9-1523-P3

PROTOTYPE DOCUMENTATION

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Project 9-1523: Electronic Appraisal Development Study

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Performing Organization:	**Sponsoring Organization:**
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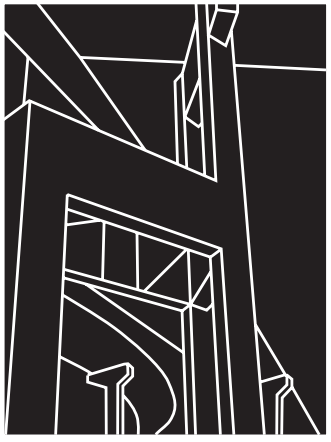
TECHNICAL MEMORANDUM 9-1523-1

CONCEPTUAL FRAMEWORK FOR THE ELECTRONIC APPRAISAL SYSTEM

Zhanmin Zhang, Carlos Caldas, Zach Piepmeyer, and Nadeem Moulvi



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Project 9-1523
Technical Memorandum 9-1523-1

Conceptual Framework for the Electronic Appraisal System

The following is a brief description of the various components of the Electronic Appraisal System as shown in Figure 1.

1. Field Data Acquisition

The first step in performing a right-of-way property appraisal is field data acquisition. This stage involves gathering basic information vital to making a value estimate. Data pertaining to site characteristics, such as physical features and dimensions, will be collected on-site by the appraiser and recorded in either paper or electronic format. The key data elements to be collected during field data acquisition will be identified in Project 9-1523. Defining a unique acquisition procedure and recording mechanism to be used during field data acquisition is outside the scope of the project and therefore, will not be covered.

2. Electronic Appraisal Form

After the property data has been gathered in the field and sufficiently developed with other data to make a conclusion of value, it is converted into an electronic format compatible with the Electronic Appraisal System (EAS). All data, along with background information pertaining to the appraiser, the property owner, and other interested parties, is loaded onto the standardized electronic appraisal form. This process will be accomplished by uploading the necessary information into the appropriate data fields through a web-based user interface accessible with a personal computer. This process will be completed by the appraiser.

The standardized electronic appraisal form will contain data fields for narrative, pictorial and numerical information. The form will be stored and transmitted electronically, reducing the need for a hard copy of the appraisal. Once all the data has been uploaded, the standardized electronic appraisal form may be printed.

3. File Transmission

Once the appraiser has gathered the required property data and converted it to the standardized electronic form, the electronic appraisal form will be transmitted from the office of the appraiser to a centrally located, temporary queue database via a secured electronic interface. This transmission will be performed by a web-based interface. Upon file transmission, the electronic appraisal form will receive an electronic signature, verifying its authenticity.

4. Queue Database for Review

Upon successful transmission of a completed electronic appraisal form to the centrally located temporary queue database, it will be protected from tampering by unauthorized persons. Queued appraisals will be accessible only by those authorized parties that need to view, modify or suspend the appraisal as necessary. Authorized parties include the appraiser, appraisal reviewers (including contract reviewers) and a limited number of DOT right-of-

way personnel. An appraisal can only be modified by the appraiser who prepared the appraisal. The function of the temporary queue database is short-term storage of the appraisal while it is being reviewed by appraisal reviewers. The short-term storage will last until the report has been approved by the reviewer and/or DOT.

5. Statistical Process Control

Initiated by DOT right-of-way personnel, the statistical process control will examine and check all critical values on the electronic appraisal form against historical appraisal information currently stored in the permanent electronic appraisal database. The purpose of the statistical process control is to identify and flag any information contained within an appraisal that falls outside of historical and/or known levels of acceptability. The reviewer will be the final judge about the acceptability of an appraisal. SPC will only serve as guidance for the reviewer.

6. DOT Approval Process

The appraisal reviewer will perform the review at this stage and consider if any of the flagged data needs correction, verification or analysis by the appraiser. If the information contained in the appraisal in its current form is deemed acceptable and approved by the appraisal review process, the appraisal will be transmitted to the permanent electronic appraisal database for storage. Any appraisal that is found to contain inconsistent information by the reviewer will not be loaded to the permanent storage and notification will be sent to the appraiser with details outlining those elements that were deemed inconsistent. Appraisals containing information outside of acceptable limits will require a more detailed review by the appraisal reviewer; based on the review outcome, revisions by the appraiser may be required in order for that appraisal to be deemed acceptable.

7. Appraisal Database

Only those appraisals accepted by the appraisal review process will be uploaded to the permanent electronic appraisal database. Appraisals stored in the database may be accessed only by personnel authorized by DOT for later use.

8. Summary Information

All appraisals stored in the permanent database will be available to authorized right-of-way personnel to perform various analyses and to generate summary information. This summary information may be viewed on personal computers and printed.

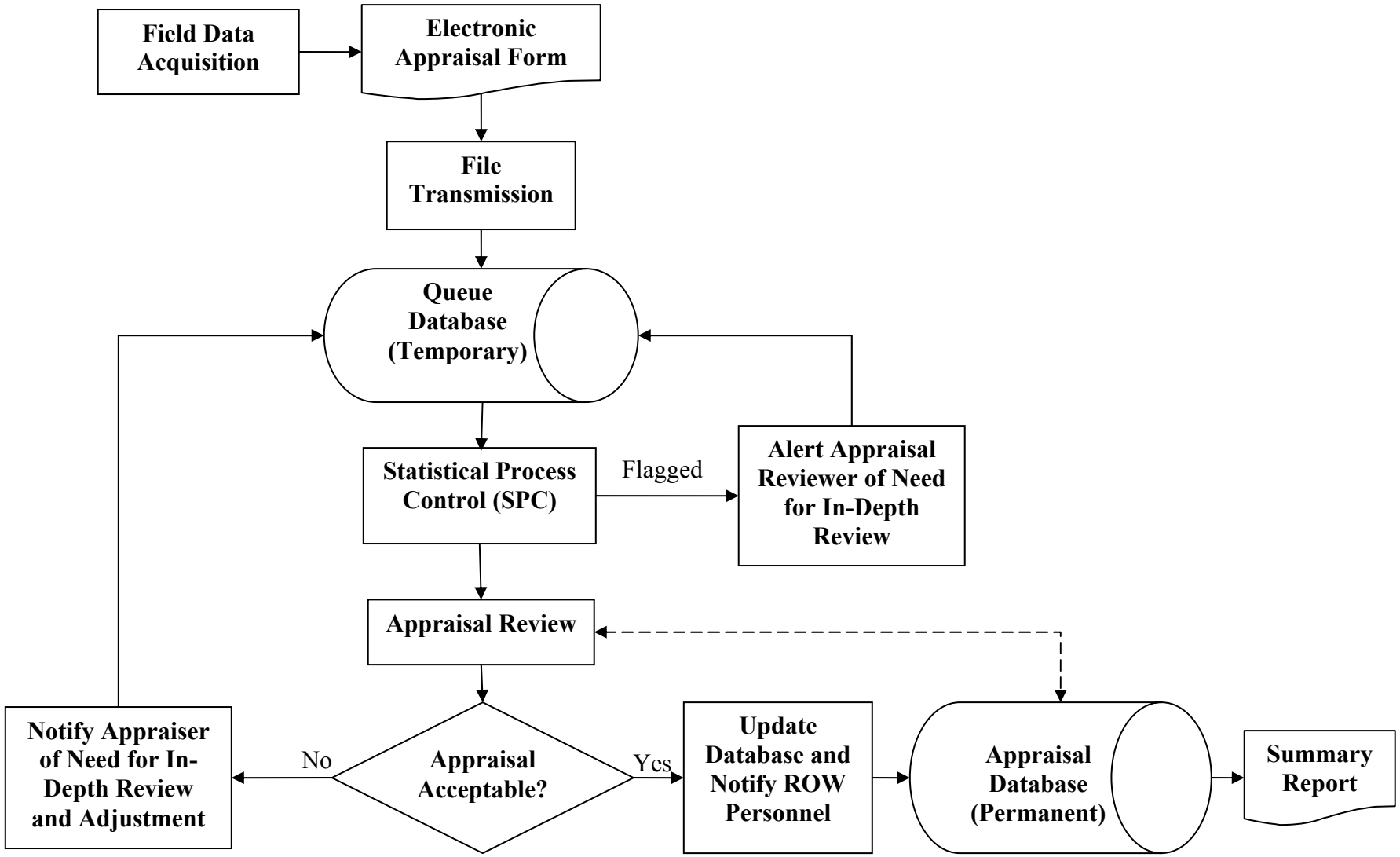
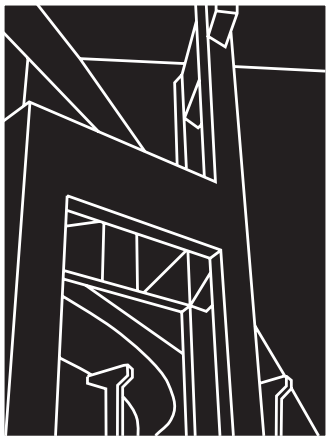


Figure 1: Electronic Appraisal System Process

TECHNICAL MEMORANDUM 9-1523-2

USER FUNCTIONAL NEEDS FOR THE ELECTRONIC APPRAISAL SYSTEM

Zhanmin Zhang, Carlos Caldas, Zach Piepmeyer, and Nadeem Moulvi



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User Functional Needs for the Electronic Appraisal System

The following is a list of the User Functional Needs broken down into six categories representing each of the major components and processes of the System: Appraisal Form, Data/File Transmission, Queue Database for Review, Statistical Process Control, Approval Process, and Permanent Appraisal Database.

I. Appraisal Form

[3.67] **A)** One electronic appraisal form with the option of being expandable. Expandability removes the need for multiple forms (i.e. "complex" and "non-complex" forms). The level of expandability will be determined by the valuation approach used during the appraisal process.

[4.50] **B)** All of the primary sections, such as the neighborhood analysis and the value of property, will be included in the electronic appraisal form.

[4.00] **C)** Numerical values, check boxes and drop-down lists will be used as much as possible to help standardize input data and reduce the likelihood of misinterpretation of the information included in the appraisal.

[4.50] **D)** For security purposes, the electronic appraisal form will contain a mechanism for applying an electronic signature.

[4.58] **E)** The electronic appraisal form will contain a provision for including visuals such as plats and pictures. The visuals required will be a function of the type of appraisal being completed.

[4.16] **F)** The electronic appraisal form will include a cover page with essential information such as the certification of the appraiser and executive summary. The specific page will be altered by the individual states.

[4.25] **G)** The electronic appraisal form will require identification and justification of the valuation approaches used during the appraisal process.

[4.16] **H)** Navigation and control mechanisms will be provided to ensure that all of the required data fields are completely filled with valid data.

[4.75] **I)** A mechanism will be included to allow the appraiser to "save" input information on a personal computer and/or temporary database location so that the appraisal form can be completed in stages.

[3.58] **J)** A mechanism to use existing standard information and/or appraisals for the creation of templates.

[4.25] **K)** The finished report (complete or abbreviated format) will be in electronic format and will be easily available in printable versions. Hard copies can be generated as needed.

[3.66] **L)** The electronic appraisal form will include a summary page with statistical information that can be transmitted directly into the permanent database.

[4.75] **M)** A printable version of the complete report, including both the form and attachments, will be available.

II. Data/File Transmission

[3.91] **A)** The system will have a mechanism to retain a copy of the original acceptable appraisal in the database. States have the option to archive earlier versions.

[4.08] **B)** A provision for automatically sending reviewers' comments back to the appraiser and corresponding district ROW office/ Central ROW office.

[4.16] **C)** A quality control mechanism for the appraiser to review the submittals to ensure that all data fields are completely and accurately filled.

[4.00] **D)** A mechanism to review the appraisal history for the property (i.e. multiple appraisals for a single piece of property).

[4.25] **E)** E-mail confirmation/notification of the successful submission of an appraisal will be sent to all parties involved.

III. Queue Database for Review

[4.33] **A)** The database will be accessible to the appraisers, the reviewer, and corresponding ROW personnel with controlled privileges.

[3.50] **B)** The database will maintain the option to overwrite the previous version of the appraisal until it is finalized. This feature will be given only to the appraiser until he officially submits the report.

[3.33] **C)** When the proposed Electronic Appraisal System is fully implemented (after the completion of the research), it will provide access to the ROW appraisal review form to the reviewer to carry out the appraisal review.

[4.08] **D)** E-mail notification of a completed appraisal review will be sent to the appraiser and ROW personnel.

IV. Statistical Process Control (SPC)

[3.75] **A)** The goal of implementing such a system is to ultimately reduce the time needed to complete the appraisal process. The intention of the SPC is to flag inconsistencies in an appraisal to

alert the reviewer. For example, when the land value from one appraisal significantly differs from the land value of similar appraisals, the reviewer should be alerted. In this manner, the SPC will help ensure consistency among similar appraisals. SPC will serve only as guidance for the reviewer; it is the reviewer who will make the final judgment.

[2.91] **B)** The SPC will support the development of the summary information on appraisals for DOT's internal use.

[3.58] **C)** Ranges in key values will be used to help determine the consistency of the input appraisal data.

V. Approval Process

[3.75] **A)** When the proposed Electronic Appraisal System is fully implemented (after the completion of the research), the appraisal will be approved online with the support of the electronic appraisal review form.

[3.91] **B)** E-mail notification of the approval will be sent to the appraiser, reviewer, and ROW acquisition consultant(s).

[4.58] **C)** Upon approval and after any necessary final adjustments are made, the finalized appraisal will automatically be uploaded and stored in the permanent appraisal database.

VI. Permanent Appraisal Database

[4.50] **A)** Access to the permanent appraisal database will be restricted to only the personnel authorized by DOT.

[2.16] **B)** The permanent database will provide a mechanism to conduct various queries based on attribute information.

[4.16] **C)** Appraisals in the permanent database will be organized in a format that is compatible with the State DOT's administrative structure and policies in terms of the data access and management.

TECHNICAL MEMORANDUM 9-1523-3

DATA REQUIREMENTS FOR THE ELECTRONIC APPRAISAL SYSTEM

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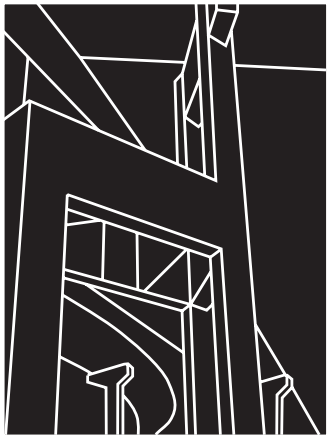

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Project 9-1523

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Data Requirements for the Electronic Appraisal System

Section 1- General Information and Certifications

Data Required		Data Type	Format	Ranking Score
1.1: Property Details				
1.1.1	Address of the Property	Text	Text Box	4.78
1.1.2	Property Owner	Text		4.78
1.1.3	Address of the property owner	Text		7.44
1.1.4	Occupants Name	Text		4.33
1.1.5	District	Text		3.11
1.1.6	CSJ	Text		4.66
1.1.7	Federal Project Number	Number		4.22
1.1.8	Parcel	Number		4.88
1.1.9	Whole/Part Acquisition	Categorical (Whole, Part)	Drop down list	4.66
1.1.10	Highway Number	Number	Text Box	4.44
1.1.11	County	Text		4.66
1.2: Purpose of the Appraisal			(Standard Format- No data Input)	4.77
1.3: Market Value			(Standard Format- No data Input)	4.77
1.4: Certificate of Appraiser			(Standard Format)	4.88
1.5: USPAP Requirements page			(Standard Format)	4.88
1.5.1	Total compensation for the acquisition of the described property	Number	Text Box	4.88
1.5.2	Dates on which the property was personally inspected by the appraiser	Number		4.88
1.5.3	Name of the Owner/Property Representative Accompanying the Appraiser on the Above Date	Text		4.33
1.5.4	The Date of Inspection of the Comparables Relied Upon in Making the Appraisal Report	Number		4.44
1.5.5	Certification number	Number		4.88

1.5.6	Effective Date of Appraisal	Number		4.88
1.5.7	Date on which Report was completed			3.88
1.5.8	Signature of the District Reviewing Appraiser along the date	Text	Text Box	4.88
1.6	Scope of the work	Text	Text Box	4.88
1.7	Signature of the appraiser	Text		4.88

Section 2- Subject Property and Neighborhood Analysis

Data Required			Data Type	Format	Ranking Score
2.1: Photographs of the Subject Property					
2.1.1	Date Taken		Number	Text Box	4.55
2.1.2	Taken by:		Text	Text Box	3.22
2.1.3	Description		Text	Text Box	4.22
2.1.4	Photograph		Picture	Box	4.66
2.1.5	Location Map		Map	Box	4.77
2.2: Area and Neighborhood Analysis					
2.2.1	Setting		Category (Rural, Suburban, Urban)	Drop-Down list	4.66
2.2.2 Boundaries	2.2.2.1	North	Text (Area, Road)	Text Box	4.33
	2.2.2.2	South	Text (Area, Road)		4.33
	2.2.2.3	West	Text (Area, Road)		4.33
	2.2.2.4	East	Text (Area, Road)		4.22
	2.2.2.5	Remarks	Text	Comment Box	4.00
2.2.3 Access	2.2.3.1	Distance from the Central Business District	Number (miles)	Text Box	3.11
	2.2.3.2	Distance from the Nearest Freeway	Number (miles)		3.22
	2.2.3.3	Name of the Nearest Freeway	Text		3.11
	2.2.3.4	Distance from Public Transportation	Number (miles)		3.33
	2.2.3.5	Name of the Public Transportation	Text		2.77
	2.2.3.6	Distance from Other Important Accesses	Number (miles)		3.44
	2.2.3.7	Name of Other Important Accesses	Text		3.44

2.2.4	Demographic Factors		Text	Text Box	4.22
2.2.5 Development	2.2.5.1	Neighborhood Build Up Percentage	Number (%)	Text Box	4.00
	2.2.5.2 Land Use	Single Family	Number (%)	Text Box	4.11
		Multi Family	Number (%)		
		Office	Number (%)		
		Retail	Number (%)		
		Industrial	Number (%)		
		Vacancy	Number (%)		
	2.2.5.3	Land Use Change	Category (Anticipate, Taking place, Doubtful)	Drop-Down List	4.44
	2.2.5.4	Economic Base Change	Category (Anticipate, Taking place, Doubtful)	Drop-Down List	4.22
	2.2.5.5	Property Value Change	Category (Anticipate, Taking place, Doubtful)	Drop-Down List	4.11
	2.2.5.6 Immediate Surrounding Land Use	North	Text	Text Box	4.44
		East	Text		
		South	Text		
		West	Text		
		Remarks	Text		
	2.2.5.7	Age Range of Property	Number	Text Box	3.88
	2.2.5.8	Predominant Age	Number	Text Box	3.66
	2.2.5.9	Rental Range	Number	Text Box	3.66
2.2.6	Education (An overview of the educational institutions in the area and the neighborhood)		Text	Text Box	3.55
2.2.7	Concluding Remarks (if any)		Text	Comment Box	3.88
2.2.8	Neighborhood Map		Map	Box	4.44
2.3: Whole Site Analysis					
2.3.1	Legal Description		Text	Text Box	4.66
2.3.2	Access		Category (Good, Fair, Poor)	Drop down list	4.88
2.3.3	Size		Number	Text Box	4.77
2.3.4	Site Dimensions		Number	Text Box	4.55

