the prototype (ESRI and Intergraph also offer map viewers that could be integrated with the system). Using the TransCAD map viewer or another viewer, one could provide additional support for viewing data on the map, such as by showing popup windows with information on selected environmental features, and supporting color coding roads and bridges by functional class. Further, it would be extremely useful to allow the user to perform map-based queries, such as showing all of the environmental features within a specified project extent.

- **Tailor the user interface to support common tasks.** The user interface developed for the EIMS is extremely flexible and ideal for somebody who wants to see all of the data stored in the system. However, most users have a specific set of tasks to perform and would prefer to have a user interface tailored based on consideration of what data they need and the work flow they follow. Further development on the EIMS should be performed considering end users' data needs and work flows, and the user interface should be tailored accordingly. This approach would facilitate use of the system for support processes such as project screening and comment tracking.
- **Add tools for customizing list views.** By default the EIMS shows lists of all of the data of a given type (e.g., all of the projects, all of the documents, etc.). The system should be enhanced to include filters for allowing the user to narrow the set of items on a list view, and to customize what data items are shown in the list views.
- **Add email notification.** An administrator should be able to configure the system to define specific types of events (e.g., generation of new comments or updates to particular data items) as triggers for system-generated emails. This functionality could be used to allow users to monitor changes to data over time and/or provide reminders to update data in a timely fashion. Furthers, users should be able to edit their email preferences to avoid unwanted emails.
- **Develop data import/export functionality.** In the prototype system, data must be imported and exported through the Microsoft SQL Server database environment, as there are no data import/export tools built into the user interface. The system should be enhanced to import and export common data formats, including Extensible Markup Language (XML) files coded using the evolving AASHTO TransXML schema, HPMS data, NBI data, and other common formats.
- **Add support for additional asset types.** The EIMS supports three asset types: roads, bridges and facilities/other assets. Transportation agencies operate and maintain a range of additional assets, including many different

types of facilities, rights-of-way, culverts, signs, retaining walls, catch basins, guard rails, median barriers, barrier walls, lighting, signal systems, and so forth. Ideally, the EIMS would support definition of additional agency-defined assets to better support integration with other agency data sources, and facilitate management of a broader range of assets.

- **Add functionality for comparing environmental performance with goals and/or commitments.** This would support comparing how well an agency has performed in areas such as water quality monitoring, fish survival, noise measurements, plant establishment success, and so forth relative to agency goals and commitments.
- **Develop additional technical documentation.** This report provides an overview of the system, as well as a user manual for operating the system once installed. Agencies implementing the EIMS would benefit from having additional technical documentation detailing items such as how to customize the EIMS database, and how to integrate the system with other agency databases.

5.2 RECOMMENDED STEWARDSHIP APPROACH

One of the objectives of NCHRP Project 25-23(2) was to recommend an approach for stewardship of the EIMS following initial development of the prototype system. This section recommends the set of functions that should be provided by the organization that stewards the EIMS, discusses the options considered for stewardship of the system, and recommends a stewardship approach.

Stewardship Functions

The organization that stewards future development of the EIMS should provide the following functions, at a minimum:

Provide maintenance and support for the EIMS. The EIMS developed through NCHRP 25-23(2) is a working prototype system. The research team expects that agencies can use materials provided through this project to implement the EIMS to support environmental management in their agencies. However, any piece of software must be maintained and supported if it is to be used over time, and the EIMS is no exception. Further, because the EIMS is a highly configurable web-based system, the level of maintenance and support needed for successful implementation is relatively high. To be successful the EIMS steward will need to have the resources and expertise to maintain and support the system, including expertise in web-based systems, relational databases, and GIS.

Enhance the EIMS to improve its support for environmental management. The research team expects that some degree of enhancement will be needed to the system for it to reach its full potential for supporting environmental management. Section 5.1 recommends a set of enhancements for the EIMS. The exact nature and extent of the enhancements made to the system will necessarily

depend upon the needs, priorities and available resources of the agencies that use the system. The organization that takes on stewardship of the EIMS will need to have the resources and expertise to enhance the software, and/or be in a position to gather the necessary resources and expertise.

Support the goals of the NCHRP 25-23 Project. The primary goal of NCHRP Project 25-23 is to develop an EIMS that supports environmental management for all modes and at all levels of decision-making. The EIMS, as originally envisioned, is a tool that both helps transportation agencies comply with environmental issues more effectively and efficiently, and that facilitates environmental stewardship. Ideally, the organization that stewards the system going forward would support the underlying objectives behind the NCHRP effort as detailed in NCHRP Report 481 (*1*).

Stewardship Options

The following stewardship options were considered in consultation with the Panel for future support of the EIMS:

Option 1: Manage the EIMS through the AASHTO Cooperative Software Development Program. The need for supporting and maintaining specialized software for transportation agencies is a familiar one to most transportation agencies, and AASHTO's Cooperative Software Development Program (also referred to as the "AASHTOWare Program") has been designed to meet this need. Through this program, AASHTO designates specific pieces of software as "AASHTOWare". For each AASHTOWare development project or product, AASHTO organizes a task force to guide the development and support of the software. The project or product task force, is in turn directed by AASHTO's Special Committee on Joint Development (SCOJD).

Initial funding for a new AASHTOWare project is provided through a software solicitation sent to each AASHTO member. An AASHTO member must sponsor the solicitation, and the requisite number of AASHTO members (typically ten) must agree to fund the project at the requested level of support to enable the project to proceed. If the software project relies on previously-developed code, as would be the case for the EIMS, the agency that owns the pre-existing code must grant ownership of any further development rights to AASHTO. Once a piece of software has been developed, AASHTO licenses the software to its members on an annual basis. License revenues are used to manage the ongoing effort, provide maintenance and support services, and fund further enhancements. The AASHTOWare program has been used successfully for a number of software products, including the Trans*Port suite of construction management tools, the Pontis Bridge Management System, and DARWin Pavement Analysis and Design System.

Option 2: Manage the EIMS as an Open Source Software Product. Another option for the EIMS is for the system to be placed in the public domain as an open source software product. Under this model, NCHRP would release the

EIMS software code to interested parties, ideally with an open source license. Commonly-used open source licenses include the GNU General Public License (GPL) (*11*), BSD License (*12*), and Mozilla Public License (MPL) (*13*). Using any of these licenses, NCHRP could ensure that the EIMS source code would be available to transportation agencies and software developers free of charge, and that the original source code for the system would remain in the public domain. Depending on the details of the license, further enhancements to the original source code may or may not be required to remain in the public domain, as well.

The open source model has been successfully employed for a number of different software products in recent years. Many of the more successful open source efforts have been large-scale efforts relevant to many applications (thus attracting the attention of many software developers), such as the Linux operating system. However, there are numerous examples of smaller-scale efforts, as well.

Option 3: Enhance the EIMS Through Further NCHRP Research. A third alternative for continuing development of the EIMS would be to initiate a third phase of the NCHRP 25-23 program. The objective of the third phase would be to perform additional research to enhance the prototype EIMS, resulting in a new version of the system. This approach would not be viable for maintenance and support of the system, as NCHRP projects are intended to address research needs rather than software support. However, this approach may be viable as a means to develop unique new functionality of the EIMS of interest to the transportation community.

Recommended Approach

The research team recommends that Option 1 – Manage the EIMS through the AASHTO Cooperative Software Development Program – be pursued for stewardship of the EIMS. We believe this option is preferable for the following reasons:

1. AASHTO's goals, and the mission of the AASHTOWare program, are well-aligned with those of NCHRP and the NCHRP 25-23 Project. AASHTO's current strategic plan details the high-level goals for AASHTO, and specific objectives associated with each goal (*14*). For the goal of "assisting State DOTs with leadership and performance", AASHTO's objectives include:

- **Provide a comprehensive framework for improved project delivery of all transportation projects (Objective 4B):** Assist the state DOTs in addressing ways and means to improve and accelerate project delivery of all transportation projects from "cradle to grave" (planning and programming through construction and maintenance and operations). This will include addressing environmental review issues, developing a project delivery acceleration tool box, assessing best practices in context sensitive design, and establishing a program to monitor project delivery time frames and impediments.

- **Develop an environment for strengthening community relationships to better integrate transportation, land use, and economic development (Objective 4F):** Identify and promote successful approaches to integrating transportation, land use, and economic development through peer-to-peer exchanges, expanded and improved networks and partnerships, domestic and international scans, and the joint conduct of national seminars.

The AASHTOWare Program is intended to support AASHTO's goals by helping transportation agencies jointly develop software that they need to operate effectively. These goals and objectives are closely aligned with those of the NCHRP 25-23 Project detailed in NCHRP Report 481 (*1*).

2. The EIMS software is at an ideal point for transitioning from a research effort to production software. At the start of the current phase of the NCHRP 25-23 Project, the EIMS was still a concept rather than a working computer system, and further research was needed to determine what the EIMS should include, how it should be designed, and whether the system could be of use to meet the needs of transportation agencies. The research performed for this phase of the project has resulted in a well-defined system that can be put into production. Given that the NCHRP Program is oriented around research and the AASHTOWare Program is oriented around distributing production-ready software, it is clear that if the EIMS effort is to make a transition from NCHRP research to AASHTOWare software, the completion of the second phase of the NCHRP 25-23 project is the appropriate time for that transition.

3. The AASHTOWare Program provides a proven mechanism for funding development, maintenance and support of transportation software. A critical issue in the future success of the EIMS will be identifying the means for agencies to pool the resources needed to fund the system on an ongoing basis. A single agency with sufficient resources could undoubtedly support the system, but the system is more likely to meet the objectives of the NCHRP 25-23 effort if multiple agencies fund it and participate in its development going forward. The AASHTOWare Program is a proven model for joint software development and offers a framework for use in establishing leadership of a software effort, funding enhancements, and providing ongoing support and maintenance services.

In summary, the research team recommends managing the EIMS through the AASHTOWare Program as this option offers the most viable model for moving the EIMS into production in multiple transportation agencies consistent with the vision established for the system. Next steps for NCHRP, AASHTO and transportation agencies interested in continuing development of the EIMS include:

- Install and use the EIMS developed through this project. As noted previously, the EIMS developed as part of this project, though intended to serve as a prototype, is a working piece of software and can be used to support environmental management. Agencies can use the system for their

current management needs, and as a means to determine what additional enhancements or other work will be needed to enhance the system and/or environmental management process going forward.

- Pursue the AASHTOWare solicitation process. At least one agency interested in supporting the system must sponsor a solicitation for making the EIMS a part of the AASHTOWare Program. Once AASHTO prepares and issues a solicitation, a certain minimum number of agencies must commit to participate in the program for it to be approved.
- Participate in the discussion on environmental management. As detailed in Section 2, a number of transportation agencies are actively engaged in improving their systems and processes for environmental management. For many agencies, improving environmental management is much more than a worthy research topic – it is an imperative for meeting their goals. Fortunately, there exists a number of resources for agencies to utilize to share their perspectives, experience, and needs with regard to this vital area, most notably the AASHTO Center for Environmental Excellence. The members of the research team look forward to participating in the continuing discussion of how to improve environmental management, and hope the research described in this report will help advance the state-of-the-practice.

