GASB Statement 34 Compliance:
Development of a Fixed Asset (Infrastructure) MIS – Phase 1

For the
Alabama Department of Transportation

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16. Abstract

This project defined the scope, goals, and high-level requirements for the Alabama Department of Transportation's Asset Management System, so that it will comply with the General Accounting Standards Board policy 34. The system will provide a network-level planning tool for needs analysis and resource allocation, and will evaluate the impacts of variations in funding levels.

The objectives of the new system are to institutionalize data collection, validation, and storage; assure internal consistency of the data; leverage current information systems; provide reporting and information retrieval that is timely and distinct (providing ad-hoc and drill down decision support); conduct comparable analyses between years; enhance existing algorithms and projections and enhance intuitive analysis through visualization

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Executive Summary

This project was conducted for the Alabama Department of Transportation, to define the scope, goals, and high-level requirements for a rigorous Asset Management System. As developed, the system complies with the General Accounting Standards Board policy 34. The system will provide a network-level planning tool for needs analysis and resource allocation, and will evaluate the impacts of variations in funding levels.

The objectives of the new system are to institutionalize data collection, validation, and storage; assure internal consistency of the data; leverage current information systems; provide reporting and information retrieval that is timely and distinct (providing ad-hoc and drill down decision support); conduct comparable analyses between years; enhance existing algorithms and projections and enhance intuitive analysis through visualization.

It is envisioned that the system will be developed through a series of four projects, which were defined during this research, and which are discussed in more detail in the body of this report.

Section 1.0
Background and Business Context

The Alabama Department of Transportation (ALDOT) faces critical challenges as it moves forward into the 21st century. ALDOT needs management tools and systems refinement to meet these challenges and to continue to effectively build and maintain the state's transportation system. Some of these challenges are reviewed in this section, along with some of ALDOT's current software tools that might be incorporated as part of an improved future management system.

1.1 Aging Transportation Systems

For most of the 20th Century the United States focused its transportation system efforts on construction of new highways and interstates. The early 1900's saw the initiation of a national highway system. In the 1950's the United States began the development of the Interstate Highway System that was completed in the early 1990's. As a result, there is a shift from new construction to an emphasis on maintenance, management, and reconstruction of existing infrastructure. The shift is one of the drivers causing many transportation organizations to seek improvement in their planning processes and ALDOT is no exception.

1.2 Aging Workforce and Personnel Constraints

Some states have lost significant numbers of staff in recent years as a result of government reinvention and accompanying downsizing and outsourcing. The trend is likely to continue. Furthermore, ALDOT is particularly vulnerable in that many of their most experienced employees are nearing retirement age and the organization has been unable to adequately prepare personnel to replace that outgoing experience and expertise.

1.3 Constrained Funding

Budget pressures are arising from constraints on the availability of funds. This pressure is compounded by the fact that the demands on the transportation system are increasing. As a result ALDOT is being asked to do more with less. Therefore, ALDOT would like to utilize tools that will articulate the trade-offs between alternative investment strategies.

1.4 GASB 34

The establishment of Governmental Accounting Standards Board Policy 34 (GASB 34) requires ALDOT to set infrastructure preservation levels associated with alternative condition targets, and estimate the spending levels necessary to achieve those targets. This information will provide a basis from which to establish attainable condition goals.

1.5 Comprehensive Project Management System

With the implementation of ALDOT's Comprehensive Project Management System (CPMS), extensive project and financial information become available. It can be leveraged for use by other tools designed to assist ALDOT in the planning process and to improve communication with stakeholders.

1.6 GIS

Geographic Information System (GIS) software is no longer a leading edge technology. It is being utilized by a variety of industries, and has become readily available in the market place. GIS has a number of potential uses and would be helpful both as a planning tool and a communication tool.

In light of the above challenges, this project was conducted as the first step in the development of ALDOT's asset management system. The overall concept was to make the system a comprehensive management tool that was fully compliant with GSP 34 requirements.

Section 2.0
Preliminary Approach

The investigative approach for this project was a rigorous methodology utilized by the Management Information Systems program at The University of Alabama. The methodology was a combination of techniques considered to be leading practices that modeled, analyzed and refined requirements. In this project it was applied to ALDOT's resource allocation processes.

The research was initiated with a kickoff meeting with key ALDOT leadership personnel. Prior to the meeting, the team performed preliminary research on asset management so that the researchers could understand and anticipate ALDOT's expectations. The meeting also laid a foundation for understanding the ALDOT information systems that effect resource allocation.

After the initial meeting, the team identified and developed a series of issues that were used to guide subsequent interviews with other ALDOT employees involved with asset management. A copy of the questionnaire dealing with these issues can be found in Appendix A.

The primary goal of the initial meetings and the review of documentation was to gain an understanding of ALDOT's resource allocation processes and of the information systems that support resource allocation. Early meetings focused on major outputs (both standard and ad hoc reports) associated with the major areas of resource allocation (such as new construction, resurfacing, and maintenance of bridges). In addition, current uses of computer systems and their interfaces to other ALDOT systems were examined, with emphasis on documenting information that was difficult to obtain in the current environment. As a result of this work, the UA-team gained a broad understanding of the management system currently in place. The outcome of this process was the functional scope of the project, including (1) problem identification, and (2) proposed information system support to augment the resource allocation process.

