



TEXAS TECH UNIVERSITY

Multidisciplinary Research in Transportation

Rigid Pavement Database User and Administrator's Guide

Sung Woo Ryu, Sureel Saraf, Moon C. Won

Texas Department of Transportation

Report #: 0-6274-P1
www.techmrt.ttu.edu/reports.php

September 2012

Disclaimer

Texas Rigid Pavement Database (TxRPDB) has been and will be continuously improved. Accordingly, this Guide will also be revised periodically to reflect the changes made. For the most up-to-date Guide, click “About” in the home page of the TxRPDB.

TxRPDB

Texas Rigid Pavement Database

0-6274-P1

Rigid Pavement Database User and Administrator's Guide

Developed by

Texas Tech Center for Multidisciplinary Research in Transportation - TechMRT

Texas Tech University

Under

TxDOT Research Project 0-6274

February 2012

TxRPDB – Texas Rigid Pavement Database is a product of TxDOT Research Project 0-6274: “Project Level Performance Database for Rigid Pavements in Texas – II” and provides an enterprise platform for sharing design and structural information as well as performance data for concrete pavements in Texas.

This manual provides step-by-step instructions to access rigid pavement data via the TxRPDB website as well as detailed instructions for the database admin to control and manage the database and upload new data. Technical information regarding database development, database architecture and development of web interface are discussed as well.

The manual has been divided into the following sections to address the above mentioned areas:

1. Secure User Access
2. Data Access and Download
3. Query Interface
4. Test Data File Nomenclature
5. Admin Controls and Data Upload
6. Database Design and Architecture
7. Data Storage
8. Website Development
9. Technical Specifications

1] Secure User Access

TxRPDB can be accessed by typing the URL <http://www.depts.ttu.edu/techmrtweb/rpdb/> into the address bar of an internet browser. The website has been tested to be compatible with all popular internet browsers viz. Internet Explorer, Mozilla Firefox, Google Chrome and Safari.

The URL takes the user to the home screen of TxRPDB as shown in Figure 1. The home page provides the user basic introduction to the purpose of TxRPDB. In addition to the “Home” tab, the home screen gives access to four tabs:

- Register
- Update Profile
- About
- Sign In



Figure 1. Home Screen – TxRPDB

Register

The “Register” tab, as shown in Figure 2, provides a first time TxRPDB user an interface to input details in order to create a user account. Specific details requested from the user are user name, first name, last name, email id and password. The password needs to be a minimum of 6 characters in length and could be a combination of alpha-numeric characters. The user at this stage can input whether he/she would like user or admin control of the database. However, granting the user the desired level of access depends only on the admin. Once the user clicks the “Register Me’ button, the user information is updated in the User List discussed in Section 4. If the admin considers the user details to be correct and the desired user level to be appropriate, the user account is activated. Once the user is activated in the User List, an automated e-mail message stating the user credentials to access TxRPDB is sent to the e-mail address input by the user.

Update Profile

This interface facilitates updating the user information. If an existing user prefers to change the username, password or email address in the User List, “Update Profile” allows him/her to make these updates.

About

The “About” tab describes the type of pavement data stored in the TxRPDB and current capabilities of TxRPDB for data access and querying. The user will also have access to Database user’s and admin manuals from here.

Sign In

Once the user has obtained the log-in credentials via email, the “Sign In” tab at the top right corner of the home page is used to log-in to TxRPDB. In case the user forgets the username and/or password, the “Sign In” page also has a “Forgot Password” help page. The “Forgot Password” link prompts the user to provide the email address registered with the user account and the log-in details are subsequently emailed to the user.

2] Data Access and Download

The following type of data can be accessed via the TxRPDB web interface.

Table 1. TxRPDB Data Type

Main Data Type	Sub Data Type	Data Type	File Type
CRCP	Level I	Average Deflection, Load Transfer Efficiency, Crack Spacing, Pictures	.xls, .pdf
	General Sections	Plan Sets, Pictures, Reports	.pdf, .ppt
CPCD		Plan Sets, Pictures, Reports, Plan Sets	.pdf, .ppt
Experimental Sections	Coarse Aggregate	Plan Sets, Pictures, Reports, Plan Sets	.pdf, .ppt
	Steel Percentage		
	Construction Season		
Special Sections	Fast Track pavement	Plan Sets, Pictures, Reports, Plan Sets	.pdf, .ppt
	Bonded Overlay		
	Unbonded Overlay		
	Whitetopping		
	Precast pavement		
	Cast-in-place prestressed pavement		
Recycled concrete pavement			

“CRCP” tab contains CRCP data at two levels: “Level I Sections” and “General Sections.” “Level I Sections” consists of pavement performance data collected under TxDOT research

project 0-6274. As shown in Figure 2, “Level I Sections” page allows the user to select a specific district, highway and section I.D. and displays the General Information below.