2.3.5	Shape		Category (Rectangular, Triangular, Irregular)	Drop-Down List	4.55
2.3.6	Frontage {include approximate figures along each street}		Category /Numbers (Good, Fair, Poor)	Drop-Down List & Text Box	4.66
2.3.7	Topography		Category (Good, Fair, Poor)	Drop-Down List	4.44
2.3.8	Topography Description { Describe in 2 words, ex Level, Light Slope etc}		Text	Text Box	4.22
2.3.9	Drainage		Category (Good, Fair, Poor)	Drop-Down List	4.44
2.3.10 Utilities	2.3.10.1	Electricity	Text	Text Box	4.55
	2.3.10.2	Gas	Text		4.44
	2.3.10.3	Telephone	Text		4.44
	2.3.10.4	Water	Text		4.55
	2.3.10.5	Sewer	Text		4.55
2.3.11	Corner Plot		Category (Yes, No)	Drop-Down List	4.33
2.3.12	Rail Road Access		Category (Yes, No)	Drop-Down List	4.33
2.3.13	Hazards Due to Flood		Category (Yes, No)	Drop-Down List	4.44
2.3.14	FEMA Map Panel Number		Number	Text Box	4.00
2.3.15	Soil Conditions		Categorical (Good, Fair, Poor)	Drop-Down List	333
2.3.16	Soil Conditions Description		Text	Text Box	3.88
2.3.17 Zoning	2.3.17.1	Name of the Zone	Text	Text Box	4.77
	2.3.17.2	Description	Text	Text Box	4.33
	2.3.17.3	Change in Zoning	Category (Anticipate, Doubtful)	Drop-Down List	4.44
2.3.18	Easements/Encroachments		Text	Text Box	4.88
2.3.19	School District		Text	Text Box	3.33
2.3.20 Street Condition	2.3.20.1	Street Width	Number	Text Box	3.11
	2.3.20.2	Paving	Text		3.55
	2.3.20.3	Sidewalks	Text		3.22
	2.3.20.4	Curbs and Gutters	Text		3.00
	2.3.20.5	Storm Sewers	Text		3.44
	2.3.20.6	Lighting	Text		3.00
2.3.21	Concluding Remarks		Text	Text Box	3.88
2.3.22	Maps (aerial map, plat map, flood plain map, zoning map)*		Maps	Box	4.22

2.4: Improvement Analysis					
2.4.1 Type of Use	2.4.1.1	Residential			4.88
		Number of SF	Number	Text Box	4.88
	2.4.1.2	Office			4.88
		Number of SF	Number	Text Box	4.88
	2.4.1.3	Retail			4.88
		Number of SF	Number	Text Box	3.88
	2.4.1.4	Industrial			4.66
		Number of SF	Number	Text Box	4.66
	2.4.1.5	Other (Name)			4.55
		Number of SF	Number	Text Box	4.88
2.4.2 Description of the Building	2.4.2.1	Name of the Property	Text	Text Box	4.88
	2.4.2.2	Type of Property	Text		4.77
	2.4.2.3	Configuration	Text		4.66
	2.4.2.4	Number of Building	Number		4.00
	2.4.2.5	Net Building Area	Number		4.44
	2.4.2.6	Gross Building Area	Number		4.77
	2.4.2.7	Stories	Number		4.66
	2.4.2.8	Land to Building Ratio	Number		4.00
	2.4.2.9	Ceiling Height	Number		4.44
	2.4.2.10	Year Built	Number		4.77
	2.4.2.11	Effective Age	Number		4.55
	2.4.2.12	Estimated Physical Life	Number		4.66
	2.4.2.13	Exterior Walls	Text		4.66
	2.4.2.14	Foundation	Text		4.66
	2.4.2.15	Roof	Text		4.11
	2.4.2.16	Doors	Text		4.66
	2.4.2.17	Frame	Text		4.44
	2.4.2.18	Flooring	Text		4.00
	2.4.2.19	Interior Partitions	Text		4.22
	2.4.2.20	Ceilings	Text		4.77
	2.4.2.21	Parking	Text		4.11
	2.4.2.22	Lighting	Text		4.22
	2.4.2.23	Plumbing	Text		4.55
	2.4.2.24	Heating	Text		4.44
	2.4.2.25	Air-Conditioning	Text		3.88
	2.4.2.26	Electricity	Text		3.88
	2.4.2.27	Security System	Text		4.33
	2.4.2.28	Fire Protection	Text		4.00
	2.4.2.29	Elevators	Text		4.22
	2.4.2.30	Insulations	Text		4.33
	2.4.2.31	Landscaping	Text		4.22

	2.4.2.32	Paving	Text		4.33
	2.4.2.33	Sidewalks	Text		4.22
	2.4.2.34	Fencing	Text		4.33
	2.4.2.35	Septic Tank	Text		4.66
	2.4.2.36	Signs	Text		4.33
	2.4.2.37	Miscellaneous	Text		4.33
	2.4.2.38	Remarks	Text		4.44
2.4.3 Improvement Evaluation			Category (Good, Fair, Poor, N/A)	Drop-Down List	
	2.4.3.1	Appearance			4.55
	2.4.3.2	Design			4.55
	2.4.3.3	Condition-Overall			4.77
	2.4.3.4	Condition-Exterior			4.77
	2.4.3.5	Condition-Interior			4.77
	2.4.3.6	Heating			4.55
	2.4.3.7	Plumbing			4.44
	2.4.3.8	Electrical			4.55
	2.4.3.9	Parking			4.55
	2.4.3.10	Air-Conditioning			4.55
	2.4.3.11	Landscaping			4.33
2.4.4	Improvement Analysis Summary/ Remarks	Text	Text Box		4.77
2.4.5	Maps (Improvement Maps)	Map	Box		4.22
2.5: Assessment and Taxes					
2.5.1	Taxing Jurisdiction		Text (Name)		3.88
2.5.2 Most Recent Tax Assessment (As per the Tax Records)	2.5.2.1	Account Number	Number		3.66
	2.5.2.2	Land SF	Number		3.66
	2.5.2.3	Improvement SF	Number		3.66
	2.5.2.4	Assessment	Number ($)	Text Box	4.11
2.5.3 Estimated Tax Liability	2.5.3.1	Total Assessment	Number ($)		4.11
	2.5.3.2	Tax Rate	Number ($/SF)		3.11
	2.5.3.3	Tax Liability	Number ($)		3.22
2.5.4	Remarks		Text		3.88
2.6: Property History of Five Years			Text	Narrative Box	4.66
2.7: Environmental Assessment					
2.7.1	Environmental Problem Prevalent/Expected		Category (Yes, No)	Drop-Down List	4.66
2.7.2	Remarks		Text	Text Box	4.77

2.8: Highest and Best Use					
2.8.1	Property Type		Category (Retail, Industrial, Office, General Commercial, Residential-Single family, Residential-Multi-family, Agricultural, Recreational)	Drop-Down List	4.77
2.8.2 Highest and Best Use as if Vacant	2.8.2.1	Physically Possible Uses	Text	Text Box	4.77
	2.8.2.2	Financially Feasible Uses	Text		4.77
	2.8.2.3	Legally Permissible Uses	Text		4.77
	2.8.2.4	Maximally Productive Uses	Text		4.77
	2.8.2.5	Explanatory Remarks/Comments	Text		4.77
2.8.3 Highest and Best Use as Improved	2.8.3.1	Physically Possible Uses	Text/ N/A	Text Box	4.88
	2.8.3.2	Financially Feasible Uses	Text/ N/A		4.88
	2.8.3.3	Legally Permissible Uses	Text/ N/A		4.88
	2.8.3.4	Maximally Productive Uses	Text/ N/A		4.88
	2.8.3.5	Explanatory Remarks/ Comments	Text/ N/A		4.88

Section 3- Whole Property Valuation

Data Required			Data Type	Format	Ranking Score
3.1: Sales Comparison Approach (Whole Land Value)					
3.1.1 Subject Property	3.1.1.1	Relative Location	Text	Text Box	4.77
	3.1.1.2	Utilities	Text		4.77
	3.1.1.3	Number of Tracts	Number		
3.1.2 Comparable Number 1	3.1.2.1	Name of the Grantor	Text	Text Box	4.11
	3.1.2.2	Name of the Grantee	Text		4.11
	3.1.2.3	Date of Sale	Text		4.77
	3.1.2.4	Relative Location	Text		4.77
	3.1.2.5	Size (Square Feet)	Number		4.77
	3.1.2.6	Sale Price	Number ($)		4.88
	3.1.2.7	Unit Price	Number ($)		4.66
	3.1.2.8	Adjustments for:			
		Financing	Number		4.77
		Condition of Sale	Number		4.77
		Date of Sale	Number		4.77
	3.1.2.9	Adjusted Price	Number ($)		4.87
	3.1.2.10	Adjustments for:			
		Location	Number		4.77
		Physical Characteristics	Number		4.77
		Size	Number		4.77
		Utilities	Number		4.77
		Zoning	Number		4.77
		Others	Number		4.87
	3.1.2.11	Indicated Unit Value	Number ($)		4.77
Note: Continue similarly for all the comparables					
3.1.6 Estimated Value of Subject Property	3.1.6.1	Number of Square Feet	Number ($)	Text Box	4.77
	3.1.6.2	Estimated Unit Value/Fee	Number ($)		4.77
	3.1.6.3	Total Value (3.1.6.1*3.1.6.2)	Number ($)		4.77
3.1.7 Summary	3.1.7.1	The Estimated Value by Sales Comparison Approach	Number($)	Text Box	4.88

3.2: Land Sale Supplement				
3.2.1	District	Text	Text Box	3.22
3.2.2	Parcel Number	Number		4.33
3.2.3	Highway	Number		4.66
3.2.4	County	Text		4.77
3.2.5	CSJ Number	Text		4.22
3.2.6	Photograph of the Property	Photograph		4.77
3.2.7	Map of the Property	Map		4.55
3.2.8	Grantor/Lessor	Text		4.66
3.2.9	Grantee/Lessee	Text		4.66
3.2.10	Date	Number		4.77
3.2.11	Recording Information	Number		4.66
3.2.12	Key Map	Number, Text		4.33
3.2.13	Address	Text		4.77
3.2.14	Zip Code	Number		3.77
3.2.15	Legal Description	Text		4.44
3.2.16	Confirmed Price	Number ($)		4.88
3.2.17	Price Verified with:	Text		4.88
3.2.18	Terms and Conditions of Sale	Text		4.88
3.2.19	Land Size	Number		4.77
3.2.20	Unit Price as Vacant	Number ($)		4.66
3.2.21	Street Type	Text		4.33
3.2.22	Utilities	Text		4.77
3.2.23	Current Use	Category (Retail, Industrial, Office, General Commercial, Residential-Single family, Residential-Multi-family, Agricultural, Recreational/ other)	Drop-Down List	4.77
3.2.24	Highest and Best Use	Text	Text Box	5.00
3.2.25	Date of Inspection	Number		4.77
3.2.26	Zoning	Text		4.77
3.2.27	Flood Plain	Text		4.55
3.2.28	Remarks/Additional Information	Text	Box	4.77
3.2.29	Name of the Appraiser	Text	Text Box	4.11
3.2.30	Date	Number		4.00

3.3: Adjustment Explanation					
3.3.1	Financing Terms		Text	Text Box	4.77
3.3.2	Conditions of Sale		Text		4.77
3.3.3	Date of Sale		Text		4.88
3.3.4	Location		Text		4.77
3.3.5	Physical Characteristics		Text		4.77
3.3.6	Size		Text		4.77
3.3.7	Utilities		Text		4.77
3.3.8	Zoning		Text		4.77
3.3.9	Others		Text		4.77
3.3.10	Concluding Remarks		Text		4.66
3.4:Cost Approach (Whole Land Value)					
3.4.1	Improvement Type		Text	Text Box	4.22
3.4.2	Number of Square Feet of Improvement		Number		4.77
3.4.3	Replacement Value		Number		4.66
3.4.4	Depreciation in Unit Value		Number		4.77
3.4.4.1	Total Depreciation		Number		4.77
3.4.5	Contributory Value		Number		4.77
Note: Repeat the 3.4.1 to 3.4.5 steps for All the Buildings/Improvement on the Property.					
3.4.6	Contributory Value of the Buildings		Number		4.66
3.4.7	Contributory Value of Accessory Improvements		Number		4.55
3.4.8 Site Improvements	3.4.8.1 Paving	Number of Square Feet of improvement	Number	Text Box	4.55
		Replacement Costs	Number		4.66
		Depreciation in Cost	Number		4.77
		Contributory Value	Number		4.66
	3.4.8.2 Fencing	Number of Square Feet of Improvement	Number	Text Box	4.77
		Replacement Costs	Number		4.66
		Depreciation in Cost	Number		4.66
		Contributory Value	Number		4.77
	3.4.8.3 Landscaping	Number of Square Feet of Improvement	Number	Text Box	4.66
		Replacement Costs	Number		4.00

		Depreciation in Cost	Number		4.00
		Contributory Value	Number		4.88
	3.4.8.4 Sidewalks	Number of Square Feet of Improvement	Number	Text Box	4.55
		Replacement Costs	Number		4.55
		Depreciation in Cost	Number		4.66
		Contributory Value	Number		4.88
	3.4.8.5 Others	Number of Square Feet of Improvement	Number	Text Box	4.55
		Replacement Costs	Number		4.55
		Depreciation in Cost	Number		4.55
		Contributory Value	Number		4.88
3.4.9	Contributory Value of Site Improvements		Number	Text Box	4.88
3.4.10	Contributory Value of All Improvements		Number		4.88
3.4.11	Land Value		Number		4.77
3.4.12	Estimated Value by Cost Approach		Number		4.88
3.4.13	Cost Approach Descriptions		Text		4.33
3.4.14	Depreciation Explanation		Text		4.33
3.4.15	Source of Information		Text		4.66

3.5: Sales Comparison Approach (Whole and Improved Value)					
3.5.1 Subject Property	3.5.1.1	Date of Sale	Number	Text Box	4.77
	3.5.1.2	Building Size	Number		4.77
	3.5.1.3	Land Size	Number		4.77
	3.5.1.4	Land to Building Ratio	Number		4.55
	3.5.1.5	Age	Number		4.55
	3.5.1.6	Property Rights	Text		4.77
	3.5.1.7	Financing	Text		4.66
	3.5.1.8	Condition of Sales	Text		4.77
	3.5.1.9	Market Conditions	Text		4.77
3.5.2 Comparable Number 1	3.5.2.1	Name of the Grantor	Text	Text Box	4.00
	3.5.2.2	Name of the Grantee	Text		4.00
	3.5.2.3	Date of Sale	Number		4.77
	3.5.2.4	Building Size	Number		4.66
	3.5.2.5	Land Size	Number	Text Box	4.77
	3.5.2.6	Land to Building Ratio	Number		4.55
	3.5.2.7	Age	Number		4.55
	3.5.2.8	Sale Price	Number		4.88
	3.5.2.9	Sale price per SF	Number		4.66
	3.5.2.10 Adjustments for:	Property Rights	Number	Text Box	4.77
		Financing	Number		4.66
		Condition of Sales	Number		4.77
		Market Conditions	Number		4.66
	3.5.2.11	Adjusted Price Per SF	Number	Text Box	4.66
	3.5.2.12 Adjustments for:	Location/Access	Number	Text Box	4.77
		Physical Characteristics	Number		4.77
		Age/Condition /Utility	Number		4.88
		Land to Building Ratio	Number		4.33
		Other	Number		4.66
	3.5.2.13	Indicated Unit Value	Number	Text Box	4.66
Note: Continue the same procedure for all the comparables					
3.5.3	Gross Income Multiplier		Number	Text Box	4.66
3.5.3	Estimated Value of the Subject Property		Number		4.77
3.5.4	Value of Excess Land		Number		4.66
3.5.5	Total Estimated Value		Number		4.77

3.6: Improved Sales Data Sheet				
3.6.1	District	Text	Text Box	3.22
3.6.2	Parcel Number	Number		4.22
3.6.3	Highway	Number		4.55
3.6.4	County	Text		4.66
3.6.5	CSJ number	Text		4.33
3.6.6	Photograph of the Property	Photograph		4.55
3.6.7	Map of the Property	Map		4.66
3.6.8	Grantor/Lessor	Text		4.55
3.6.9	Grantee/Lessee	Text		4.55
3.6.10	Date	Number		4.77
3.6.11	Recording Information	Number		4.44
3.6.12	Key Map	Number, Text		4.55
3.6.13	Address	Text		4.66
3.6.14	Zip Code	Number		3.66
3.6.15	Legal Description	Text		4.44
3.6.16	Confirmed Price	Number ($)		4.88
3.6.17	Price Verified with:	Text		4.77
3.6.18	Terms and Conditions of Sale	Text		4.88
3.6.19	Land Size	Number		4.77
3.6.20	Street Type	Text		4.33
3.6.21	Utilities	Text		4.77
3.6.22	Improvement Description	Text		4.77
3.6.23	Improvement Size	Number		4.77
3.6.24	Unit Price as Improved	Number		4.55
3.6.27	Condition and Functional Design			4.66
3.6.28	Financial Date of Sale (if available)	Text (Box)		4.66
3.6.29	Current Use	Category (Retail, Industrial, Office, General Commercial, Residential-Single family, Residential-Multi-family, Agricultural, Recreational/ Other)	Drop-Down List	4.77
3.6.30	Highest and Best Use	Text	Text Box	4.88
3.6.31	Date of Inspection	Number		4.66
3.6.32	Zoning	Text		4.77
3.6.33	Flood Plain	Text		4.55
3.6.34	Remarks/Additional Information	Text	Box	4.88
3.6.35	Name of the Appraiser	Text	Text Box	3.88
3.6.36	Date	Number		4.00
Note:- The Improved Land Sale Supplement has to be filled for every comparable property chosen				

3.7: Adjustment Explanation					
3.7.1	Financing Terms		Text	Text Box	4.66
3.7.2	Conditions of Sale		Text		4.77
3.7.3	Date of Sale (Market Conditions)		Text		4.77
3.7.4	Location		Text		4.77
3.7.5	Physical Characteristics		Text		4.77
3.7.6	Size		Text		4.77
3.7.7	Utilities		Text		4.77
3.7.8	Zoning		Text		4.77
3.7.9	Others		Text		4.77
3.7.10	Concluding Remarks		Text	Comment Box	4.88
3.7.11	Maps		Map	Box	4.55
3.8: Income Approach (Whole Property)					
3.8.1	Potential Gross Income		Number	Text Box	4.33
3.8.2	Market Rent		Number		4.77
3.8.3	Other Income		Number		4.77
3.8.4	Percentage Vacancy		Number		4.77
3.8.5	Vacancy in Dollars		Number		4.77
3.8.6	Effective Gross Income		Number		4.77
3.8.7 Fixed Expenses	3.8.7.1	Taxes	Number	Text Box	4.66
	3.8.7.2	Insurance	Number		4.77
	3.8.7.3	Others (Expandable)	Number		4.66
3.8.8 Variable Expenses	3.8.8.1	Management	Number	Text Box	4.55
	3.8.8.2	Other (Expandable)	Number		4.55
3.8.9	Repairs		Number	Text Box	4.77
3.8.10	Reserves		Number		4.77
3.8.11	Total Expenses		Number		4.77
3.8.12	NOI		Number		4.88
3.8.13	Capitalization Rate		Number (%)		4.77
3.8.14	Capitalized Value		Number		4.77
3.8.15	Value of Excess Land		Number		4.66
3.8.16	Estimated Value by Income Approach		Number		4.77