A second round of interviews, data collection and analysis then focused on gaining a deeper understanding of the maintenance projections for pavement and bridges; current-year project funding methods; the 3, 5, and 20 year planning process; pavement deficiency/condition; and the Alabama Statewide Transportation Plan initiative developed by the firm of Post-Buckley, Schuh and Jernigan. A listing of interviews completed to this point by the UA project team is available in Appendix B. The analysis based on the outcome of the interviews and study of the current system is presented in Appendix C.

Section 3.0
Asset Management System Goals, Objectives, Roles and Responsibilities

Goals of the Project

This project defined the scope, goals, and high-level requirements for an Asset Management System for ALDOT that:

1. Complies with GASB 34
2. Provides an network-level planning tool for
   a. needs analysis
   b. resource allocation
3. Evaluates impacts of variations in funding

Objectives of the New System

The objectives of the new system are to:

1. Institutionalize data collection, validation, and storage
2. Assure internal consistency of the data
3. Leverage current information systems
4. Provide reporting and information retrieval that is:
   a. timely
   b. distinct (providing ad-hoc and drill down decision support)
   c. comparable between years
   d. enhance existing algorithms and projections
   e. enhances intuitive analysis through visualization

Roles and Responsibilities

The project has been a joint effort of The University of Alabama project team and ALDOT staff. Both organizations provided input and evaluation of project components.

The University Team (Project managers: Drs. David Hale, Joanne Hale, Shane Sharpe, and Kelly Brennan; Analysts: Scott Otts and Brandon Haynie; and Enterprise Integration Lab staff assigned as needed):

1) Developed the business and technical requirements for the forecasting system
2) Prepared an analysis and recommendations for the Request for Proposal
3) Prepared necessary documentation to ensure knowledge transfer

The ALDOT staff (engineers and professional staff from the bureaus of Finance, Project Planning, Pavement Management, Bridge Maintenance, and Computer Services):

1) Provided a primary point of contact
2) Assisted with the development of business and technical requirements through interviews, meetings and questionnaires
3) Provided timely feedback

4) Reviewed project deliverables
5) Made necessary refinements to the project deliverables
6) Signed and approved deliverables

Section 4.0
Projects Required to Develop an Asset Management System

Four systems projects were defined and it is anticipated that these will be key portions of the fully developed ALDOT asset management system:

1. A revised Pavement Management System (code-name Hydra)
2. A revised Bridge Management System (code-name ALBridge)
3. Codification of manual procedures to control data accuracy
4. An Intuitive Geographic Visualization Data Presentation Module

4.1 Intuitive Geographic Visualization Data Presentation Module

This research project developed the general structure for the systems projects, and made a preliminary evaluation of the magnitude of change required to meet ALDOT needs. These are displayed graphically in Figure 4-1 below:

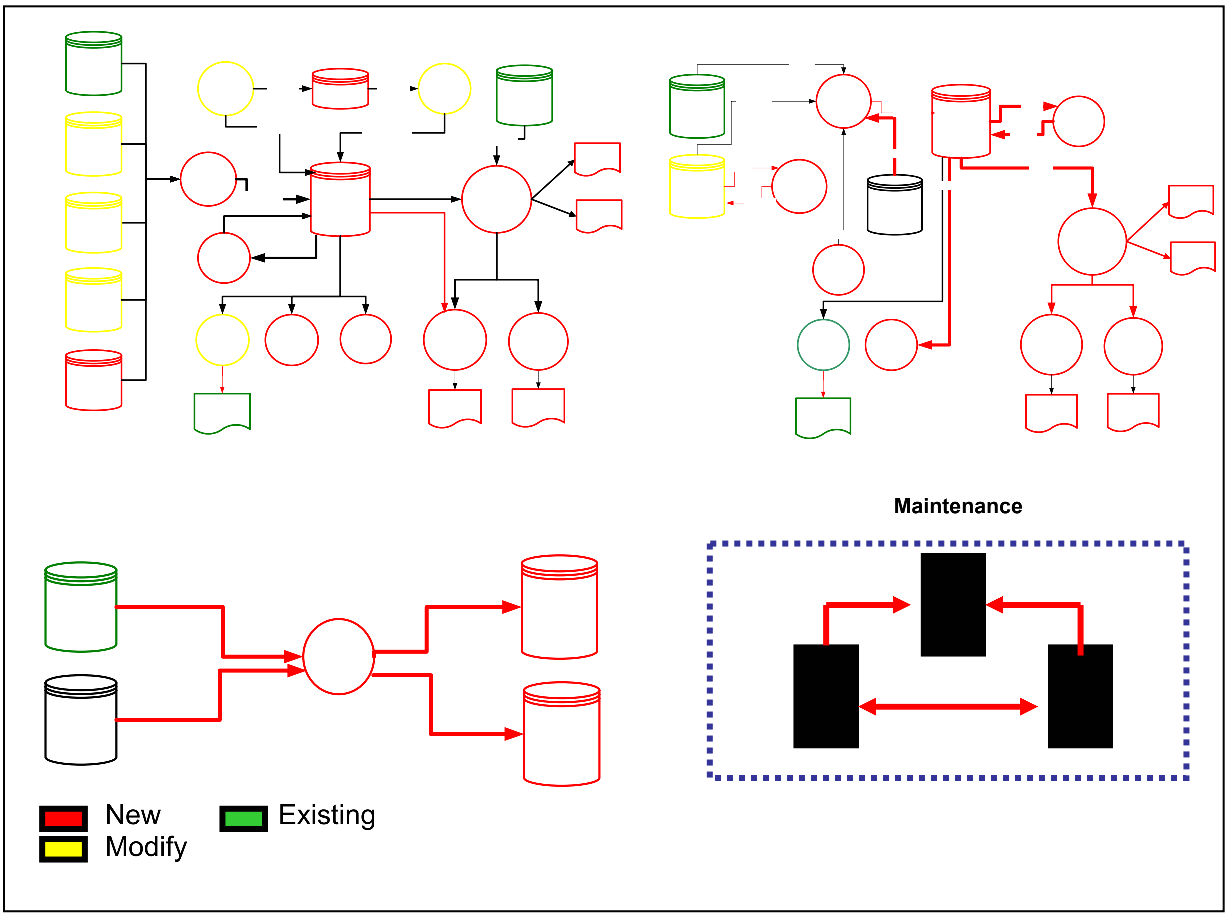


Figure 4-1: Systems projects identified during this research

Section 5.0
Overview of Projects

The four defined projects are reviewed in this section of the report. The descriptions are in outline format, and are intended as "sketches" of the projects rather than detailed definitions.

5.1 Pavement Management and Maintenance Resurfacing Forecast System

5.11 System Scope

Develop and deploy a prototype resurfacing forecasting tool that will allow creation of various investment scenarios and the analysis of overall long-term effects of each alternative. The system will:

- Utilize data from CPMS, the Pavement Management System and other existing systems
- Provide "what if" ability for different levels of funding
- Offer alternative strategies on how funds can be used (for example, 70 percent for deficient roads and 30 percent for roads reaching the optimal point for resurfacing

5.12 Deliverables

The following project deliverables were identified:

- Business Requirements for a resurfacing forecasting tool
- Technical Requirements for a resurfacing forecasting tool
- Prototype
- Recommendation based on analysis of prototype
- Procurement/Construction
- Testing and Verification Report

5.13 Deployment

This system has been named Hydra. Its' status of this system, as of December 2001, is shown in Figure 5-1. Sample reports that will be generated by the system are shown in Figure 5-2.

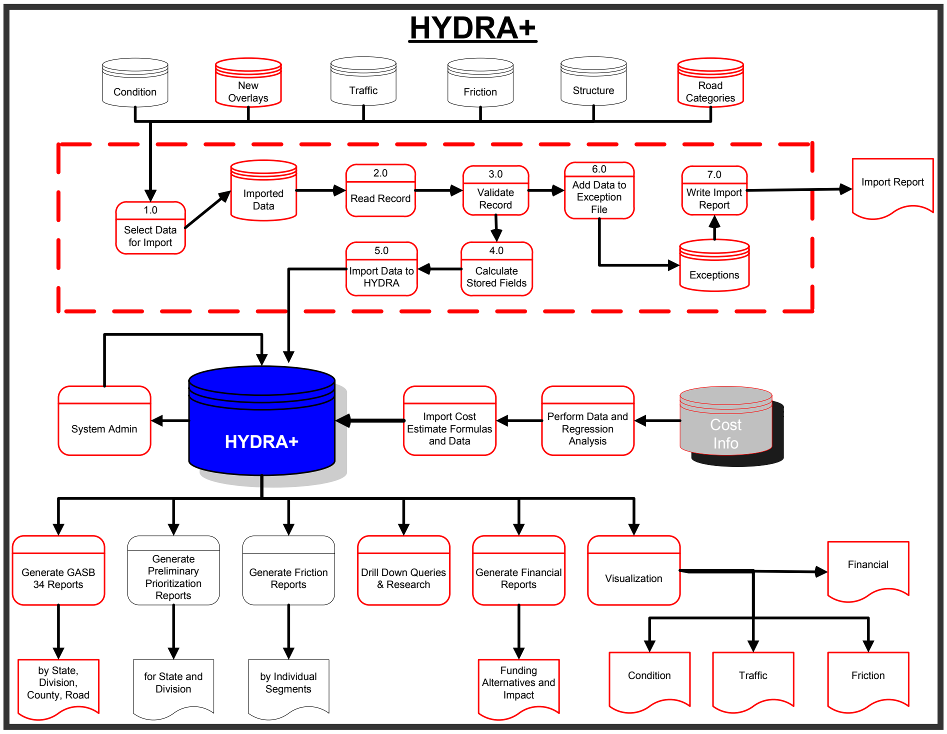
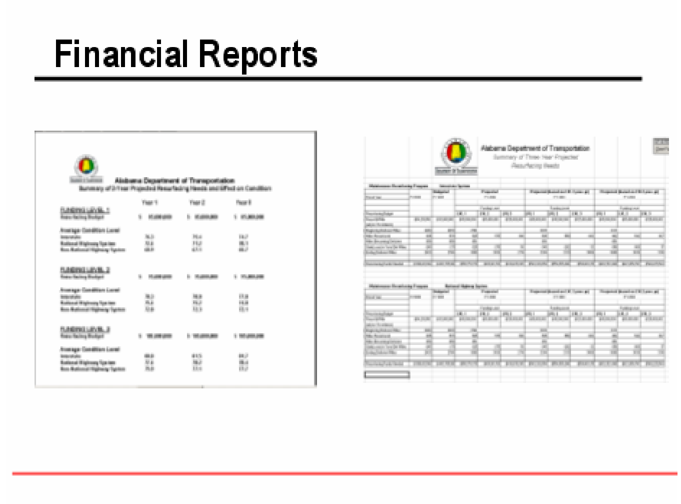