Figure 2. Level I Sections General Information

The page also provides links to deflection, load transfer efficiency, crack information and pictures for that particular section. To access a specific data type, click on the corresponding link and a list of test data files for the particular section are displayed in a pop-up window as shown in Figure 3.



Figure 3. Level I Sections – Data Files

All the data files are named as per their section I.D. and the testing date. The file nomenclature is described in detail in Section 4. The test data files can be downloaded as well as viewed online by clicking on the “viewer” mark or “down-arrow” mark on the right, respectively.

“General Sections” follows a data access method similar to “Level I Sections.” The user can select the district and highway and the results are displayed below. “General Sections” currently consists of plan sets, pictures and reports that can be downloaded by the user as well as viewed online.

“Experimental Sections” and “Special Sections” follow web interface and data access pattern similar to “General Sections.”

3] Query Interface

“Search” provides an interface to perform query functions in TxRPDB. As shown in Figure 4, an extensive list of attributes is available to the user to perform query functions.



The screenshot shows a web interface titled "SEARCH DATABASE". It features a "Search" button at the top. Below it, there are several search criteria, each with a "Select" dropdown menu and an "And" dropdown menu. The criteria are: District, Highway, No of Lanes, Thickness, Pavement Type, Shoulder Type, Concrete CAT, Drainage, Vertical Alignment, Horizontal Alignment, and Construction Year. The Construction Year field has a "Equals" dropdown menu and a text input box. A "Search" button is located at the bottom of the form.

Figure 4. Search Attributes

Multiple values for the same attribute can be selected from the attribute drop-down as shown in Figure 5.



Figure 5. Multiple Attribute Selection

“Search” also allows the user to select the query operator “And” or “Or” for each attribute being queried for. The values for the construction year need to be input manually by the user in the format “YYYY”. The “Construction Year” attribute also comes with the flexibility of four additional query operators, “Equals,” “Not Equals,” “Greater Than” and “Less Than.”

The query results are displayed on the right side along with general information regarding each result. Also, results for each combination of queried attributes are displayed together as shown in Figure 6. The total number of results returned by the query as well as the attributes queried for is displayed in the bottom left corner of the “Search” window.

SEARCH DATABASE

Search

District: Select And

Highway: Select And

No of Lanes: Select And

Thickness: Select And

Pavement Type: Select And

Shoulder Type: Select And

Concrete CAT: Select And

Drainage: Select And

Vertical Alignment: Select And

Horizontal Alignment: Select And

Construction Year: Equals

Search

Query Attributes

District: Amarillo, Austin, Beaumont, Dallas, El Paso, Ft Worth

Thickness: 10, 11, 12, 13, 14, 15

Number of Records: 28

DATABASE (28 Records)

District : Dallas, Thickness : 13

Section ID : 18-130-1

Highway : IH 30 Ref Marker : MP 8.8

District : Dallas County : Dallas Construction Year : 2008

More Information : [18-130-1](#)

District : Ft Worth, Thickness : 13

Section ID : 2-135-1

Highway : IH 35W Ref Marker : MP 41

District : FtWorth County : Tarrant Construction Year : 1978

More Information : [2-135-1](#)

District : Beaumont, Thickness : 15

Section ID : 20-110-1

Highway : IH 10 Ref Marker : MP 858+0.2

District : Beaumont County : Orange Construction Year : 2007

More Information : [20-110-1](#)

District : El Paso, Thickness : 13

Section ID : 24-110-1

Highway : IH 10 Ref Marker : MP 36+0.3

District : El Paso County : El Paso Construction Year : 1995

More Information : [24-110-1](#)

Section ID : 24-110-2

Highway : IH 10 Ref Marker : MP 39+0.3

District : El Paso County : El Paso Construction Year : 1995

More Information : [24-110-2](#)

Section ID : 24-110-3

Highway : IH 10 Ref Marker : MP 45+0.1

District : El Paso County : El Paso Construction Year : 1995

More Information : [24-110-3](#)

Section ID : 24-110-4

Highway : IH 10 Ref Marker : MP 85

District : El Paso County : El Paso Construction Year : 1995

Figure 6. Query Results

Click on the test section I.D. besides “More Information” in the results section to access test data files and other information for each section in the search results.

