

Computerization of ALDOT R&D Library Titles

A Project for The Alabama Department of Transportation

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16. Abstract <p>The Alabama Department of Transportation (ALDOT) Research and Development (R&D) Bureau wished to catalog the paper publications in its library and produce a searchable database that allows an internet user easily to identify if a particular document is present. That work was performed using the following steps:</p> <ul style="list-style-type: none"> • Select appropriate items in the library for inclusion in an online library catalog. • Select appropriate computer software to perform the project that is also compatible with ALDOT website requirements. • Collect electronic catalog data for the publications. • Label each publication with a unique numerical identifier both in the database and on the publication's front cover. • Write the interface between the users' queries and the electronic database. • Place the library catalog on the ALDOT website. <p>The completed electronic catalog is accessible at the ALDOT internet site using the following address: http://www.dot.state.al.us/Bureau/R_and_D/card_catalog/Search.asp. Any internet user can determine online if a document is present in the library. R&D personnel can quickly locate the publication on the shelves by the unique identifier located on the front cover of the publication. For the relatively few items in the library that are hosted on websites, the searcher can read the document in its entirety by clicking on the hyperlink on the online catalog's output page.</p>			
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Executive Summary

The Alabama Department of Transportation (ALDOT) Research and Development (R&D) Bureau desired an online catalog of the items in its library to allow Internet users to determine if a particular document is contained in the library. The library is located in Montgomery, Alabama and contains over 20,000 periodicals, bulletins, and research reports. The library did not maintain a “card catalog” or other index.

A University of Alabama team performed the project to meet the R&D Bureau’s needs, using the following steps:

- Selected approximately 10,000 items in the library for inclusion in an online library catalog. (Items such as monthly magazines and vendor literature were not cataloged.)
- Selected appropriate computer software to perform the project that is also compatible with ALDOT website requirements.
- Collected electronic catalog data for the publications.
- Labeled each publication with a unique numerical identifier both in the database and on the publication’s front cover.
- Wrote the interface between the users’ queries and the electronic database.
- Worked with ALDOT computer personnel to place the library catalog on the ALDOT website.

The completed database is accessible at the ALDOT Internet site using the following address:

http://www.dot.state.al.us/Bureau/R_and_D/card_catalog/Search.asp (Please note that the three spaces that appear blank are underscores.) R&D Bureau personnel and any Internet user can determine online if a document is present in the library. R&D personnel can quickly locate the publication on the shelves by the unique identifier located on the front cover of the publication. For the relatively few items in the library that are hosted on websites, the searcher can read the document in its entirety by clicking the hyperlink contained on the online catalog’s output page.

ALDOT R&D Bureau personnel can update the online catalog by updating the database using instructions given in Section 4 of this report.

Section 1

Introduction

As well as authorizing and monitoring new research projects, the Research and Development (R&D) Bureau at the Alabama Department of Transportation (ALDOT) stores paper copies of completed research reports, transportation journals, federal and state research publications, etc. in its library. The Bureau wished to catalog the items in the library and produce a database compatible with ALDOT's website so that users can easily identify whether a particular document is present and find it quickly in the shelves. The research described in this report performed that task.

Background

The R&D library is located in Montgomery, Alabama and contains over 20,000 periodicals, bulletins, and research reports. Publications are grouped on the shelves in chronological order, e.g., all Transportation Research Records (TRRs) from a given year are placed together on a shelf. The library did not maintain a "card catalog", so to verify whether items were present, R&D personnel were forced to go to the library and search for them manually. The R&D Engineer desired to improve the library by placing searchable catalog information about the publications on ALDOT's Internet site and by labeling each publication with a unique identifier. These changes could improve library efficiency in two ways:

- Personnel onsite or at a remote site could determine if the library contains a particular publication while sitting at their computers.
- R&D personnel could quickly locate the desired publication by its unique identifier, and copy it or send it to the requestor.