Figure 5-1 Status of HYDRA, the pavement management component of the asset management system



DEPARTMENT OF TRANSPORTATION

GASB34 Report
Road Condition
Report Generated: 02/20/02
Data as of: 1996

Summary for Alabama Interstate Rating
This contains all rating data for interstate highways using lane 1 data where rating has been performed

Interstates	Total KM	Miles	Rating	weight	weighted rating	
I-20	46.34	28.17	85.74	0.078	6.66	
I-59	224.96	139.78	88.17	0.385	33.97	
I-65	236.58	147.01	80.47	0.405	32.61	
I-459	53.664	33.35	85.52	0.092	7.86	
I-565	23.22	14.43	73.91	0.040	2.94	
Total Distance	583.764	362.74			84.05	Overall Rating

Summary for Alabama National Highway Rating
This contains all rating data for national highways using lane 1 data where rating has been performed

National Highways	Total KM	Miles	Rating	weight	weighted rating	
US-31	46.34	28.17	71.74	0.078	6.66	
US-43	224.96	139.78	69.17	0.385	33.97	
US-44	236.58	147.01	72.47	0.405	32.61	
US-58	53.664	33.35	75.52	0.092	7.86	
US-231	23.22	14.43	73.91	0.040	2.94	
Total Distance	583.764	362.74			73.01	Overall Rating

Summary for Alabama Non-National Highway Rating
This contains all rating data for non-national highways using lane 1 data where rating has been performed

Non National Highways	Total KM	Miles	Rating	weight	weighted rating	
	46.34	28.17	70.74	0.078	6.66	
AL-22	224.96	139.78	68.17	0.385	33.97	
AL-34	236.58	147.01	51.47	0.405	32.61	
AL-94	53.664	33.35	62.52	0.092	7.86	
AL-255	23.22	14.43	65.91	0.040	2.94	
Total Distance	583.764	362.74			64.05	Overall Rating

ALABAMA DEPARTMENT OF TRANSPORTATION
Bureau of Materials and Tests
Pavement Management Section

Preliminary Prioritization Report
Sixth Division

Route	Begin MP	End MP	Year 1	Year 2	Year 3	Overlaid	AADT	% Comm.	County	Cost to RSF Yr. 1	Cost to RSF Yr. 2	Cost to RSF Yr. 3
0185	23.935	29.480				1979	1100	22.8	Lowndes	291360	345738	454200
0006	331.410	350.957				1990	1800	26.1	Bullock	922640	1094837	1438300
0015	283.700	283.729				1981	2600	31.3	Macon	1408	1671	2195
0185	8.260	23.935				1992	1200	26.4	Butler	728400	864345	1135500
0041	200.650	201.980	5			1991	11000	30.8	Dallas	63128	74909	98410
0185	33.290	37.223	13	10	5	1979	1800	20.5	Lowndes	194240	230492	302800
0006	219.040	220.810	21	20	18	1984	5300	27.0	Autauga	97120	115246	151400
0008	172.090	175.120	24	20	17	1991	6600	29.6	Lowndes	145680	172869	227100
0003	238.880	284.900	26	22	18	1992	13100	35.2	Montgomery	2233760	2650658	3482200
0006	190.800	194.980	28	24	20	1991	2900	21.9	Autauga	194240	230492	302800

Figure5-2 Example HYDRA reports

5.2. ALBridge Maintenance Forecasting Tool

System Scope

Develop and deploy a forecasting tool to combine bridge and pavement information for various investment scenarios, and to analyze the long-term effect of each alternative. The system will:

- Utilize data from CPMS, the Pavement Management System, ABIMS and other existing systems
- Provide "what If" abilities for different levels of funding
- Offer alternative strategies for optimally utilizing resources from a system perspective

Deliverables

The following project deliverables have been identified:

- Business requirements for a bridges maintenance forecasting tool
- Technical requirements for the tool
- Develop prototype
- Recommendations based on analysis of the prototype
- Procurement/construction
- Testing and verification report

Figure 5-3 depicts the current ALBridge System, as compared to the needs outlined in the goals and objectives of this project. Obviously, the system currently does not meet ALDOT needs.

