



**CENTER FOR TRANSPORTATION RESEARCH
THE UNIVERSITY OF TEXAS AT AUSTIN**

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IMPLEMENTATION OF DATABASE FOR TxDOT ARRA PROJECTS

Khali R. Persad
Jasjyot S. Suri

**CENTER FOR TRANSPORTATION RESEARCH
BUREAU OF ENGINEERING RESEARCH
THE UNIVERSITY OF TEXAS AT AUSTIN**

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16. Abstract The American Recovery and Reinvestment Act of 2009 (ARRA) was a fiscal stimulus package signed by President Obama on March 6, 2009. State agencies like the Texas Department of Transportation (TxDOT) who received ARRA funds had to report, on a monthly basis, various data on each project in the ARRA program, including staff numbers, hours worked, and payroll. Research Project 0-6592, "Implementing ARRA Economic Impacts Database," explored labor usage in ARRA projects. One product of 0-6592 was a Microsoft Access® database (0-6592-P1) that summarized and displayed data on TxDOT ARRA projects. TxDOT asked the Center for Transportation Research (CTR) to identify and isolate specific elements of the 0-6592 database that TxDOT's Construction Division (CST) can implement into an existing TxDOT database. The resulting modified 0-6592 database is referred to here as the 5-6592 database. This implementation report documents the key elements of the 5-6592 database and procedures for updating.					
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Khali R. Persad
Jasjyot S. Suri

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Center for Transportation Research
The University of Texas at Austin
1616 Guadalupe St
Austin, TX 78701

www.utexas.edu/research/ctr

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Project Engineer: Khali R. Persad
Professional Engineer License State and Number: TX 74848
P. E. Designation: Research Engineer

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Implementation of Database for TxDOT ARRA Projects

1.1 Background

The American Recovery and Reinvestment Act of 2009 (ARRA) was a fiscal stimulus package signed by President Obama on March 6, 2009. The total value of the ARRA program was \$787 billion, and of the \$48.1 billion allocated to transportation, \$27.5 billion was for highway projects. Texas was allotted \$2.2 billion, the second highest distribution behind California, and by the April 2010 deadline, the Texas Department of Transportation (TxDOT) had taken up the full allocation.

The President promised full accountability and transparency of ARRA funding and a web site (<http://www.recovery.gov/>) was established (Figure 1.1). State agencies like TxDOT who received ARRA funds had to report, on a monthly basis, various data on each project in the ARRA program including staff numbers, hours worked, and payroll. From September 2009 to August 2010, TxDOT supported Research Project 0-6592, “Implementing ARRA Economic Impacts Database,” to explore labor usage in construction projects.



Figure 1.1: ARRA website logo

One product of Project 0-6592 was a Microsoft Access® database (0-6592-P1) that summarized and displayed data on TxDOT ARRA projects. In late 2010, Mr. John Barton, Deputy Executive Director of TxDOT, recommended an Implementation Project for the Center for Transportation Research (CTR) to identify and isolate specific elements of the 0-6592 database that TxDOT’s Construction Division (CST) can implement in an existing TxDOT database.

During the course of discussions between CTR and CST, the project participants decided that, rather than overlaying the 0-6592 database elements on the TxDOT database, the researchers would take the ARRA data in the TxDOT database and process it in the 0-6592 database. The resulting modified 0-6592 database is now referred to as the 5-6592 database. This implementation report documents the key elements of the 5-6592 database and procedures for updating.

1.1.1 ARRA Funding for Texas

Highways & Bridge: Under ARRA, Texas was granted \$2.25 billion for construction of highways and bridges. Of that, \$1.68 billion was allocated to the Texas Transportation Commission (with a minimum of \$175 million to be spent in rural areas), \$500 million went to

the state's Metropolitan Planning Organizations (MPOs), while the remaining \$67.5 million was allocated for transportation enhancement projects (e.g., hike and bike trails).

Transit: Texas received \$371,806,104. Urban recipients received \$301,055,797, smaller rural recipients received \$42,181,107, and another \$28,569,200 was for cities, using a high growth and high density state formula. Effectively, rural recipients got about \$50 million.

General Aviation: the Federal Aviation Administration received \$1.1 billion nationwide in discretionary funds. Texas and other states were required to apply for these funds on a project-specific basis.