6.0 References

1. Booz Allen Hamilton and Michael Baker, Jr., Inc., *NCHRP Report 481: Environmental Information Management and Decision Support System – Implementation Handbook*, TRB, National Research Council (NRC), Washington, DC (2003).
2. ISO, *Environmental Management Systems – Specification with Guidance for Use, ISO 14001: 1996(E)*, ISO, Geneva, Switzerland (1996).
3. Cambridge Systematics, Inc.; Parsons Brinckerhoff Quade and Douglas, Inc.; and Venner Consulting, Inc, *NCHRP 25-23(2): Interim Report 1*, draft, TRB, NRC, Washington, DC (January 2005).
4. Cambridge Systematics, Inc.; Parsons Brinckerhoff Quade and Douglas, Inc.; and Venner Consulting, Inc, *NCHRP 25-23(2): Interim Report 2*, draft, TRB, NRC, Washington, DC (January 2006).
5. Venner Consulting and Parsons Brinckerhoff, NCHRP Project 25-25(04) Final Report: Environmental Stewardship Practices, Procedures, and Policies for Highway Construction and Maintenance, TRB, NRC, Washington, DC (2004).
6. CH2M Hill, Research Results Digest 304: Technologies to Improve Consideration of Environmental Concerns in Transportation Decisions, TRB, NRC, Washington, DC (2006).
7. A. Amekudzi and M. Meyer, *NCHRP Report 541: Consideration of Environmental Factors in Transportation Systems Planning*, TRB, NRC, Washington, DC (2005).
8. Environmental Law Institute, *Watershed Initiatives and Decision Support Tools*, accessed in August 2006 at http://www.eli.org/pdf/wsSymposium/WatershedInitiatives.pdf.
9. Thomas H. Turton, *Florida's ETDM Process: Efficient Transportation Decision Making While Protecting the Environment*, accessed in August 2006 at http://etdmpub.fla-etat.org/help/ETDM.pdf#search=%22florida%20etdm%22.
10. ICF International, *About CommentWorks*, accessed in August 2006 at http://www.icfi.com/Services/Enterprise-Solutions/CommentWorks/Overview.asp.
11. Free Software Foundation, *GNU General Public License, Version 2, June 1991*, accessed in August 2006 at http://www.gnu.org/licenses/gpl.txt.
12. Open Source Software Initiative, *New BSD License*, accessed in August 2006 at http://www.opensource.org/licenses/bsd-license.php.

13. Mozilla Project, *Mozilla Public License Version 1.1*, accessed in August 2006 at http://www.mozilla.org/MPL/MPL-1.1.html.

14. AASHTO, *AASHTO Strategic Plan 2005-2010*, AASHTO, Washington, DC (2005).

Appendix A. Representative Environmental Management Initiatives

Table A-1 Examples of Environmental Information Management System Efforts Undertaken by State DOTs

Agency	Description
Arkansas State Highway and Transportation Department	**Participates in Multi-Agency Wetland Planning Team** that conducts a state wetland inventory, utilizing a wetland prioritization model based on GIS, a wetland classification and characterization database, a wetland planning database, and functional assessment models. These tools support the DOT in improved wetland planning, management, and monitoring. **Developed an environmental GIS** including information on engineering constraints, alternative alignments, and natural and social environmental analysis. **Developed Historic Bridge Management System** utilizing GIS to manage the state's Historic Bridge Inventory. The system centralizes all historic bridge data and facilitates data sharing and evaluation processes with the Arkansas Historic Preservation Program.
Caltrans	**Co-sponsored a statewide effort to identity and prioritize conservation areas for habitat connectivity** that identified and prioritized 232 critical habitat linkages. Caltrans is now incorporating this data and environmental analysis into regional-level planning by comparing its long range transportation plan to priority conservation areas. **Developing and organizing statewide information on environmental mitigation needs** in conjunction with identification of mitigation or environmental enhancement opportunity areas. Integrated mitigation need summaries and plans will be developed by region, covering a ten-year time horizon. The project will investigate past Caltrans mitigation projects to summarize outcomes and compare to costs. Existing programmatic agreements and mitigation/conservation banks available to Caltrans will be identified and linked to geo-referenced needs, and improve Caltrans' existing BioMitigation database. **Established division-level pilot projects for electronic document management supporting project work flow**. Systems allow users to electronically search and utilize archived material, review documents in progress, and track comments. Systems enable concurrent review, ensure review time is spent on up to date documents, and can generate reports on status of documents under review. Caltrans is now implementing a document tracking system that is anticipated to include existing biological reports, scanned and geo-referenced to enhance access. District 6 Project Management Division

Agency	Description
	undertook pilot to integrate document management system with work flow engine. **Identified environmental aspects of design, maintenance, and construction activities** (with a focus on storm water) as a part of the agency's practice guidelines for selecting best management practices. **Implementing directive for all Caltrans districts to maintain an Environmental Commitments Record (ECR)** to ensure that the agency meets its environmental commitments by: 1) recording each environmental mitigation, compensation, and enhancement commitment made for an individual project; 2) specifying how each commitment will be met; and 3) documenting the completion of each commitment. The ECR brings all relevant environmental compliance information together in a single place as a detailed reference throughout all project phases, both to identify and track commitments and to locate the most current, detailed source of information. The ECR review also facilitates quality control and continuity, and is being integrated into a variety of other Caltrans processes. **Development of Environmental IT Solution.** Caltrans is currently developing an Environmental Analysis IT approach which will manage and integrate information at multiple levels in concert with other systems, incorporate management and metrics tools, and deliver products/information to stakeholders and decision makers while contributing to and drawing upon the corporate knowledge. The system will consist of four integrated but independently functioning components: 1) environmental / production information flow; 2) process metrics and feedback; 3) communicated corporate knowledge; and 4) project management tracking.
Colorado DOT	**Developed an EMS in conjunction with the State Natural Heritage Program characterizing mitigation needs for the most populous eastern third of the state** by vegetation communities and species, to assist the agency in complying with Endangered Species Act section 7 requirements and to help achieve ecosystem recovery goals, for both listed and non-listed species. The EMS and related agreement provided a programmatic consultation framework, improved conservation outcomes, and more efficient and cost-effective transportation project delivery. **Developed a Commitment Tracking System for the NorthWest Parkway** and the multi-modal Transportation Expansion Project on the main highway through the metro area, building on a spreadsheet model. **Developing an EMS** to reduce pollutants and trash loads, for maintenance facilities and as part of a stormwater consent decree.
Florida DOT	**Developed the ETDM Process** to support early and efficient environmental screening, comment, and decision-making for transportation projects at the long-range plan and pre-programming/Statewide Transportation Improvement Program. The process also facilitates linkages between land use, transportation and environmental resource planning initiatives through early, interactive agency involvement and increasing environmental screening on the MPO level. Includes:

Agency	Description
	• A web-based interagency analysis and comment system. • A Public Information Site that provides public access to information about proposed transportation projects, their status, and interactive environmental maps through the Florida Geographic Data Library. • Project Management tools to support project implementation once a project is accepted for programming. Functions include electronic Class of Action determination and support for EA and EIS development. • Performance tracking of interagency Environmental Technical Advisory Teams for decision support and continuous improvement in administration of DOT-funded positions. **Supported development of wildlife occurrence and habitat GIS database for use in roadway alignment analysis, impact assessment, and identification of priority areas for conservation and habitat connectivity improvements**. Participating in interagency Greenways Program partnership to guide land acquisition activity. **Developed GIS-model for road improvement projects, including an interactive CD-ROM allowing the user to perform multiple scenarios and analyze impacts** related to wildlife crossings, road mortality, habitat connectivity, and other environmental impacts. (in conjunction with the Florida Fish and Wildlife Conservation Commission).
Illinois DOT (IDOT)	**Developed the Project Monitoring Application database** to track the status of Biological and Cultural resource surveys, including: • **Electronic Environmental Survey Request forms** that have standardized data elements and are completed on-line by District Offices and can be accessed by external users. Windows for Biological and Cultural resource surveys in the system include fields to enter various commitments. Wetlands and Special Waste screens have been added. • **Commitments Window,** a central "one-stop-shop" for all project commitments to be listed. • **Ability to run annual reports and track internal compliance.** • **Integration with IDOT project management databases** through common project and contract numbers.
Indiana DOT (INDOT)	**Developed a GIS application for use during NEPA project development and long-range planning**. Tool includes 170 geospatial data layers pertaining to southwestern Indiana, with plans to expand the system for state-wide use. **Developed criteria for prioritizing work on maintenance facilities**, including proximity to public surface water intake, other high quality waters, and natural areas as part of an

Agency	Description
	EMS approach. **Developed a mitigation commitment summary, from an electronic project tracking system**, which INDOT incorporates into NEPA document and project plans. Incorporating the summary into the tracking system has increased the effectiveness of the summary and resulted in more complete implementation of environmental commitments. **Developed a "Scope/Environmental Compliance Certification/Permit Application Certification" checkpoint** at four different design stages to assure that the design has incorporated all environmental commitments. This tool certifies that the requisite permits have been acquired and the associated conditions/requirements have been included in the plans, specifications, and estimates.
Kentucky Transportation Cabinet (KYTC)	**Developed an online commitment tracking approach called "Communicating All Promises" (CAP) that posts and tracks all agency commitments through all phases of project development** and implementation. Produces CAP reports that are incorporated into bid and contract documents, and that provide the basis for project engineering plans to fulfill commitments. KYTC developed an associated Guidance Accountability Form checklist, which is used by consultants and reviewed by KYTC to communicate mitigation of tasks in all phases of the transportation development process. During project implementation, KYTC uses their Project Impact Profile form as a communication tool to summarize the impacts of a project and the related mitigation. KYTC's CAP is an SQL add-on to the agency's existing Oracle-based preconstruction management program. KYTC created pages within this existing system for Project Managers to input the commitments. The agency is in the process of converting to a web-based system.
Maryland SHA	**Established Environmental Stewardship as a Key Performance Area** for the agency. Environmental stewardship goals, objectives and performance measures are included. **Participates in state-wide efforts to identify and preserve ecologically significant resources and link conservation areas**. Utilizes State Green Print databases and watershed plans to assist in meeting watershed and wetland mitigation goals. **Developed an information management system to inventory, rank, and track hydraulic and water quality control structures**, facilitating National Pollutant Discharge Elimination System (NPDES) program compliance, asset management, environmental enhancements, and efficient administration. System data is used for on-line NPDES permits, storm water system evaluation, and maintenance work and assignments. A GIS helps staff determine location of systems, track maintenance activities, and address public complaints. Ultimately, the system will be capable of hydrologic analysis of the drainage systems for estimating assessments of storm water runoff from MDSHA right of way. **Prepares Environmental Compliance/ Consideration Checklists for all major projects**. MDSHA is working to create a statewide system for all NEPA EA and Environmental

Agency	Description
	Impact Statement (EIS) projects, and a system to support tracking and achievement of environmental stewardship goals. **Tracking interagency concurrence points** in the transportation development process. **Developed a desktop permit tracking system**, to which it is adding commitment tracking capabilities, focused on project development and design. MDSHA's desktop permit tracking system was developed in Oracle and Microsoft Visual Basic programming language, with plans to make the tool web-based. Utilizing existing systems and databases, the system imports current projects and schedules, and tracks all projects and permits. MDSHA is extending it to track conditions and commitments. The MDSHA Project Management system utilizes Microsoft Project and both systems run on Oracle, on the same server, to be able to accommodate databases from other legacy systems. Common project numbers and geographic coordinates for projects facilitate linkage to the agency's cash flow system for capital forecasting and also GIS. **Integrating data management projects.** Under the direction of Planning, all MDSHA data management projects are being pulled into one GIS platform using Oracle. MDSHA is now able to track environmental information on all projects, major and minor, supplementing the major project efforts described below. **Used a commitment tracking system for large and environmentally controversial projects.** For projects such as the Woodrow Wilson Bridge, MDSHA used a commitment tracking system in Microsoft Access. Compliance was documented in concert with daily inspections, and actual vs. projected impacts were tabulated/estimated separately from the database, for reporting purposes. While this existing system is not web-accessible, a model to be developed for the Intercounty Connector will be web-based. **Prepares Environmental Compliance/Consideration Checklists** for all major projects and summarizes all environmental mitigation and project commitments to ensure that environmental commitments are not lost through value engineering or other plan revisions.
Massachusetts Highway Department	**Developed an EMS for agency maintenance facilities focusing on six compliance program areas**: Hazardous Waste, Wetlands, Hazardous Materials, Underground Storage Tanks, Water Quality and Solid Waste. A Management System Improvement and Implementation Plan was established for each area.
Maine DOT	**Developed and implementing environmental management systems for all Maine DOT maintenance facilities**. Developed manuals and reference guides targeted to appropriate managers and field personnel. Conducting annual audits of facilities to review effectiveness of policies and procedures. An Environmental Management Committee has delegated responsibility for tracking and timely closure of audit findings.
Michigan DOT	**Developed the Michigan DOT Electronic Document Management System** to provide an integrated tool for project web site collaboration, imaging, process workflow automation, electronic forms, shared document access, documentation security control, versioning control, and document life-cycle management. Applied to five focus areas:

Agency	Description
	transportation planning environmental review, real estate property disposal engineering review, CAD file management, web site collaboration, and executive correspondence response and tracking. **Developed Southeast Michigan Snow and Ice Management Partnership** with four road maintenance agencies and a regional transit authority to coordinate winter maintenance vehicles in region. System includes snowplow sensor systems, a communications system, and central management systems. Communication system transmits environmental and status data from in-vehicle devices to transit management center, which transmits data to maintenance managers and transit dispatchers.
Minnesota DOT	**Piloting effort to manage design and environmental information electronically, and provide decision support in the field**. GIS wetland information leveraged for construction by creating links to graphics, permits, and construction equipment guidance systems. Existing environmental data layers and Computer-Aided Design (CAD) information is made available to designers in cohesive, standardized format. Electronic design files are available at the construction site, and changes to the data are entered in the field through handheld computers.
Nevada DOT	**Developed the on-line Reno TRAC Mitigation Monitoring Program Report System**, which provides the public with real-time reports on the project's compliance with Nevada DOT's environmental commitments and streamlines note-taking and report-writing. System replaces manual field note taking with electronic field-based recording using hand-held devices and data upload via wireless connections. Reno city officials estimated that ReTRAC.info saves each monitor 45 minutes each day per report filed. ReTRAC also served as a document management system containing compliance reports, notices to the contractor, and feedback from resource agencies (controlled access), and access to sensitive cultural resource data. The system streamlines reporting, enhances quality control, improves compliance monitoring, and supports improved public communications. ReTRAC.info is non-proprietary, and can an be adapted to solicit comments from the public when reviewing NEPA documents.
New Hampshire DOT	**Established an EMS in the Bureau of Traffic, initially focused on painting and signing** operations, with goal of expanding the program into other units. The system was implemented in accordance with ISO 14001 guidelines (though not yet certified). **Developed and implemented Risk Assessment for Site Contamination and Appraisal of Land and Inventory of Managed Properties –** a system of integrated handheld computers and web-based data management to support a contaminated property valuation policy for prospective and currently owned properties.
New Jersey DOT	**Developed the New Jersey DOT Environmental Policy Statement and Stewardship Action Plan**.
New York State DOT (NYSDOT)	**Established the Environmental Commitment and Obligations Package for Construction (ECOPAC)** that records and tracks environmental compliance of construction projects. ECOPAC is a PDF form checklist that the Design group fills out and gives to Construction. Construction uses the form for follow up, awareness, and field

Agency	Description
	inspection. **Automated the New York State Department of Environmental Conservation's State Environmental Audit System to report environmental initiative activities and self-report violations**. This Oracle-based system is focused on facilities (e.g. rest stops, maintenance shops) and is used to track non-compliance and to develop remediation plans. The system also could be used to identify patterns, improve overall processes, and initiate training. **Developed ETRACK database to track projects and major milestones**, and establish consistency in statewide environmental information management. ETRACK is an environmental permit tracking database in Microsoft Access, which is being used in all NYSDOT Regions. NYSDOT currently has an IT proposal to make it web-based and to potentially link it to ECOPAC, as the agency would like to add commitment tracking capabilities. Providing a linkage to the ECOPAC checklist would be a first step in this regard. ETRACK is used for project scoping and permit tracking, but not for any environmental terms or conditions. ETRACK has the potential to offer standardized reports and the ability to make queries, track items of interest, track the number of permits in process and time required for completion, and other factors. Each Region has a stand-along system; state-wide queries are not supported. **As part of NYSDOT's Environmental Ethic Initiative, undertaking a comprehensive process improvement program** in planning, design, construction, maintenance and operation of transportation facilities, including development of environmental quality assurance/control procedures; project tracking and management; and establishment of performance measures.
NCDOT	**Established the Ecosystem Enhancement Program (EEP) with North Carolina Department of Environment and Natural Resources to conduct planning and mitigation on watershed level** to streamline project delivery process and improve ecological outcomes. An EMS enables comparison of problems and assets of local watersheds based on GIS data analysis of five broad categories of information: 1) baseline watershed conditions; 2) watershed resources or attributes; 3) watershed problems; 4) potential threats and stressors; and 5) other factors. System includes a screening methodology to identify target areas for restoration, and tracks performance by comparing actual impacts of implemented projects against targeted goals for wetland and riparian functions. EEP is developing a system for assessment of wetland and ecosystem functions, which will be linked to the mitigation credit and need accounting system. **Maintenance Management System's inventory of sample sections of roadway includes assessments of some environmental conditions and deficiencies**. **Developing an Environmental Strategic Plan for the agency**.
Oregon DOT (ODOT)	**Established CETAS**, an interagency environmental coordination body, to implement stewardship agenda.

Agency	Description
	Established programmatic agreement with Oregon Department of Fish and Wildlife for culvert retrofit and replacement. **Developed a GIS-based sensitive resource inventory along nearly 6,000 miles of state highway** as part of Salmon Resources and Sensitive Area Mapping Project, used to support planning, scoping, and appropriate maintenance activities. Currently developing an internet-based application to enable wider desktop access to data and to facilitate data sharing and communications with resource agencies. **Established programmatic approach to ESA for routine road maintenance without review of individual actions**, based on jointly developed Resource and Restricted Activity Zone Maps. **Developed a Bridges Internet GIS to support repair or replacement of more than 360 state and 125 local bridges over ten years**, through a strategic, corridor-based approach. Initiative includes comprehensive program of bridge site assessment and programmatic agreements with regulatory agencies to streamline environmental permitting. Extensive information on each bridge site is provided through an interactive, graphics-based Internet Map Server. **Initiated efforts to estimate and track environmental costs**; in the process of adding elements to accounting system for expanded tracking. **Initiated development of data management system for inventory of 20,000 drainage facilities**, enabling ODOT to track, prioritize, schedule and budget maintenance and repair of facilities. **Evaluating use of real-time GPS connection to maintenance vehicles**. **In the process of developing a global asset management system**. The ODOT Transportation Management System will integrate management of highway pavement, bridges, highway safety, traffic congestion, public transportation facilities and equipment, inter-modal transportation facilities and systems, and traffic monitoring. OTMS will ultimately incorporate other systems that track environmental assets.
PennDOT	**Developed a computerized CE Expert System**, which was then expanded to environmental assessments. An on-line system to support CE and EA evaluations was launched in November 2002, replacing a paper-based process. The CE/EA Expert System has been expanded to support electronic review and approval, including on-line public review of documents and responses to comments, and permit applications and tracking, **Developed a Strategic Environmental Management Program** which identified environmental aspects of work agency-wide. A pilot ISO 14001-certified EMS was developed for erosion control and winter maintenance operations in Engineering District 10, which includes performance measures. PennDOT plans to expand this system to other Districts.

Agency	Description
	Developed a State-wide fish database of all species to enable users to conduct rapid, in-house reviews for project impacts on fish species of concern. **Developed a Cultural Resource Document Tracking system**, enabling automated environmental reviews, support to Design processes, and expedited alternatives analysis. PennDOT plans to integrate this system with GIS in the future. **Supports Penn State University's Pennsylvania Direct and Gravel Roads Center**, and an on-line system to identify and rank erosion control problem areas along roadsides. **Developed a Salt Stockpile Management, Stockpile Academy, and Quality Assurance Program using a 50 element QA review**. System enables PennDOT to track and compare application rates against targets.
Pennsylvania Turnpike Commission	**Developed computerized spreadsheet/database tracking systems.** Systems identify and monitor right-of-way requirements (not in NEPA document), changes in environmental impacts, and fulfillment of mitigation commitments during construction.
Texas DOT (TXDOT)	**Developed comprehensive ETS to track projects during project development**, focusing on management of NEPA and environmental permitting requirements prior to construction. ETS, the main database, records when a project is received, who is reviewing, and what agency coordination is occurring. ETS: • Tracks NEPA and permit status and process time for environmental clearance. • Enables electronic circulation of all project documents, provides e-notifications to reviewers, and estimates process time for each phase. • Allows determination if all Environmental Permits, Issues and Commitments (EPIC) are addressed in the project plans. EPIC is an ETS function that lists permits, issues, and commitments. Reports or checklists on commitments can be generated at the end of the project, then attached to the plan, and incorporated into specifications. Engineers are required to review EPIC screens and ensure that plan sheets include commitments. • Enables remote project entry and project status queries by district environmental coordinators and automatically flags projects that have surpassed predetermined circulation periods within the Environmental Division. • Generates a monthly report, identifying all transportation projects entered within a certain month or within a given period or exceeding their circulation period, as well as a "Clear Environmental" report, identifying all projects cleared by the Division within a certain month or within a given period. A project circulation report identifies projects that have exceeded the assigned circulation period at FHWA or other federal or state agencies. • Is available on-line to FHWA with plans to share with other agencies to facilitate

Agency	Description
	comments in an ETDM-like environment in the future. ETS was built in PowerBuilder Version 9, which allowed conversion of all old data into a new database with growth potential. The ETS is based on a two-tier architecture (client, database server). TXDOT plans on moving ETS to the web, using Microsoft SQL Server and Microsoft .NET (with C# as the programming language). **Implemented Environmental Commitment Checklist.** All TXDOT Districts use a checklist to monitor construction, maintenance, and facilities projects. Contractors use the checklist to verify compliance with environmental commitments and permit conditions. The checklist is also used by Texas Department of Environmental Compliance for compliance review. **Developed tracking software and a web-based environmental process manual**. TXDOT plans to add functionality, including a centralized repository, and internet links to resource agencies' policies. **Developed a Pollution Prevention and Abatement and Audit Program for Maintenance Facilities**. **Developed an approach to environmental screening using best available data over a more than 1,000-mile project corridor (Interstate 69).**
WSDOT	**Developed an on-line Environmental Procedure Manual** for the agency, consultants, and contractors, with links to all appropriate regulations. **Developed a watershed-based approach to assess how improved ecological benefits could be achieved from mitigation**, at reduced mitigation costs. Developed and applied criteria and EMS tools to assess and rank alternative mitigation sites and processes, including capability to identify priority recovery areas for individual targeted resources and priority areas for multi-objective mitigation. Analysis includes a functional assessment and social, economic, and environmental cost benefit analysis for candidate sites. **Designed Environmental GIS Workbench** program with 125 GIS data layers, to provide technical support to project planning and delivery, including desktop access to 60 layers of environmental and natural resource management data. System is supported by WSDOT's Environmental Information Program, which coordinates with Federal, state and local agencies to ensure current and accurate data. **Manages WSDOT's GeoData Catalog** that allows public to view GIS metadata and example maps, and to download agency GIS data. **Initiated project to compare the cost and benefit of using remote sensing based approaches** to environmental analysis with other methodologies. **Developed decision support system for evaluating and addressing slope failure areas** and chronic environmental deficiencies.