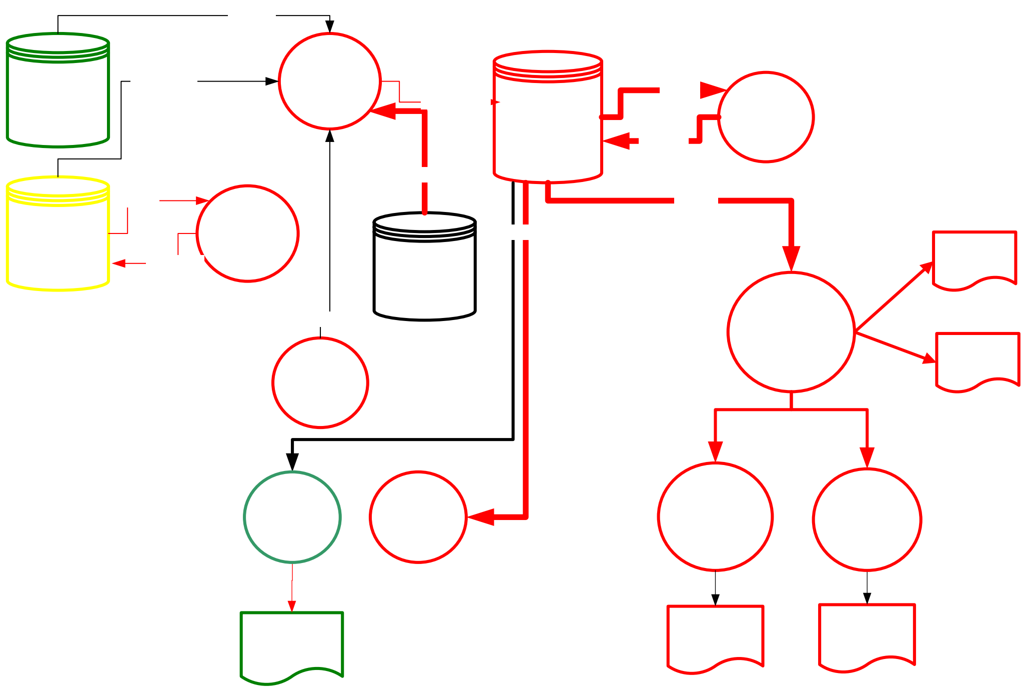


Figure 5-3 Current ALBridge System configuration

5.3 Codification of Procedures

5.31 Scope

To facilitate knowledge transfer from the more experienced ALDOT employees who are nearing retirement age, and to provide an objective rationale for the project selection process, we are proposing to codify the project selection process. This will entail:

- Identification of the inputs needed to analyze the viability and priority of a project
- Identification of the processes involved in generating the above inputs

5.32Deliverables

- Develop detailed deliverables
- Identify inputs required for project selection
- For one segment of the resource allocation system (planning), document the processes involved in creation of traffic flow outputs for use in project selection (with overlapping evaluation of safety)
- Document processes involved in creation of information from all other bureaus which provide information for project selection

5.4 Intuitive Geographic Visualization Data Presentation Module

5.4.1 Scope

Identify potential uses of a GIS front-end for resource allocation and planning:

- Traffic flow – historical and projected
- Condition – historical and projected
- Population – historical and projected
- Economic impact

Example areas which may be used to cluster data include:

- State overview
- ALDOT Division
- County
- Political jurisdiction
- Interstate
- National Highway System
- Non-National Highway System

5.4.2 Deliverable

Identified listing with supporting documentation of GIS potential uses

Figure 5-4 depicts example mappings of data that ALDOT staff has set as GIS rendering prototypes. They illustrate the added value that visualization provides to ALDOT's asset management system.