3.9: Rental Data Supplement				
3.9.1	District	Text	Text Box	3.33
3.9.2	Parcel Number	Number		3.77
3.9.3	Highway	Number		4.11
3.9.4	County	Text		4.77
3.9.5	CSJ number	Text		4.33
3.9.6	Photograph of the Property	Photograph		4.66
3.9.7	Map of the Property	Map		4.44
3.9.8	Grantor/Lessor	Text		4.44
3.9.9	Grantee/Lessee	Text		4.44
3.9.10	Date	Number		4.66
3.9.11	Recording Information	Number/ N/A		4.33
3.9.12	Key Map	Number, Text		4.33
3.9.13	Address	Text		4.66
3.9.14	Zip Code	Number		3.77
3.9.15	Legal Description	Text		4.00
3.9.16	Rental Data	Text		4.55
3.9.17	Land to Building Ratio	Number		4.55
3.9.18	Asking Rental Rate	Number		4.66
3.9.19	Lease Term	Text		4.66
3.9.20	Remarks	Text		4.77
3.9.21	Expense Data Structure	Text Box		4.66
3.9.22	Improvement Description	Text		4.77
3.9.23	Improvement Size	Number		4.66
3.9.24	Unit Price as Improved	Number		4.66
3.9.25	Data Verified with:	Text		4.77
3.9.26	Condition and Functional Design	Text		4.44
3.9.27	Current Use	Category (Retail, Industrial, Office, General Commercial, Residential-Single family, Residential-Multi-family, Agricultural, Recreational, Other)	Drop-Down List	4.66
3.9.28	Highest and Best Use	Text	Text Box	4.66
3.9.29	Date of Inspection	Number		4.55
3.9.30	Zoning	Text		4.44
3.9.31	Flood Plain	Text		4.33
3.9.32	Remarks/Additional Information	Text	Comment Box	4.66
3.9.33	Name of the Appraiser	Text	Text Box	3.66
3.9.34	Date	Number		3.66
Note:- The Rental Data Supplement has to be filled for every comparable property chosen				

3.10: Rental Comparables Analysis					
3.10.1 Subject	3.10.1.1	Building Size	Number	Text Box	4.77
	3.10.1.2	Land Size	Number		4.55
	3.10.1.3	Relative Location	Number		4.77
	3.10.1.4	Net Rentable Area	Number (%)		4.77
	3.10.1.5	Land to Building-Ratio	Number		4.55
	3.10.1.6	Others	Categorical (Yes, No)	Tick Box	4.44
	3.10.1.7	Age	Number	Text Box	4.66
	3.10.1.8	Rental Rate per Square Feet	Number		4.77
	3.10.1.9	Conditions of Lease	Text		4.77
	3.10.1.10	Market Conditions	Text		4.77
	3.10.1.11	Location/ Access	Category (Good/ Average/ Poor)	Drop-Down List	4.66
	3.10.1.12	Physical Characteristics	Text		4.88
	3.10.1.13	Condition/ Utility	Category (Good/ Average/ Poor)	Drop-Down List	4.88
3.10.2 Comparable Number 1	3.10.2.1	Building Size	Number	Text Box	4.77
	3.10.2.2	Land Size	Number		4.77
	3.10.2.3	Relative Location	Number		4.77
	3.10.2.4	Office Space	Number (%)		4.55
	3.10.2.5	Land to Building Ratio	Number		4.66
	3.10.2.6	Others	Number		4.66
	3.10.2.7	Age	Number		4.66
	3.10.2.8	Rental Rate Per Square Feet	Number		4.77
	3.10.2.9 Adjustments for:	Conditions of Lease	Number (%)		4.66
		Market Conditions	Number (%)		4.77
	3.10.2.10	Adjusted Rate	Number		4.77
	3.10.2.11 Adjustments for:	Location/ Access	Category (Good/Average/ Poor)	Drop-Down List	4.66
		Physical Characteristics	Number (%)	Text Box	4.88

		Age/Condition /Utility	Number (%)	Text Box	4.55
		Office Space	Number (%)		4.77
		Land to Building Ratio	Number (%)		4.66
		Other	Number (%)		4.55
	3.10.2.12	Indicated Rate	Number	Text Box	4.66
3.10.3	Estimated Rental for the Subject/SF		Number	Text Box	4.77
3.10.4	Estimated Annual Base Rent		Number		4.77
Note:- Section 3.10.2 has to be completed for every comparable property chosen					
3.10.5	Description for Individual Adjustments		Text	Text Box	4.77
3.10.6 Subject Lease Summary	3.10.6.1	Name of the Tenant	Text	Text Box	4.11
	3.10.6.2	Rented Area	Number		4.77
	3.10.6.3	Start Date of Rental	Number		4.55
	3.10.6.4	End Date of Rental	Number		4.44
	3.10.6.5	Present Rent	Number		4.77
	3.10.6.6	Effective Rent/SF	Number		4.77
	3.10.6.7	Estimated Market Rent/SF	Number		4.66
Note: Enter the information for all the tenants in a similar fashion					
3.10.7 Lease Terms of Subject	3.10.7.1	Percentage Vacancy	Number	Text Box	4.77
	3.10.7.2	Average Rent/SF	Number		4.66
	3.10.7.3	Contract Rents Range	Numbers		4.77
	3.10.7.4	Effective Rents Range	Numbers		4.77
	3.10.7.5	Expense Pass-through	Text		4.77
	3.10.7.6	Improvement Allowance for Tenants	Text		4.66
3.10.8	Discussion of Expenses		Text	Text Box	4.66
3.10.9	Remarks/Comments		Text	Comment Box	4.66
3.10.10	Descriptive Analysis of Capitalization Rate		Text	Text Box	4.77
3.10.11	Capitalized Value Indication (NOI/CR)		Number		**4.77**

3.11: Final Value Estimate for the Whole Property				
3.11.1 Indication of Value:	Cost Approach	Number	Text Box	4.88
	Sales Comparison Approach	Number		4.88
	Income Approach	Number		4.88
3.11.2	Analyses of Individual Approaches and its Applicability for Best Results	Text	Text Box	5.00
3.11.3	Final Conclusion of Fee Simple Value	Number		4.88

Section 4: Property Valuation of the Part to be Acquired Before Acquisition

Data Required			Data Type	Format	Ranking Score
4.1: Part to be acquired					
4.1.1 Contributory Value of the Improvements:	4.1.1.1	Building	Number	Text Box	5.00
	4.1.1.2	Paving	Number		4.77
	4.1.1.3	Sidewalks	Number		4.66
	4.1.1.4	Landscaping	Number		4.77
	4.1.1.5	Fire Hydrant System	Number		3.22
	4.1.1.6	Others			4.77
	Note: Continue filling the improvements that are the part of the property being acquired				
	4.1.1.7	Total Contributory Value of Improvements	Number	Text Box	5.00
	4.1.1.8	Easement		Text Box	5.00
		Number of SF / acres	Number		5.00
		Rate/acre	Number		4.88
		Total	Number		5.00
	4.1.1.9	Fee		Text Box	4.44
		Number of SF / acre	Number		4.44
		Rate/acre	Number		5.00
		Total	Number		5.00
	4.1.1.10	Total Land	Number	Text Box	5.00
	4.1.1.11	Total Value as a Unit	Number		4.66
	4.1.1.12	Remarks	Number	Comment Box	4.66
Note:	Economic Unit Analysis can be inserted here				
4.2	**Remainder Before The Acquisition**				
4.2.1	Contributory Value of Improvements			Text Box	4.88
4.2.1.1	Improvement Number 1		Number		4.88
Note: Continue typing all the other improvements					
4.2.2	Total Contributory Value of Improvements		Number	Text Box	4.88
4.2.3	Easement (SF/acre)		Number	Text Box	4.88
4.2.4	Cost (SF/acre)		Number ($)	Text Box	5.00
4.2.5	Total Easement Cost		Number	Text Box	4.77
4.2.6	Fee (SF/acre)		Number	Text Box	4.33
4.2.7	Fee (SF/acre)		Number ($)	Text Box	4.44
4.2.8	Fee Cost		Number	Text Box	4.44
4.2.9	Total Land		Number	Cost	4.88
4.2.10	Total as a Unit		Number	Cost	4.55
4.3	**Maps and Exhibits**		**Maps, legal exhibits**	Box	5.00

Section 5: Property Valuation of the Remainder, after Acquisition

Data Required			Data Type	Format	Ranking Score
5.1: Sales Comparison Approach (Whole Land Value)					
5.1.1 Subject Property	5.1.1.1	Relative Location	Text	Text Box	4.77
	5.1.1.2	Utilities	Text		4.77
	5.1.1.3	Number of Tracks	Number		
5.1.2 Comparable Number 1	5.1.2.1	Name of the Grantor	Text	Text Box	4.11
	5.1.2.2	Name of the Grantee	Text		4.11
	5.1.2.3	Date of Sale	Text		4.77
	5.1.2.4	Relative Location	Text		4.77
	5.1.2.5	Size (Square Feet)	Number		4.77
	5.1.2.6	Sale Price	Number ($)		4.88
	5.1.2.7	Unit Price	Number ($)		4.66
	5.1.2.8	Adjustments for:-			
		Financing	Number		4.77
		Condition of Sale	Number		4.77
		Date of Sale	Number		4.77
	5.1.2.9	Adjusted Price	Number ($)		4.87
	5.1.2.10	Adjustments for:-			
		Location	Number		4.77
		Physical Characteristics	Number		4.77
		Size	Number		4.77
		Utilities	Number		4.77
		Zoning	Number		4.77
		Others	Number		4.87
	5.1.2.11	Indicated Unit Value	Number ($)		4.77
Note: Continue similarly for all the comparables					
5.1.3 Estimated Value of Subject Property	5.1.3.1	Number of Square Feet	Number ($)	Text Box	4.77
	5.1.3.2	Estimated Unit Value-Fee	Number ($)		4.77
	5.1.3.3	Total Value (3.1.6.1*3.1.6.2)	Number ($)		4.77
5.1.4	The Estimated Value by Sales Comparison Approach		Number($)	Text Box	4.88

5.2: Land Sale Supplement				
5.2.1	District	Text	Text Box	3.22
5.2.2	Parcel Number	Number		4.33
5.2.3	Highway	Number		4.66
5.2.4	County	Text		4.77
5.2.5	CSJ number	Text		4.22
5.2.6	Photograph of the Property	Photograph		4.77
5.2.7	Map of the Property	Map		4.55
5.2.8	Grantor/Lessor	Text		4.66
5.2.9	Grantee/Lessee	Text		4.66
5.2.10	Date	Number		4.77
5.2.11	Recording Information	Number		4.66
5.2.12	Key Map	Number, Text		4.33
5.2.13	Address	Text		4.77
5.2.14	Zip Code	Number		3.77
5.2.15	Legal Description	Text		4.44
5.2.16	Confirmed Price	Number ($)		4.88
5.2.17	Price Verified with:	Text		4.88
5.2.18	Terms and Conditions of Sale	Text		4.88
5.2.19	Land Size	Number		4.77
5.2.20	Unit Price as Vacant	Number ($)		4.66
5.2.21	Street Type	Text		4.33
5.2.22	Utilities	Text		4.77
5.2.23	Current Use	Category (Retail, Industrial, Office, General Commercial, Residential-Single family, Residential-Multi-family, Agricultural, Recreational/ Other)	Drop-Down List	4.77
5.2.24	Highest and Best Use	Text	Text Box	5
5.2.25	Date of Inspection	Number		4.77
5.2.26	Zoning	Text		4.77
5.2.27	Flood Plain	Text		4.55
5.2.28	Remarks/Additional Information	Text	Box	4.77
5.2.29	Name of the Appraiser	Text	Text Box	4.11
5.2.30	Date	Number		4.00

5.3: Adjustment Explanation					
5.3.1	Financing Terms		Text	Text Box	4.77
5.3.2	Conditions of Sale		Text		4.77
5.3.3	Date of Sale		Text		4.88
5.3.4	Location		Text		4.77
5.3.5	Physical Characteristics		Text		4.77
5.3.6	Size		Text		4.77
5.3.7	Utilities		Text		4.77
5.3.8	Zoning		Text		4.77
5.3.9	Others		Text		4.77
5.3.10	Concluding Remarks		Text		4.66
5.4:Cost Approach (Whole Land Value)					
5.4.1	Improvement Type		Text	Text Box	4.22
5.4.2	Number of Square Feet of Improvement		Number		4.77
5.4.3	Replacement Value		Number		4.66
5.4.4	Depreciation in Unit Value		Number		4.77
5.4.4.1	Total Depreciation		Number		4.77
5.4.5	Contributory Value		Number		4.77
Note	Repeat the 5.4.1 to 5.4.5 Steps for all the Buildings/Improvement on the Property.				4.77
5.4.6	Contributory Value of the Buildings		Number		4.66
5.4.7	Contributory Value of Accessory Improvements		Number		4.55
5.4.8 Site Improvements	5.4.8.1 Paving	Number of Square Feet of Improvement	Number		4.55
		Replacement Costs	Number		4.66
		Depreciation in Cost	Number		4.77
		Contributory Value	Number		4.66
	5.4.8.2 Fencing	Number of Square Feet of Improvement	Number		4.77
		Replacement Costs	Number		4.66
		Depreciation in Cost	Number		4.66
		Contributory Value	Number		4.77
	5.4.8.3 Landscaping	Number of SF improvement	Number		4.66
		Replacement Costs	Number		4.00
		Depreciation Cost	Number		4.00

		Contributory Value	Number		4.88
	5.4.8.4 Side Walks	Number of Square Feet of Improvement	Number		4.55
		Replacement Costs	Number		4.55
		Depreciation in Cost	Number		4.66
		Contributory Value	Number		4.88
	5.4.8.5 Others	Number of Square Feet of Improvement	Number		4.55
		Replacement Costs	Number		4.55
		Depreciation in Cost	Number		4.55
		Contributory Value	Number		4.88
5.4.9	Contributory Value of Site Improvements		Number	Text Box	4.88
5.4.10	Contributory Value of All Improvements		Number		4.88
5.4.11	Land Value		Number		4.77
5.4.12	Estimated Value by Cost Approach		Number		4.88
5.4.13	Cost Approach Descriptions		Text		4.33
5.4.14	Depreciation explanation		Text		4.33
5.4.15	Source of Information		Text		4.66
5.5: Sales Comparison Approach (Whole and Improved Value)					
5.5.1 Subject Property	5.5.1.1	Date of Sale	Number	Text Box	4.77
	5.5.1.2	Building Size	Number		4.77
	5.5.1.3	Land Size	Number		4.77
	5.5.1.4	Land to Building Ratio	Number		4.55
	5.5.1.5	Age	Number		4.55
	5.5.1.6	Property Rights	Text		4.77
	5.5.1.7	Financing	Text		4.66
	5.5.1.8	Condition of Sales	Text		4.77
	5.5.1.9	Market Conditions	Text		4.77
	5.5.2.1	Name of the Grantor	Text	Text Box	4.00
	5.5.2.2	Name of the Grantee	Text		4.00
	5.5.2.3	Date of Sale	Number		4.77

5.5.2 Comparable Number 1	5.5.2.4	Building Size	Number		4.66
	5.5.2.5	Land Size	Number		4.77
	5.5.2.6	Land to Building Ratio	Number		4.55
	5.5.2.7	Age	Number		4.55
	5.5.2.8	Sale Price	Number		4.88
	5.5.2.9	Sale price per SF	Number		4.66
	5.5.2.10 Adjustments for:	Property Rights	Number	Text Box	4.77
		Financing	Number		4.66
		Condition of Sales	Number		4.77
		Market Conditions	Number		4.66
	5.5.2.11	Adjusted Price Per SF	Number	Text Box	4.66
	5.5.2.12 Adjustments for:	Location /Access	Number	Text Box	4.77
		Physical Characteristics	Number		4.77
		Age/Condition /Utility	Number		4.88
		Land to Building Ratio	Number		4.33
		Other	Number		4.66
	5.5.2.13	Indicated Unit Value	Number	Text Box	4.66
Note: Continue the same procedure for all the comparables					
5.5.3	Gross Income Multiplier		Number	Text Box	4.66
5.5.3	Estimated Value of the Subject Property		Number		4.77
5.5.4	Value of Excess Land		Number		4.66
5.5.5	Total Estimated Value		Number		4.77

5.6: Improved Sales Data Sheet				
5.6.1	District	Text	Text Box	3.22
5.6.2	Parcel Number	Number		4.22
5.6.3	Highway	Number		4.55
5.6.4	County	Text		4.66
5.6.5	CSJ number	Text		4.33
5.6.6	Photograph of the Property	Photograph		4.55
5.6.7	Map of the Property	Map		4.66
5.6.8	Grantor/Lessor	Text		4.55
5.6.9	Grantee/Lessee	Text		4.55
5.6.10	Date	Number		4.77
5.6.11	Recording Information	Number		4.44
5.6.12	Key Map	Number, Text		4.55
5.6.13	Address	Text		4.66
5.6.14	Zip Code	Number		3.66
5.6.15	Legal Description	Text		4.44
5.6.16	Confirmed Price	Number ($)		4.88
5.6.17	Price Verified with:	Text		4.77
5.6.18	Terms and Conditions of Sale	Text		4.88
5.6.19	Land Size	Number		4.77
5.6.20	Street type	Text		4.33
5.6.21	Utilities	Text		4.77
5.6.22	Improvement Description	Text		4.77
5.6.23	Improvement Size	Number		4.77
5.6.24	Unit Price as Improved	Number		4.55
5.6.27	Condition and Functional Design			4.66
5.6.28	Financial Date of Sale (if available)	Text (Box)		4.66
5.6.29	Current Use	Category (Retail, Industrial, Office, General Commercial, Residential-Single family, Residential-Multi-family, Agricultural, Recreational/ Other)	Drop-Down List	4.77
5.6.30	Highest and Best Use	Text	Text Box	4.88
5.6.31	Date of Inspection	Number		4.66
5.6.32	Zoning	Text		4.77
5.6.33	Flood Plain	Text		4.55
5.6.34	Remarks/Additional Information	Text	Box	4.88
5.6.35	Name of the Appraiser	Text	Text Box	3.88
5.6.36	Date	Number		4.00
Note:- The Improved Land Sale Supplement has to be filled for every comparable property chosen				