Agency	Description
	Developing an EMS to integrate environmental issues with program and project delivery. The initial focus is on construction, parts of Maintenance and Operations, and the State Ferry System, with an emphasis on ensuring and demonstrating compliance. **Developed a commitment tracking system** that: • Tracks all formal commitments (environmental, design, right-of-way) from inception through construction to completion or handoff to Maintenance and Operations Offices. • Ensures permit conditions are adequately incorporated into contract documents. If permit language is not appropriate as contract language for the final PS&E, the system facilitates finding/crosswalking to relevant contract language. If no appropriate contract language exists, the user may draft new language. • Allows commitments to be matched with Standard Specs, General Special Provisions, and Standard Plans. WSDOT is building environmental procedures into the agency's construction manual and standard specifications, drawing from the NCHRP 25-25(04) Environmental Stewardship Practices Guide. • Will provide "job-aids" to help ensure all environmental commitments and permit conditions are implemented (e.g. project inspection checklists, compliance binders for site inspectors, summarized notification requirements, etc.). • Generates reports showing whether all environmental commitments have been met prior to completion of the project, and if Maintenance and Operations have received and confirmed understanding of all long-term compliance expectations for the site. • Incorporates programmatic permit or consultation conditions; however, prompts are not automated in the system. The user has to be aware that a programmatic agreement exists and apply it to the project to incorporate the commitments therein. The commitment tracking system does not include document management or storage functions. Instead, WSDOT has focused on making project-related documentation available to the public through the agency's website. WSDOT has basic task scheduling functionality as part of the agency's Project Delivery Information System. The system was custom-built on a Microsoft SQL Server database using Microsoft .NET. All projects with project specific commitments are now being entered, including CEs. In the long run, WSDOT intends to incorporate the different commitments in the system and as a GIS layer in the GIS workbench and translate mileposts to GIS raster data. Ultimately, WSDOT is interested in incorporating performance measurement and reporting into the system as well. **WSDOT's database for tracking construction site erosion and sedimentation control risk, requirements/commitments, and performance** assesses trends and provides reports at the project, regional, and state levels. Reports will also include data on the use frequency, correct application, maintenance, and overall effectiveness of 37 best management practices. All construction sites are evaluated and characterized based on

Agency	Description
	inherent risk of erosion (size, timing and duration of work, soils, slopes, groundwater levels, need for in-water work); runoff from 20% of projects that meet the risk criteria is tested during storm events and during critical periods of in-water work. Monitoring results are used to evaluate project performance and to validate results of the TESC assessment database. The assessment program identifies 1) how well WSDOT is protecting water quality; 2) areas that need improvement; and 3) strategies to use in making improvements. **Developing environmental cost assessment tools for project development** through the Environmental GIS Program. **Maintenance Accountability Process** includes tracking of some environmental conditions and deficiencies.
Wisconsin DOT	**Developed and implemented methodology to conduct System-Plan Environmental Evaluations** to meet State requirements. Applies environmental criteria to evaluate and compare major system plan alternatives. Developed worksheets to guide user through the environmental screening process and to streamline EA and EIS development. Decision support software has not yet been developed. **Conducted Environmental Costs study** to develop and refine a process to capture standardized financial data to track environmental costs on transportation projects. **Conducted inventory of high potential corridors for the presence of lupine and developed right of way management plan to protect habitat** for the Karner Blue Butterfly. **Implementing use of on-vehicle differential Global Positioning System receivers and other sensors to collect environmental data, equipment status data, and material usage data** to track and manage winter maintenance activities, including use of winter operations performance measures. Uses GIS application, "Wiscplow" to integrate vehicle data with manually entered data and spatial data.

Appendix B. EIMS User's Guide

B.1 OVERVIEW

This User's Guide is designed to help you learn and use the EIMS. This section provides an overview of the software. Section B.2 shows how to use the main navigation bar in the EIMS, the main table list, and the interactive map. Sections B.4 through B.9 describe how to use each module in the EIMS. Section B.10 discusses how to configure the system.

B.1.1 EIMS Basics

The EIMS is a prototype software system that supports environmental management for transportation agencies. It is intended to serve as one component of an agency's broader environmental management system. The EIMS is designed to support transportation and planning agencies in environmental decision-making throughout the transportation process, from long-range planning through project development, construction, operations, and maintenance.

The EIMS contains:

- A database of information on plans, projects and physical assets such as highways, bridges and maintenance facilities;
- A mapping interface that lets users view plan, project and asset data, as well as other environmental data, on a map;
- Modules for managing environmental management data related to plans, projects, and alternatives;
- A module for entering and tracking commitments, responsibilities and actions; a
- A module that support specification of links to relevant sets of requirements, and best practices; and
- A module for linking documents to any of the items (entities) stored in the database.

Key terms as they are used in the context of the EIMS are defined below.

Plans

A plan in the EIMS is used to track environmental management data related to a long-term plan. The plan data include a description, priority environmental objectives, and the expected environmental performance. The user can view specific projects associated with a plan, and he/she has the ability to assign and unassign projects to and from the plan. The user can create one or more

alternatives for a plan. Following initial entry of data on the plan, the user can track the data over time, share the data with others in the agency, monitor the commitments and public process steps associated with the planning process, and track environmental performance against performance objectives.

Projects

A project in the EIMS is used to summarize the environmental data and other data for a particular project. Project data include information on project extents, tracking information, and whether or not a project qualifies for a categorical exclusion. The user can specify what assets (e.g., highways or bridges) are associated with the project to allow viewing data on the map. The user may enter and track commitments made with regard to a particular project.

The user can create one or more alternatives for a project and specify which alternative is the preferred one. Other data the user can specify include information on analyses performed for each alternative, impacts indicated by those analyses, and documents associated with the project.

Assets

Different asset types include roads, bridges, and other assets. Typically, data on highways in the EIMS are imported from the Highway Performance Monitoring System (HPMS), and data on bridges are imported from the National Bridge Inventory (NBI). A third asset type is user-specified (typically maintenance facilities). The user can create one or more alternatives for an asset and specify which alternative is the preferred one. Other data the user can enter include commitments made for a particular asset and documents associated with the asset.

Alternatives

Users can define one or more alternatives for each plan, project, and asset. For each alternative, the user has the option of adding any public process steps and analyses performed on the alternative, and associating document links with the alternative.

Commitments

A commitment in the EIMS is a planned or potential set of actions associated with a particular plan, project or asset. For each commitment, the user can define one or more commitment actions.

Commitment Actions

Commitment actions detail any specific actions that need to be performed in support of a commitment.

Requirements/Best Practices Sets

The user can use the EIMS to document the agency's best practices and requirements. Each set can have one or more requirements or best practices.

Requirement

Each requirement must be associated with a requirement/best practice set. The user can create Uniform Record Locator (URL) or document links relating the best practices described in the EIMS back to process descriptions, photos, plans, and/or other agency documents that detail the requirement.

Public Process Steps

A public process step in the EIMS may represent a public meeting, release of a document or newsletter to the public, or any other event related to public involvement. Each public process step is associated with an alternative. The data the user can specify include public process actions for each public process step and documents associated with the steps.

Public Process Actions

Public process actions detail any specific actions that need to be performed in support of the associated public process step. Each public process action in the EIMS is associated with a public process step.

Analyses

An analysis in the EIMS is an environmental analysis of a plan, project or asset alternative. The user can define one or more impacts and documents for each analysis.

Impacts

An impact is a finding made through an analysis. Each impact is associated with an analysis.

B.1.2 Getting Help

The EIMS includes on-line help containing most of the information found in this User's Guide. Simply click **Help** to access the on-line help.

B.1.3 Getting Started

The EIMS is a server application, and does not require special software to be installed on your desktop or laptop PC. To use EIMS, your computer must be connected to the Internet, and you must have Microsoft Internet Explorer version 6.0 or above and the Adobe Acrobat Reader.

Every user of EIMS has a user account that provides him or her with access to the system, and that specifies whether or not the user can edit data, or is a read-only user (a browser).

To Start the EIMS

1. Launch Microsoft Internet Explorer (version 6.0 or higher).
2. Enter the URL for the EIMS.
3. The login screen will be displayed.
4. Enter your user name and password, and click **Login**.
5. An introductory screen will be displayed. Click any link on the introductory screen to navigate to the main page.
6. You are now ready to begin using the EIMS.

B.2 MAIN PAGE

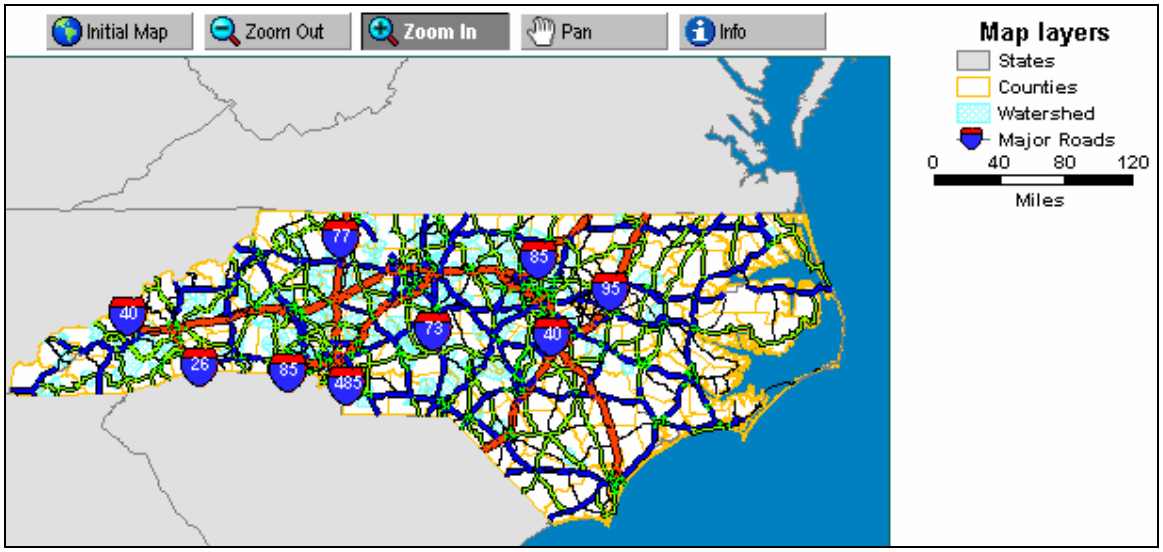
The Main Page of the EIMS consists of three components: the navigation bar on the left-side of the screen; a table (or list view) listing entities in the system, and a map display.

B.2.1 Using the Navigation Bar

You can use the Navigation Bar on the left-side of the screen for accessing major system functions or modules. Click on the "List" links to display table lists (e.g., lists of plans, projects, assets, commitments, requirements, and documents). Click on the "Add" links to create a new entity.

B.2.2 Using the Map

The EIMS allows you to modify the size, location, or scale of the map to see the geographic area and assets you want.



To Change the Map Scale or Location

Select one of the tools that appears in the top toolbar of the map, and then use the tool as described below.

To do this...	Do this...
To show the entire state	Click **Initial Map**. The EIMS shows the entire state in the map.
To show a larger area of the map	Choose the **Zoom Out** tool, and click on any location on the map. The EIMS centers the map at that point and shows a larger area; or Choose the **Zoom Out** tool, and drag a rectangle on the map. The EIMS shrinks the existing map to fit that rectangle, and fills in the remainder of the map with additional information.
To zoom in to a specific portion of the map	Choose the **Zoom In** tool and drag a rectangle on the portion of the map you would like to see in more detail.
To zoom in on a specific location on the map	Choose the **Zoom In** tool and click on the location of interest. The EIMS doubles the map scale and zooms in on that point.
To shift the map to show nearby areas	Choose the **Pan** tool and drag the map in the direction you want to move.

B.2.3 Using the Table

The Table lists selected entities in the EIMS database. It contains summary information about each entity. Use the page links at the bottom of the table to see items in the list.