Project Structure

The project consisted of six steps:

- Toured the existing facility and determined which items would be cataloged and which would not. (For example, monthly magazines were not cataloged.)
- Selected appropriate computer software (compatible with ALDOT website requirements) to perform the project.
- Collected electronic catalog data for the publications.
- Labeled each publication with a unique numerical identifier.
- Wrote the interface between the users' queries and the electronic database.
- Worked with ALDOT computer personnel to place the library catalog on the ALDOT website.

Section 2

Building Electronic Database

The ALDOT R&D Engineer and a member of the University of Alabama (UA) project team toured the library to select types of documents that would be placed in the database. Then, catalog data from the selected documents was placed in an electronic database.

Selecting Document Types

The R&D Library contained over 20,000 publications, but only approximately 10,000 were selected for inclusion in the electronic database. Publications that were excluded largely consisted of monthly “magazines,” newsletters, vendor information, and some technical documents that were considered unlikely to be consulted frequently.

The agencies listed below have significant numbers of publications in the new ALDOT R&D library electronic catalog:

- Departments of Transportation of various States
- Transportation Research Board
- Highway Research Board
- Federal Highway Administration
- American Association of State Highway and Transportation Officials
- University Transportation Center for Alabama
- Purdue University
- US Department of Transportation
- Portland Cement Association
- US Corps of Engineers
- Asphalt Institute
- Federal Railroad Administration
- United States Geological Survey
- Bureau of Public Records
- National Asphalt Pavement Association

The following agencies are represented in the new R&D Library electronic catalog, but have 10 or fewer publications.

- University of Kentucky
- US Department of Commerce
- American Institute of Steel Construction
- Maricopa Association of Governments
- Gurries Manufacturing Company

- Midwest Research Institute
- University of Missouri
- Trucking Research Institute
- Expanded Shale, Clay & Slate Institute
- National Crushed Stone Association
- North Central Texas Council of Governments
- Office of Maccaferri S.P.A.
- Highway Innovative Technology Evaluation Center

Software Selection

After consulting with ALDOT's Bureau of Computer Services, MS-Access was chosen as the project database. Active Server Pages (ASP) was selected for creating the interface between the user and the information contained in the database. The project was developed on a Widows 2000 platform.

An Access data entry form was created in design view and is shown in Figure 2-1. The completed database was named BookCollection.mdb and contains the following data headings:

- Contact ID is the unique identifier for each publication. Contact ID numbers were assigned consecutively, and the number was taped to the lower, right corner of the front cover of each document.
- Book Title is frequently the descriptive title of the publication, e.g., "Alabama Rural Transit Opportunities". However, some publications contain a dual title, such as "TRR No. 1816, Pavement Management, Monitoring, and Accelerated Testing." In those cases, "TRR No. 1816" was entered as the Book Title, and "Pavement Management, Monitoring, and Accelerated Testing" was placed in the Keywords section.
- Keywords are used to describe the principle subjects of the publication. Some agencies list keywords in a page at the front of the publication. For example, many FHWA publications list keywords and other information in a Technical Report Documentation Page. In those instances, keywords were taken from that page. In other instances, such as "TRR No. 1816" described immediately above, the "Pavement Management, Monitoring, and Accelerated Testing" information was placed in the keywords section.
- Title ID is usually a variation of the publisher, as defined below.
- Year of Publication lists the year the publication was published.
- Publisher lists the organization that published the document. For many of the documents, the publishers were organizations such as the Transportation Research Board or the Highway Research Board. However, for publications obviously performed for the State DOT, the publisher was listed as California DOT, Alabama DOT, or Texas DOT even if the publisher were the Texas Transportation Institute, the University of Texas, or the University of Alabama.
- URL lists the web address of the limited number of publications that are available online. In those cases, a URL was listed in the search output, and the searcher can read the document online by clicking on the URL on the output screen.

The screenshot shows the Microsoft Access [Author] window with a data entry form. The form contains the following fields and values:

Contact ID	1793	Title	Highway Research Board
First Name		Title	Highway Research Board Bulletin 59
Last Name		Keywords	Zoning for Truck Loading Facilities
FirstName1		Publisher	Highway Research Board
LastName1		Year of Publication	1953
FirstName2		ISBN no	
LastName2		Topic	
FirstName3		URL:	
LastName3			
FirstName4			
LastName			
Publication			

At the bottom of the form, there is a navigation bar with buttons for "Enter Next Record" and other navigation functions. The status bar at the bottom indicates "Record: 2410 of 2410" and "Form View".