5.7 Adjustment Explanation					
5.7.1	Financing Terms		Text		4.66
5.7.2	Conditions of Sale		Text		4.77
5.7.3	Date of Sale (Market Conditions)		Text		4.77
5.7.4	Location		Text		4.77
5.7.5	Physical Characteristics		Text	Text Box	4.77
5.7.6	Size		Text		4.77
5.7.7	Utilities		Text		4.77
5.7.8	Zoning		Text		4.77
5.7.9	Others		Text		4.77
5.7.10	Concluding Remarks		Text	Comment Box	4.88
5.7.11	Maps		Map	Box	4.55
5.8: Income Approach					
5.8.1	Potential Gross Income		Number	Text Box	4.33
5.8.2	Market Rent		Number		4.77
5.8.3	Other Income		Number		4.77
5.8.3	Percentage Vacancy		Number		4.77
5.8.4	Vacancy in Dollars		Number		4.77
5.8.5	Effective Gross Income		Number		4.77
5.8.6 Fixed Expenses	5.8.5.1	Taxes	Number		4.66
	5.8.5.2	Insurance	Number		4.77
	5.8.5.3	Others (Expandable)	Number		4.66
5.8.7 Variable Expenses	5.8.6.1	Management	Number		4.55
	5.8.6.2	Other (Expandable)	Number		4.55
5.8.8	Repairs		Number	Text Box	4.77
5.8.9	Reserves		Number		4.77
5.8.10	Total Expenses		Number		4.77
5.8.11	NOI		Number		4.88
5.8.12	Capitalization Rate		Number (%)		4.77
5.8.13	Capitalized Value		Number		4.77
5.8.14	Value of Excess Land		Number		4.66
5.8.15	Estimated Value by Income Approach		Number		4.77

5.9: Rental Data Supplement				
5.9.1	District	Text	Text Box	3.33
5.9.2	Parcel Number	Number		3.77
5.9.3	Highway	Number		4.11
5.9.4	County	Text		4.77
5.9.5	CSJ Number	Text		4.33
5.9.6	Photograph of the Property	Photograph		4.66
5.9.7	Map of the Property	Map		4.44
5.9.8	Grantor/Lessor	Text		4.44
5.9.9	Grantee/Lessee	Text		4.44
5.9.10	Date	Number		4.66
5.9.11	Recording Information	Number/ N/A		4.33
5.9.12	Key Map	Number, Text		4.33
5.9.13	Address	Text		4.66
5.9.14	Zip Code	Number		3.77
5.9.15	Legal Description	Text		4
5.9.16	Rental Data	Text		4.55
5.9.17	Land to Building Ratio	Number		4.55
5.9.18	Asking Rental Rate	Number		4.66
5.9.19	Lease Term	Text		4.66
5.9.20	Remarks	Text		4.77
5.9.21	Expense Data Structure	Text Box		4.66
5.9.22	Improvement Description	Text		4.77
5.9.23	Improvement Size	Number		4.66
5.9.24	Unit Price as Improved	Number		4.66
5.9.25	Data Verified with:	Text		4.77
5.9.26	Condition and Functional Design	Text		4.44
5.9.27	Current Use	Category (Retail, Industrial, Office, General Commercial, Residential-Single family, Residential-Multi-family, Agricultural, Recreational, Other)	Drop-Down List	4.66
5.9.28	Highest and Best Use	Text	Text Box	4.66
5.9.29	Date of Inspection	Number		4.55
5.9.30	Zoning	Text		4.44
5.9.31	Flood Plain	Text		4.33
5.9.32	Remarks/Additional Information	Text	Comment Box	4.66
5.9.33	Name of the Appraiser	Text	Text Box	3.66
5.9.34	Date	Number		3.66
Note:- The Rental Data Supplement has to be filled for every comparable property chosen				

5.10: Rental Comparables Analysis					
5.10.1 Subject	5.10.1.1	Building Size	Number	Text Box	4.77
	5.10.1.2	Land Size	Number		4.55
	5.10.1.3	Relative Location	Number		4.77
	5.10.1.4	Net Rentable Area	Number (%)		4.77
	5.10.1.5	Land to Building Ratio	Number		4.55
	5.10.1.6	Others	Category (Yes, No)	Tick Box	4.44
	5.10.1.7	Age	Number	Text Box	4.66
	5.10.1.8	Rental Rate per Square Feet	Number		4.77
	5.10.1.9	Conditions of Lease	Text		4.77
	5.10.1.10	Market Conditions	Text		4.77
	5.10.1.11	Location/ Access	Category (Good/Average/ Poor)	Drop-Down List	4.66
	5.10.1.12	Physical Characteristics	Text		4.88
	5.10.1.13	Condition/ Utility	Category (Good/ Average/ Poor)	Drop-Down List	4.88
5.10.2 Comparable Number 1	5.10.2.1	Building Size	Number	Text Box	4.77
	5.10.2.2	Land Size	Number		4.77
	5.10.2.3	Relative Location	Number		4.77
	5.10.2.4	Office Space	Number (%)		4.55
	5.10.2.5	Land to Building Ratio	Number		4.66
	5.10.2.6	Others	Number		4.66
	5.10.2.7	Age	Number		4.66
	5.10.2.8	Rental Rate per Square Feet	Number		4.77
	5.10.2.9 Adjustments for:	Conditions of Lease	Number (%)		4.66
		Market Conditions	Number (%)		4.77
	5.10.2.10	Adjusted Rate	Number		4.77
	5.10.2.11 Adjustments for:	Location/ Access	Category (Good/ Average/ Poor)	Drop-Down List	4.66
		Physical Characteristics	Number (%)	Text Box	4.88

		Age/Condition /Utility	Number (%)	Text Box	4.55
		Office Space	Number (%)		4.77
		Land to Building Ratio	Number (%)		4.66
		Other	Number (%)		4.55
	5.10.2.12	Indicated Rate	Number	Text Box	4.66
5.10.3	Estimated Rental for the Subject/SF		Number	Text Box	4.77
5.10.4	Estimated Annual Base Rent		Number		4.77
Note:- Section 5.10.2 has to be completed for every comparable property chosen					
5.10.5	Description for Individual Adjustments		Text	Text Box	4.77
5.10.6 Subject Lease Summary	5.10.6.1	Name of the Tenant	Text	Text Box	4.11
	5.10.6.2	Rented Area	Number		4.77
	5.10.6.3	Start Date of Rental	Number		4.55
	5.10.6.4	End Date of Rental	Number		4.44
	5.10.6.5	Present Rent	Number		4.77
	5.10.6.6	Effective Rent/SF	Number		4.77
	5.10.6.7	Estimated Market Rent/SF	Number		4.66
Note: Enter the information for all the tenants in a similar fashion					
5.10.7 Lease Terms of Subject	5.10.7.1	Percentage Vacancy	Number	Text Box	4.77
	5.10.7.2	Average Rent/SF	Number		4.66
	5.10.7.3	Contract Rents Range	Numbers		4.77
	5.10.7.4	Effective Rents Range	Numbers		4.77
	5.10.7.5	Expense Pass-through	Text		4.77
	5.10.7.6	Improvement Allowance for Tenants	Text		4.66
5.10.8	Discussion of Expenses		Text	Text Box	4.66
5.10.9	Remarks/Comments		Text	Comment Box	4.66
5.10.10	Descriptive Analysis of Capitalization Rate		Text	Text Box	4.77
5.10.11	Capitalized Value Indication (NOI/CR		Number		4.77

5.11: Final Value Estimate for the Remainder Property				
5.11.1 Indication of Value:	Cost Approach	Number	Text Box	4.88
	Sales Comparison Approach	Number		4.88
	Income Approach	Number		4.88
5.11.2	Analyses of Individual Approaches and its Applicability for Best Results	Text	Text Box	5.00
5.11.3	Final Conclusion of Fee Simple Value	Number		4.88

Section 6: Final Compensation Summary

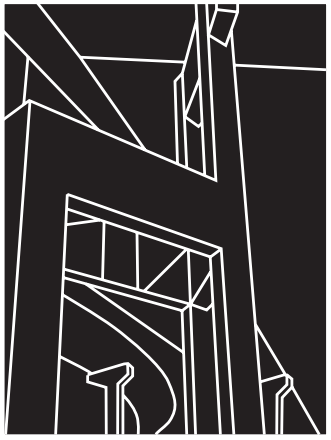
Data Required		Data Type	Format	Ranking Score
6.1	**Explanation as Cost to Cure**	**Text**		4.88
6.1.1	Total Compensation	Number	Text Box	4.88
6.2	**Compensation Summary**			
6.2.1	Market Value for Whole Property	Number	Text Box	4.88
6.2.2	Value of the Part to be Acquired	Number		5.00
6.2.3	The Value of the Remainder Before the taking	Number		4.44
6.2.4	The Value of the Remainder after the Taking	Number		4.88
6.2.5	Net Damages	Number		4.88
6.2.6	Net Enhancements	Number		3.66

Note: This page will the same as the existing page 6 of the ROW-A-5 with minor changes

TECHNICAL MEMORANDUM 9-1523-4

TECHNICAL REQUIREMENTS FOR THE ELECTRONIC APPRAISAL SYSTEM

Zhanmin Zhang, Carlos Caldas, Nadeem Moulvi, and Liang Liang



CENTER FOR TRANSPORTATION RESEARCH

BUREAU OF ENGINEERING RESEARCH

THE UNIVERSITY OF TEXAS AT AUSTIN

Project 9-1523
Technical Memorandum 9-1523-4
Technical Requirements for the Electronic Appraisal System

The following is a list of the Technical Requirements for the Electronic Appraisal System. The bulleted statements describe the basic features and technical options to meet the User Functional Needs previously described in Technical Memorandum 9-1523-2 – User Functional Needs for the EAS.

I. Appraisal Form

A) One electronic appraisal form with the option of being expandable. Expandability removes the need for multiple forms (i.e. "complex" and "non-complex" forms). The level of expandability will be determined by the valuation approach used during the appraisal process.

- There are two options to accomplish this user need. The first option is to ask the appraiser to specify the type of appraisal, before he/she starts filling the appraisal form. Based on the type of the appraisal, the form would be generated. For example, if the appraiser specifies that the appraisal under consideration is a whole land acquisition, sections of the form dealing with partial acquisition will not be generated.
- The other option is to have a completely adaptable 'intelligent' system where the form is generated on the basis of the inputs made by the appraiser. The form will automatically generate itself in the required format based on the type of appraisal report being prepared. Once the user starts filling the form, based on his or her choices, the system would generate the rest of the appraisal form customized to the user's needs. Also, a dynamic form structure can be used to dynamically adjust the length of the appraisal form based on the needs of the user.

Frontend languages such as JavaScript and backend languages like PHP, Perl, ASP, JSP and Coldfusion can be used to implement this function in the system.

JavaScript can immediately change the content of the rest of the appraisal form after the user makes some choices on the page. Backend languages have to wait till the user finishes the entire page and clicks on the "Next Page" button to customize the content of next page. It is also possible to combine the frontend and backend languages in generating forms.

B) All of the primary sections, such as the neighborhood analysis and the value of property, will be included in the electronic appraisal form.

- A separate table will be created for each of the six sections that are part of the appraisal form. Every data entry will be saved in the database. The sections will be inter-connected in the database for the purpose of conducting queries and for analysis.

The database can be created using relational database software such as Oracle, Sybase, SQL, etc.

C) Numerical values, check boxes and drop-down lists will be used as much as possible to help standardize input data and reduce the likelihood of misinterpretation of the information included in the appraisal.

- Readily available functionalities in the programming language and database software can be employed to accomplish the implementation of these features. By asking the user to enter the data in this format, the system will be able to better correlate between similar appraisals, taking advantage of the standardization of the data input.

To implement this mechanism, frontend languages such as JavaScript and backend languages like PHP, Perl, ASP, JSP and Coldfusion can be used.

D) For security purposes, the electronic appraisal form will contain a mechanism for applying an electronic signature.

- A secure network can be created by using the login IDs and passwords which can serve as an electronic signature.

  When the user first registers, he/she will be asked to choose a user name and a password and specify an email address. This information can then be encoded and saved in the database. The system will also ask the user to provide a reminder question like mother's maiden name, city of birth, etc, to help him remember the password if he/she forgets the same. Once the user registers, an automated email will be generated with a link in the email. The user could then be asked to activate his/her account by clicking on the link. The user table in the database will have a column specifying the user's status. Once the user clicks on the link, the status will reflect "Activated" in the tabular column of the database. For security purposes, the IP address used by the user can also be stored in the database.

  Backend languages can be used to check the user name and password. The database can be created using Oracle, Sybase, SQL, etc.

- Alternatively, if a state DOT has adopted a procedure for electronic signature in its e-business protocols, this adopted procedure can be implemented in the EAS.

E) The electronic appraisal form will include a provision for including visuals such as plats and pictures. The visuals required will be a function of the type of appraisal being completed.

- The appraiser will be asked to quantify the number of visuals to be loaded and the form would then automatically create the required number of spaces to load the visuals. The visuals can be loaded in the following ways:
  - The address of the visual can be filled up by the appraiser and the system would then automatically load the visual.

- The appraiser can manually load the visual from the hard drive of the computer through typical windows navigation processes.

When the appraiser tries to upload a visual, the system will check the file to verify whether the file is a visual. This will be accomplished by checking the file types such as JPEG, GIF, TIF, and BMP. Files that are not visuals will not be allowed to be uploaded.

- The visuals can be saved in the database in two ways. The first way is to save the web-address of the visual in the database. The other way of saving the visual is to actually save the visual itself in the database. This is not recommended as it would lead to slower processing speed due to the large content in the database.

Any of the available backend languages can be used to create this mechanism.

F) The electronic appraisal form will include a cover page with essential information such as the certification of the appraiser and executive summary. The specific page will be altered by the individual states.

- This is a part of the system output design, where the appraisal report will include a cover page that would bear the essential information from the appraisal. This information would include data like the name and address of the property owner, address of the property, the parcel number, certification of the appraiser, legal jargon, etc. This cover page can be created after the system evaluates the data submitted by the appraiser.

PHP, Perl, ASP, JSP and Coldfusion can be used to create this page.

G) The electronic appraisal form will require identification and justification of the valuation approaches used during the appraisal process.

- The system will have a mechanism in the electronic form that will not allow the appraiser to continue with data input unless justification is provided for the valuation process being employed.

  Before the specific valuation approach page is generated, a text box would be created. The appraiser would be asked to justify the reasons for using the valuation approach under consideration. Only then will the next page bearing the data required for the valuation approach will be activated.

- The other way of accomplishing this user need is to ask the appraiser at the very start of the appraisal process, when he/she is specifying the appraisal type, to justify the valuation approaches that will be used in the appraisal. In this way, the appraisal form can be generated in the required format at the very outset.

Backend languages such as PHP, Perl, ASP, JSP and Coldfusion can be used to achieve this user need.

H) Navigation and control mechanisms will be provided to ensure that all of the required data fields are completely filled with valid data.

- Error handling can be done at the frontend (on the browser page) using Java Script. Error handling can be also done on the backend (on the server) using PHP, Perl, ASP, JSP, Coldfusion, etc.
- Every time the user clicks on the "Next Page" button, the system will check the mandatory data fields before proceeding to the next page. If backend languages are used, the user will be brought back to the current page if required fields are not filled with valid data. To alert the user, error messages can be shown on top of the page in red or the data fields which have an invalid data entry can also be marked in red using an "*" symbol. If frontend language is used, an alert pop-up window is created informing the appraiser about such data entry errors.

I) A mechanism will be included to allow the appraiser to "save" input information on a personal computer and/or temporary database location so that the appraisal form can be completed in stages.

- The appraiser will be given the option to complete the appraisal report in parts. He/she can be provided with a mechanism to save his/her incomplete appraisal in the temporary queue database. The saved incomplete appraisal can only be accessible by the appraiser who prepared the appraisal. The status for such an appraisal in the database would reflect that the appraisal is incomplete.

This feature can be easily accomplished using the available backend languages.

J) A mechanism to use existing standard information and/or appraisals for the creation of templates.

- The appraiser can be provided with the option of using default values which would be stored in the appraisal system. The server can allow the appraiser to save part of the information which he/she repeats in most of his/her appraisals.
- The other option is automatically saving the information from the reports the appraiser submitted recently. The appraiser could then edit the report to make a new report rather than re-typing the entire data.

Backend languages can be suitably employed to create this feature. The database that stores the information can be created using SQL-compatible database software or any other database software.

K) The finished report (complete or abbreviated format) will be in electronic format and will be easily available in printable versions. Hard copies can be generated as needed.

- The proposed system is a web-based system. The appraisal report to be generated will be in electronic format and saved in the database. Once the appraisal is

completed and submitted, a PDF version of the appraisal would be generated to allow for easy production of hard copies by simply taking print-outs.

- The other option would be to provide an MS Word version for printing purposes.

Backend languages can be used to provide this feature.

L) The electronic appraisal form will include a summary page with statistical information that can be transmitted directly into the permanent database.

- Summary information can be generated to help the DOT personnel get a summarized record of an appraisal or a few selected appraisals.

  The summary could include any important information that is saved in the database. It will be easily searchable using the web browser by logging into the EAS. Data fields such as the appraisal number, property address, appraiser name, date or combined keywords, can be used to search a specific property data. It will also be possible to create ad-hoc statistical tables as needed.

Any of the available backend languages can be used to provide this function.

M) A printable version of the complete report, including both the form and attachments, will be available.

- A mechanism to print the appraisal form can be provided in the following ways:
  - A PDF version of the form.
  - A MS Word version of the form.
  - A web version of the form.

Backend languages such as PHP, Perl, ASP, JSP, and Coldfusion can be used to request the data from database, and convert it to html, PDF or MS Word format. The database software like Oracle, Sybase, and SQL can be used to store the data and the URL addresses of the files.

II. Data/File Transmission

A) The system will have a mechanism to retain a copy of the original acceptable appraisal in the database. States have the option to archive earlier versions.

- When an appraisal is submitted, it will be saved in the temporary database. The appraiser will be provided with the ability to refine the report upon request from the reviewer. Once the report is accepted, it cannot be edited anymore. If any further revisions are required at a later stage due one or the other reasons, that report will be saved with another version number.

Backend languages can be used to create this mechanism.

B) A provision for automatically sending reviewers' comments back to the appraiser and corresponding district ROW office.

- The reviewer while reviewing the appraisal might want to provide comments or request clarifications. The EAS provides a function to facilitate such communications. This can be done in either of the following two ways:
    - The comments can be saved in the database and an email alert can be send to the appraiser to read the same.
    - The other option would be to send the comments as an attachment with the email.

Backend languages can be used for creating this feature. An on-site message system can be used for storing the messages.

C) A quality control mechanism for the appraiser to review the submittals to ensure that all data fields are completely and accurately filled.

- During the submission process, the appraiser will be asked to review and verify the information he/she is submitting with a PDF file that is generated with the data submitted by the appraiser. Once the appraiser has reviewed the appraisal in PDF format, he/she will be requested to confirm the submission.
- Alternatively, the appraiser can review the information he/she is submitting directly from the database, while a function button is provided for the appraiser to confirm his/her submission.

This feature can be implemented by using any of the available backend languages.