4] Test Data File Nomenclature

All test data files being uploaded to the database follow a pre-determined naming format. For easy identification of a particular type of test data file as well as providing correct file name when the data is being uploaded by the admin, Table 2 enlists the file nomenclature followed in TxRPDB.

Table 2. File Nomenclature

File Type	File Name Format
Average Deflection Data	“Section I.D.”GN“Testing Date”
Load Transfer Efficiency Data	“Section I.D.”LTE“Testing Date”
Pictures	“Section I.D.”PD“Testing Date”
Crack Spacing Data	“Section I.D.”CS“Testing Date”
Plan Sets	“Abbreviated District Name”-“Highway”_CCSJ No.

The “Testing Date” in naming the data files follows “MMDDYY” format.

5] Admin Controls and Data Upload

TxRPDB provides easy data upload and management capabilities to the admin as upload of data files, introduction of new sections into the database as well as deleting unwanted data files can be conducted from within the TxRPDB portal. A user with admin log-in controls gets access to two additional tabs “Upload” and “Manage Account” within TxRPDB.

“Upload” allows the admin to introduce new sections into the database via “Upload Section Data” and add new test data files through “Upload Survey Data.” The admin can add new sections to the master Excel sheet containing information for each section in the database and upload it using “Upload Section Data.”

“Upload Survey Data” follows a two-step process to introduce new test data files as shown in Figure 7. Firstly, the admin is prompted to specify section I.D. and type of section the test data is associated with. By clicking “Check Database.” the database looks for the specific section I.D. in the database. Only if the specific section I.D. exists in the database, a confirmation message is displayed and the admin can upload the test data using “Upload Survey Files.”

Figure 7. Upload Survey Data Identifier Window

Figure 8 shows the layout of the window to upload survey data. Once the admin clicks on the “Upload” button shown in Figure 7, a new pop-up window opens. The admin needs to input the name of file and file type based on the file nomenclature discussed in Section 4. The admin then locates the file to be uploaded using the “Browse” button and once the required file is selected, it can be uploaded to the database by clicking the “Upload” button. As shown in Figure 8, the list of all test data files existing in the database will be enlisted in the “List of Uploaded Files” below the “Upload Survey Data.” The admin also has access to the “Delete” tab on the right side of each file in the “List of Uploaded” files, allowing the user to delete unwanted test data files for that particular section.



Figure 8. Upload Survey Data Window

“Manage Account” nests three additional capabilities within it, namely “User List,” “Update Section Data” as well as “Update Survey Data.”

Once a new user registers to access the database, the user details are enlisted in “User List” as shown in Figure 9.



Figure 9. User List Window

Using “User List,” the admin can activate new-user accounts by checking the box on the left-most of each user-detail and clicking the “Activate Users” button. Multiple users can be check-marked and activated at the same time. Existing user accounts or newly created accounts seeking access can also be deleted and denied access respectively from the “User List” by placing check-marks and clicking the “Delete Request” button.

“Update Section Data” enlists the sections currently in the database as illustrated in Figure 10. The admin can remove a section from the database by placing a check-mark in the left-most side “Check-box” and then clicking on the delete symbol on the right side. Multiple sections can be deleted by placing multiple check marks against the sections to be deleted and clicking the “Delete All” button.

SECTION DETAIL

Search by Section ID :

