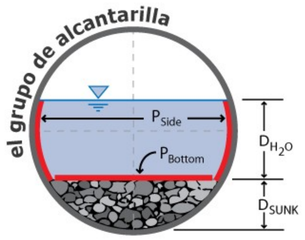


Culvert Inventory Geodatabase

Texas Department of Transportation

Texas State University – San Marcos, Department of Geography, was asked to assist the Texas Department of Transportation (TxDOT) in creating a geodatabase that would provide Hydrologists and Maintenance personnel the real time data needed to control cost and improve culvert reliability. TxDOT will use this geodatabase to catalog and manage information about culverts in Hays County, Texas.

Needs Assessment and Data

The first stage of the project was to determine the project needs and expectations of both TxDOT hydrologic engineers and the TxDOT maintenance workers. The team conducted a series of conference calls with our client and met with local road maintenance workers to discuss the design of the project. Following these meetings, the group Identified the data needs. The list below shows the data used:

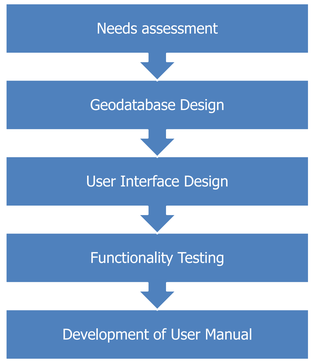
Texas Reference Marker System (TRM)
- The TRM is a program used by TxDOT to inventory road features

San Marcos, Texas Orthoimagery 2008
- Obtained from the Capital Area Council of Governments (CAPCOG)

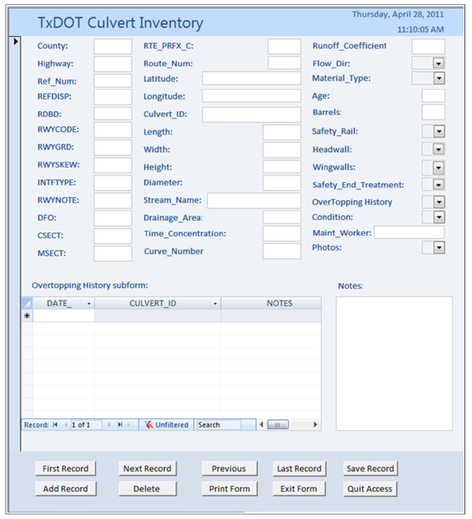
Geodatabase Design

The design consists of two parts: an ArcGIS geodatabase and a Microsoft Access database with user interface. In ArcGIS, the user is able to examine the spatial distribution of culverts as point features in a road segment. The attributes of these features can also be accessed through attribute tables. In Microsoft Access, the user is able to open tables, run queries, and enter/edit data.