D) A mechanism to review the appraisal history for the property (i.e. multiple appraisals for a single piece of property).

- In cases where a property is appraised by two or more appraisers and in cases where the property was appraised again after some lapse in time, a mechanism will be provided to view the appraisal history of such a property. To achieve this mechanism, a link to the appraisal history of the property can be provided from the existing data in the database.

PHP, Perl and other backend languages can be used to accomplish this user need.

E) E-mail confirmation/notification of successful submission of an appraisal will be sent to all parties involved.

- When an appraisal is successfully completed and submitted, an automated email notification would be generated informing all the parties involved in the appraisal that the appraisal has been submitted.

Backend languages can be used to communicate with the database and generate this automated email notification.

VII. Queue Database for Review

A) The database will be accessible to the appraisers, the reviewers, and corresponding ROW personnel with controlled privileges.

- The temporary database will only be accessible when the user logs into the system using the secure login system. The appraiser and the reviewer will have different privileges. The appraiser would be the only user with the capacity to revise an appraisal. The reviewer will be provided with the feature to send his/her comments to the appraiser and relevant DOT personnel.

Backend languages like PHP, Perl, ASP, JSP, and Coldfusion can be used to check the user name, user level, and password. The user information will be stored in the database which can be developed using any of the available database software.

B) The database will maintain the option to overwrite the previous version of the appraisal until it is finalized. This feature will be given only to the appraiser until he officially submits the report.

- Once the appraisal is submitted, upon request from the reviewer, the appraiser will be provided with the ability to overwrite the existing version and saving it in the queue database. He/she can make changes to the appraisal as long as the appraisal is not accepted. Once accepted, the appraisal will be shifted to the permanent database. Subsequently, the appraiser will not be able to revise the appraisal anymore.

Backend languages such as PHP, Perl, ASP, JSP, and Coldfusion can be used to create this feature.

C) When the proposed Electronic Appraisal System is fully implemented (after the completion of the research), it will provide access to the ROW appraisal review form to the reviewer to carry out the appraisal review.

- When a reviewer selects an appraisal for review, an appraisal review form will be generated along with the appraisal report. The reviewer will have the capability to fill the review form in stages. He/she can save the review form in the database. When the reviewer starts the review process, the status of the appraisal will change to "Under Review".

This feature can be implemented using backend programming languages.

D) E-mail notification of a completed appraisal review will be sent to the appraiser and ROW personnel.

- When an appraisal is successfully reviewed and accepted, an automated email notification would be generated informing all the parties involved in the appraisal that the appraisal has been accepted.

Backend languages will be used to communicate with the database and generate this automated email.

VIII. Statistical Process Control (SPC)

A) The goal of implementing such a system is to ultimately reduce the time needed to complete the appraisal process. The intention of the SPC is to flag inconsistencies in an appraisal to alert the reviewer. For example, when the land value from one appraisal significantly differs from the land value of similar appraisals, the reviewer should be alerted. In this manner, the SPC will help ensure consistency among similar appraisals. SPC will serve only as guidance for the reviewer; it is the reviewer who will make the final judgment.

- SPC can be accomplished using any of the following techniques:
    - SPC using statistical analysis.
    - SPC using neural network applications
    - SPC using data mining and knowledge discovery in database (KDD).

SPC will ensure consistency between similar appraisals. For more information on SPC mechanism, please refer to Technical Memorandum 9-1523-5.

B) The SPC will support the development of the summary information on appraisals for DOT's internal use.

- Various summary information on appraisals may be of interest to the DOT ROW personnel. Since SPC helps ensure the consistency of appraisal data and information, it will ultimately aid in developing the summary information. This information will be available for internal use by the DOT personnel.

Basic database features can be used to run queries and generate this information.

C) Ranges in key values will be used to help determine the consistency of the input appraisal data.

- The SPC mechanism will basically check the data entered by the appraiser against similar appraisals. It will create a range of values for the appraisal under

consideration. If the value entered by the appraiser is within this range, the value will be deemed consistent.

IX. Approval Process

A) When the proposed Electronic Appraisal System is fully implemented (after the completion of the research), the appraisal will be approved online with the support of the electronic appraisal review form.

1. After the reviewer completes the review form, he/she will be giving the option to approve the appraisal or send it to the official in-charge for approving the appraisals. The approval can be executed by clicking on a properly designed function button on the bottom of the page.

Any backend language can be used to create this mechanism.

B) E-mail notification of the approval will be sent to the appraiser, the reviewer, and ROW acquisition consultant(s).

- When an appraisal is approved, an automated email notification would be generated informing all the parties involved in the appraisal that the appraisal has been accepted.

Backend languages can be used to communicate with the database and generate this automated email.

C) Upon approval, the appraisal will automatically be marked "approved" in the appraisal database.

- After the appraisal is approved by the reviewer/DOT, the status of the appraisal in the queue database will change from "Under Review" to "Approved" and remain so until it is moved to the permanent database. Once approved, the appraisal report cannot be edited by anyone. When changes are made to the appraisal, it will be stored with a different version number.

X. Permanent Appraisal Database

A) Access to the permanent appraisal database will be restricted to only the personnel authorized by DOT.

- The permanent database will only be accessible after the user logs into the system using the secure login system. Access to this database will be restricted to personnel authorized by the DOT.

Backend languages can be used for implementing this function. The database can be developed using database software such as Oracle, Sybase, and SQL.

B) The database will provide a mechanism to conduct various queries based on attribute information.

- Using basic features of a database, the user will be provided with the capability to conduct various queries. This will help the DOT personnel to quickly get the relevant information about a specific appraisal or a group of appraisals along a corridor.

  The search function will be web-based. The user will be able to search the database based on attribute information such as appraisal number, property address, owner name, appraiser name, or combined keywords.

Backend languages and database functions can be used to accomplish this user need.

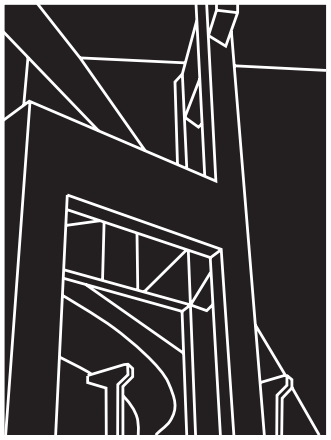
C) Appraisals in the permanent database will be organized in a format that is compatible with the State DOT's administrative structure and policies in terms of the data access and management.

- The appraisals in the database will be organized in a format that is in accordance with the administrative structure of the state DOT. This can be accomplished through a solid understanding of the DOT's administrative structure and policies and the utilization of the basic database functions.

TECHNICAL MEMORANDUM 9-1523-5

STATISTICAL PROCESS CONTROL: PRELIMINARY RECOMMENDATIONS

Zhanmin Zhang, Carlos Caldas and Nadeem Moulvi



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Project 9-1523
Technical Memorandum 9-1523-5
Statistical Process Control: Preliminary Recommendations

1. Introduction

Statistical Process Control (SPC) is a methodology that is widely being used in manufacturing and financial industries and is making in-roads in the appraisal industry. It is a method that allows users to separate random variations in their data from nonrandom variations, and then analyze the nonrandom variations to improve the quality and reduce the cost of products. SPC is a control philosophy concerned with continuous process improvements using a collection of tools for data and process analysis and making inferences about process behavior. SPC is a key component of total quality initiatives.

In the appraisal industry, there are several different interpretations of this technology. Therefore, the development of a SPC mechanism for the Electronic Appraisal System (EAS) proposed in this project is a complex task. In the sections that follow, SPC process and the various technologies that can be used to implement the SPC mechanism are explained. Preliminary implementation recommendations are presented as well as future steps on the development of the SPC component for the EAS.

2. SPC Process

As mentioned earlier, SPC is extensively used manufacturing and financial industries. To better understand the SPC mechanism, we have considered the example of a SPC mechanism in a manufacturing industry. To run the SPC mechanism, we first need to identify the parameters that have to be measured, the sampling method, and the data sources. To use statistics for the process, the system must be able to break the process down so that the statistics can be applied to a well-defined, repeatable, and measurable step.

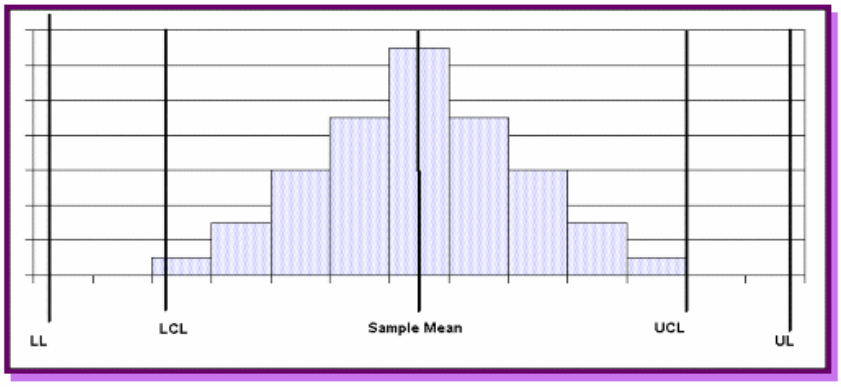

Figure 1: A typical histogram [STSC]

The easiest methods of displaying historical data are by using run charts and histograms. The histogram in the figure 1 shows the desirable relationship between the upper and the lower test limits (UL and LL) in comparison to the upper and lower process control limits (UCL and LCL). It is desired that the control limits are always within the limits set by the test program. These limits are set based on the specifications required from the batch.

When the control limits fall outside the test limits, an inconsistency is said to occur. This inconsistency is flagged by the SPC to alert the reviewer. The inconsistency is depicted in the figure 2.

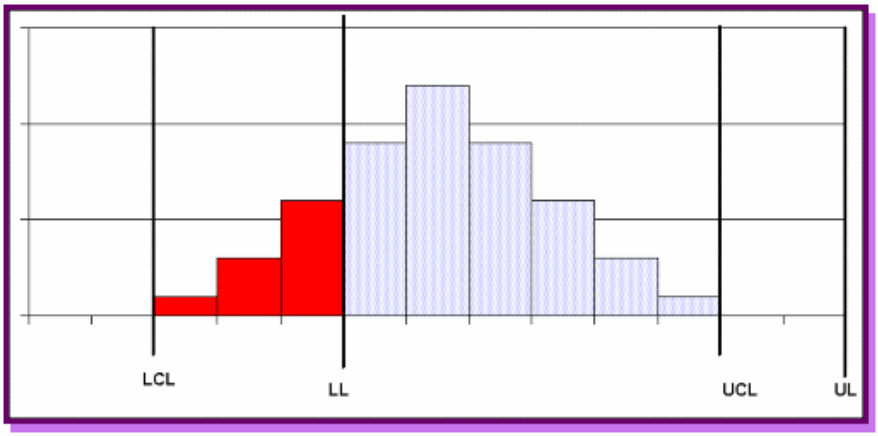

Figure 2: Inconsistency in data entry [STSC]

These inconsistencies can be easily noted by simple statistical analyses. To conduct an SPC analysis, sample data is required. The body and soul of the SPC is contained in two charts: the "Mean" (X) chart and the "Range" (R) chart. These charts are referred in tandem to find the inconsistencies in the batch by calculating the UCL and the LCL.

UCL = X + AR; LCL = X-AR; where A is a constant dependent on the size of the sample. When a data entry is made, its standard deviation is calculated. If the value is outside the control limits, that data field is flagged. As the entire system is computerized, these calculations are done by the computer thereby carrying out the SPC analysis. [STSC]

3. Implementation Techniques

There are several techniques that might be used to implement a SPC mechanism for the proposed Electronic Appraisal System. The noteworthy techniques are mentioned below:

a) Statistical Analysis
b) Neural Networks
c) Data Mining and Knowledge Discovery in Databases (KDD)

These techniques are discussed in brief in the sections that follow.

a. Statistical Analysis

Statistical analysis is one of the widest used methods for conducting the SPC mechanism. One example of a SPC mechanism for this project is a very simple process in which the data entered by the appraiser is compared with the range of values that are possible for that data entry. If the data entered by the appraiser falls outside the given range, then the data is considered inconsistent.

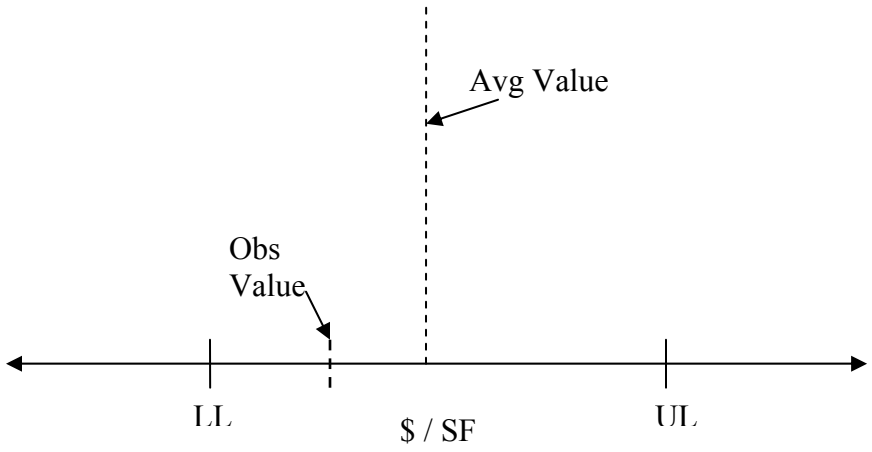

Figure 3: Consistent Data

Simple statistical analysis is carried out to determine the mean of the values that are available from similar appraisals. The lower limit (LL) and the upper limit (UL) for the expected property value are found using an acceptable range based on historical data [Berger 83]. When an appraiser submits his/her data, the SPC mechanism compares the value entered by the appraiser with the range of values that are generated based on other similar appraisals. (The procedure to determine parameters to be controlled and their respective range of acceptable values will be discussed with the PMC). For example, as shown in figure 3, the observed value i.e. the value entered by the appraiser, is within the acceptable range. This value is considered 'consistent' and is not flagged by the SPC.

Similarly, if the value entered by the appraiser is outside this limit, then the value is deemed 'inconsistent'. Such a data entry will be flagged by the SPC mechanism to alert the appraisal reviewer about possible inconsistencies in the appraisal. This has been shown in figure 4.

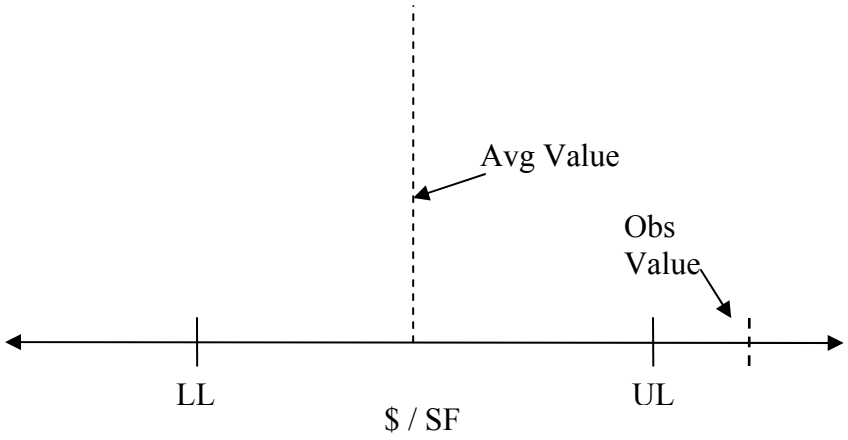

Figure 4: Inconsistent Data

b. Neural Networks

According to Simon Haykin, "a neural network is a massively parallel distributed processor made up of simple processing units, which has a natural propensity for storing experiential knowledge and making it available for use. It resembles the brain in two respects:

- Knowledge is acquired by the network from its environment through a learning process.
- Interneuron connection strengths, known as synaptic weights, are used to store the acquired knowledge." [Haykin 99]

Neural network technology uses multilayered approach that approximates complex mathematical functions to process data. It consists of many processing elements or nodes that work in parallel. Nodes are connected to each other in layers, and layers are interconnected. These nodes are simple mathematical functions; the connections between these nodes are how neural networks "think." As the complexity of the task increases, the network size increases, and the number of nodes increases rapidly.

To train a neural network, the developer has to feed the network with appraisal data from numerous completed appraisal reports. This data provides the neural network with information to create a unique configuration of network structure with a unique set of connection strengths or weights. As the neural network is modeled on the human brain, it learns new tasks with experience thereby improving its efficiency with time. [Landas and Taylor 98]

When a new input is made, the network weighs the connections between nodes based on the data that has been fed earlier to it. Each connection node builds on previous decision nodes proliferating down to the final decision. For instance, in case of an appraisal, neural networks can be used to estimate the property value. This value is

then compared against the average value of similar parcels, obtained from historical appraisal data. If there is an impermissible deviation, then the value is flagged.

Neural networks are very adaptable and complex. They are perhaps one of the best possible tools to be used for creating SPC mechanism for manufacturing industries. But, since the configuration of the network structure and the set of connection strengths or weights are not transparent to most users (many users refer to it as a "blackbox"), its use is not recommended for this study.

c. Data Mining and Knowledge Discovery in Databases (KDD)

Data Mining and KDD are analytic processes to explore and analyze, by automatic or semi-automatic means, large quantities of data in order to discover meaningful patterns and/or systematic relationships between variables and then to validate the findings by applying the detected patterns to new sub sets of data. The entire process basically consists of three main stages namely initial exploration, model building or knowledge identification, and deployment. [Wang 99]

In the exploration stage, data preparation is done by cleaning data, transforming data and selecting the records that will be used for creating the data mining mechanism. Then depending on the nature of the analytic problem, the variables are chosen.

In the model building and validation stage, various models are considered based on their descriptive or predictive performance (i.e. explaining the variability in question and producing stable results across samples). There are a variety of techniques that can be used for comparing the performance of various models. These include Bagging, Boosting, Stacking and Meta-Learning.

In the third and final stage, the model selected in the previous stage is applied to the data and descriptions/predictions of the expected outcome are generated.

This approach is very sophisticated and is ideally suited for applications such as credit card fraud detection, computer network intrusion detection, marketing and sales promotion, inventory management, and transforming corporate data into business intelligence, among others,. Although the SPC using data mining and KDD can be employed for the purposes of our project, we think that this approach is better suited when analyzing larger data sets (e.g.: millions of appraisal reports). Since the number of appraisal reports to be analyzed by the proposed statistical process control mechanisms is on the order of thousands, we believe that the extra complexity of DM/KDD approaches can not be justified for our needs.

4. Our Analysis and Recommendations

After having carefully gone through the various alternatives and techniques available for implementing a SPC mechanism for the Electronic Appraisal System (EAS), we are of

the opinion that using statistical analysis is best suited for the project under consideration. The method chosen is simple and effective. It meets all the requirements that are desired from the SPC mechanism. The SPC mechanism that we envision will have statistical analysis functions acting together with queries that will be generated from the database. These queries will be automatically generated while conducting the SPC analysis on the appraisal report.