The Table also provides you with access to the Entity Detail page, which displays detailed data about each entity.

To Use the Table

1. The Table has some special features that make it easy to look at all or selected entities, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom-right corner of the Table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Display Entity Details

1. Use the Table to locate the entity about which you would like detailed information.
2. Click on the row of the table that contains this entity.
3. The EIMS will display the Detail page for the selected entity.

To Select an Entity

1. Browse the Table to identify the entity you want.
2. Click the **Select** button to the left of the entity.
3. The EIMS will highlight the selected entity in the table list.

To Unselect an Entity

1. Click the **Select** button of the entity that you want to unselect.
2. The EIMS will remove the selected entity from the set of selected items.

B.2.4 Mapping Assets

The EIMS lets you map selected assets when viewing an asset list, or to map the assets associated with a plan or project if viewing a plan or project view.

To Map Selected Assets

1. Use the **Select** button in the Entity Table to select the desired entities.
2. Click the **Map Selected Assets** link on top of the table.
3. The EIMS will find the assets associated with the list and display them on the map.

To Map All Assets

1. Click the **Map All Assets** link on top of the table.
2. The EIMS will display all assets on the map.

B.3 PLANS

The Plans module supports viewing and creating long-term transportation plans. It allows you to view detailed characteristics of a plan and to associate projects, alternatives, commitments, and documents with a plan.

To Get to This Page

1. Click on the **Plans** link in the navigation bar.

B.3.1 Plans List Page

Plans Table

The Plans Table displays all the plans defined in the EIMS database. It contains a set of information about each plan. The table shows the records in blocks of 10. Use the page links at the bottom of the table to see additional records.

The Plans Table also provides you with access to the Plan Detail page, which displays detailed data about each plan.

To Use the Plans Table

1. The Plans Table has special features that make it easy to look at all or selected plans, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the Table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select a Record

1. In the Table, click the **Select** button of the record you want.
2. The EIMS will highlight the selected record in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect a Record

1. In the Table, click the **Select** button of the selected record.
2. The EIMS will remove the record from the set of selected items.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect All

1. Click the **Unselect All** at the bottom of the Table.
2. The EIMS will unselect the selected records in all pages.
3. The **Selected total** and the **Selected on this page** status labels will display 0.

To Delete a Plan

1. In the Table, click the **Select** button of the record you want to delete.
2. The EIMS will highlight the selected record in the table list.
3. Click the **Delete Selected**.
4. The system will prompt you for confirmation. Click **OK**.
5. The selected plan and associated data will be deleted.

To Display Plan Detail

1. Use the Plans Table to locate the plan about which you would like detailed information.
2. Click on the description of the plan in the Table.
3. The EIMS will display the Plan Detail page for the selected plan.

To Run a Report

1. Select plans from the Plans Table to include in the report.
2. Click the **Plan List Report** link in the navigation bar.
3. The EIMS will display the Plan List Report in an Adobe Acrobat window.

Mapping Assets

To Map Selected Assets

1. Use the **Select** button in the Plans Table to select the desired plan(s).
2. Click the **Map Selected Plan Assets** link on top of the table.
3. The EIMS will finds the assets associated with the plan and display them on the map.

To Map All Assets

1. Click the **Map All Assets** link on top of the table.
2. The EIMS will display all of the assets on the map.

B.3.2 Plan Detail

The Plan Detail page displays plan information in a series of tabs. Users with the EDIT permission can view and edit the plan data, and create a new plan. Users with the READONLY permission (browsers) are only able to view the data. Many of the links on this page will be invisible/disabled to the browser user.

Edit Links

Edit. Click **Edit** to turn on the Edit Mode. The Validate, Revert, and Save links will be enabled, and the tab items will be enabled for editing. The Edit Mode must be turned off before switching to different tabs. This link is invisible for users with the browser permission.

Validate. Once in the Edit Mode, the user can click **Validate** to perform the data validation. If any errors are found, an error message will be displayed next to the corresponding data item. This link is invisible for users with the browser permission.

Revert. The user can revert any changes made by clicking **Revert**. Any unsaved changes will be reverted back to the original values. This link is invisible for users with the browser permission.

Save. The user can save changes made by clicking **Save**. This turns off the edit mode. This link is invisible for users with the browser permission.

Navigation Links

The links at the bottom of the Plan Detail page allow you to view and create projects, alternatives, commitments, and documents associated with the currently selected plan.

Project List. Use this link to view the list of projects associated with the current plan.

New Project. Click **New Project** to create a new project for the currently selected plan. The new project will be part of the current plan. This link is invisible for users with the browser permission.

Assign/Unassign Projects. Click **Assign/Unassign Projects** to assign or remove projects from the currently selected plan.

Alternative List. Use this link to view the list of alternatives associated with the current plan.

New Alternative. Click **New Alternative** to create a new alternative for the currently selected plan. The new alternative will be part of the current plan.

Commitment List. Use this link to view the list of commitments associated with the current plan.

New Commitment. Click **New Commitment** to create a new commitment for the currently selected plan. The new commitment will be part of the current plan. This link is invisible for users with the browser permission.

Documents and Links. Use this link to display the list of documents linked to the current plan.

Report. Use this link to display the Plan Detail report.

Back to the List of Plans. Use this link to return to the Plan List page.

To Create a New Project

1. Click the **New Project** link at the bottom of the page.
2. The first tab of the New Project page will be displayed with the Edit Mode on. The name of the currently selected plan will be displayed at the top of the page.
3. Enter the project data. Click **Save** to save your changes.
4. Click the other tabs to enter data in different tabs.
5. When done entering data, click **Back to the Plan Detail** to return to the Plan Detail page.

To Create a New Alternative

1. Click the **New Alternative** link at the bottom of the page.
2. The first tab of the New Alternative page will be displayed with the Edit Mode on. The name of the currently selected plan will be displayed at the top of the screen.
3. Enter the alternative data. Click **Save** to save your changes.
4. Click the other tabs to enter data in different tabs.
5. When done entering data, click **Back to the Plan Detail** to return to the Plan Detail page.

To Create a New Commitment

1. Click the **New Commitment** link at the bottom of the page.
2. The first tab of the New Commitment page will be displayed with the Edit Mode on. The name of the currently selected plan will be displayed on top of the page.
3. Enter the commitment data. Click **Save** to save your changes.
4. Click the other tabs to enter data in different tabs.
5. When done entering data, click **Back to the Plan Detail** to return to the Plan Detail page.

B.3.3 Project Assignment Page

The Project Assignment screen displays the name of the currently selected plan at the top. The list box on the left shows the projects that are currently assigned to the plan (if any). The list box on the right shows projects that are not assigned to the plan.

To Get to This Page

1. Click the **Plans** link in the navigation bar.
2. Click on a desired plan from the Plan Table. The Plan Detail page will be displayed.
3. Click **Assign/Unassign Projects** at the bottom of the Plan Detail page.

To Assign Project(s) to a Plan

1. From the list box on the right, select the projects that you want to assign to the current plan. Use the Ctrl or Shift key for multiple selection.
2. Click **Assign Selected Projects to the Plan** at the bottom of the right list box.
3. The selected project(s) will appear in the list box on the left.
4. Click **Back to the Plan Detail** at the bottom of the screen to return to the Plan Detail page.

To Remove Project(s) from a Plan

1. From the list box on the left, select the projects that you want to remove from the current plan. Use the Ctrl or Shift key for multiple selection.
2. Click **Remove Selected Projects from the Plan** at the bottom of the left list box.
3. The selected project(s) will appear in the list box on the right.
4. Click **Back to the Plan Detail** at the bottom of the screen to return to the Plan Detail page.

B.3.4 New Plan Page

To Create a New Plan

1. From the left navigation bar, click **Add New Plan**.
2. The first tab of the New Plan page will be displayed with the Edit Mode on.
3. Enter plan data. Click **Save** to save your changes.
4. Click the other tabs to enter data in different tabs.

5. When done entering data, click **Back to the List of Plans** to return to the Plan List page.

B.4 PROJECTS

The Projects module supports viewing and creating projects. It allows you to view detailed characteristics of a project and to associate assets, alternatives, commitments, and documents with a project.

To Get to This Page

1. Click on the **Projects** link in the left navigation bar.

B.4.1 Projects List Page

Projects Table

The Projects Table displays all the projects defined in the EIMS database. It contains summary information about each project. The table shows the records in blocks of 10. Use the page links at the bottom of the table to see additional records.

The Projects Table also provides you with access to the Project Detail page, which displays detailed data about each project.

To Use the Projects Table

1. The Projects Table has special features that make it easy to look at all or selected projects, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the Table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select a Project

1. In the Projects Table, click the **Select** button of the project you want to view.
2. The EIMS will highlight the selected project in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect a Project

1. In the Projects Table, click the **Select** button of the selected project.

2. The EIMS will remove the record from the set of selected items.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect All

1. Click **Unselect All** at the bottom of the Projects Table.
2. The EIMS will unselect the selected projects in all pages.
3. The **Selected total** and the **Selected on this page** status labels will display 0.

To Delete a Project

1. In the Projects Table, click the **Select** button of the project you want to delete.
2. The EIMS will highlight the selected project in the table list.
3. Click **Delete Selected**.
4. The system will prompt you for confirmation. Click **OK**.
5. The selected project and associated data will be deleted.

To Display Project Detail

1. Use the Projects Table to locate the project about which you would like detailed information.
2. Click on the description of the project in the Projects Table.
3. The EIMS will display the Project Detail page for the selected project.

To Run a Report

4. Select projects from the Projects Table to include in the report.
5. Click the **Project List Report** link in the navigation bar.
6. The EIMS will display the Project List Report in an Adobe Acrobat window.

Mapping Assets

To Map Selected Assets

1. Use the **Select** button in the Projects Table to select the desired project(s).
2. Click the **Map Selected Project Assets** link on top of the table.
3. The EIMS will finds the assets associated with the selected projects and display them on the map.

To Map All Assets

1. Click the **Map All Assets** link on top of the table.
2. The EIMS will display all assets on the map.

B.4.2 Project Detail Page

The Project Detail page displays project information in a series of tabs. Users with the EDIT permission can view and edit the project data, and create a new project. Users with the READONLY permission are only able to view the data. Many of the links on this page will be invisible/disabled to the browser user.

Edit Links

Edit. Click **Edit** to turn on the Edit Mode. The Validate, Revert, and Save links will be enabled. The tab items will be enabled for editing. The Edit Mode must be turned off before switching to different tabs. This link is invisible for users with the browser permission.

Validate. Once in the Edit Mode, the user can click **Validate** to perform the data validation. If any errors are found, an error message will be displayed next to the corresponding data item. This link is invisible for users with the browser permission.

Revert. The user can revert any changes made by clicking **Revert**. Any unsaved changes will be reverted back to the original values. This link is invisible for users with the browser permission.

Save. The user can save changes made by clicking **Save**. This automatically turns off the Edit Mode. This link is invisible for users with the browser permission.

Navigation Links

The links at the bottom of the Project tab allow you to view and create assets, alternatives, commitments, and documents associated with the currently selected project.

Asset List. Use this link to view the list of assets associated with the current project.

Assign/Unassign Assets. Click Assign/Unassign Assets to assign or remove assets from the currently selected project.

Alternative List. Use this link to view the list of alternatives associated with the current project.

New Alternative. Click New Alternative to create a new alternative for the currently selected project. The new alternative will be part of the current project.

Commitment List. Use this link to view the list of commitments associated with the current project.

New Commitment. Click **New Commitment** to create a new commitment for the currently selected project. The new commitment will be part of the current Project. This link is invisible for users with the browser permission.

Documents and Links. Use this link to display the list of documents linked to the current project.

Report. Use this link to display the Project Detail Report.

Back to the List of Projects. Use this link to return to the Project List page.