Transportation Enhancements: ARRA required TxDOT to spend \$67.5 million on transportation enhancement (TE) projects. TxDOT decided to advance several projects that had previously been selected but had not yet gone to construction.

High Speed Intercity Passenger Rail: ARRA funds were also made available under the High Speed Intercity Passenger Rail Grant program (HSIPR). Funding for this program came from two sources: the ARRA and the FY 2009 Appropriations Act. TxDOT received about \$4 million in HSIPR ARRA funds to adjust signal timing for several at-grade crossings for Amtrak's Heartland Flyer over 63 miles of BNSF-owned rail.

1.2 State Reporting on ARRA

The following were the ARRA reporting requirements.

1.2.1 Federal Reporting Requirements

Each month, the DOTs were required to submit two forms to the FHWA: Forms 1585 and 1587. Form 1585 included the following data items for each project utilizing ARRA funds:

1. Report Month
2. State Project Number or Identification Number
3. Contract Number
4. Contracting Agency
5. Federal-aid Project Number
6. Advertisement Date
7. Award Date
8. Notice to Proceed Date
9. ARRA Funds (\$)
10. Total Fund (\$)
11. Disadvantage Business Enterprise (DBE) Goal (%)
12. DBE Commitment (%)
13. DBE Actual Payment (\$)
14. Project Percent Complete (%)
15. Contractor Name
16. Contractor Address
17. Data Universal Numbering System (DUNS) Number = Unique ID for each Contractor
18. Contractor E-Mail Address

Form 1587 included the following data:

1. Report Month
2. State Project Number
3. Contract Number
4. Federal-aid Project Number
5. Project Description
6. Contractor Name and State/Local Agency
7. Contractor Report Status
8. Total Employees
9. Total Hours
10. Total Payroll(\$)

The last three items were the essence of the direct labor reporting requirements. Each contractor was required to submit to the DOT the number of ‘boots on the ground’ employees on site at the end of each month, the number of work hours paid, and the payroll amount.

1.3 Implementation Project Scope

Based on the request of the TxDOT Project Director, Mr. Ken Barnett, P.E., the primary objective of this project was to modify the 0-6592 database so it could manipulate and display ARRA project data from the TxDOT database. The objective of the 5-6592 database remains the same as the 0-6592 database: to provide summarized information pertaining to ARRA projects in the form of reports and graphical representations

The scope of the 5-6592 database is limited to TxDOT projects that utilized ARRA funds. To accomplish this, it pulls only ARRA projects from the TxDOT database. The source database was provided to the researchers in February 2010, and contains data up to January 31, 2010. The 5-6592 database can be easily updated by importing relevant tables from the TxDOT database. The 5-6592 database has the following features:

- Ease of use for TxDOT staff to access and update the database.
- Intuitive graphic interface.
- Dynamic graphs and reports, in order to provide flexibility to view required information based on numerous parameter values.
- Reduction of data redundancy to the maximum extent possible.

1.4 Tasks Performed

As originally proposed by CTR, the implementation project was to include four tasks. The original scope, modifications, and final disposition are described below:

Task 1—Initial Assessment: This task involved CTR performing support activities to identify elements of the research product database (0-6592-P1) that CST could use. The “Administrator” component was assessed as crucial to CST, and project participants mutually agreed to develop the “Administrator” component of the database further, and to maintain it independent of the existing CST database. CST provided the data from its database in the form of Microsoft Access

tables, to be incorporated in the 0-6592 database and to create the new 5-6592 database. CTR was assigned the responsibility of designing the 5-6592 database and providing documentation.

Task 2—Modification of CST Database: This task was changed based on the outcome of Task 1. Originally, the CST database was to be modified to incorporate elements of the 0-6592 design. Instead, based on discussions with the Project Director (PD), CTR modified the 0-6592 database to run the CST data. Appropriate field headings and parameters were modified, and relevant data fields from the CST provided database were used for designing the 5-6592 database. The CST data was imported as source data into the 5-6592 database, and used to generate records, reports, and graphs.

Task 3—Integration: This task would have included the creation of the storage group, integration of the database with the storage group, creation of table space and table, and assigning of administrative and user rights. It would also have involved database security, using measures such as Password Security, Access Rights, and Data Encryption as required. As the PD requested, the 5-6592 database was to be maintained independently within TxDOT, with open access for selected staff. Therefore, a single “Administrator” username and password was set up, and rights can be assigned by CST through the administrator login table in the 5-6592 database.