Although the other noteworthy techniques of conducting SPC namely neural networks, and data mining and KDD can be used for our project, we believe that the extra implementation complexity, potential users' unfamiliarity with techniques used, and the limited size of the dataset limit the benefits of these approaches for this particular project. Statistical analysis is an excellent choice for carrying out the SPC of an appraisal report.

5. Future Steps

The recommendations presented in this document are preliminary. The research team will build on the foundation that has been created while generating this document. Meetings will be conducted with the PMC, the appraisal reviewers, and the consultants to better understand the appraisal review process. This will aid in developing a SPC mechanism that is fruitful and profitable to the proposed EAS.
Based on the outcome of the meetings, the research team will determine the parameters that have to be checked by the SPC. The procedure for creating the range of acceptable values will also be established.

These measures and techniques will be documented in subsequent project documents.

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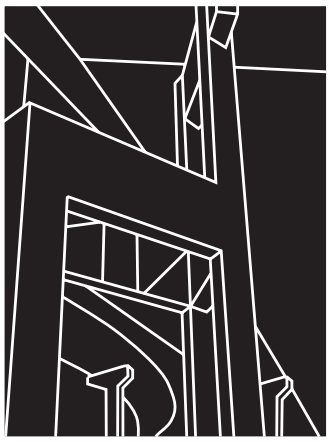
TECHNICAL MEMORANDUM 9-1523-6

PROTOTYPE DEVELOPMENT AND TESTING PLAN FOR THE ELECTRONIC APPRAISAL SYSTEM

Zhanmin Zhang, Carlos Caldas, and Nadeem Moulvi



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Project 9-1523
Technical Memorandum 9-1523-6

Prototype Development and Testing Plan for Electronic Appraisal System

1. Introduction

The purpose of this document is to provide a detailed work plan and schedule of activities for the development of a prototype of the Electronic Appraisal System (EAS). The document also describes the expected status of test cases and criteria to be used to evaluate the prototype upon the completion of its development.

This Prototype Development Plan is consistent with the framework of the Electronic Appraisal System (EAS). The prototype is intended to serve as a proof-of-concept for the EAS.

2. General Architecture

The prototype of the Electronic Appraisal System (EAS) will be a web-based system. It will essentially have the following components: A login system, an appraisal form, a temporary queue database, a permanent database and a statistical process control (SPC) mechanism. PHP, a programming language that is commonly used for developing web-based applications, will be used for the backend generation (server side) of the appraisal form and for submitting the data to the database. It will also be used for creating a secure login system and to run queries on the database. Java script will be used for the frontend (client side) development of the dynamic electronic forms. The databases will be developed using MySQL. The Statistical Process Control (SPC) mechanism will be established through statistical analysis and database queries.

3. Key Functions

The key functions that will be included in the prototype of the Electronic Appraisal System (EAS) are listed as follows:

- Logging into the system
- Filling the appraisal form
- Submitting the appraisal form
- Converting the appraisal form into PDF format
- Checking the consistency of data with Statistical Process Control mechanism
- Sending/Receiving emails from/to reviewers and appraisers
- Loading and deleting reports from the temporary database
- Transferring the reports from the temporary database to the permanent database
- Generating summary information and running queries

4. Process Flow Diagram for Developing the Prototype

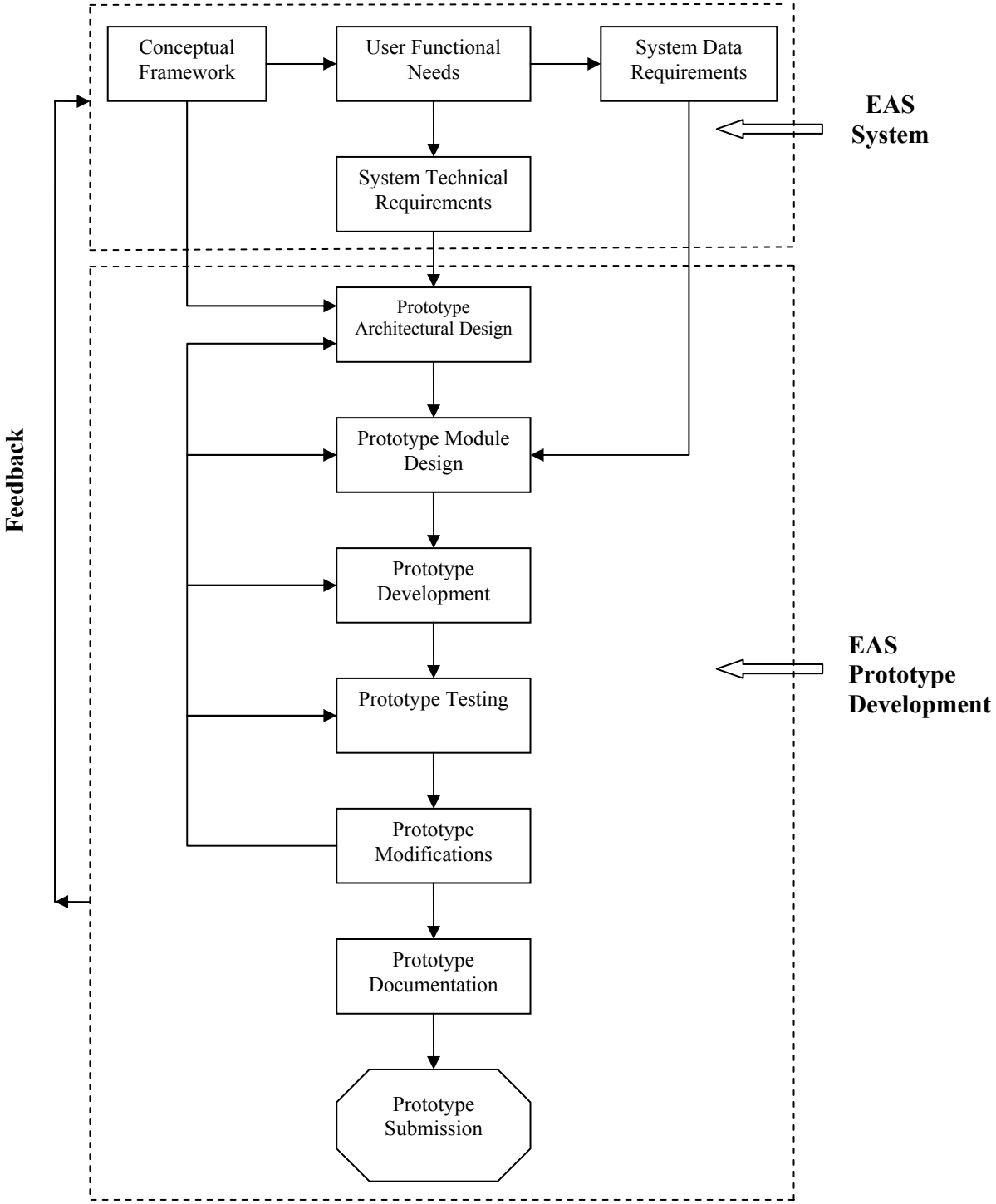


Figure 1: Process Flow Diagram

The development plan is basically divided into two stages. The Electronic Appraisal System (EAS) architecture and specifications and the EAS prototype development plan.

The EAS architecture and specifications include the conceptual framework, the user functional needs, the data requirements and the technical requirements. To achieve this, extensive discussions were conducted with Right-of-Way personnel and consultants from the appraisal industry. Also, existing practices were thoroughly studied. These documents have been submitted as Technical Memorandum 9-1523-1 – Conceptual Framework for the EAS, Technical Memorandum 9-1523-2 – User Functional Needs for the EAS, Technical Memorandum 9-1523-3 – Data Requirements for the EAS and Technical Memorandum 9-1523-4 – Technical Requirements for the EAS.

To prove the validity of the EAS architecture and recommendations, the next step of the research project is to develop a prototype for the proposed Electronic Appraisal System (EAS). The processes, plan, and specific steps involved in the EAS Prototype Development are briefly discussed as follow.

a. Prototype Architectural Design

The first step in EAS Prototype Development is to develop the architecture for the prototype system. There are various technologies that can be employed to develop the prototype. The research team would carefully examine these technologies to arrive at the best possible and most feasible architectural design for the prototype, including the development environment and programming language(s). The designed architecture for the prototype would be compatible with the technical requirements and the conceptual framework of the EAS.

b. Prototype Module Design

In this step, every module of the prototype will be designed. Primary modules of the prototype include the electronic appraisal form, file transmission mechanism, the queue database, permanent database and SPC mechanism. In addition, data flows among these modules will also be defined.

The electronic form and other modules will be compatible with data items specified in the data requirements document. The file transmission mechanism will be designed so as to allow for easy storage of the file in the queue database. Also, a provision will be made to transfer the approved appraisal to the permanent database. The queue database and the permanent database will share a common database structure, but with varying features and privileges to their users. The SPC mechanism will be built upon statistical analysis tools and database queries.

c. Prototype Development

Once the architectural design and the module design are completed, the prototype development will take place. The research team will develop the prototype as per the designs made in the earlier steps. During the development process, the research team will keep close communications with and make demonstrations to the PD and PMC.

Feedback information from the PD and PMC will be incorporated into the prototype development.

d. Prototype Testing

After the prototype is developed, it will be tested and evaluated with typical ROW appraisals to ensure that it has the robustness to demonstrate the requirements as specified in Technical Memorandum 9-1523-2. The tests will be carefully planned and executed to ascertain a good quality product. The testing plan is explained in detail in section six of this document.

e. Prototype Modifications

Subsequent to testing the prototype, if any defects are found as part of the testing process, they will be modified and/or corrected. The modification process will be completed before the prototype is submitted to the PMC. Such modifications will cover the whole prototype processes and modules as needed to incorporate comments and suggestions from the PD and to ensure the system is as complete as possible.

f. Prototype Documentation

Throughout the development of the prototype, the research team will make every effort to keep a complete record of the activities that are being undertaken which will be a part of the project repository. Details of the prototype development process will be documented in Technical Memorandum 9-1523-7 – Prototype Design of EAS and Technical Memorandum 9-1523-8 – Prototype Development of EAS. The technical memoranda will be submitted to the PD as scheduled.

g. Prototype Submission

Once the prototype is carefully reviewed and finalized, upon the approval of the PD and PMC, the prototype will be submitted to the PD in a format specified by the PD.

It should be realized that, during the prototype process, revisions to the original architecture and specifications of the EAS may be needed as the feedback from the prototype development. Consequently, the EAS system will be suitably revised if necessary to achieve a more accurate and reliable design of the Electronic Appraisal System

5. Deliverables

Upon completion of the task on prototype development, the following documents and products will be generated and delivered as scheduled:

Deliverable		Due Date
1.0	Process Flow Diagram, Plan and Testing Plan of EAS	08/31/2005
2.0	Prototype Design of EAS	12/31/2005
3.0	Prototype Development of EAS	08/31/2006

6. Test Plan and Procedures

The purpose of this section is to outline a reasonable testing plan for the prototype of the Electronic Appraisal System (EAS). It provides guidelines in quality assurance, testing and other evaluation procedures that the research team will follow to ensure proper and satisfactory functioning of the prototype product. Major functionalities to be tested are briefly discussed as follows.

a. Logging into the system

The prototype will be tested to ensure that the logging system works as per the expectations. The privileges offered to the appraisers and reviewers are different and this will be verified in this test. To carry out this test, the users representing the appraiser, the reviewer, and the system administrator will be identified to participate in the testing using their user IDs that are assigned with different privileges.

b. Filling the appraisal form

After logging into the system, the system should provide the appraiser with the appraisal form. The system will be checked to verify that the form is generated in the appropriate length that is consistent with the type of the appraisal undertaken by the appraiser. The form will also be tested to ensure that data can be saved at anytime by the appraiser so that it can be completed in parts. Tests will also be carried out to make certain that the visuals and plats can be included in the appraisal as pictures.

c. Converting the appraisal information into appraisal report in PDF format

In this test, the research team will make sure that the appraisal information submitted by the appraiser in HTML format is converted to PDF format. The generated appraisal report in PDF format will allow the appraiser to first review the appraisal and then confirm the submission.

d. Submitting the appraisal

In this test, the appraisal system will be tested to verify the proper submission of the appraisal once it is completed. Once the appraisal is successfully submitted, a message will confirm the submission. In the meanwhile, an email notification of the submission will be sent to all the parties involved. The submitted appraisal will be saved in the queue database for review.

e. Checking the Statistical Process Control (SPC)

This test will be carried out to ensure the proper functioning of the Statistical Process Control (SPC) mechanism. One way to test the effectiveness of the SPC is to deliberately use some inconsistent information in the appraisal report and then run the SPC module to monitor if the inconsistency is flagged by the SPC.

f. Sending email notifications to involved parties

The prototype system will have a mechanism to allow notifications of appraisal status to be automatically sent to the involved parties. By this test, the proper functioning of this mechanism will be verified.

g. Transferring the reports from the temporary database to the permanent database

Once the appraisal report has been approved, it will be transferred from the temporary database to the permanent database. The research team will validate the proper functioning of this mechanism by approving a report online and checking whether the report was transferred to the permanent database.

h. Generating summary information through various queries

In this test, various kinds of summary information that is of importance to DOT ROW personnel will be generated from the permanent database by conducting queries.

7. Key Characteristics of the Prototype System

The final submission of the prototype system is scheduled for August 31, 2006. By following the development and testing plans, it is expected that the final prototype system for the EAS will be marked by the following characteristics.

a. User-friendly

The prototype system developed should be user-friendly. It should be easy to navigate and understand. The features provided should be easy to comprehend and use.

b. Practical

The proposed EAS will only be acceptable by the industry if it is practical. The prototype developed should be realistic and sensible. It should only have the features that are required and useful for producing quality appraisals.

c. Maintainable

Easy maintenance of any automated system is of immense importance. The prototype developed should demonstrate the characteristic of easy and straight forward means and mechanisms for system maintenance.

d. Flexible

The prototype should be flexible such that it can be used for different types of appraisals and for future modifications as needed. The system should also be flexible to accommodate any future needs.

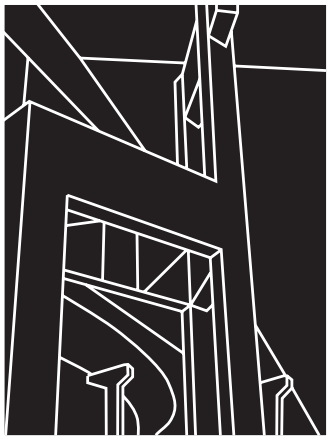
e. Sustainable

The developed prototype should demonstrate that, with appropriate implementation policies, the EAS should be sustainable over time.

TECHNICAL MEMORANDUM 9-1523-7

PROTOTYPE DESIGN OF ELECTRONIC APPRAISAL SYSTEM (EAS)

Zhanmin Zhang, Carlos Caldas, and Nadeem Moulvi



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Project 9-1523
Technical Memorandum 9-1523-7
Prototype Design of the Electronic Appraisal System

I. Introduction

This document contains the design specifications for the Electronic Appraisal System (EAS). It includes the system architecture, detailed descriptions of components, and other technical information. This document is written from the developer's point of view.

1.1 Scope of the Development Project

In this project, a prototype of the new Electronic Appraisal System (EAS) will be developed for the participating states. The main purpose of the new system is to streamline the property appraisal process.

1.2 Definitions, Acronyms and Abbreviations

This document contains various acronyms and abbreviations. The definitions of the acronyms and abbreviations are listed in the Table 1.

Table 1: Terms and acronyms used in this document

Term	Definition
EAS	Electronic Appraisal System
HTML	Hyper Text Markup Language
WWW	World Wide Web
PHP	Hypertext Preprocessor, is a widely used general purpose scripting language that is especially suited for web development and can be embedded into HTML
SQL	Structured Query Language, a High-Level query language used to extract and process data stored in databases
SPC	Statistical Process Control

1.3 Overview of Document

Section I introduces the project. Section II provides an abstract view of the system architecture, including the components, structure and relationships, and user interfaces. Section III describes each of these components in more detail, including design and architectural decisions.

II. System Architecture Description

The following section describes the various components of the prototype of the EAS. It also explains the structure and relationship of the components that make up the prototype of the EAS.

2.1 Overview of Modules / Components

The prototype of the EAS has the following major elements:

1) User Registration
2) User Login
3) Appraisal Form
4) Queue Database for Review
5) Statistical Process Control (SPC) Mechanism
6) Review Form
7) Permanent Appraisal Database

2.2 Structure and Relationships

The various components of the prototype closely interact with each other. When the user first accesses the system, he/she will be requested to register. While registering, relevant information such as the user type (appraiser/reviewer), affiliation, user name and password will be collected. Upon registration, the user will be directed to the login page to login into the system. On successful login, based on the user type, the appraiser home page or the reviewer home page will be loaded.

The appraiser home page and the reviewer home page have some common links. Both the appraiser and the reviewer will be provided with the option of checking the status of a particular appraisal. The appraisal will appear on the reviewer's home page only when the appraiser formally submits the same. The other common features include the ability to view the appraisal report in PDF format or as a webpage. When the appraiser/reviewer clicks on the buttons to access the webpage or the PDF version, the system will access the queue database and obtain the requested appraisal in the required format.

Apart from the common features, the appraiser will also have links to create a new appraisal and to edit an existing appraisal. To accomplish this feature, the user will be provided access to the electronic appraisal form. The appraisal form is provisioned to allow the user to complete it in stages. The appraiser can save the appraisal and come back to complete it at a later time. This saved appraisal will be stored in the queue database. The appraisal form is composed of a number of pages. The appraiser will have to complete all the required data on the page and click on the 'Continue' button to go to the next page. When he/she clicks the 'Continue' button, the appraisal will be automatically saved as well. Once the appraiser completes the last page, he/she can now submit the appraisal. When the 'Submit' button is clicked, a PDF version of the appraisal will be automatically generated providing the appraiser with an opportunity to completely go through the appraisal report and verify its contents. If the appraiser is satisfied, he/she can click on the 'Confirm Submission' button to formally submit the appraisal report. If not, he/she can cancel submission and edit the appraisal before resubmitting the same. If the appraisal is submitted, it will be saved in the

queue database and an email will be sent to all parties involved in the appraisal informing them of the submission. The appraisal will now appear on the reviewer home page as well.

The reviewer's home page will have additional options of reviewing the appraisal and initializing the Statistical Process Control (SPC) mechanism apart from the options that are common to the reviewer and the appraiser.

The reviewer can review an appraisal by clicking on the 'Review' button corresponding to the appraisal that the reviewer wishes to review. This will open the review form where the reviewer will have the opportunity to comment on the appraisal report and finally approve/request changes/not approve the appraisal. To help the reviewer in reviewing the appraisal, an SPC mechanism is provided. SPC mechanism is initialized when the reviewer clicks on the 'Conduct SPC' button. The SPC mechanism will basically cluster similar appraisals together including the appraisal under review.

If the reviewer approves the appraisal, the appraisal will be transferred from the queue database to the permanent appraisal database and an automated email will be generated informing all the parties involved about the approval. If the appraisal is not approved or if changes are requested, the concerned appraiser will be sent an email informing him/her about the changes requested and the appraisal will be retained in the queue database. In either case, the status of the appraisal will be updated which will reflect in the user home page.