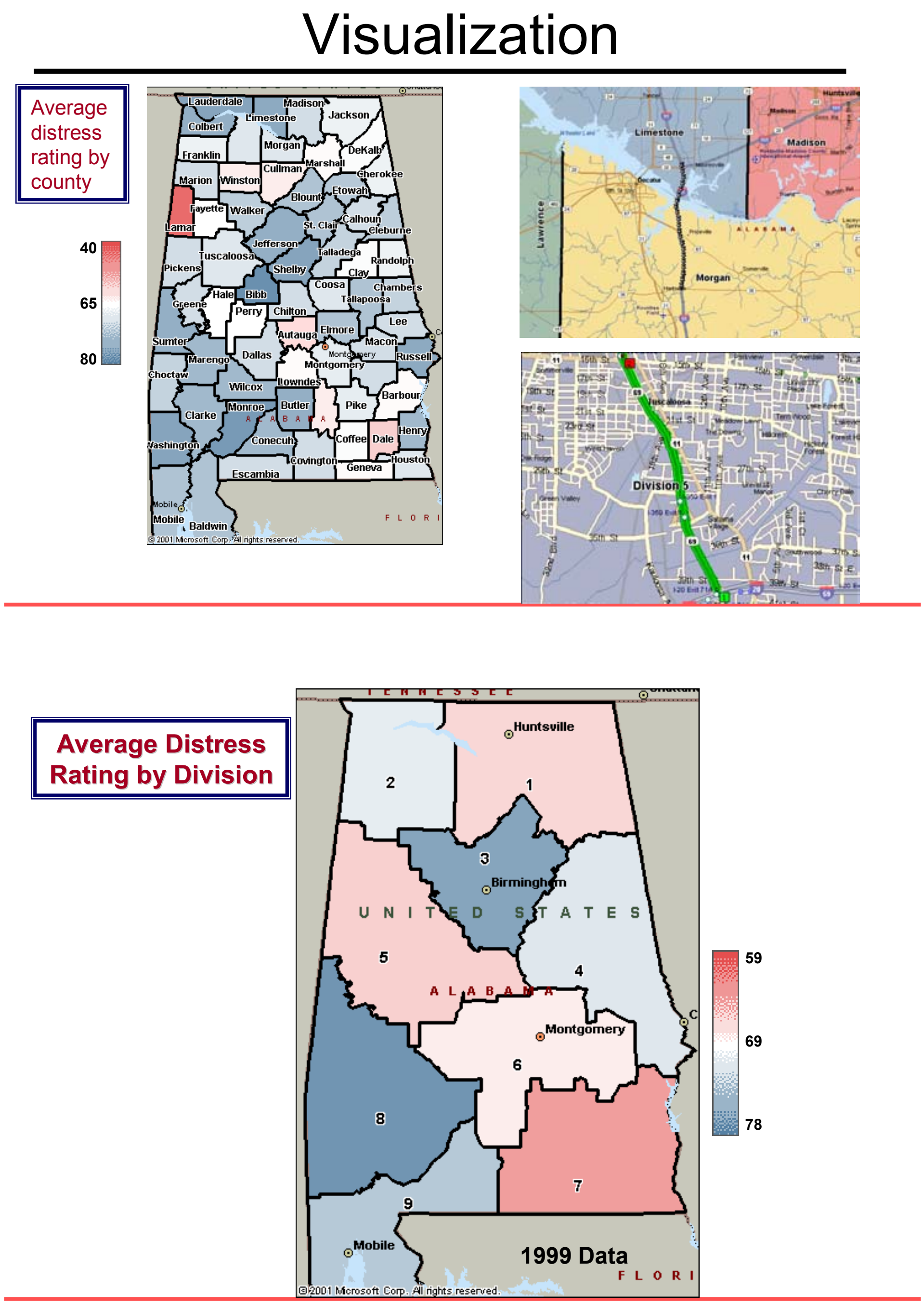


Figure 5-4 Example visualizations from proposed asset management system

Section 6.0
Summary

This project defined the scope, goals, and high-level requirements for an Asset Management System for the Alabama Department of Transportation. The proposed system will comply with the General Accounting Standards Board policy 34. In addition the system will provide a network-level planning tool for needs analysis and resource allocation, and will evaluate the impact of variations in funding levels.

The objectives of the new system are to institutionalize data collection, validation, and storage; assure internal consistency of the data; leverage current information systems; provide reporting and information retrieval that is timely and distinct (providing ad-hoc and drill down decision support); conduct comparable analyses between years; enhance existing algorithms and projections and enhance intuitive analysis through visualization.

It is envisioned that the proposed system will be developed through a series of four projects, which were identified and defined through this research project.

Appendix A
Interview Form

INTERVIEW WITH:____________ROLE:________________ DEPT:____________ DATE: __________

1. When was this system developed?

OUTPUTS:

2. Why is the data important? What decisions are made based on the data/reports? BY WHOM

3. [*WHO IS THE CUSTOMER…WHAT IS THE PRODUCT*] Who uses the data? How often? Can we get copies of system generated reports? Is the data easily accessible to users?

4. Obtain copies of other pertinent documentation

5. How often do you receive requests for info? How long does it take to respond to requests? How long are you given to respond?

INPUTS:

6. What Data is entered into the system? How many records does the system contain?

7. Who collects it? How? (Source)

8. Who enters the data? How? Where?
    - Is the speed of the system satisfactory?
    - Ease of use?

9. Is the system centrally maintained/updated/accessed? Who has access? How often is data changed or updated?

PERFORMANCE

10. Is the information current and accurate and available on a timely basis? (redundant data? Prone to errors?)

11. How many records? Fields? Size?

12. Used Applications/operating systems

13. Do they have a report generation package?

14. Do the reports/system contain unnecessary information? Is the format of the data/reports effective?

FUTURE SYSTEM

15. Do the reports/data contain the necessary information? What data, not contained in the reports/system, would be useful?

16. If there is one, what would you say is the biggest problem with the current system? (if needed to illicit further reply…temporal issues? inaccurate data?)

NOTE: need to determine the capability/technical knowledge of the users of the system from data entry clerks to decision makers