Figure 2-1 MS-Access data entry form

“Topic” and “ISBN number” are listed in Figure 2-1 but were not used during actual data gathering. The information intended to be placed in “Topic” was instead placed in the “Title” or “Keywords,” and few of the publications contained ISBN numbers.

Figure 2-2 shows a portion of the database table that contains many of the Highway Research Records published by the Highway Research Board (which later became the Transportation Research Board). The data fields correspond to the fields listed immediately above, but “author” information is not given because there is no single author for a Highway Research Record. The phrases “Highway Research Board”, “Highway Research Record” and “HRB”, plus the inclusion of the Highway Research Record number mean that searches using several different phrases and/or numbers will result in identification of the publication desired.

Contact ID	BookTitle	Keywords	Title ID	YearPublished	Publisher	URL
111	Highway Research Record 111	Soil Drainage and Other Soil-Water	Highway Research Record	1966	HRB	
112	Highway Research Record 112	Concrete Pavement Design	Highway Research Record	1966	HRB	
113	Highway Research Record 113	Symposium on Effects of Aggressiv	Highway Research Record	1966	HRB	
114	Highway Research Record 114	Origin and Destination: Methods and	Highway Research Record	1966	HRB	
115	Highway Research Record 115	Transportation and Economic Develp	Highway Research Record	1966	HRB	
116	Highway Research Record 116	Culverts and Storm Drains	Highway Research Record	1966	HRB	
117	Highway Research Record 117	Bituminous Materials, Mixtures, and	Highway Research Record	1966	HRB	
118	Highway Research Record 118	Satistical and Mathematical Aspect	Highway Research Record	1966	HRB	
119	Highway Research Record 119	Psical and Physico-Chemical Prope	Highway Research Record	1966	HRB	
120	Highway Research Record 120	Aggregate Characteristics an Exam	Highway Research Record	1966	HRB	
121	Highway Research Record 121	Pavement Design and Evaluation	Highway Research Record	1966	HRB	
122	Highway Research Record 122	Road User Characteristics	Highway Research Record	1966	HRB	
123	Highway Research Record 123	Highway Drainage and Scour Studie	Highway Research Record	1966	HRB	
124	Highway Research Record 124	Aggregates for Concrete	Highway Research Record	1966	HRB	
125	Highway Research Record 125	Highway Transportation Research, E	Highway Research Record	1966	HRB	
126	Highway Research Record 126	Land Use Forecasting Concepts	Highway Research Record	1966	HRB	
127	Highway Research Record 127	Line-Haul Trucking Costs and Weigl	Highway Research Record	1966	HRB	
128	Highway Research Record 128	Frost, ical Properties and Stabilizati	Highway Research Record	1966	HRB	
129	Highway Research Record 129	Evaluation of Pavements by Deflecti	Highway Research Record	1966	HRB	
130	Highway Research Record 130	Shopping Centers and Parking	Highway Research Record	1966	HRB	
131	Highway Research Record 131	Design, Performance and Surface P	Highway Research Record	1966	HRB	
132	Highway Research Record 132	Bituminous Concrete Construction	Highway Research Record	1966	HRB	
133	Highway Research Record 133	Utilization of Sites of Soft Foundatio	Highway Research Record	1966	HRB	
134	Highway Research Record 134	Bituminous Materials	Highway Research Record	1966	HRB	
135	Highway Research Record 135	Rock Mechanics	Highway Research Record	1966	HRB	
136	Highway Research Record 136	Studded Tires	Highway Research Record	1966	HRB	
137	Highway Research Record 137	Component Elements of the Plannin	Highway Research Record	1966	HRB	
138	Highway Research Record 138	Highway Finance and Benefits	Highway Research Record	1966	HRB	
139	Highway Research Record 139	Behavior Characteristics of Lime-So	Highway Research Record	1966	HRB	
140	Highway Research Record 140	Corrosion and Protection of Metals	Highway Research Record	1966	HRB	
141	Highway Research Record 141	Origin and Destination	Highway Research Record	1966	HRB	
142	Highway Research Record 142	Photogrammetry and Arial Surveys	Highway Research Record	1966	HRB	
143	Highway Research Record 143	Management Personnel and Costs	Highway Research Record	1966	HRB	
144	Highway Research Record 144	Pipe Culverts	Highway Research Record	1966	HRB	
145	Highway Research Record 145	Buried Circular Conduits and Behavi	Highway Research Record	1966	HRB	