<input type="checkbox"/>	Section	Highway	Ref mark	County	District	Data Type	
<input type="checkbox"/>	12-441-1-2	IH 45	Exit 72B	Montgomery	Houston	Level 1 Sections	X
<input type="checkbox"/>	12-US290-1	US 290		Waller	Houston	Level 1 Sections	X
<input type="checkbox"/>	12-US290-2	US 290		Waller	Houston	Level 1 Sections	X
<input type="checkbox"/>	12-US290-3	US 290		Waller	Houston	Level 1 Sections	X
<input type="checkbox"/>	18-I30-1	IH 30	MP 8.8	Dallas	Dallas	Level 1 Sections	X
<input type="checkbox"/>	19-US59-1	US 59	MP 218- 4	Bowie	Atlanta	Level 1 Sections	X
<input type="checkbox"/>	19-US59-2	US 59	MP 218- 4	Cass	Atlanta	Level 1 Sections	X
<input type="checkbox"/>	2-I35-1	IH 35W	MP 41	Tarrant	Ft Worth	Level 1 Sections	X
<input type="checkbox"/>	2-I820-1	IH 820	MP 11	Tarrant	Ft Worth	Level 1 Sections	X
<input type="checkbox"/>	20-I10-1	IH 10	MP 858+0.2	Orange	Beaumont	Level 1 Sections	X
<input type="checkbox"/>	24-I10-1	IH 10	MP 36+0.3	El Paso	El Paso	Level 1 Sections	X
<input type="checkbox"/>	24-I10-2	IH 10	MP 39+0.3	El Paso	El Paso	Level 1 Sections	X
<input type="checkbox"/>	24-I10-3	IH 10	MP 45+ 0.1	El Paso	El Paso	Level 1 Sections	X
<input type="checkbox"/>	24-I10-4	IH 10	MP 85	Hudspeth	El Paso	Level 1 Sections	X
<input type="checkbox"/>	25-I40-1	IH 40	MP 158.52	Wheeler	Childress	Level 1 Sections	X
<input type="checkbox"/>	25-I40-2	IH 40	MP 147-0.15	Wheeler	Childress	Level 1 Sections	X
<input type="checkbox"/>	3-I35-1	IH 35	MP 484+0.5	Cooke	Wichita Falls	Level 1 Sections	X
<input type="checkbox"/>	3-US287-1	US 287	MP 330	Wichita	Wichita Falls	Level 1 Sections	X
<input type="checkbox"/>	3-US287-2	US 287		Wichita	Wichita Falls	Level 1 Sections	X
<input type="checkbox"/>	3-US81-1	US 81	MP 220	Montague	Wichita Falls	Level 1 Sections	X
<input type="checkbox"/>	4-I40-1	IH 40	MP 33+ 287ft.	Oldham	Amarillo	Level 1 Sections	X
<input type="checkbox"/>	5-I27-1	IH 27	MP 43+0.22	Hale	Lubbock	Level 1 Sections	X
<input type="checkbox"/>	5-Loop_289-1	SL 289		Lubbock	Lubbock	Level 1 Sections	X
<input type="checkbox"/>	9-I35-1	IH 35	MP 361-0.2	Hill	Waco	Level 1 Sections	X
<input type="checkbox"/>	9-I35-2	IH 35	Exit 333 B	McLennan	Waco	Level 1 Sections	X

1 2 3 4 5 6 7

Figure 10. Update Section Data Window

“Upload Survey Data” follows the “Update Section Data” format as shown in Figure 11. It enables the admin to delete test data files that have been uploaded to the database previously.

SURVEY DETAIL

Search by Section ID :

ID	Section	File Name	Survey Data		
<input type="checkbox"/>	363	DAL-SH289_0091-05-525	DAL-SH289-PICS.pdf	Pictures	×
<input type="checkbox"/>	362	DAL-US75_0047-06-066	DAL-US75_0047-06-066-PICS.pdf	Pictures	×
<input type="checkbox"/>	361	DAL-US380_0135-02-030	DAL-US380_0135-02-030-PICS.pdf	Pictures	×
<input type="checkbox"/>	360	25-I40-2	25I402PD062310.pdf	Pictures	×
<input type="checkbox"/>	359	25-I40-1	25I401PD062310.pdf	Pictures	×
<input type="checkbox"/>	358	24-I10-4	24I104PD083110.pdf	Pictures	×
<input type="checkbox"/>	357	24-I10-3	24I103PD083010.pdf	Pictures	×
<input type="checkbox"/>	356	24-I10-2	24I102PD083010.pdf	Pictures	×
<input type="checkbox"/>	355	24-I10-1	24I101PD083010.pdf	Pictures	×
<input type="checkbox"/>	354	19-US59-2	19US592PD091410.pdf	Pictures	×
<input type="checkbox"/>	353	19-US59-1	19US591PD091410.pdf	Pictures	×
<input type="checkbox"/>	352	5-Loop_289-1	5LP2891PD061710.pdf	Pictures	×
<input type="checkbox"/>	351	5-I27-1	5I271PD061710.pdf	Pictures	×
<input type="checkbox"/>	350	4-I40-1	4I401PD062410.pdf	Pictures	×
<input type="checkbox"/>	349	25-I40-2	25I402PD031610.pdf	Pictures	×
<input type="checkbox"/>	348	25-I40-1	25I401PD031610.pdf	Pictures	×
<input type="checkbox"/>	347	24-I10-4	24I104PD021810.pdf	Pictures	×
<input type="checkbox"/>	346	24-I10-3	24I103PD021810.pdf	Pictures	×
<input type="checkbox"/>	345	24-I10-2	24I102PD021710.pdf	Pictures	×
<input type="checkbox"/>	344	24-I10-1	24I101PD021710.pdf	Pictures	×
<input type="checkbox"/>	343	5-Loop_289-1	5LP2891PD121609.pdf	Pictures	×
<input type="checkbox"/>	342	5-I27-1	5I271PD121609.pdf	Pictures	×
<input type="checkbox"/>	341	24-I10-4	24I104PD092211.pdf	Pictures	×
<input type="checkbox"/>	340	24-I10-3	24I103PD092211.pdf	Pictures	×
<input type="checkbox"/>	339	24-I10-2	24I102PD092111.pdf	Pictures	×

1 2 3 4 5 6 7 8 9 10 ...