To Create a New Alternative

1. Click the **New Alternative** link at the bottom of the page.
2. The first tab of the New Alternative page will be displayed with the Edit Mode on. The name of the currently selected project will be displayed at the top of the page.
3. Enter alternative data. Click **Save** to save your changes.
4. Click the other tabs to enter data in different tabs.
5. When done entering data, click the **Back to the Project Detail** to return to the Project Detail page.

To Create a New Commitment

1. Click the **New Commitment** link at the bottom of the page.
2. The first tab of the New Commitment page will be displayed with the Edit Mode on. The name of the currently selected project will be displayed at the top of the page.
3. Enter commitment data. Click **Save** to save your changes.
4. Click the other tabs to enter data in different tabs.
5. When done entering data, click the **Back to the Project Detail** to return to the Project Detail page.

B.4.3 Asset Assignment Page

The Asset Assignment page displays the name of the currently selected project at the top. The list box on the left shows the assets that are currently assigned to the project (if any). The list box on the right shows assets that are not assigned to the project.

To Get to This Page

1. Click the **Projects** link in the navigation bar.
2. Click on a desired project from the Project Table. The Project Detail page will be displayed.

3. Click on the **Assign/Unassign Assets** at the bottom of the Project Detail page.

To Assign Asset(s) to a Project

1. From the list box on the right, select the assets that you want to assign to the current project. Use the Ctrl or Shift key for multiple selection.
2. Click **Assign Selected Assets to the Project** at the bottom of the right list box.
3. The selected asset(s) will appear in the list box on the left.
4. Click **Back to the Project Detail** at the bottom of the screen to return to the Project Detail page.

To Remove Asset(s) from a Project

1. From the list box on the left, select the assets that you want to remove from the current project. Use the Ctrl or Shift key for multiple selection.
2. Click **Remove Selected Assets from the Project** at the bottom of the left list box.
3. The selected asset(s) will appear in the list box on the right.
4. Click **Back to the Project Detail** at the bottom of the screen to return to the Project Detail page.

B.4.4 New Project Page

To Create a New Project

1. From the left navigation bar, click **Add New**.
2. The first tab of the New Project page will be displayed with the Edit Mode on.
3. Enter project data. Click **Save** to save your changes.
4. Click the other tabs to enter data in different tabs.
5. When done entering data, click **Back to the List of Projects** to return to the Project List page.

B.5 ALTERNATIVES

B.5.1 Alternatives List Page

Alternatives Table

The Alternatives Table displays a list of alternatives of the currently selected entity (plan, project, or asset). Each row in the table represents an alternative

record. The table shows the records in blocks of 10. Use the page links at the bottom of the table to see additional records.

The Alternatives Table also provides you with access to the Alternative Detail page.

To Use the Alternatives Table

1. The Alternatives Table has special features that make it easy to look at all or selected alternatives, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the Table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select an Alternative

1. In the Alternatives Table, click the **Select** button of the alternative you want.
2. The EIMS will highlight the selected alternative in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect an Alternative

1. In the Alternatives Table, click the **Select** button of the selected alternative.
2. The EIMS will remove the record from the set of selected items.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect All

1. Click **Unselect All** at the bottom of the Alternatives Table.
2. The EIMS will unselect the selected alternatives in all pages.
3. The **Selected total** and **Selected on this page** status labels will display 0.

To Delete an Alternative

1. In the plans Table, click the **Select** button of the alternative you want to delete.
2. The EIMS will highlight the selected alternative in the table list.
3. Click **Delete Selected Alternatives**.
4. The system will prompt you for confirmation. Click **OK**.

5. The selected alternative and associated data will be deleted.

B.5.2 Alternative Detail Page

Edit Links

Edit. Click **Edit** to turn on the Edit Mode. The Validate, Revert, and Save links will be enabled. The tab items will be enabled for editing. The Edit Mode must be turned off before switching to different tabs. This link is invisible for users with the browser permission.

Validate. Once in the Edit Mode, the user can click **Validate** to perform the data validation. If any errors are found, an error message will be displayed next to the corresponding data item. This link is invisible for users with the browser permission.

Revert. The user can revert any changes made by clicking **Revert**. Any unsaved changes will be reverted back to the original values. This link is invisible for users with the browser permission.

Save. The user can save changes made by clicking **Save**. This automatically turns off the Edit Mode. This link is invisible for users with the browser permission.

Navigation Links

The links at the bottom of the Alternative Detail tab allow you to view and create public process steps, analyses, and documents associated with the currently selected alternative.

Public Process Steps. Use this link to view the list of public process steps associated with the current alternative.

Analyses. Click this link to view analyses associated with the current alternative.

Documents and Links. Use this link to display the list of documents linked to the current alternative.

Back to the List of Project Alternatives. Use this link to return to the Project Alternatives List page.

B.5.3 Public Process Steps List Page

Public Process Steps Table

The Public Process Steps Table displays all the public process steps of the currently selected alternative. Each row in the table represents a public process step. The table shows the records in blocks of 10. Use the page links at the bottom of the table to see additional records.

The Public Process Steps Table also provides you with access to the Public Process Steps Detail page.

To Use the Public Process Steps Table

1. The Table has special features that make it easy to look at all or selected alternatives, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select a Record

1. In the Table, click the **Select** button of the record you want.
2. The EIMS will highlight the selected record in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect a Record

1. In the Alternatives Table, click the **Select** button of the selected record.
2. The EIMS will remove the record from the set of selected items.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect All

1. Click **Unselect All** at the bottom of the Table.
2. The EIMS will unselect the selected records in all pages.
3. The **Selected total** and the **Selected on this page** status labels will display 0.

Navigation Links

Delete Selected Steps. Use this link to delete the selected steps in the Table.

New Step. Use this link to create a new public process step.

Back to the Alternative Detail. Use this link to return to the Alternative Detail page.

To Delete a Record

1. In the Table, click the **Select** button of the record you want to delete.
2. EIMS will highlight the selected alternative in the table list.
3. Click **Delete Selected Steps**.

4. The system will prompt you for confirmation. Click **OK**.
5. The selected record and associated data will be deleted.

To Create a New Step

1. Click the **New Step** link at the bottom of the page.
2. The New Step page will be displayed with the Edit Mode on. The name of the currently selected alternative will be displayed on top of the page.
3. When done entering data, click **Save** to save your changes.
4. Click **Back to the List of Public Process Steps**.

B.5.4 Public Process Detail Screen

Edit Links

Edit. Click **Edit** to turn on the Edit Mode. The Validate, Revert, and Save links will be enabled. The tab items will be enabled for editing. The Edit Mode must be turned off before switching to different tabs. This link is invisible for users with the browser permission.

Validate. Once in the Edit Mode, the user can click **Validate** to perform the data validation. If any errors are found, the error message will be displayed next to the corresponding data item. This link is invisible for users with the browser permission.

Revert. The user can revert any changes made by clicking **Revert**. Any unsaved changes will be reverted back to the original values. This link is invisible for users with the browser permission.

Save. The user can save changes made by clicking **Save**. This automatically turns off the Edit Mode. This link is invisible for users with the browser permission.

Navigation Links

The links at the bottom of the Public Process Detail page allow you to view and create actions and documents associated with the currently selected public process step.

Actions. Click this link to view actions associated with the current public process step.

Documents and Links. Use this link to display the list of documents linked to the current record.

Back to the List of Public Process Steps. Use this link to return to the Public Process Step List page.

B.5.5 Actions List Page

Actions Table

The Actions Table displays a list of actions of the currently selected public process step. Each row in the table represents an action record. The table shows the records in blocks of 10. Use the page links at the bottom of the table to see additional records.

The Actions Table also provides you with access to the Action Detail page.

To Use the Table

1. The Table has special features that make it easy to look at all or selected plans, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the Table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select a Record

1. In the Table, click the **Select** button of the record you want.
2. The EIMS will highlight the selected record in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect a Record

1. In the Table, click the **Select** button of the selected record.
2. The EIMS will remove the record from the set of selected items.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect All

1. Click **Unselect All** at the bottom of the Table.
2. The EIMS will unselect the selected records in all pages.
3. The **Selected total** and the **Selected on this page** status labels will display 0.

To Display the Detail Page

1. In the Table, locate the record about which you would like detailed information.

2. Click on the description of the record in the Table.
3. The EIMS will display the Detail page for the selected record.

Navigation Links

Delete Selected Actions. Use this link to delete the selected actions from the Table.

New Action. Use this link to create a new action.

Back to the Step Detail. Use this link to return to the Public Process Step Detail page.

To Delete a Record

1. In the Table, click the **Select** button of the record you want to delete.
2. EIMS will highlight the selected record in the table list.
3. Click **Delete Selected Actions**.
4. The system will prompt you for confirmation. Click **OK**.
5. The selected action and associated data will be deleted.

To Create a New Action

1. Click the **New Action** link at the bottom of the page.
2. The New Action page will be displayed with the Edit Mode on. The name of the currently selected public process step will be displayed on top of the page.
3. When done entering data, click **Save** to save your changes.
4. Click **Back to the Step Detail**.

B.5.6 Action Detail Page

Edit Links

Edit. Click **Edit** to turn on the Edit Mode. The Validate, Revert, and Save links will be enabled. The tab items will be enabled for editing. The Edit Mode must be turned off before switching to different tabs. This link is invisible for users with the browser permission.

Validate. Once in the Edit Mode, the user can click **Validate** to perform the data validation. If any errors are found, the error message will be displayed next to the corresponding data item. This link is invisible for users with the browser permission.

Revert. The user can revert any changes made by clicking **Revert**. Any unsaved changes will be reverted back to the original values. This link is invisible for users with the browser permission.

Save. The user can save changes made by clicking **Save**. This automatically turns off the Edit Mode. This link is invisible for users with the browser permission.

Navigation Links

Documents and Links. Use this link to display the list of documents linked to the current record.

Back to the List of Actions. Use this link to return to the Actions List page.

B.5.7 Analysis List Page

Analysis Table

The Analysis Table displays a list of analyses of the currently selected alternative. Each row in the table represents an analysis record. The table shows the records in blocks of 10. Use the page links at the bottom of the table to see additional records.

The Analysis Table also provides you with access to the Analysis Detail page.

To Use the Table

1. The Table has special features that make it easy to look at all or selected analysis, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select a Record

1. In the Table, click the **Select** button of the record you want.
2. The EIMS will highlight the selected record in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect a Record

1. In the Table, click the **Select** button of the selected record.
2. The EIMS will remove the record from the set of selected items.

3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect All

1. Click **Unselect All** at the bottom of the Table.
2. EIMS will unselect the selected records in all pages.
3. The **Selected total** and the **Selected on this page** status labels will display 0.

Navigation Links

Delete Selected Analyses. Use this link to delete the selected analysis from the Table.

New Analysis. Use this link to create a new analysis.

Back to the Alternative Detail. Use this link to return to the Alternative Detail page.

To Delete a Record

1. In the Table, click the **Select** button of the record you want to delete.
2. EIMS will highlight the selected record in the table list.
3. Click **Delete Selected Analyses**.
4. The system will prompt you for confirmation. Click **OK**.
5. The selected analyses along with associated data will be deleted.

To Create a New Step

1. Click the **New Step** link at the bottom of the page.
2. The New Analysis page will be displayed with the Edit Mode on. The name of the currently selected alternative will be displayed on top of the page.
3. When done entering data, click **Save** to save your changes.
4. Click **Back to the Alternative Detail**.

B.5.8 Analysis Detail Page

Edit Links

Edit. Click **Edit** to turn on the Edit Mode. The Validate, Revert, and Save links will be enabled. The tab items will be enabled for editing. The Edit Mode must be turned off before switching to different tabs. This link is invisible for users with the browser permission.