Appendix B
Project Interviews

	Title	Dept/System	Date
1	Assistant Chief Engineer		June 5, 2001
2	Bureau Chief, Finance Assistant Bureau Chief Cost and Systems Supervisor Assistant Bureau Chief Special Projects Accountant	Finance	June 13, 2001
3	Pavement Management Engineer	Pavement	
4	Civil Engineering Faculty UA	U of A	June 19, 2001
5	Bureau Chief Transportation Planning Project Management System Coordinator	CPMS	June 20, 2001
6	Equipment Coordinator Assistant Equipment Coordinator	Equip. Mgt. System	June 20, 2001
7	Bridge Management Engineer	ABIMS	June 21, 2001
8	Bureau Chief, Multimodal Special Projects Engineer Safety Management Engineer	Safety Mgt. Systems	June 21, 2001
9	Pavement Management Engineer	Pavement	June 21, 2001
10	Assistant Bureau Chief-Finance	Finance	June 21, 2001
11	Assistant State Maintenance Engineer	ABIMS, MMS	July 2, 2001
12	IS/Programming Support Manager	Computer Services	July 2, 2001
13	Cost and Systems Supervisor	Accounting/CPMS	July 2, 2001
14	Pavement Management Engineer	Trns*port	July 3, 2001
15	Special Projects Programming Super.	ABIMS	July 3, 2001
16	Information Services Staff	Protégé	July 5, 2001
17	Assistant Chief Engineer		July 9, 2001
18	Assistant State Maintenance Engineer	Bridges	July 16, 2001
19	Assistant State Maintenance Engineer	Pavement	July 16, 2001
20	Finance Assistant Bureau Chief,	Finance	July 19, 2001
21	Pavement Management Engineer	Pavement	July 26, 2001
21	Bureau Chief Transportation Planning and Staff	Planning	July 26-27, 2001
22	Engineering Support Manager	GIS	August 7, 2001
23	Pavement Management Engineer	Pavement	August 7, 2001
24	Traffic Data Engineer	Traffic	August 7, 2001
25	Pavement Management Engineer	Pavement	August 14, 2001
26	Traffic Data Engineer	Planning/Traffic	August 14, 2001

Appendix C
Project Requirements

	Category	Project Requirement	Comments
1.0 Data Conversion/Standardization			
1.1		Combine all Distress data by years for every year that surveys have been performed	There are distress files for 1984, 1986, 1988, 1990, 1992, 1996, and 1999. Must confirm whether this is the 50m Roadware data file or the METDC files
1.2	Error Checking	Filter bad or redundant data	
1.2.1	Conversion	Filter for asphalt segments only, by lane and direction	In some cases lane won't be necessary. (ex 2 lane road). In the case of a 4 lane highway, the first lane (right lane) is usually chosen because it is likely to be worst case condition wise. The tables have a "pavement type" field. In most cases F=Asphalt, R=Concrete. NOTE: Some tables seem use A & B instead
1.2.2	Error Checking	Filter to prevent double calculation of current and equation road segments	An example of a common road is where I-59 runs concurrently with I-20. This is one road. "Equation" is for shortened and lengthened road segments. Alton Treadway's dBaseIII file shows one way to execute this type of filter
1.2.3	Error Checking	Build error checking routine to check invalid input	Beginning and ending KM posts can be swapped. Mfactor number can not be larger than 999.00
1.2.4	Data Standardization	If data fields are missing from previous years, back populate tables with valid data	e.g. if IRI data is missing, use the PSI rating to calculate the current road's IRI rating
1.2.5	Data Standardization	Standardize all fields in the control file	There is a concern that control files for each year will be structured differently making it impossible to query
1.2.6	Data Check	Check GAPS in overlay Table	
1.2.7		Splitting conditions, Friction, Traffic into 52.8 ft Sections	
1.2.8	Data Change	Routes Type UPDATE/CHANGE	
1.3	Input Design	Provide Overlay data in an electronic file format	A procedure must be established to determine who will do this, and how often. Currently, Alton receives a listing of resurfacing projects and the date they are completed. He records it as the date the road is finished. This information is currently provided to him once a year.
1.4	Input Design	Automate the update of Control File with most recent overlay data (New Algorithm)	The current process for updating the control file with overlay data is completely manual. Partial road segments may be resurfaced, creating new road segments (explained in detail in HYRDRA analysis). For example, if road segment 1.5 to 7.8 received an overlay from 3.4 to 5.6. The result would be 3 segments. Approx…1.5 to 3.4, then 3.4 to 5.6, then 5.6 to 7.8. The Pavement Management engineers currently update each segment in the control file one by one. (No control segment crosses a county line)
1.5.1	Input Design	Create processes to update **Deficiency** information	Currently there is a control file for each division. The new "segment" file will be able to provide historical data where applicable, re: any specific road segment for any given point and time (This includes both condition and friction, and structural data)
1.5.2	Input Design	Create processes to update **Friction** information	Currently there is a control file for each division. The new "segment" file will be able to provide historical data where applicable, re: any specific road segment for any given point and time (This includes both condition and friction, and structural data)

1.5.3	Input Design	Create processes to update **Structure** information	Currently there is a control file for each division. The new "segment" file will be able to provide historical data where applicable, re: any specific road segment for any given point and time (This includes both condition and friction, and structural data)
1.5.4	Input Design	Create processes to update **Speed Limit** information	Currently there is a control file for each division. The new "segment" file will be able to provide historical data where applicable, re: any specific road segment for any given point and time (This includes both condition and friction, and structural data)
1.5.5	Data Standardization	Track changes to routes	MP numbers change as routes are changed
1.5.6	Data Standardization	Track changes to road segments, counties and divisions	Counties are occasionally moved to different divisions. Road segments are moved to different divisions. (County borders haven't changed since the 1920's)
1.6	Input Design	Filter Traffic database for appropriate year by road segment	The traffic database is maintained in an Access database by Transportation & Planning. They have historical records for every year. The database is extensive but our application only requires the road segment and AADT (Annual Average Daily Traffic)…May not be necessary depending on Database design
1.7	Input Design	Provide data file w/ road way categories -(1)Interstate (2)National Highway System (3)Non-National Highway System	The road segments must be broken down into 3 categories for GASB 34 reporting purposes. The department of Transportation Planning maintains this data. Changes occur but they are infrequent. The current Pavement Management database only breaks the roads into two categories (Interstate and State). The data from Transportation Planning will separate the state roads into the appropriate category
1.7.1	Update	Establish business processing rule and method to ensure that updated info re: road segment categories is provided to HYDRA	The steering committee preferred some type of electronic feed or interface for the information in Transportation Planning