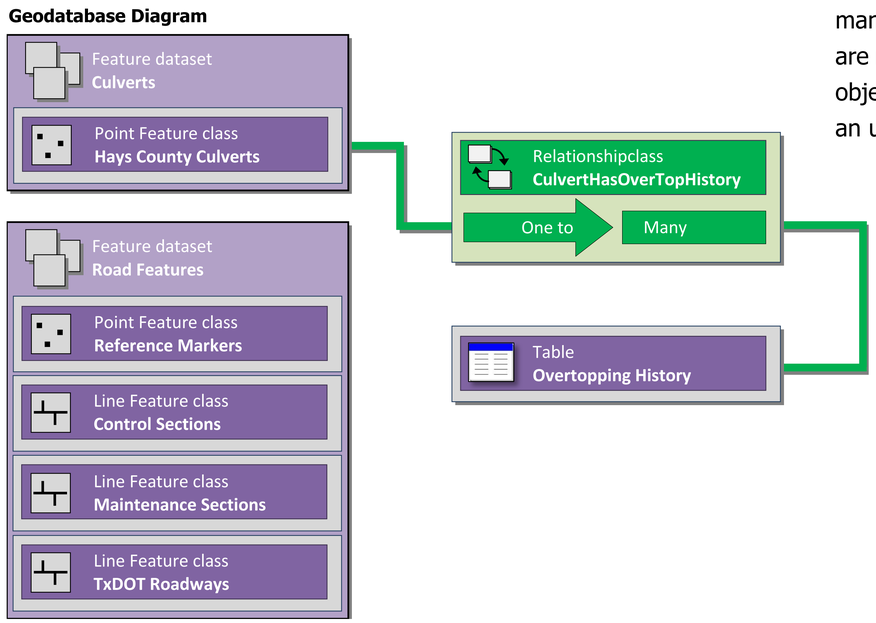
Project Workflow



User Interface



Geodatabase Diagram



Culvert Table Data Definitions

Field Name	Definition
OBJECTID	Object ID
Shape	Definition of the kind of feature class (point, line, polygon)
CNTY	County designation number, see TRM manual page 2-9
HWY	Highway designation type and number, see TRM code index
REFNBR	Number of Reference Marker that is on the route where the feature is located
REFDISP	The distance of the feature (miles) downstream from the nearest upstream Reference Marker
RDBD	Roadbed ID
RWYCODE	Total Width (feet) of the Right-of-Way at the location of the feature, see TRM manual page 10-14
RWYGRD	How the feature sits relative to the roadway grade: D – below, S – on surface, U - above
RWYSKEW	Diagonal skew of crossing feature relative to the downstream direction of the route, see TRM manual page 11-4
INTFTYPE	Intersecting feature type, see TRM code index
RWYNOTE	Catch-all descriptor of intersecting feature
DFO	Distance from the origin Reference Marker (miles) for the route
CSECT	Control section number
MSECT	Maintenance section number

Field Name	Definition
RTE_PRFX_C	Route prefix
RTE_NBR	Route number
LATITUDE	Latitude (decimal degrees)
LONGITUDE	Longitude (decimal degrees)
CULVERT_ID	Culvert identification number
LENGTH	Length of the feature (feet)
WIDTH	Width of the feature (inches)
HEIGHT	Height of the feature (inches)
DIAMETER	Diameter of the feature (inches)
STREAM_NAME	Name of the stream associated with the feature
DA	Drainage area (miles^2)
Tc	Time of concentration (minutes)
CN	Curve number
RC	Runoff coefficient
FLOW_DIR	Flow direction
MAT_TYPE	Material type
AGE	Year feature was emplaced on site
BARRELS	Number of barrels associated with the feature
SAFETY_RAIL	Presence of a safety rail
HEADWALL	Presence of a headwall
WINGWALLS	Presence of wingwalls
SFTY_END_TRTMT	Presence of safety end treatments
OVERTOP_HIST	Presence of overtopping history
CONDITION	Condition of feature
MAINT_WKR	user who recorded or inspected the feature
NOTES	Notes
PHOTOS	Presence of photos

Graphical User Interface

A Graphical User Interface (GUI) was developed for inputting data into the geodatabase. The GUI consists of an electronic form in Microsoft Access where the maintenance worker can input the data gathered in the field. The form is very simplified and easy to use. Data entry through ArcGIS is another option; however, for users with less technical training the GUI is easier to use.

Functionality Testing

To test the functionality of the geodatabase, road segment RM 150 was chosen from Hays County, Texas. Prior to inputting data, a unique ID was generated for each culvert feature. The locations were validated using orthoimagery and the experience of the local TxDOT maintenance office.

User Manual

The final objective of the project was to develop a user manual for the geodatabase. The user manual explains how to input data through ArcGIS or Microsoft Access. The road segment RM 150 serves as an example in the user manual. The manual is easy to understand for users who are not familiar with ArcGIS or Microsoft Access. The objective of the manual is to train users on data entry in an understandable way.

TEXAS STATE UNIVERSITY SAN MARCOS
The rising STAR of Texas

Prepared by: El Grupo de Alcantarilla
Jason Kleinert, Andres Aguirre, Kyle Vonderau, Thomas Platt GEO 4427 Spring 2011

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Visit our website at: http://geosites.evans.txstate.edu/g4427/2010/S11/