Validate. Once in the Edit Mode, the user can click **Validate** to perform the data validation. If any errors are found, the error message will be displayed next to

the corresponding data item. This link is invisible for users with the browser permission.

Revert. The user can revert any changes made by clicking **Revert**. Any unsaved changes will be reverted back to the original values. This link is invisible for users with the browser permission.

Save. The user can save changes made by clicking **Save**. This automatically turns off the Edit Mode. This link is invisible for users with the browser permission.

Navigation Links

The links at the bottom of the Analysis Detail tab allow you to view and create impacts indicated by the analysis and documents associated with the currently selected alternative.

Impacts. Click this link to view impacts associated with the current analysis.

Documents and Links. Use this link to display the list of documents linked to the current analysis.

Back to the List of Project Alternatives. Use this link to return to the Analysis List page.

B.5.9 Impacts List Page

Impacts Table

The Impacts Table displays a list of impacts identified through the currently selected analysis. Each row in the table represents an impact record. The table shows the records in blocks of 10. Use the page links at the bottom of the table to see additional records.

The Impacts Table also provides you with access to the Analysis Detail page.

To Use the Table

1. The Table has special features that make it easy to look at all or selected plans, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the Table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select a Record

1. In the Table, click the **Select** button of the record you want.

2. The EIMS will highlight the selected record in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect a Record

1. In the Table, click the **Select** button of the selected record.
2. The EIMS removes the highlighting from the record.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect All

1. Click **Unselect All** at the bottom of the Table.
2. The EIMS will unselect the selected records in all pages.
3. The **Selected total** and the **Selected on this page** status labels will display 0.

To Display the Detail Page

1. In the Table, locate the record about which you would like detailed information.
2. Click on the description of the record in the Table.
3. EIMS will display the Detail page for the selected record.

Navigation Links

Delete Selected Impacts. Use this link to delete the selected impacts from the Table.

New Impact. Use this link to create a new impact.

Back to the Analysis Detail. Use this link to return to the Analysis Detail page.

To Delete a Record

1. In the Table, click the **Select** button of the record you want to delete.
2. EIMS will highlight the selected record in the table list.
3. Click **Delete Selected Impacts**.
4. The system will prompt you for confirmation. Click **OK**.
5. The selected impact and associated data will be deleted.

To Create a New Impact

1. Click the **New Impact** link at the bottom of the page.

2. The New Impact page will be displayed with the Edit Mode on. The name of the currently selected analysis will be displayed on top of the page.
3. When done entering data, click **Save** to save your changes.
4. Click **Back to the List of Impacts**.

B.5.10 Impact Detail Page

Edit Links

Edit. Click **Edit** to turn on the Edit Mode. The Validate, Revert, and Save links will be enabled. The tab items will be enabled for editing. The Edit Mode must be turned off before switching to different tabs. This link is invisible for users with the browser permission.

Validate. Once in the Edit Mode, the user can click **Validate** to perform the data validation. If any errors are found, the error message will be displayed next to the corresponding data item. This link is invisible for users with the browser permission.

Revert. The user can revert any changes made by clicking **Revert**. Any unsaved changes will be reverted back to the original values. This link is invisible for users with the browser permission.

Save. The user can save changes made by clicking **Save**. This automatically turns off the Edit Mode. This link is invisible for users with the browser permission.

Navigation Links

Documents and Links. Use this link to display the list of documents linked to the current impact.

Back to the List of Impacts. Use this link to return to the Impacts List page.

B.6 ASSETS

The Assets module supports viewing asset data. It allows you to view the detailed characteristics of an asset and to associate alternatives, commitments, and documents with an asset.

To Get to This Page

1. Click on the **Assets** link in the navigation bar.

There are three types of assets in EIMS – Highway Segment, Bridge, and Facility/Other Asset. You can use the left navigation bar to view all assets or view assets of a certain type.

To View All Assets

1. Click **List of All Assets** in the navigation bar.

To View Highway Segments Only

1. Click **Highway Segment List** in the navigation bar.

To View Bridges Only

1. Click **Bridge List** in the navigation bar.

To View Maintenance Facilities Only

1. Click **Maintenance Facility List** in the navigation bar.

B.6.1 Assets List Page

Assets Table

The Assets Table displays all the assets defined in the EIMS database. It contains summary information about each asset. The table shows the assets in blocks of 10. Use the page links at the bottom of the table to see additional assets.

The Assets Table also provides you with access to the Asset Detail page, which displays detailed data about each asset.

To Use the Asset Table

1. The Asset Table has special features that make it easy to look at all or selected assets, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the Table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select a Record

1. In the Table, click the **Select** button of the record you want.
2. The EIMS will highlight the selected asset in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect a Record

1. In the Assets Table, click the **Select** button of the selected record.

2. The EIMS will remove the record from the set of selected items.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect All

1. Click **Unselect All** at the bottom of the Table.
2. The EIMS will unselect the selected records in all pages.
3. The **Selected total** and the **Selected on this page** status labels will display 0.

To Display Asset Detail

1. In the Table, locate the record about which you would like detailed information.
2. Click on the description of the record in the Table.
3. The EIMS will display the Detail page for the selected record.

To Run a Report

4. Select assets from the Asset Table to include in the report.
5. Click the **Asset List Report** link in the navigation bar.
6. The EIMS will display the Asset List Report in an Adobe Acrobat window.

Mapping Assets

To Map Selected Assets

1. Use the **Select** button in the Assets Table to select the desired asset(s).
2. Click the **Map Selected Assets** link on top of the table.
3. The EIMS will finds the assets and will display them on the map.

To Map All Assets

1. Click the **Map All Assets** link on top of the table.
2. The EIMS will display all the assets on the map.

To Map Nearby Assets

1. Click the **Map Nearby Assets** link on top of the table.
2. The EIMS will display the nearby assets on the map.

B.6.2 Asset Detail Page

The Asset Detail page displays asset information in a series of tabs. Users with the EDIT permission can view and edit the asset data, and create a new asset. Users with the READONLY permission are only able to view the data. Many of the links on this page will be invisible/disabled to the browser user.

Edit Links

Edit. Click **Edit** to turn on the Edit Mode. The Validate, Revert, and Save links will be enabled. The tab items will be enabled for editing. The Edit Mode must be turned off before switching to different tabs. This link is invisible for users with the browser permission.

Validate. Once in the Edit Mode, the user can click **Validate** to perform the data validation. If any errors are found, the error message will be displayed next to the corresponding data item. This link is invisible for users with the browser permission.

Revert. The user can revert any changes made by clicking **Revert**. Any unsaved changes will be reverted back to the original values. This link is invisible for users with the browser permission.

Save. The user can save changes made by clicking **Save**. This automatically turns off the Edit Mode. This link is invisible for users with the browser permission.

Navigation Links

The links at the bottom of the Asset detail page allow you to view and create alternatives, commitments, and documents associated with the currently selected asset.

Alternative List. Use this link to view the list of alternatives associated with the current asset.

New Alternative. Click **New Alternative** to create a new alternative for the currently selected asset. The new alternative will be part of the current asset.

Commitment List. Use this link to view the list of commitments associated with the current asset.

New Commitment. Click **New Commitment** to create a new commitment for the currently selected asset. The new commitment will be part of the current Asset. This link is invisible for users with the browser permission.

Documents and Links. Use this link to display the list of documents linked to the current asset.

Report. Use this link to display a detail report for the current asset.

Back to the List of Assets. Use this link to return to the Asset List page. Depending on the asset type, this link will read Back to the List of Maintenance Facility, Back to the List of Highway Segments, or Back to the List of Bridges.

To Create a New Alternative

1. From the Assets Table, click a desired asset for which you want to create an alternative.
2. The Asset Detail page will be displayed. Click the **New Alternative** link at the bottom of the page.
3. The first tab of the New Alternative page will be displayed with the Edit Mode on. The name of the currently selected asset will be displayed at the top.
4. Enter the alternative data. Click **Save** to save your changes.
5. Click the other tabs to enter data in different tabs.
6. When done entering data, click **Back to the Asset Detail** to return to the Asset Detail page.

To Create a New Commitment

1. From the Assets Table, click a desired asset for which you want to create a commitment.
2. The Asset Detail page will be displayed. Click the **New Commitment** link at the bottom of the page.
3. The first tab of the New Commitment page will be displayed with the Edit Mode on. The name of the currently selected asset will be displayed at the top.
4. Enter the commitment data. Click **Save** to save your changes.
5. Click the other tabs to enter data in different tabs.
6. When done entering data, click **Back to the Asset Detail** to return to the Asset Detail page.

B.7 COMMITMENTS

The Commitments module allows you to view all the commitments defined in the EIMS and to create actions associated with a commitment.

To Get to This Page

1. Click on the **Commitments** link in the navigation bar.

B.7.1 Commitments List Page

Commitments Table

The Commitments Table displays all the commitments defined in the EIMS database. It shows the associated entity (e.g., project or asset) for each commitment. The table lists the commitments in blocks of 10. Use the page links at the bottom of the table to see additional commitments.

The Commitments Table also provides you with access to the Commitment Detail page, which displays detailed data about each commitment.

To Use the Table

1. The Table has special features that make it easy to look at all or selected commitments, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select a Record

1. In the Table, click the **Select** button of the record you want.
2. The EIMS will highlight the selected record in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect a Record

1. In the Table, click the **Select** button of the selected record.
2. The EIMS will remove the record from the set of selected items.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect All

1. Click the **Unselect All** at the bottom of the Table.
2. The EIMS will unselect the selected records in all pages.
3. The **Selected total** and the **Selected on this page** status labels will display 0.

To Delete a Record

1. In the Table, click the **Select** button of the record you want to delete.

2. The EIMS will highlight the selected record in the table list.
3. Click **Delete Selected Commitments**.
4. The system will prompt you for confirmation. Click **OK**.
5. The selected commitment along with associated data will be deleted.

To Display Commitment Detail

1. In the Table, locate the record about which you would like detailed information.
2. Click on the description of the record in the table.
3. The EIMS will display the Detail page for the selected record.

To Run a Report

1. Select commitments from the Commitment Table to include in the report.
2. Click the **Commitment List Report** link in the navigation bar.
3. The EIMS will display the Commitment List Report in an Adobe Acrobat window.

B.7.2 Commitment Detail Page

The Commitment Detail page displays commitment data. Users with the EDIT permission can view and edit the data, and create a new commitment. Users with the READONLY permission are only able to view the data. Many of the links on this page will be invisible/disabled to the browser user.

Edit Links

Edit. Click **Edit** to turn on the Edit Mode. The Validate, Revert, and Save links will be enabled. The data items will be enabled for editing. This link is invisible for users with the browser permission.

Validate. Once in the Edit Mode, the user can click **Validate** to perform the data validation. If any errors are found, the error message will be displayed next to the corresponding data item. This link is invisible for users with the browser permission.

Revert. The user can revert any changes made by clicking **Revert**. Any unsaved changes will be reverted back to the original values. This link is invisible for users with the browser permission.

Save. The user can save changes made by clicking **Save**. This automatically turns off the Edit Mode. This link is invisible for users with the browser permission.

Navigation Links

The links at the bottom of the Commitment Detail page allow you to view and create actions and documents associated with the currently selected commitment.

Actions. Use this link to view the list of actions associated with the current commitment.

Documents and Links. Use this link to display the list of documents linked to the current commitment.

Report. Use this link to display the Commitment Detail Report.

Back to the List of Commitments. Use this link to return to the Commitment List page.

B.7.3 Commitment Actions List Page

Commitment Actions Table

The Commitment Actions Table displays a list of actions of the currently selected commitment. Each row in the table represents an action record. The table shows the records in blocks of 10. Use the page links at the bottom of the table to see additional records.

The Commitment Actions Table also provides you with access to the Commitment Action Detail page.