Figure 2-2 Example Screen of the Project Database

Data Entry

A team of five University of Alabama graduate students entered data into the database using the form shown in Figure 2-1. One student removed publications from the library stacks, keeping associated publications together and in chronological order. That student applied a unique identifying number to the bottom right corner of the publication cover. Then, four other students used laptop computers to insert information about each document into the database. The first student then returned publications to the shelves, keeping them in order, and placing a numbered marker every 500 documents so that documents could be located quickly in the future. Approximately 50 person days of effort was consumed in this process.

The students started data entry with the Highway Research Records shown in Figure 2-2. They quickly learned that the project budget would not provide the time to support as much data entry as desired, so they modified data entry procedures to save time. Many of the documents (such as Highway Research Records) do not have overall authors associated with them, so the students did not include author names in data entry of any publication. In addition, the “Topic” and “ISBN No.” fields were skipped, as explained previously.

Section 3

Building the Interface

To search the database and provide the desired output, the UA team wrote a web-based software application using ASP that would act as an interface between the users and the database. The scripting language used for ASP was VBScript.

The first ASP page provides the user with facilities for specifying the search item and the criteria for the search. This page then sends that information to another ASP page where the information is processed, the database is queried, and the desired information is displayed to the user.

The first page, called “Search.asp,” is shown in Figure 3-1 and is the screen that the user will see upon accessing the R&D Library web page. To use it, the searcher first types data about the desired publication into the “Search For” box. The data may be the name of the publication, keywords of the publication, the Transportation Research Record number, etc. The user then selects from the Title, Keywords and Publisher data entry fields to search for a match with the information in the “Search For” box. If only “Title” is selected, then the search engine will only look in the “Title” data field to try to match information. If all three fields are selected, the search engine will search all three fields for a match. The user can also set a limit on the year of publication of the records to be searched by selecting from the “Search Period” boxes. Searching fewer fields and fewer years of data reduces the time required for the search.

The “Match” determines how the search is performed, i.e., if the “Exact string” option is selected, the program searches the database for a string that exactly matches the string typed in the “Search For” box. If “Any Word” is selected, the program searches for any of the words in the database that match at least one of the words that are entered in the text box. If the “All Words” option is selected, then only the database fields that contain all the words given in the text box (regardless of their position) are output.

When a user fills in the “Search For” box, selects search criteria, and presses the “Go” button, the values are passed as a “query string” to another Active Server Page named “SearchResults.asp.” This page processes the information, establishes a connection to the database, retrieves the results, and outputs the results. For example, if the user has searched for “transport,” then the results page appears as Figure 3-2.