Task 4—Evaluation: This task involved testing and fine-tuning the sequences for performance, integrity, concurrent access, and security constraints. The 5-6592 database has been compacted, and configured to compact each time the file is closed, in order to ensure efficient running of the database. Also, as far as possible, redundant data has been eliminated from the database design to ensure efficient functioning. The database components have been tested to ensure accuracy of information, based on the input data available.

1.5 Project Deliverables

1.5.1 Information Technology (IT) deliverable

The Microsoft Access ® database file submitted as 5-6592-P1 is provided as the IT deliverable. All relevant components such as tables, forms, queries, reports, macros, and relationship diagrams can be accessed from the accdb file.

1.5.2 Report

This report documents project information and is submitted as the written report deliverable for the 5-6592 project.

1.6 Database Design

Following are some of the information needs of CST personnel and policymakers addressed by this database:

- ARRA Obligation Amount
- Total Contract Amount
- Direct Jobs Created

This information has been grouped based on factors such as project, location, project purpose, award date, etc., as applicable.

1.6.1 Interface Diagram

Figure 1.2 represents the structure of the database and related forms and reports.

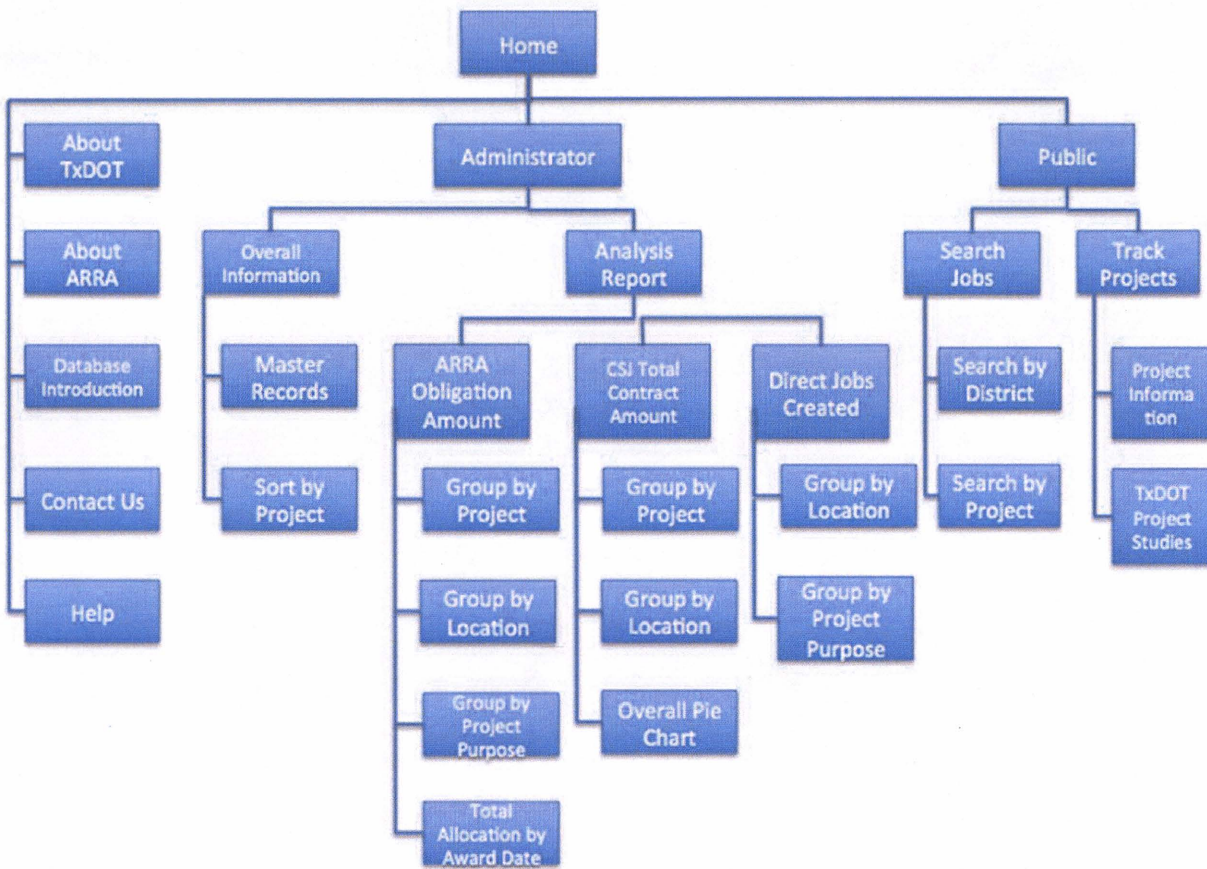


Figure 1.2: Database Interface Diagram

The “Administrator” section is designed to provide information for reporting and decision-making within TxDOT. The “Public” section provides the ability to generate dynamic reports based on contractor, project, and district. All reports have a print preview option, and are formatted to enable efficient printing of the reports. This section also has a link to the TxDOT website.

1.6.2 Data Relationships

Tables provided by CST from its existing database are the source for the 5-6592 database. The tables used as data input are:

- dbo_AWARDS
- dbo_CBS_CNTRCTRS

- dbo_Monthly Status
- dbo_Projects
- dbo_FMIS
- dbo_FMIS_Obligation

The table linkages are shown in Figure 1.3.



Figure 1.3: Data Table Relationships

1.6.3 Parameters

Selecting appropriate fields from the TxDOT-provided tables to generate appropriate results presented a design challenge. Following meetings with TxDOT personnel, appropriate data fields that could yield beneficial information were selected, and incorporated into the database design.

Table 1.1 is a list of parameters used in the calculations to generate the reports and graphs.

Projects have been grouped based on Federal Project Number. For the ARRA Obligation Amount and CSJ Total Contract Amount fields, the maximum value for a particular project has been selected, to account for any changes that may have occurred during the life cycle of the project. Direct jobs created have been interpreted as the total employment, represented in man-months.

1.7 Database Use