Figure 11. Update Survey Data Window

6] Database Design and Architecture

Microsoft SQL Server 2008 has been used as a database engine with Windows authentication for TxRPDB database storage. Section data, survey data and user data are three main categories for TxRPDB database.

- **Section Data**

Section data category contain six data tables; “Section Data,” “Section Detail,” “Construction Information,” “Location Information,” “Align Detail,” and “Section Data Type.”

The relation among the data tables is shown in Figure 12.

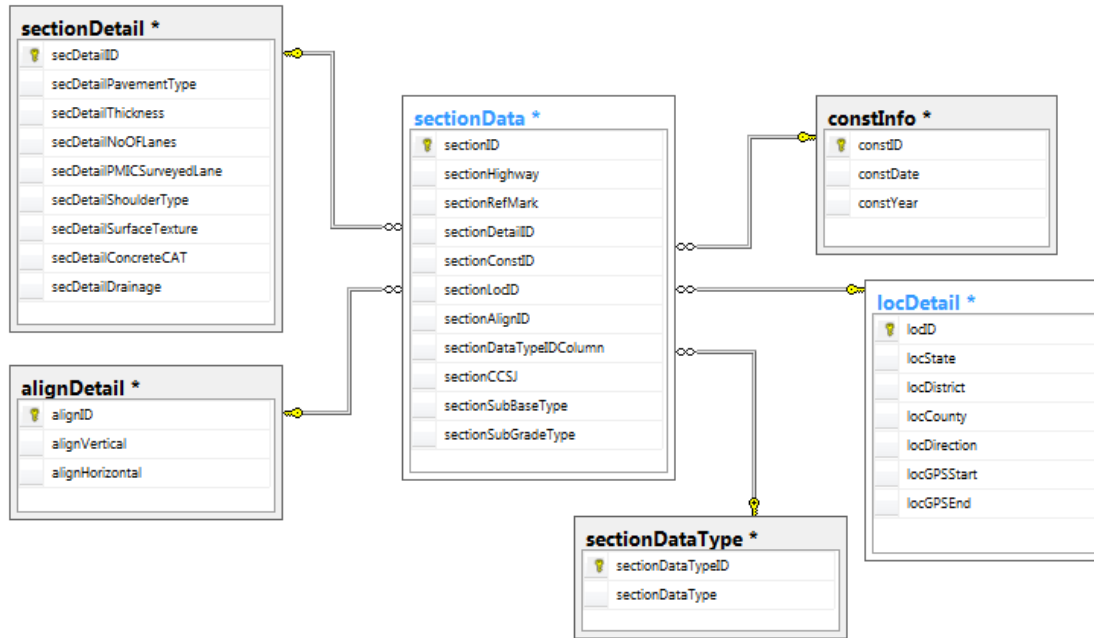


Figure 12. TxRPDB Database Architecture

Table Name: sectionData

sectionData is a primary table and contains primary information about test sections. “sectionDetail” is the identifier for section information. Data elements “sectionDetailID,” “sectionConstID,” “sectionLocID,” “sectionAlignID” and “sectionDataTypelDColumn” are useful to fetch section detail information, construction information, location of section, alignment detail and section data type respectively from the secondary tables.

Table 3. sectionData

Data Element	Data Type	Constraints
sectionID	varchar(20)	not null(PK)
sectionHighway	varchar(20)	
sectionRefMark	varchar(20)	
sectionDetailID	int	not null(FK)
sectionConstID	int	not null(FK)
sectionLocID	int	not null(FK)
sectionAlignID	int	not null(FK)
sectionDataTypelDColumn	int	not null(FK)
sectionCCSJ	varchar(100)	
sectionSubBaseType	varchar(50)	
sectionSubGradeType	varchar(50)	

Table Name: sectionDetail

It is the secondary table containing detailed information for the section. Section details are related to the primary section data table through the unique identifier “secDetailID”.