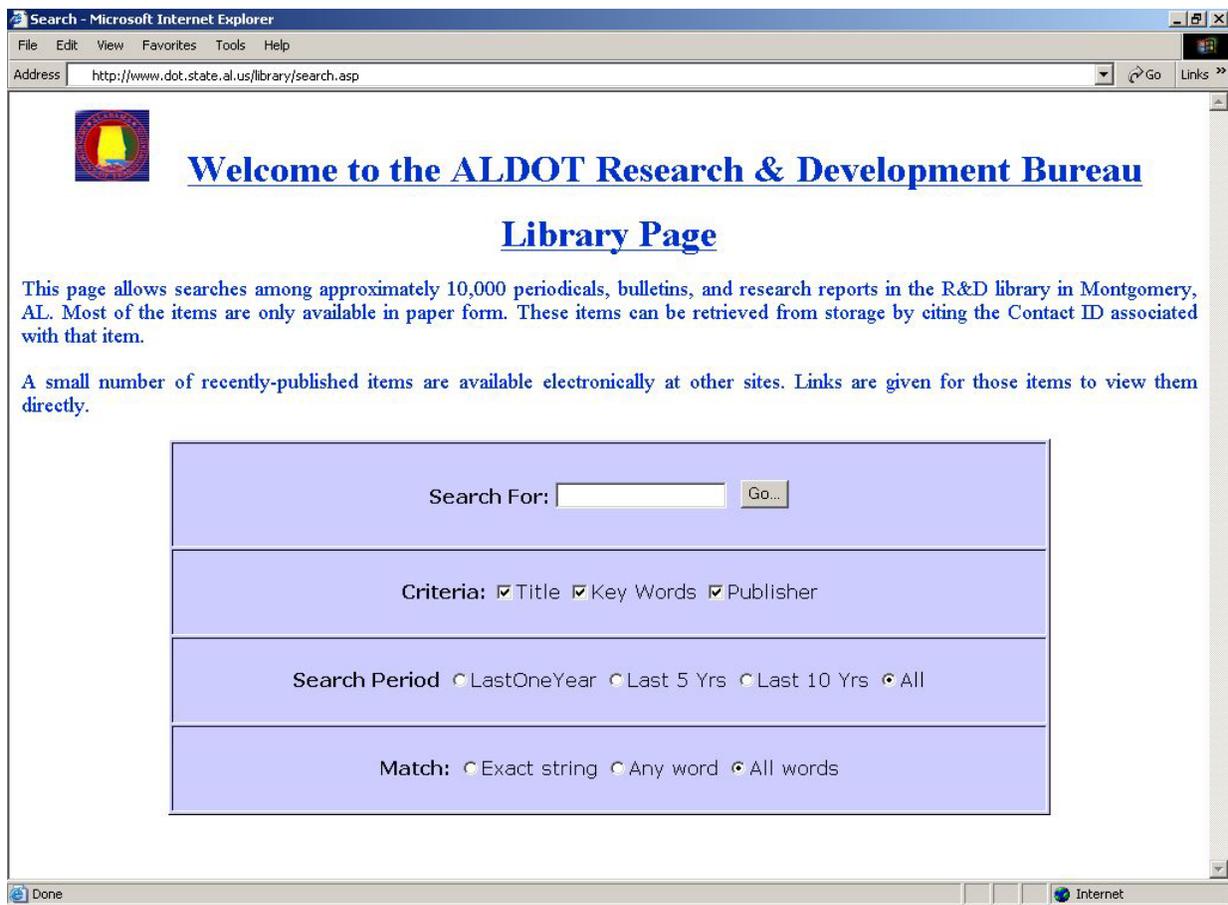


Figure 3-1 Search input page

In Figure 3-2, results are shown four to a page. If one of the results corresponds to the document the user desires to find, then that document can be located quickly in the library using the Contact ID number (503 in the first result). If none of the four results on the first output page correspond to the desired document, the user can browse through subsequent output pages by selecting numbered links at the bottom of the page. That is, if the user wants to go to the fourth page of outputs, that can be done by clicking the “4” at the bottom of the page. If none of the results is satisfactory, the user can perform another search by selecting “Back to Search” at the bottom of the page.

A limited number of documents are available in electronic form online. In those cases, a globe symbol is displayed rather than the Contact ID. Those items can be read in full by clicking on the hyperlink. Figure 3-3 shows an output screen with hyperlinks.