2.0 System Administration

2.1	User Privileges	6 User Groups	Tester (for Friction data), Accounting, Research, Cost Maintenance, Supervisor, Administrator
2.1.2	User Privileges	Accounting users should have read only access	
2.1.2	User Privileges	Research users should have read only access	
2.1.3	User Privileges	The tester should only be able to add or modify friction data	Only the Tester who enters a particular friction record should be able to edit that data
2.1.4	User Privileges	Cost Maintenance users should only be able to update cost data	The personnel that will update cost data for the system have not been identified. Furthermore, a business processing rule must be established for the update
2.1.5	User Privileges	The Supervisor User Group should have full control over the friction table and the ability to add records to the control file	
2.1.6	User Privileges	A control record can only be modified or deleted by the administrator	The administrator has privileges to create, read, update and delete records to any table
2.2	DIVISIONS	Restricted access for info pertaining only to each specific division	

2.3	Validation	The capability should exist to exclude a record from a report but keep the record	This is necessary because the data collected may be in error. GIS may be incorrect. Another example would be the IRI (International Roughness Index) for a certain road segment indicates the road is in excellent condition but 3 potholes were recorded on that same segment. (The question is do we need the capability to exclude certain fields from a record or the entire record itself?)
2.4	Audit	An audit trail capability should be established to identify modifications	
2.5	Security	Standard Log-In Screens (User ID and Password)	Delete user id and password after 4 or more failed attempts (administrator must intervene)
3.0 GASB 34 Report			
3.1		Provide a state-wide condition rating for each category of roads (1)Interstate (2)NHS (3)Non-NHS for GASB 34 Compliance.	The current system provides deficiency (condition) numbers for individual segments but not a system wide rating by category.
3.2		Provide Drill Down capability for Specific categories of roads, divisions, counties	Division engineers should only receive reports for their division. They will also be able to view reports by county within their division. A weighted rating of each route
3.3		Provide the capability to determine the % of roads above a particular deficiency rating by category	For example, determine the % of Interstate Roads that will be ranked above 90
4.0 Standard Pavement Management Reports (PPR/Friction)			
4.1		Calculate the **<u>Distress Rating</u>** by Road segment	In the current process, the road segments. We have already modified the deficiency calculation from the dBaseIII programs currently used by ALDOT to correct minor errors.
4.2		Calculate the **<u>Projection</u>** by Road Segment	Use the Projection formula in the dBaseIII files. The projections will be for 3 years
4.3		**<u>Store</u>** deficiency ratings and projections by Overlay	
4.4		Include AADT and ESAL's	This information can be obtained from the Traffic database file
4.5	Report	Generate Preliminary Prioritization Reports	In ranked order and by mile post number. By division and for entire state
4.6		Calculate Friction number by road segment	Use banker's rounding
4.7	Friction	Generate Friction Test Survey Report	Using data from the friction files for specific roadway segments. This will include milepost information, the coarse and fine aggregates, the contractor who placed the overlay.
5.0 Ad-Hoc HYDRA reports			
5.1	Performance	Provide results from Queries	
5.2		Answer questions re: historical condition of specific road sections	(i.e. historical overlay information)
5.3	FEASIBILITY?	Compare historical conditions to projections for a specific area and time period	This would allow research to identify discrepancies and facilitate finding the cause and possibly improve the projections

5.4		Report re: mix types and their effectiveness	Analyze which mix type has been the most effective
5.5	Report Management	Provide Module to keep statistics on Report views and AD HOC Queries	
6.0 Visualization			
6.1	Tentative	Color Code County, division or district based on the ***overall*** condition, friction scores	Possibly red for marginal, yellow for needs improvement, green for satisfactory
6.2	Tentative	Display the projected condition, traffic, and friction numbers for any given road segment	The Plan is to do this using the GPS numbers available in the Roadware Inc.'s data and a commercial GIS package (ex. MS Map Point)….This would be extremely effective if it could be provided to the divisional offices
6.3	Tentative	Provide Different Views	For categories of roads, individual divisions, counties
Proposed Future Enhancements			
	Input Design	Give users the ability to search for records that have already been added to input tables to allow for additional modification of data before it is committed to the Hydra+ database	This enhancement could be an add-on to the existing input forms. It would be a "query builder" enhancement where the user may be able to enter data in one or more fields on the form and then press a search button to find all records that match the criteria entered by the user
	Ad-Hoc Queries	Monitor queries that are most commonly used and turn them into standard reports as system output	