Table 4. sectionDetail

Data Element	Data Type	Constraints
secDetailID	int	not null(PK)
secDetailPavementType	varchar(80)	
secDetailThickness	varchar(10)	
secDetailNoOFLanes	varchar(10)	
secDetailPMICSurveyedLane	varchar(80)	
secDetailShoulderType	varchar(80)	
secDetailSurfaceTexture	varchar(80)	
secDetailConcreteCAT	varchar(80)	
secDetailDrainage	varchar(80)	

Table Name: sectionDataType

sectionDataType contains a list of data types for the sections. Data types can be like “Level 1 Information,” “CPCD,” “CRCP,” “Fast Track Pavement,” “Coarse Aggregate Effects” etc. Section data type relate to primary section data table by its unique identifier “sectionDataTypeID.”

Table 5. sectionDataType

Data Element	Data Type	Constraints
sectionDataTypeID	int	not null(PK)
sectionDataType	varchar(50)	

Table Name: locDetail

This secondary table contains location details of test section. Location information relate to primary section data table by its unique identifier “locID.”

Table 6. locDetail

Data Element	Data Type	Constraints
locID	int	not null(PK)
locState	varchar(25)	
locDistrict	varchar(25)	
locCounty	varchar(25)	
locDirection	varchar(5)	
locGPSStart	varchar(80)	
locGPSEnd	varchar(80)	

Table Name: constInfo

This secondary table contains construction detail of section data. Construction information relate to primary section data table by its unique identifier “constID.”

Table 7. constInfo

Data Element	Data Type	Constraints
constID	int	not null(PK)
constDate	date	
constYear	varchar(10)	

Table Name: alignDetail

This secondary table contains alignment detail of section data. Alignment information relate to primary section data table by its unique identifier “alignID.”

Table 8. alignDetail

Data Element	Data Type	Constraints
alignID	int	not null(PK)
alignVertical	varchar(40)	
alignHorizontal	varchar(40)	

- **Survey Data**

Survey category contains three data tables: “Survey Data,” “Survey Detail,” and “Survey Data Type.”

Table Name: surveyData

surveyData table is a primary table. It contains the information of survey held for each section or highway. Data element “surveyDataID” is a unique identifier for the survey information held on Section/Highway defined by data element “surveySectionID.” If Survey held on Section /Highway from “General Section,” “Special Section,” “Experimental Section,” or “CPCD,” data element “surveyLevel” will be blank. Surveyor names and survey date also are not mandatory fields for the database.

Table 9. surveyData

Data Element	Data Type	Constraints
surveyDataID	int	not null(PK)
surveySectionID	varchar(50)	
surveyDate	date	
surveyLevel	varchar(10)	
surveyorNames	varchar(80)	

Table Name: surveyDetail

surveyDetail table is a primary table. surveyDetail table contains information of uploaded survey files for surveyed Sections / Highway. Data element “surveyFileName” contains the names of uploaded files to display on the list of files related to the section. Data element “surveyFileDataType” contains the type of survey data. File types can be “Load Transfer Information,” “Crack Information,” “Pictures,” etc. Data element “surveyFileType” contains information of file type. File types can be “jpg,” “gif,” “pdf,” “doc,” “ppt,” etc. Data element “surveyFilePath” contains the related path of the uploaded file on the server. This path will be used for the download or the view of file functionality.

Table 10. surveyDetail

Data Element	Data Type	Constraints
surveyDetailID	int	not null(PK)
surveySectionID	varchar(50)	
surveyFileName	varchar(50)	
surveyFileDataType	varchar(50)	
surveyFileType	varchar(80)	
surveyFilePath	varchar(500)	
surveyDate	date	

Table Name: surveyTypeDB

This is a secondary table containing the list of all available types of survey data. These survey types can be “Crack information,” “Deflection,” “Distress,” “Plans,” and “Pictures.” Data element “surveyTypeShortName” is useful to assign short name in case of a big survey file name. This field value will be displayed on the web, though data will be stored by the full name of survey type. Data element “surveyTypeDesc” can be used to give the description of the survey type.

Table 11. surveyTypeDB

Data Element	Data Type	Constraints
surveyTypeID	int	not null(PK)
surveyType	varchar(50)	
surveyTypeShortName	varchar(50)	
surveyTypeDesc	varchar(80)	

- **User Data**

The User category contains 1 data table; “User Data.”

Table Name: userData

This is the primary table used to store all user information including users’ first and last names, username, password, email and type of user. Data element “userIsActive” contain two possible values: “true” and “false.” If value is active, it means the admin has accepted request and that user will be able to access database through website. Data element “userType” has possibly two values “admin” and “user.”