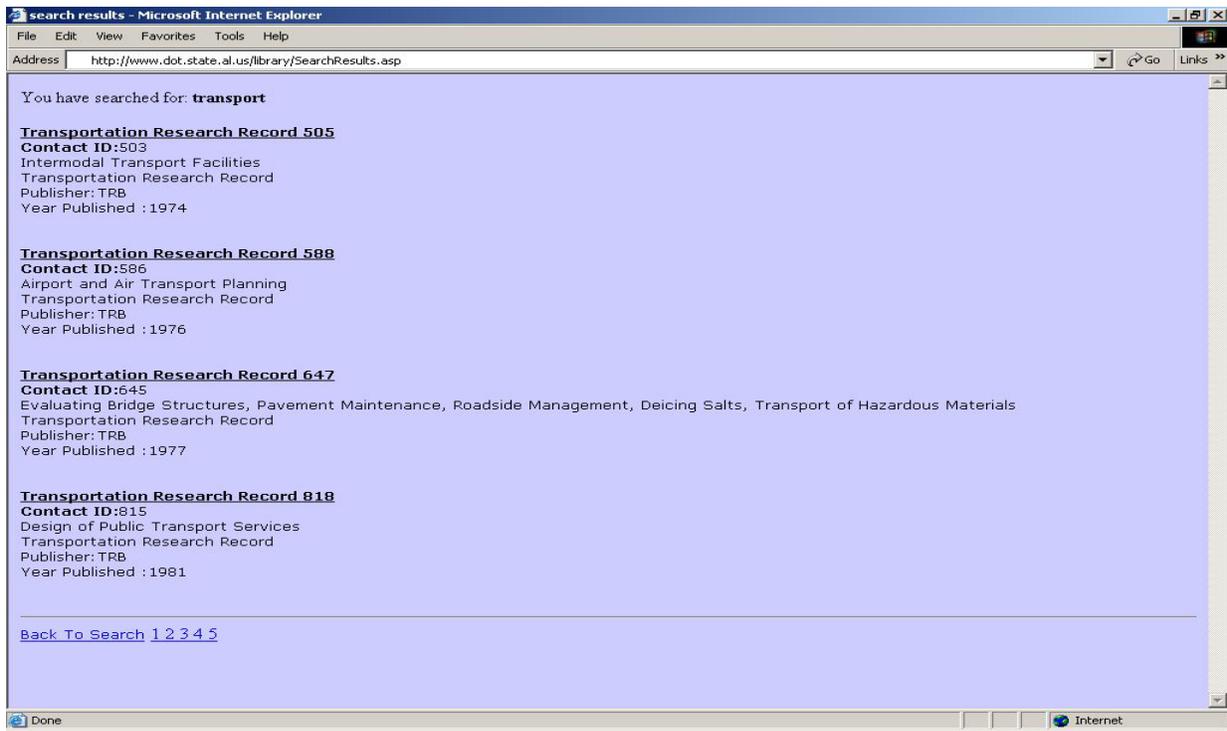


Figure 3-2 Sample output page

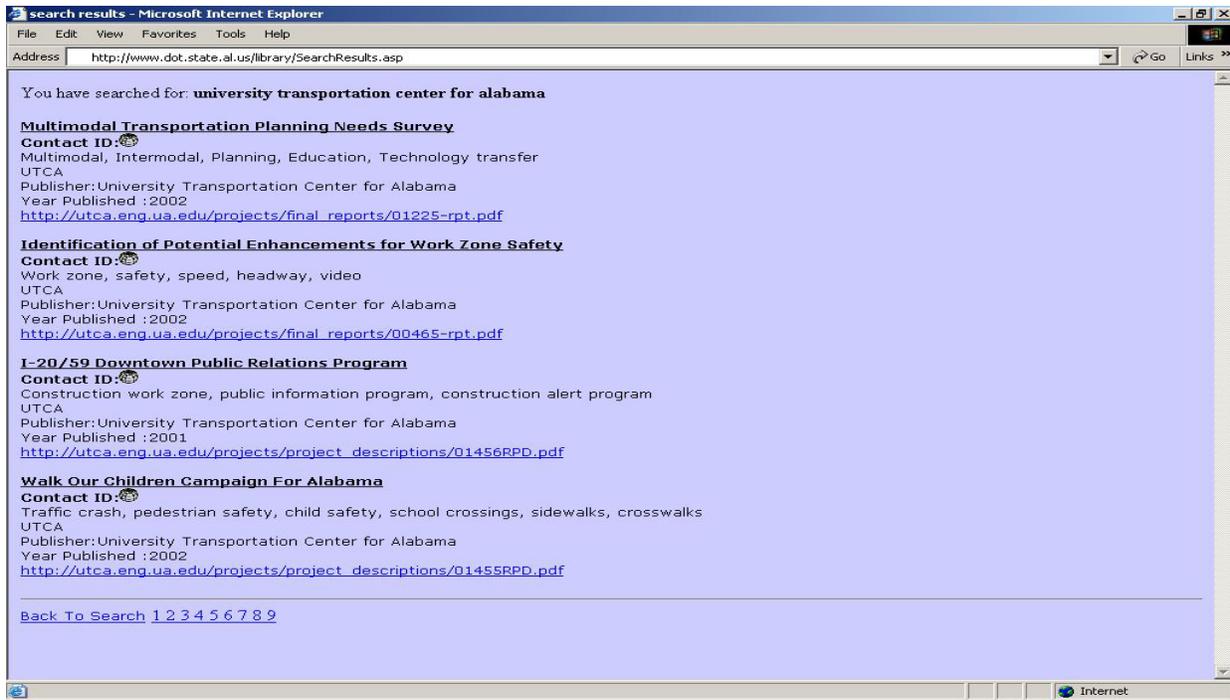


Figure 3-3 Sample output page with hyperlinks

Section 4 Modifying the Database

The ALDOT R&D Bureau will desire to add new entries to the database as it receives new publications. There are different entry procedures, depending on the medium in which the document is available. For new items that are available in paper form only and for new items that have paper and electronic formats, data entry is performed as follows:

1. Double click on the BookCollection.mdb file.
2. A window will pop up. Select “tables” under the “objects” category. The result will show the “books” table in the side window. This is the main table of the database.
3. Double click on the “books” table. It will open the table as shown in Figure 2-2.
4. Right click on the “Contact ID” column and select “Sort Ascending.” This aligns all the rows in increasing order of Contact IDs.
5. Go to the bottom of all the rows and insert the data for the new item. That data can include a URL if the document is also available on the worldwide web. The *Contact ID should be one number greater than the last Contact ID.*
6. To save the changes, select “save” from the “file menu.”

To insert data for new items that are available only on the worldwide web, use the follow steps:

1. Perform steps 1 through 3 as described above.
2. Go to the bottom of the rows and insert the data of the new item, with a *Contact ID of 0.*
3. To save the changes, select “save” from the “file menu.”

To update an existing item:

1. Perform steps 1 through 3 of the first list.
2. Right click on the “Contact ID” column and select the “Find” option. This will cause a window to pop up. Enter the Contact ID of the document for which information should be changed and press Enter. This will take the cursor to the row containing the given Contact ID.