The relationship and interactions between the components is shown in figure 1.

III. Detailed Description of the Components

In this section, the various components of the prototype are explained. Also, the programming languages and software that will be used to create the different components have been listed.

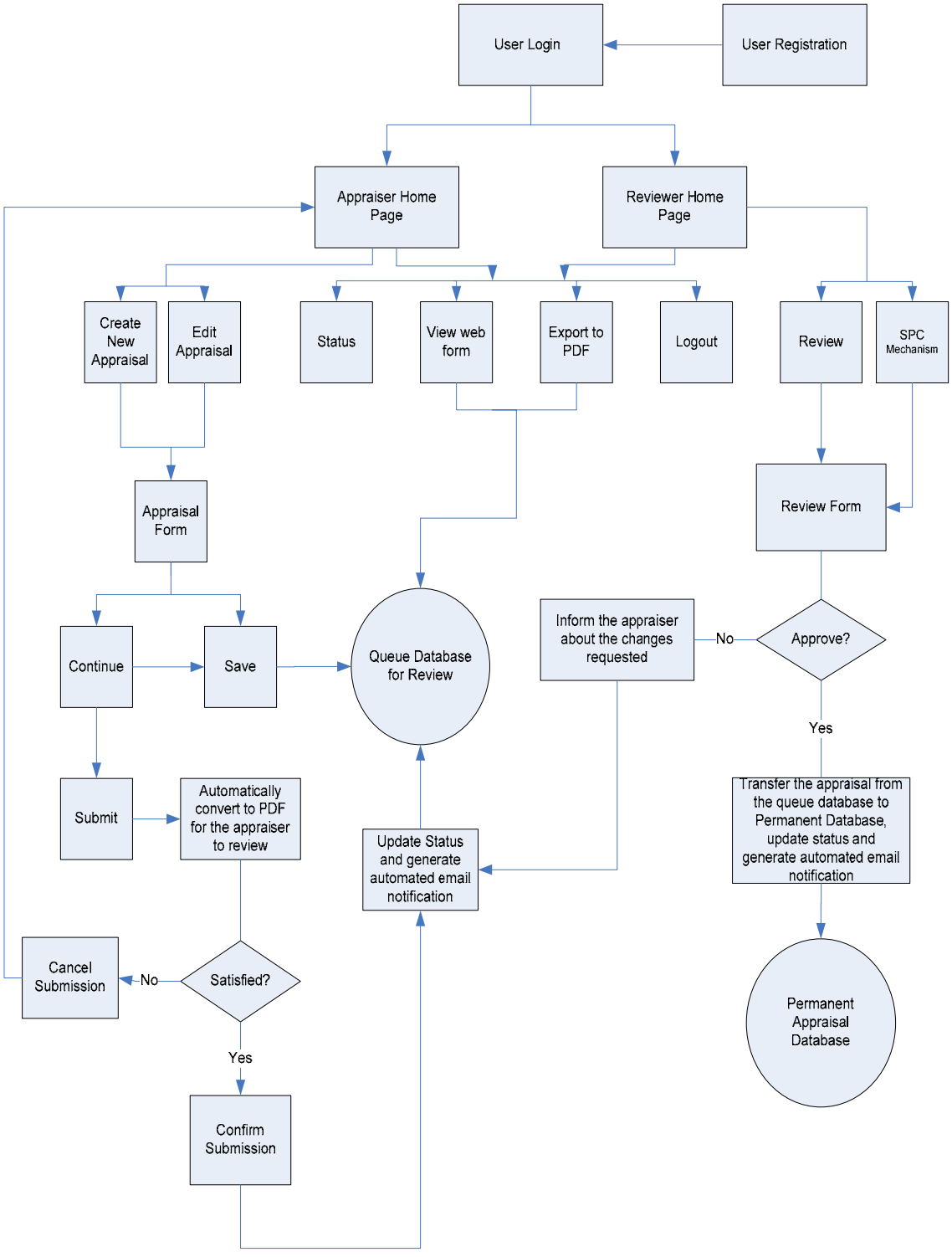

Figure 1: Relationship and interaction between components

3.1 Component Template Description

Using the template that follows, each component is explained with the help of a table which contains the following information: identification, type, purpose, function, subordinates, dependencies, interfaces, resources, processing, and data, as shown in Table 2.

Table 2: Template for the component description table

Identification	The unique name for the component and its location in the system.
Type	A module, a subprogram, a data file, a class, etc.
Purpose	Function and performance requirements implemented by the design component.
Function	What the component does, the transformation process, the specific inputs that are processed, the algorithms that are used, the outputs that are produced, where the data items are stored, and which data items are modified.
Subordinates	The internal structure of the component, the constituents of the component, and the functional requirements satisfied by each part.
Dependencies	How the component's function and performance relate to other components. How this component is used by other components.
Interfaces	Descriptions of the interface as well as any additional mechanisms for communicating through messages, parameters, or common data areas.
Resources	A complete description of all resources external to the component, but required by the component to carry out its functions.
Processing	The function dispensation of the component.
Data	For the data internal to the component, describes the representation method, initial values, use, semantics, and format.

3.2 User Registration

User registration is the first major component of the EAS. It collects the necessary information from the first-time users so as to allow the user to securely log into the system on a subsequent occasion. It also helps in determining whether the user is an appraiser or a reviewer. The details about this component are given in the Table 3.

Table 3: User registration description

Identification	Registration
Type	A module
Purpose	To gather user information from first time users
Function	Registration will create a login for the new users to provide access to the EAS. The data that will be collected includes the name, appraiser or reviewer, affiliation, certification number and state of the appraiser/reviewer.
Subordinates	Input boxes, drop-down list and submission buttons will be provided
Dependencies	This component has no dependencies.
Interfaces	When a user visits the website, the welcome screen will have the login boxes and also a link to register in case of first time users. All information entered by the user will be processed upon clicking the submit button and if any information is inaccurate, incomplete, or inappropriately configured, then the page will reload with a message informing the user about the error that prevented the completion of the registration.
Resources	The registration component will be completed using HTML and PHP for output and MySQL for logic and database.
Processing	On submitting the registration information, the information will be analyzed and validated using PHP and MySQL.
Data	Each input will be assigned a specific name to allow easy reference.

In Figure 2, a screen shot of the user registration page has been shown.

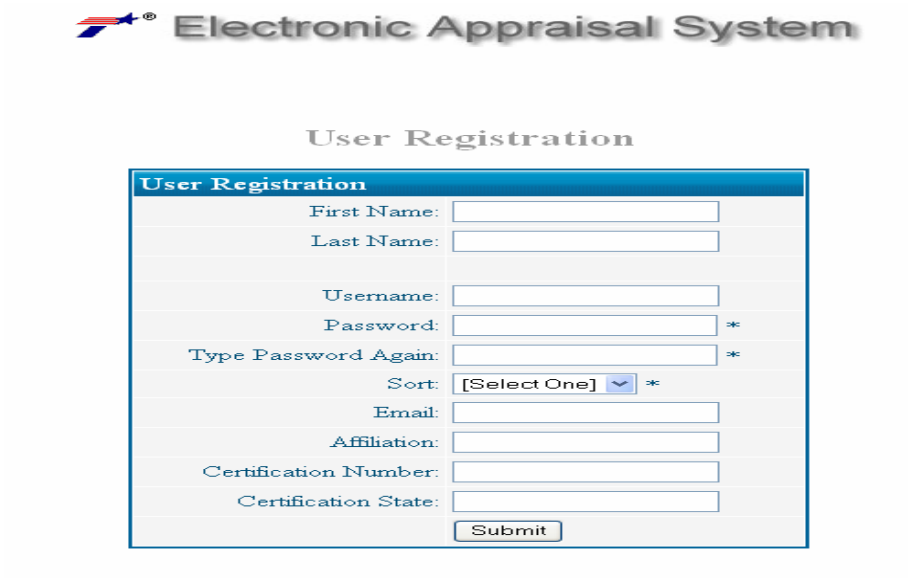

Figure 2: Screen shot of the registration page

3.3 User Login

The user login is the component that would be used to validate the user when a user tries to access the EAS. This feature will also determine the page that will be loaded once the user logs into the system. The specifics of this component are given in the Table 4.

Table 4: User login description

Identification	User Login
Type	A module
Purpose	To authenticate the user and provide them with access to the EAS
Function	The function of this component is to allow the user access to his/her appraisals and information.
Subordinates	The computer will ask for the login information, verify the information, grant access if the information is verified or return the user to the login page if the entered information is incorrect.
Dependencies	This component is dependent on the registration component.
Interfaces	The login page will consist of two input boxes. One for the username and the other for the password and a submit button that the user will click upon entering the information. If the information entered by the user is correct, the user home page will be loaded by the system bearing the user information and his/her appraisals. If the incorrect information is entered, a page will be generated informing the user that incorrect information has been supplied to the system.
Resources	The user login will use HTML and PHP to present the output; and MySQL for logic and data storage.
Processing	The user will enter their password and username and click the submit button. Using backend processing, the password will be extracted from the database that corresponds to the provided username and will be compared with the supplied password. If the user enters correct information, the user home page will be loaded; otherwise the user will be taken back to the login page informing him/her about the error.
Data	The data will consist of the user provided username and password and the username and password from the database.

A screen shot of the user login page is shown in the Figure 3.

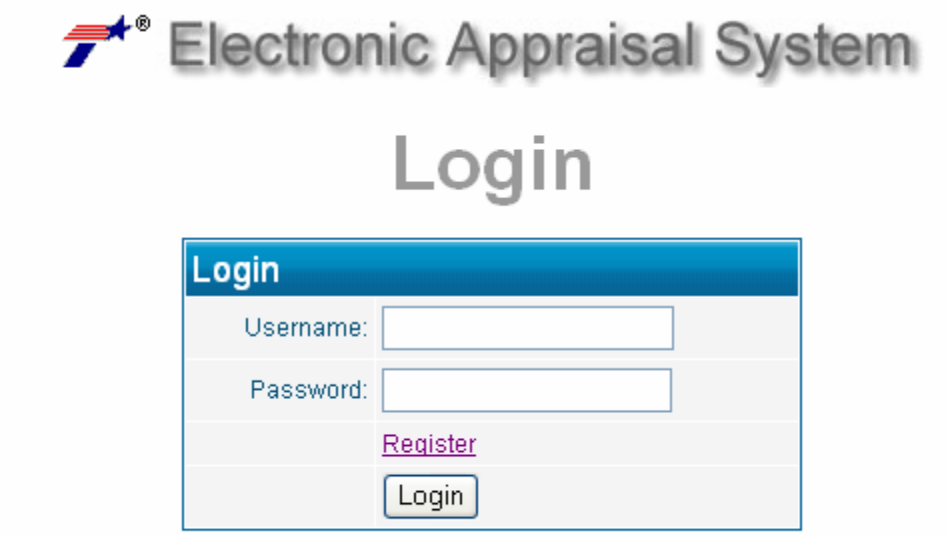

Figure 3: Screen shot of the user login page

3.4 Appraisal Form

The appraisal form is the most important component of the EAS. It will be made available to the appraiser once he/she logs into the system to carry out a new appraisal or to edit an unfinished appraisal. The essentials of this component are described in the Table 5.

Table 5: Appraisal form description

Identification	Appraisal form
Type	A module
Purpose	To provide the information required to arrive at the estimated market value of a property
Function	The appraisal form systematically asks the appraiser to supply information that is required to estimate the market value of the property.
Subordinates	The appraisal form consists of six sections. Section 1 is a introduction and legal documentation section; section 2 deals with the area, neighborhood and whole property; sections 3, 4 and 5 deal with the cost estimation of the property before after acquisition; section 6 is the summary section.
Dependencies	This section has no dependencies
Interfaces	The appraisal form is a massive document. It consists of text boxes and dropdown lists for data entry. It also has mechanisms to load pictures into the system. There is an option available to the appraiser to save the incomplete form and return to it at a later time. Also, the user interface provided allows user to navigate across the various completed sections by clicking on

	the section button on the top of the page. Finally, before submitting the appraisal report, a PDF file is generated so as to allow the appraiser to check his data and confirm its submission. 'Save' buttons and 'Continue' buttons are provided after every page and a final 'Submit' button is provided at the end of the appraisal form.
Resources	The entire appraisal form is created using PHP and HTML. The pictures will be loaded using typical windows navigation processes.
Processing	When the appraiser clicks on the save button, the data entered by the appraiser is saved in the queue database. When the continue button is clicked, the system scans the entire page to check whether required data has been entered by the appraiser. If the required data is present, the next page is loaded; otherwise, an error message along with the fields that were not complete is displayed to the user. On submitting the appraisal, a PDF file is created and the user is asked to verify the data entered. If the user confirms the data, the appraisal report is sent to the queue database.
Data	Each input will be assigned a specific name to allow easy reference in the database.

A screen shot of the appraisal form is shown in the Figure 4.

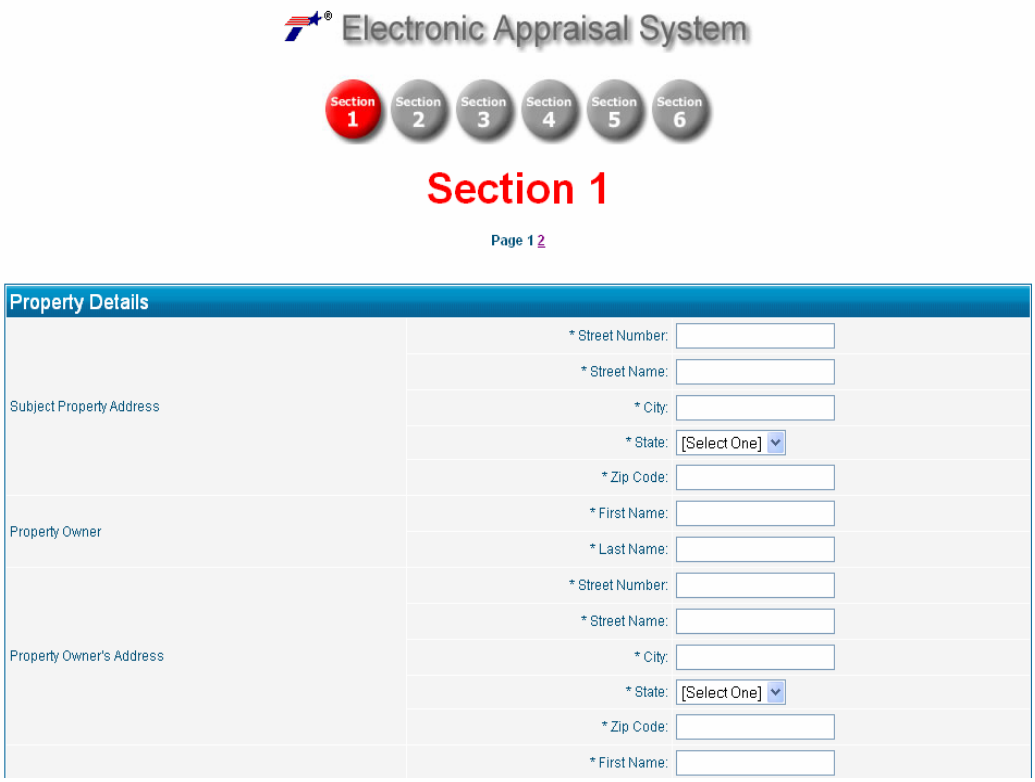

Figure 4: Screen shot of the appraisal form

3.5 Queue Database for Review

This component of the EAS is a storage space to save and store the appraisals that are being reviewed and also the appraisals that are unfinished. The appraisals are moved from this database once they are reviewed. Table 6 describes the requisites of this component.

Table 6: Queue database description

Identification	Queue database for review
Type	Database
Purpose	To provide temporary data storage space for the appraisal.
Function	The primary function of the temporary queue database is to store the appraisals while they are being reviewed by the reviewer. The database provides a secure location for the appraisals to be saved and also does not allow tampering with the appraisals.
Subordinates	The database consists of subcomponents to retrieve the data as and when required and also consists of a reviewer form to be completed by the reviewer in response to the appraisal reports
Dependencies	This section has no dependencies
Interfaces	Since this is a database, it requires no interface. User interface is provided for the reviewer review form. It basically consists of a text box and submit button. It also has some check buttons to approve/request change/not approve an appraisal
Resources	The database is created using MySQL. The review form is generated using PHP and HTML.
Processing	Once the submit button is clicked, the appraisal is sent to the queue database and an email notification is sent to all the parties involved in the appraisal. The submitted appraisal cannot be edited by the appraiser unless requested by the reviewer.
Data	Each input will be assigned a specific name to allow easy reference in the database.

3.6 Statistical Process Control (SPC)

Statistical Process Control (SPC) is a quality control mechanism that is being provided to ensure consistency in the appraisal values of the properties that are similar in nature. This process basically consists of a clustering mechanism that will group similar appraisals together for further analysis. This component has been explained in detail in Table 7.

Table 7: Statistical Process Control description

Identification	Statistical Process Control (SPC)
Type	A module
Purpose	To maintain consistency among similar appraisals.
Function	The primary function of the SPC is to separate the random variations from the non-random variations such that parcels that are similar in nature have similar appraised value.
Subordinates	The SPC mechanism will basically consists of a clustering mechanism which would cluster the similar appraisals together.
Dependencies	This section has no dependencies.
Interfaces	The SPC process is an automatic process which will be initiated when the reviewer clicks the 'Run SPC' button which will be available on reviewer's page.
Resources	Statistical software like SPSS will be used for clustering. MySQL queries will be used to obtain the appraisal data
Processing	Once the 'Run SPC' button is clicked, the clustering mechanism will be initialized. Based on the attribute data, the appraisals will be clustered such that similar appraisals are grouped together. The cluster to which the appraisal under consideration belongs will be selected and the price per square foot will be compared. If the difference in value between the appraisal under consideration and the appraisals from the cluster is within the permissible limits, the appraisal will be not be flagged; if not, the appraisal will be flagged and the reviewer will be notified to carry out a more detailed investigation.
Data	The data for the SPC process will come from the appraisal data that is provided by the appraiser on the appraisal form.

3.7 Review Form

This component of the EAS will be made available to the reviewer to carry out the review of an appraisal once the appraiser has submitted the appraisal. The review form has the options that would allow the reviewer to approve, request changes or to not approve an appraisal. The detailed information is given in the Table 8.

Table 8: Review Form description

Identification	Review form
Type	A module
Purpose	To approve/request changes/ not approve an appraisal
Function	The function of this module is to allow the reviewer to carry out the review process and to report the results of the review.
Subordinates	The module consists of a review page with options to approve, request changes or not to approve an appraisal. It also has a mechanism to automatically generate an email to inform the status of the appraisal to all parties involved.
Dependencies	This module is dependant on successful completion and submission of the appraisal form and its storage in the queue database. The appraisal will only be available for review once the appraisal has been verified and submitted by the appraiser.
Interfaces	The interface for this module consists of a web page which is generated when the reviewer clicks on the review button present beside the appraisal ID on the reviewer's home page.
Resources	This component requires PHP for its creation
Processing	When the reviewer clicks on the 'Review' button, the review page will be generated. On completing the form, the reviewer can approve, request change or not approve the appraisal. The reviewer then clicks the submit button which transfer the appraisal to the permanent database if approved or keeps the appraisal in the temporary database if the appraisal is not approved and the concerned appraiser is informed of the changes that are requested. In all of these cases, an automated email will be sent to all concerned parties about the status of the appraisal. Also, the status of the appraisal would be updated.
Data	The data required for this component is supplied by the reviewer and saved in the database.