Table 12. userData

Data Element	Data Type	Constraints
userID	int	not null(PK)
userFName	varchar(50)	
userLName	varchar(50)	
userUName	varchar(20)	
userPassword	varchar(20)	
userEmail	varchar(80)	
userIsActive	bit	
userType	varchar(10)	

7] Data Storage

Windows Enterprise Server 2008 R2 is used to store the test sections and survey files. For TxRPDB project we have two types of file to store on the server: Section data files and Survey files. Section Data files includes the general information about the sections. Survey data files include the files such as pictures, plans, crack information, deflections, etc.

- **Section Data Files**

Section data files are used to import new or update existing data. Section data files must follow the proper format. Section files have to follow several rules such as the header of section data Excel file must not be changed, order of Excel file must not be altered, section data files should not have any blank field in it, if data is not available it should be replaced by “-” (dash), in case of date field, date must be in proper format (MM/DD/YYYY), and section data type must have the same name as mentioned in Table 12.

Table 13. Section Data Types

List of Section Data Type	
Section Data Type	Section Data Category
Level 1 Sections	CRCP
Fast Track Pavement	Special Sections
Bonded Overlay	Special Sections
Unbonded Overlay	Special Sections
Whitetopping	Special Sections
Precast Pavement	Special Sections
Cast-in-place prestressed pavement	Special Sections
Recycled Concrete Pavement	Special Sections
CPCD	CPCD
General Sections	CRCP

Coarse Aggregate Effects	Experimental Sections
Steel Percentage Effects	Experimental Sections
Construction Season Effects	Experimental Sections

If the admin wants to add another type, a new Excel sheet should be uploaded using “Upload Section Data” tab on TxRPDB website and the new type will be added to the database automatically. While uploading a new Section Data Excel sheet, if the same section data is uploaded, it will not get duplicated in the database but the old section details will be updated by the new detail.

A snap-shot of the Section Data Excel sheet is shown in Figure 13.

	A	B	C	D	E	F	G	H
1	Test Section	Highway	Reference Marker	State	District	County	Direction	GPS (Start)
2	2-I35-1	IH 35W	-	Texas	Ft Worth	Tarrant	-	N32°35'58.7" W097°19'
3	2-I820-1	IH 820	MP 11	Texas	Ft Worth	Tarrant	NE	-
4	3-I35-1	IH 35	MP 484+0.5	Texas	Wichita Falls	Cooke	-	N33°26'41.3" W097°09'
5	3-US287-1	US 287	MP 330	Texas	Wichita Falls	Wichita	N	N33°57'59.7" W098°43'

Figure 13. TxRPDB Section Detail Excel Sheet – Snapshot

Naming of section data file will be done by the system. Section data files will be stored on the server for log purposes only. Section data file will be stored in the folder “Section Data.”

- **Survey Data Files**

Survey data files are the files which have been generated after survey of Section or Highway. These files can be of any type from the list shown in Table 14. Any other extension files apart from the ones shown in Table 14 cannot be uploaded.

Table 14. File Extensions – Survey Data Files

List of Acceptable File Extension for Survey Data File	
File Type	File Extension
PDF Files	“.pdf”
Image Files	“.gif”, “.png”, “.jpg”, “.jpeg”
Document Files	“.doc”, “.docx”, “.txt”
Presentation Files	“.ppt”, “.pptx”
CAD Files	“.dxf”, “.svg”
Spreadsheet Files	“.xls”, “.xlsx”

Survey data can be of any type shown in Table 14. In the future if more survey types are to be added, it can be done through the page “Admin/DatabaseDirectory.aspx”. Link of this page can be also found on “Upload Survey Data” page on TxRPDB website.

Table 15. Survey Data Types

List of Survey Data Type	
Survey Data Type	Survey Data Description
Crack Info	Crack Information
Deflections	Deflection Information
Distress	Distress Information
Load Trans Eff	Load Transfer Efficiency
Pictures	Pictures of sections/highway
Plans	Plan sets
Reports	Reports generated from survey
Traffic	Files for traffic information
Other	Other Files

Survey data files are stored on the server in hierarchical folders. As shown in Figure 14, hierarchy can be decided by the survey type, section I.D. and survey data type.