3. Make the necessary changes to the data.
4. To save the changes, select “save” from the “file menu”.

Section 5 Web Mounting

The completed online catalog consists of the following computer files:

- Search.asp
- SearchResults.asp
- BookCollection.mdb
- web.gif
- emblem.gif

The first three files have been described earlier in this report. The last two files are icons that are used to improve the look of the search input page

Mr. Ron Jones of ALDOT's Bureau of Computer Services mounted the product on ALDOT's Internet site. The R&D library electronic catalog is now operational and can be reached by typing the following URL: http://www.dot.state.al.us/Bureau/R_and_D/card_catalog/Search.asp

Alternatively, the site can be reached in the following manner:

- Type www.dot.state.al.us to access the ALDOT Internet site.
- Under the 'Bureaus' pull down menu, select 'Research and Development'.
- Click on 'Online Library Catalog'.

The UA team also delivered an electronic copy of the online catalog to ALDOT's Research & Development Bureau. R&D personnel will be able to update the catalog as needed using the electronic database and the instructions supplied in Section 4 of this report. The Bureau of Computer Services will upload the revised database.

Section 6 Summary

The ALDOT R&D Bureau desired to catalog the items in its library and to acquire an electronic database compatible with ALDOT's website so that a user could easily determine whether a particular document was present and could find it quickly in the shelves. The library is located in Montgomery, Alabama and contains over 20,000 periodicals, bulletins, and research reports. The library did not maintain a "card catalog", so to verify if items were present, R&D personnel were forced to go to the library and search for items manually.

A University of Alabama team completed the project using the following steps:

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