The Administrator section is accessed with the following defaults:

- Username: 111
- Password: 111

Table 1.1: Parameters used to generate reports

No.	Fields
1	Project Purpose
2	Project Description
3	County Codes
4	Pop Cong District
5	MaxOf ARRA Obligation Amount
6	MaxOf CSJ Total Contract Amount
7	Federal Project Number
8	Report Month
9	DUNS Number
10	Advertise Date
11	Contractor Name Part1
12	Telephone Number
13	Project Purpose
14	Improvement Type
15	ARRA Obligation Date
16	Proceed Date
17	Report Month
18	Total Employees
19	Total Hours
20	Total Payroll
21	State Code
22	Project Name

Once the interface screen comes up, the user can choose and generate the reports from Figure 1.2. Upon exit, the file is automatically compacted to maintain efficiency.

1.7.1 Challenges

The amount of data to be processed is large, encompassing all the ARRA-funded projects undertaken by TxDOT. Thus, some of the queries generated in Microsoft Access® require significant computing power, and may process relatively slowly (in excess of 1 minute) on regular laptops and desktops. Generating reports and graphs may require relatively long processing times (over 2 minutes). In addition, some inconsistencies were observed in data summations and counts due to discrepancies among the data in the input tables.

1.7.2 Updating the Database

The project participants envision that the 5-6592 database will be updated in accordance with TxDOT's standard procedures, to provide updated information as needed. Updating consists of importing the following tables from the latest version of the existing TxDOT database:

- dbo_AWARDS
- dbo_CBS_CNTRCTRS
- dbo_Monthly Status
- dbo_Projects
- dbo_FMIS
- dbo_FMIS_Obligation

The tables can be imported into the 5-6592 database very simply:

1. Select Database Tools → Import, and click on the Microsoft Access logo.
2. Select the above-listed tables from the available list of tables. Ensure that both the data and structure of the tables are imported.
3. After the tables are imported, ensure that the existing tables are overwritten. If not, delete the older tables, and rename the imported tables to represent the names as shown above.

Thereafter, saving the database file will update the queries, forms, macros, and reports to process the updated information.

1.8 Conclusion

This report documents the key elements of the 5-6592 database and procedures for updating. An “Administrator” section is designed to provide information for reporting and decision-making within TxDOT. In the “Public” section, the ability to generate dynamic reports based on contractor, project, and district have been provided. All generated reports have a print preview option, and are formatted to enable efficient printing.

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By: Khali Persad

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Center for Transportation Research

The University of Texas at Austin
1616 Guadalupe Street
Austin, TX 78701

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