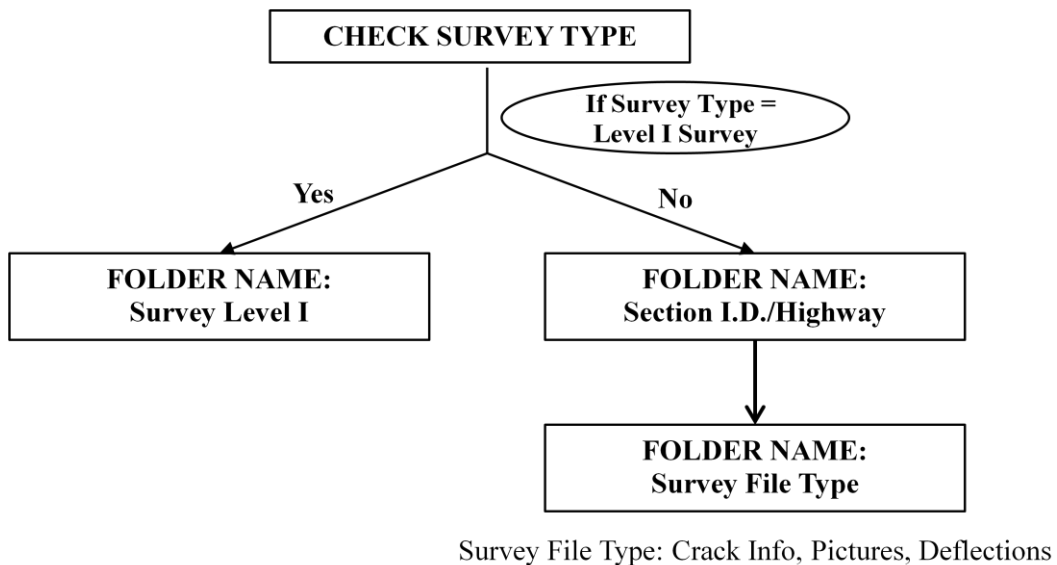


Figure 14. Folder Hierarchy for Data Storage

While importing data of survey on “UploadSurvey.aspx” page, it also will generate the folder hierarchy for survey files of Section I.D. This hierarchy of folder depends on the survey type. If it’s a level survey, a parent folder will be the Survey Level. Each section ID will have a separate folder where the survey files will be stored under the parent folder named by the Section ID.

For example, if we upload the survey file “crack info.xlsx” and “Pictured.pdf” of Level-1 survey for the section ID “IH 30,” the file will be stored into the folder hierarchy shown below.

Level-1>IH 30>Crack Info>Crack Info.xlsx
 Level-1>IH 30>Pictures>Pictures.pdf

TxRPDB database contains several store procedures to perform database operations. A list of all the store procedures are described in Table 16.

Table 16. Store Procedures

List of Store Procedures	
Store_Procedures	Short Description
in_InsertSectionData	To import section data
in_InsertSurveyData	To import survey data
in_InsertSurveyDetail	To import survey detail
in_InsertSurveyType	To import survey type
up_AddUserSession	To add user session
up_InsertUser	To import new user information
up_ValidateUser	To validate user
updateUserActiveData	To active or de-active user
updateUserData	Used to update user data.

8] Website Development

TxRPDB website is developed on the Microsoft .NET Framework 4.0. The features of the website have been enriched using AJAX Toolkit, JavaScript, jQuery, OBOU Suite controls and CSS.

- **Search Section**

A search section provides the functionality of advanced search by providing the ability to select multiple attributes and multiple values of the same attribute at the same time. jQuery and CSS code have been used to convert a single selectable dropdown list to the multi-select dropdown. According to the selection of attributes, dynamic query will be formed and will be used to fetch data from the database matching selected attributes. Search result will be grouped according to their attributes and will be displayed in the repeater control.

- **Section and Survey data view panel**

Section and survey data view panel is an oWindows in an about suite AJAX control. Script has been written to call the oWindow with specific information such as Section ID, Survey Data Type, Survey File type, etc.

- **Section, User and Survey update webpage**

Section, User and Survey update webpage contain the grid of list of existing data from the database. Search and multiple delete functionality have been developed by the C# and JavaScript code.

- **CRCP, CPCD, Experimental and Special Sections**

C#, JavaScript and AJAX have been used to perform the data view grid. Search query forms dynamically according to the selection of attributes and imported data is displayed in ASP: Repeater control.

9] Technical Specifications

Title	TxRPDB – Texas Rigid Pavement Database
Technology Used	Asp.Net, AJAX Toolkits and about suite controls
Scripting Language	C#, JavaScript and jQuery
Database	Microsoft SQL Server 2008
Database Tool	SQL Server Management Studio Express
Designing Tool	Abode Photoshop 5.0
Development Platform	.Net Framework 4.0
Development Environment	Microsoft Visual Studio 2010
Developed at	Texas Tech University

4. SUMMARY AND CONCLUSIONS

The following text is a placeholder for the main body of the document, which is currently blank or contains extremely faint text that is not legible.



TEXAS TECH UNIVERSITY

Multidisciplinary Research in Transportation

Texas Tech University | Lubbock, Texas 79409
P 806.742.3503 | F 806.742.4168