To Use the Table

1. The Table has special features that make it easy to look at all or selected plans, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the Table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select a Record

1. In the Table, click the **Select** button of the record you want.
2. The EIMS will highlight the selected record in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect a Record

1. In the Table, click the **Select** button of the selected record.

2. The EIMS will remove the record from the set of selected items.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect All

1. Click **Unselect All** at the bottom of the Table.
2. The EIMS will unselect the selected records in all pages.
3. The **Selected total** and the **Selected on this page** status labels will display 0.

To Display the Detail Page

1. In the Table, locate the record about which you would like detailed information.
2. Click on the description of the record in the Table.
3. The EIMS will display the Detail page for the selected record.

Navigation Links

Delete Selected Actions. Use this link to delete the selected actions from the Table.

New Action. Use this link to create a new commitment action.

Back to the Commitment Detail. Use this link to return to the Commitment Detail page.

To Delete a Record

1. In the Table, click the **Select** button of the record you want to delete.
2. The EIMS will highlight the selected record in the table list.
3. Click **Delete Selected Actions**.
4. The system will prompt you for confirmation. Click **OK**.
5. The selected action along with associated data will be deleted.

To Create a New Action

1. Click the **New Action** link at the bottom of the page.
2. The New Action page will be displayed with the Edit Mode on. The name of the currently selected commitment will be displayed on top of the page.
3. When done entering data, click **Save** to save your changes.
4. Click **Back to the List of Actions.**

B.7.4 Commitment Action Detail Page

Edit Links

Edit. Click **Edit** to turn on the Edit Mode. The Validate, Revert, and Save links will be enabled. The tab items will be enabled for editing. The Edit Mode must be turned off before switching to different tabs. This link is invisible for users with the browser permission.

Validate. Once in the Edit Mode, the user can click **Validate** to perform the data validation. If any errors are found, the error message will be displayed next to the corresponding data item. This link is invisible for users with the browser permission.

Revert. The user can revert any changes made by clicking **Revert**. Any unsaved changes will be reverted back to the original values. This link is invisible for users with the browser permission.

Save. The user can save changes made by clicking **Save**. This automatically turns off the Edit Mode. This link is invisible for users with the browser permission.

Navigation Links

Documents and Links. Use this link to display the list of documents linked to the current record.

Back to the List of Actions. Use this link to return to the Actions List page.

B.7.5 Creating a Commitment

Commitments can be created at the plan level, project level, or at the asset level. To create a commitment, go to either the Plans module, Projects module, or Assets module, then create a commitment for a desired entity.

B.8 REQUIREMENTS/BEST PRACTICE SETS

The Requirements/Best Practices Sets module supports viewing and creating sets of requirements and best practices.

To Get to This Page

1. Click on the **Requirements/Best Practices Sets** link in the navigation bar.

B.8.1 Requirements/Best Practices Sets List Page

Requirements/Best Practices Sets Table

The Requirements/Best Practices Sets Table displays all the requirements/best practices sets defined in the EIMS database. The table lists the records in blocks of 10. Use the page links at the bottom of the table to see additional sets.

The Requirements/Best Practices Sets Table also provides you with access to the Requirements/Best Practices Set Detail page.

To Use the Table

1. The Table has special features that make it easy to look at all or selected commitments, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the Table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select a Record

1. In the Table, click the **Select** button of the record you want.
2. The EIMS will highlight the selected record in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect a Record

1. In the Table, click the **Select** button of the selected item.
2. The EIMS will remove the record from the set of selected items.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect All

1. Click **Unselect All** at the bottom of the Table.
2. The EIMS will unselect the selected records in all pages.
3. The **Selected total** and the **Selected on this page** status labels will display 0.

To Display Record Detail

1. Use the Table to locate the record about which you would like detailed information.

2. Click on the description of the record in the table.
3. The EIMS will display the Detail page.

Navigation Links

Delete Selected Set. Use this link to delete the selected records from the Table.

Add New Set. Use this link to create a new set.

To Delete a Record

1. In the Table, click the **Select** button of the record you want to delete.
2. The EIMS will highlight the selected record in the table list.
3. Click **Delete Selected Set**.
4. The system will prompt you for confirmation. Click **OK**.
5. The selected set and associated data will be deleted.

To Create a New Requirements/Best Practices Set

1. Click **Add New Set**.
2. The New Requirements/Best Practices Set page will be displayed with the Edit Mode on.
3. Enter the data. Click **Save** to save your changes.
4. When done entering data, click **Back to the List of Requirement Sets**.

B.8.2 Requirements/Best Practices Set Detail Page

Users with the EDIT permission can view and edit the data, and create a new requirement/best practice. Users with the READONLY permission are only able to view the data. Many of the links on this page will be invisible/disabled to the browser user.

Edit Links

Edit. Click **Edit** to turn on the Edit Mode. The Validate, Revert, and Save links will be enabled. The data items will be enabled for editing. This link is invisible for users with the browser permission.

Validate. Once in the Edit Mode, the user can click **Validate** to perform the data validation. If any errors are found, the error message will be displayed next to the corresponding data item. This link is invisible for users with the browser permission.

Revert. The user can revert any changes made by clicking **Revert**. Any unsaved changes will be reverted back to the original values. This link is invisible for users with the browser permission.

Save. The user can save changes made by clicking **Save**. This automatically turns off the Edit Mode. This link is invisible for users with the browser permission.

Navigation Links

The links at the bottom of the Requirements/Best Practices Set Detail page allow you to view and create requirements and documents associated with the currently selected set.

Requirements/Best Practices. Use this link to view the list of requirements associated with the currently selected set.

Documents and Links. Use this link to display the list of documents linked to the current set.

Back to the List of Requirement Sets. Use this link to return to the Requirements/Best Practices Set List page.

B.8.3 Requirements/Best Practices List Page

Requirements/Best Practices Table

The Requirements/Best practices displays a list of requirements/best practices associated with the currently selected set. Each row in the table represents a record. The table shows the records in blocks of 10. Use the page links at the bottom of the table to see additional records.

The Requirements/Best practices Table also provides you with access to the Requirement/Best practice Detail page.

To Use the Table

1. The Table has special features that make it easy to look at all or selected plans, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the Table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select a Record

1. In the Table, click the **Select** button of the record you want.
2. The EIMS will highlight the selected record in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect a Record

1. In the Table, click the **Select** button of the selected record.
2. The EIMS will remove the record from the set of selected items.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect All

1. Click the **Unselect All** at the bottom of the Table.
2. The EIMS will unselect the selected records in all pages.
3. The **Selected total** and the **Selected on this page** status labels will display 0.

To Display the Detail Page

1. In the Table, locate the record about which you would like detailed information.
2. Click on the description of the record in the Table.
3. The EIMS will display the Detail page for the selected record.

Navigation Links

Delete Selected Requirements. Use this link to delete the selected requirements from the Table.

New Requirement/Best Practice. Use this link to create a new requirement/best practice.

Back to the Set Detail. Use this link to return to the Set Detail page.

To Delete a Record

1. In the Table, click the **Select** button of the record you want to delete.
2. The EIMS will highlight the selected record in the table list.
3. Click **Delete Selected Requirements**.
4. The system will prompt you for confirmation. Click **OK**.
5. The selected action and associated data will be deleted.

To Create a New Requirement/Best Practice

1. Click the **New Requirement/Best Practice** link at the bottom of the page.
2. The New Requirement/Best Practice page will be displayed with the Edit Mode on. The name of the currently selected set will be displayed on top of the page.

3. When done entering data, click **Save** to save your changes.
4. Click the Back to the List of Requirements/Best Practices.

B.8.4 Requirements/Best Practices Detail Page

Users with the EDIT permission can view and edit the data, and create a new requirement/best practice. Users with the READONLY permission are only able to view the data. Many of the links on this page will be invisible/disabled to the browser user.

Edit Links

Edit. Click **Edit** to turn on the Edit Mode. The Validate, Revert, and Save links will be enabled. The data items will be enabled for editing. This link is invisible for users with the browser permission.

Validate. Once in the Edit Mode, the user can click **Validate** to perform the data validation. If any errors are found, the error message will be displayed next to the corresponding data item. This link is invisible for users with the browser permission.

Revert. The user can revert any changes made by clicking **Revert**. Any unsaved changes will be reverted back to the original values. This link is invisible for users with the browser permission.

Save. The user can save changes made by clicking **Save**. This automatically turns off the Edit Mode. This link is invisible for users with the browser permission.

Navigation Links

Documents and Links. Use this link to display the list of documents linked to the current requirement/best practice.

Back to the List of Requirements/Best Practices. Use this link to return to the Requirements/Best Practices List page.

B.9 DOCUMENTS

The Documents module supports viewing and creating document links.

To Get to This Page

1. Click on the **Documents** link in the navigation bar.

B.9.1 Documents List Page

Documents Table

The Documents Table displays all the document links defined in the EIMS database. It shows the type of document and the entity with which each document is associated. The table lists the records in blocks of 16. Use the page links at the bottom of the table to see additional documents.

To Use the Table

1. The Table has special features that make it easy to look at all or selected commitments, as described here:

To do this...	Do this...
To see a particular page	Click on the page number links which appear at the bottom of the Table.
To sort records based on a data field	Click on the column header to sort by this field in ascending order. Click again to sort in descending order.

To Select a Record

1. In the Documents Table, click the **Select** button of the record you want.
2. The EIMS will highlight the selected record in the table list.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To Unselect a Record

1. In the Documents Table, click the **Select** button of the selected record.
2. The EIMS will remove the record from the set of selected items.
3. The **Selected total** and the **Selected on this page** status labels at the bottom of the table will be updated.

To View a Linked Document

1. In the Documents Table, click on the description of the document that you want to see.
2. If the selected document is a URL, then the EIMS will open the URL in a new browser window. If it's a file (i.e. Word, PDF, etc.), then the EIMS will open the file with an appropriate program.

Navigation Links

Unselect All. Use this link to unselect the selected documents from the Table.

Delete Selected. Use this link to delete the selected document from the Table.

Add New Document. Use this link to add a new document link.

To Unselect All

1. Click **Unselect All** at the bottom of the Table.
2. The EIMS will unselect the selected records in all pages.
3. The **Selected total** and the **Selected on this page** status labels will display 0.

To Delete a Record

1. In the Table, click the **Select** button of the record you want to delete.
2. The EIMS will highlight the selected record in the table list.
3. Click **Delete Selected**.
4. The system will prompt you for confirmation. Click **OK**.
5. The selected document reference is deleted.

B.9.2 Add New Document Page

To Create a New Document Link

1. Click **Add New Document**.
2. The New Document page will be displayed.
3. Select an association in the **Apply to** picklist.
4. Choose the desired item from the **Select** picklist.
5. Pick either **File** or **URL** document type. If you selected **File**, then use the **Browse** button to locate the desired file to upload. If you selected **URL**, enter the web site address.
6. Click **Submit Document**. The Document List page will be displayed.

B.10 SYSTEM ADMINISTRATION

B.10.1 User Administration

Each EIMS user has an account that provides him or her with access to the system. Each user has a set of account privileges that determine which features and functions of the software they are permitted to use.

There is no user interface for user administration. Adding or editing users must be done at the database level. To add a new user in EIMS, create a new record in the USERS table. In the USER_ROLE_KEY column, enter 1 for Administrator or enter 2 for Viewer. The Administrator role has edit rights, and the Viewer role

has read-only rights. The roles are defined in the USER_ROLES table. Once you create a new user account in the database, the new user can log into EIMS with his/her user name and password.

B.10.2 System Configuration

Before the end user can start using EIMS, the system administrator needs to configure the system, load data into the database, and compile any spatial data files that may be used. Refer to the instructions included on the EIMS installation CD for additional guidance on these topics.