A screen shot of the review form from the EAS is shown in Figure 5.

Figure 5: A screen shot of the review form

3.8 Permanent Appraisal Database

The permanent appraisal database is the final storage place for all the appraisals. The appraisals will be transferred to this database from the temporary appraisal database once the appraisals have been successfully reviewed. The table that follows describes the specifics of this component.

Table 9: Permanent database description

Identification	Permanent Appraisal Database
Type	Database
Purpose	To permanently store the appraisals in secure and convenient manner.
Function	The major functions of this component are to save the appraisals permanently for records and for information purposes and to allow easy and convenient access to the ROW staff to the appraisal information.
Subordinates	The subordinates of this component include functions which enable access to the database and preparation of summary reports using MySQL queries.
Dependencies	This component is dependent on the login module. The permanent database will only be accessible if the user logs into the system as a reviewer. It is also dependant on the outcome from the review process.
Interfaces	Since this component is a database, it does not have an interface. But an interface in the form of a webpage will be provided to generate summary information and reports.
Resources	This component is created using MySQL for database and queries and PHP for web pages.
Processing	The result of the review process will determine whether the appraisal will be saved in the permanent database or not. If information about appraisals is required, queries will be generated by using MySQL. MySQL would identify the appraisals that need to be selected to run the query.
Data	The data required for this component comes from the review process.

The data dictionary of the permanent appraisal database is given in Appendix A of this document.

IV. Database Relationships

The permanent appraisal database is a relational database consisting of nineteen tables that are connected to each other using a foreign key. Thus, the data is stored in the form of relations.

The database is comprised of the following tables:

1) Appraisal_forms: This table consists of all the essential information of the appraisals that are present in the database like the appraisal ID, status etc.

2) Subject_properties: This table consists of the addresses of the properties that are present in the database.

3) Users: This table has the information of all the users registered to use the system.

4) Appraisal_forms_sections1: The information required for the section 1 of the appraisal form is stored in this table.

5) Appraisal_forms_sections2: The information required for the section 2 of the appraisal form is stored in this table.

6) Appraisal_forms_sections3: The information required for the section 3 of the appraisal form is stored in this table.

7) Appraisal_forms_sections4: The information required for the section 4 of the appraisal form is stored in this table

8) Appraisal_forms_sections5: The information required for the section 5 of the appraisal form is stored in this table

9) Appraisal_forms_sections6: The information required for the section 6 of the appraisal form is stored in this table

10) Photos: This table stores the pictures provided in section 2 of the appraisal form.

11) Maps: This table stores the maps provided in section 2 of the appraisal form.

12) Accessory_improvements: The improvements made to the subject property are stored in this table.

13) Sales_comparison_approach_whole_land_value: The elements of the sales comparison approach are saved in this table.

14) Data_supplement: The information from the data supplement sheet which is used to collect the data of the properties that are used as ‘comparables’ is saved in this table.

15) Estimate_replacement_reproduction_cost: This table saves the information from the cost approach

16) Representative_comparable_rentals_grid: This table saves the information from the income approach

17) Site_improvements: This table saves the data collected pertaining to the site improvements made on the subject property.

18) Sales_comparison_approach_whole_and_improved: This table saves the information collected in the improved sales comparison approach.

19) Subject_lease_summary: The data pertaining to 'subject lease' is saved in this table.

The appraisal form consists of six sections. Section 1 is the summary section outlining the property and appraiser details as well as the legal requirements of the appraisal process. Section 2 deals with the area, neighborhood and whole property analysis as well as the highest and best use of the property as vacant and improved. Section 3 is the cost estimation of the whole property. Section 4 deals with the property valuation of the part to be acquired. The property valuation of the remainder after acquisition is estimated in Section 5. Section 6 is an overall summary section.

The foreign key that is used to connect majority of the tables is the 'appraisal_id'. The main table of the database is 'appraisal_forms'. All the other tables are connected to this table one way or the other. Each of the six sections that make the appraisal forms has a discrete table. Section two of the appraisal, which deals with the area, neighborhood and whole site analysis, has two dependant tables where the photographs and maps of the subject property are stored. The table for section three has seven tables which are used for storing data pertaining to various subsections of the section. Accessory improvements, site improvements have a specific table for themselves. Tables are also provided for the three estimation methods, namely sales comparison approach, income approach and the cost approach. As mentioned earlier, these tables are all connected to the table 'appraisal_forms_section3' which is the specific table for section three of the appraisal form. The tables for sections four, five and six are independent are and all connected to the table 'appraisal_forms' by the 'appraisal_id' foreign key.

The database structure and the relationships are shown in Figure 6 that follows.

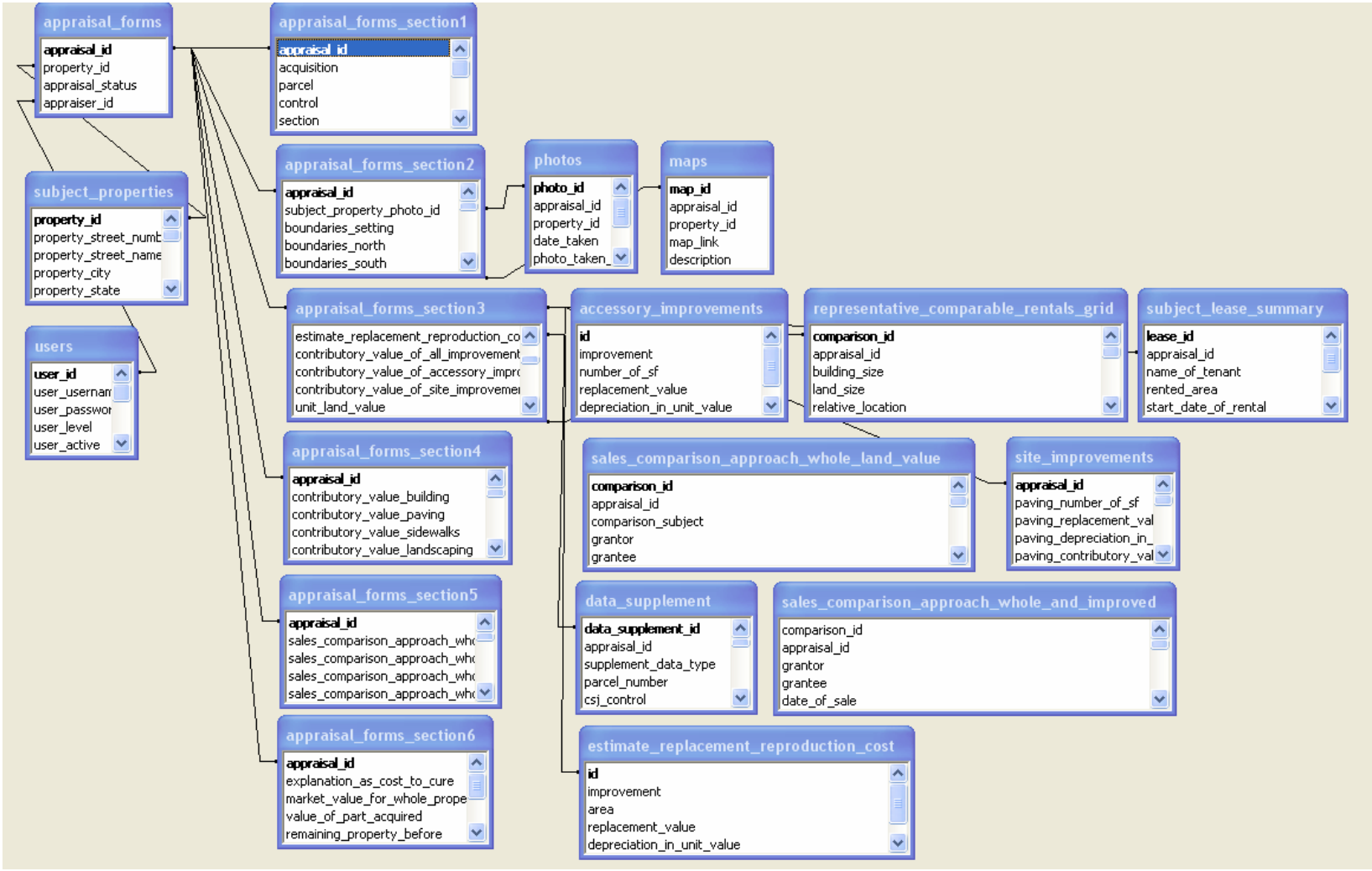

Figure 6: Database structure and relationship

Appendix A: Data Dictionary and Relationships

accessory_improvements

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
id	int(11)	No	0	
improvement	varchar(255)	No		
number_of_sf	int(11)	No	0	
replacement_value	int(11)	No	0	
depreciation_in_unit_value	int(11)	No	0	
contributory_value	int(11)	No	0	

appraisal_forms

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
appraisal_id	int(11)	No	0	
property_id	int(11)	No	0	
parcel	int(11)	No	0	
control	int(11)	No	0	
section	int(11)	No	0	
job	int(11)	No	0	
appraisal_status	varchar(100)	No	0	
review_status	varchar(100)	No	0	
appraiser_id	int(11)	No	0	
reviewer_id	int(11)	No	0	

appraisal_forms_section1

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
appraisal_id	int(11)	No	0	
acquisition	varchar(255)	No		
district	varchar(255)	No		
federal_project_number	int(11)	No	0	
highway	varchar(255)	No		
county	varchar(255)	No		
inspection_date	date	No	0000-00-00	
appraisal_effective_date	date	No	0000-00-00	
appraisal_completed_date	date	No	0000-00-00	
date_review_completed	date	No	0000-00-00	
reviewer_id	int(11)	No	0	
review_remarks	text	No		
scope_of_work	text	Yes	*NULL*	

appraisal_forms_section2

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
appraisal_id	int(11)	No	0	
subject_property_photo_id	int(11)	Yes	*NULL*	
subject_property_photo_id2	int(11)	No	0	
subject_property_photo_id3	int(11)	No	0	
subject_property_photo_id4	int(11)	No	0	
subject_property_photo_id5	int(11)	No	0	
boundaries_setting	varchar(255)	No		
boundaries_north	varchar(255)	No		
boundaries_south	varchar(255)	No		
boundaries_east	varchar(255)	No		
boundaries_west	varchar(255)	No		
boundaries_remarks	text	No		
distance_from_cbd	varchar(255)	Yes	*NULL*	
distance_from_nearest_freeway	varchar(255)	Yes	*NULL*	
name_of_nearest_freeway	varchar(255)	No		
distance_from_public_transportation	varchar(255)	No		
name_of_public_transportation	varchar(255)	No		
distance_of_other_important_access1	varchar(255)	No		
name_of_other_important_access1	varchar(255)	No		
distance_of_other_important_access2	varchar(255)	No		
name_of_other_important_access2	varchar(255)	No		
population_growth	varchar(255)	No		
source_of_population_growth	varchar(255)	No		
date_of_population_growth	date	No	0000-00-00	
employment_growth	varchar(255)	No		
source_of_employment_growth	varchar(255)	No		
date_of_employment_growth	date	No	0000-00-00	
median_income_level	varchar(255)	No		
source_of_median_income_level	varchar(255)	No		
date_of_median_income_level	date	No	0000-00-00	
median_population_age	varchar(255)	No		
source_of_median_population_age	varchar(255)	No		
date_of_median_population_age	date	No	0000-00-00	
median_house_price	varchar(255)	No		
source_of_median_house_price	varchar(255)	No		
date_of_median_house_price	date	No	0000-00-00	
percent_home_ownership	varchar(255)	No		
source_of_percent_home_ownership	varchar(255)	No		
date_of_percent_home_ownership	date	No	0000-00-00	
percent_renting_home	varchar(255)	No		
source_of_percent_renting_home	varchar(255)	No		
date_of_percent_renting_home	date	No	0000-00-00	
area_neighborhood_remarks	varchar(255)	No		
land_use_neighborhood_buildup	varchar(255)	No		
land_use_single_family	varchar(255)	No		
land_use_multi_family	varchar(255)	No		
land_use_office	varchar(255)	No		
land_use_retail	varchar(255)	No		
land_use_industrial	varchar(255)	No		
land_use_vacant	varchar(255)	No		
immediate_surrounding_north	varchar(255)	No		
immediate_surrounding_south	varchar(255)	No		
immediate_surrounding_east	varchar(255)	No		
immediate_surrounding_west	varchar(255)	No		
immediate_surrounding_remarks	varchar(255)	No		
predominant_age_of_neighborhood_property	varchar(255)	No		
rental_range_of_neighborhood_property_low	varchar(255)	No		
rental_range_of_neighborhood_property_high	varchar(255)	No		
concluding_remarks	varchar(255)	No		

location_map_id	int(11)	Yes	*NULL*
neighborhood_map_id	int(11)	Yes	*NULL*
legal_description	text	No	
access	text	No	
site_dimensions	varchar(255)	No	
property_size	int(11)	Yes	*NULL*
shape	varchar(255)	No	
frontage	varchar(255)	No	
frontage_north	varchar(255)	No	
frontage_south	varchar(255)	No	
frontage_east	varchar(255)	No	
frontage_west	varchar(255)	No	
topography	varchar(255)	No	
remarks_on_topography	text	No	
drainage	varchar(255)	No	
educational_facilities	varchar(255)	No	
electricity	varchar(255)	No	
telephone	varchar(255)	No	
sewer	varchar(255)	No	
water	varchar(255)	No	
gas	varchar(255)	No	
corner_plot	varchar(255)	No	
rail_road_access	varchar(255)	No	
flood_hazard	varchar(255)	No	
fema_map_number	float	Yes	*NULL*
soil_condition	varchar(255)	No	
soil_condition_description	varchar(255)	No	
zone_name	varchar(255)	No	
description_of_zoning	text	No	
change_of_zoning	varchar(255)	No	
street_width	varchar(255)	Yes	*NULL*
paving	varchar(255)	No	
sidewalks	varchar(255)	No	
curbs_and_gutters	varchar(255)	No	
storm_sewers	varchar(255)	No	
lighting	varchar(255)	No	
street_condition_remarks	text	No	
aerial_map_id	int(11)	Yes	*NULL*
plat_map_id	int(11)	Yes	*NULL*
flood_plain_map_id	int(11)	Yes	*NULL*
zoning_map_id	int(11)	Yes	*NULL*
use_type_by_area_residential	varchar(255)	Yes	*NULL*
use_type_by_area_retail	varchar(255)	Yes	*NULL*
use_type_by_area_office	varchar(255)	Yes	*NULL*
use_type_by_area_industrial	varchar(255)	Yes	*NULL*
use_type_by_area_other	varchar(255)	Yes	*NULL*
type_of_property	varchar(255)	No	
number_of_buildings	int(11)	Yes	*NULL*
number_of_stories	int(11)	Yes	*NULL*
configuration	varchar(255)	No	
land_to_building_ratio	varchar(255)	No	
ceiling_height	int(11)	Yes	*NULL*
net_building_area	int(11)	Yes	*NULL*
year_built	varchar(255)	No	
effective_age	int(11)	Yes	*NULL*
estimated_physical_life	int(11)	Yes	*NULL*
exterior_walls	varchar(255)	No	
foundation	varchar(255)	No	
roof	varchar(255)	No	
doors	varchar(255)	No	
frame	varchar(255)	No	
flooring	varchar(255)	No	
interior_partitions	varchar(255)	No	
ceilings	varchar(255)	No	
parking_spaces	varchar(255)	Yes	*NULL*

lighting_of_property	varchar(255)	No	
plumbing	varchar(255)	No	
heating	varchar(255)	No	
air_conditioning	varchar(255)	No	
electricity_of_property	varchar(255)	No	
security_system	varchar(255)	No	
fire_protection	varchar(255)	No	
elevators	varchar(255)	No	
insulation	varchar(255)	No	
landscaping	varchar(255)	No	
paving_of_property	varchar(255)	No	
sidewalk_of_property	varchar(255)	Yes	*NULL*
fencing	varchar(255)	No	
septic_tank	varchar(255)	No	
signage	varchar(255)	No	
miscellaneous1	varchar(255)	No	
miscellaneous2	varchar(255)	No	
miscellaneous3	varchar(255)	No	
miscellaneous4	varchar(255)	No	
description_of_the_property_remarks	text	No	
improvement_evaluation_appearance	varchar(255)	No	
improvement_evaluation_design	varchar(255)	No	
improvement_evaluation_overall_condition	varchar(255)	No	
improvement_evaluation_exterior_condition	varchar(255)	No	
improvement_evaluation_interior_condition	varchar(255)	No	
improvement_evaluation_heating	varchar(255)	No	
improvement_evaluation_plumbing	varchar(255)	No	
improvement_evaluation_electrical	varchar(255)	No	
improvement_evaluation_parking	varchar(255)	No	
improvement_evaluation_air_conditioning	varchar(255)	No	
improvement_evaluation_landscaping	varchar(255)	No	
improvement_evaluation_remarks_summary	text	No	
improvement_map1_id	int(11)	Yes	*NULL*
improvement_map2_id	int(11)	Yes	*NULL*
taxing_jurisdiction	varchar(255)	No	
tax_accessment_account_number	varchar(255)	Yes	*NULL*
tax_accessment_improvement_area	varchar(255)	Yes	*NULL*
tax_accessment_land_area	varchar(255)	Yes	*NULL*
tax_accessment	varchar(255)	Yes	*NULL*
estimated_tax_total_assessment	varchar(255)	Yes	*NULL*
estimated_tax_rate	varchar(255)	No	
estimated_tax_liability	varchar(255)	Yes	*NULL*
estimated_tax_remarks	text	No	
five_year_property_history	text	No	
environmental_problem	varchar(255)	No	
environmental_remarks	text	No	
as_vacant_property_type	varchar(255)	No	
as_vacant_physically_possible_uses	text	No	
as_vacant_financially_feasible_uses	text	No	
as_vacant_legally_permissible_uses	text	No	
as_vacant_maximally_productive_uses	text	No	
as_vacant_remarks	text	No	
as_improved_physically_possible_uses	text	No	
as_improved_financially_feasible_uses	text	No	
as_improved_legally_permissible_uses	text	No	
as_improved_maximally_productive_uses	text	No	
as_improved_remarks	text	No	

appraisal_forms_section3

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
appraisal_id	int(11)	No	0	
sales_comparison_approach_whole_land_value_subject_property_id	int(11)	No	0	
sales_comparison_approach_whole_land_value_comparable1_id	int(11)	No	0	
sales_comparison_approach_whole_land_value_comparable2_id	int(11)	No	0	
sales_comparison_approach_whole_land_value_comparable3_id	int(11)	No	0	
sales_comparison_approach_whole_land_value_comparable4_id	int(11)	No	0	
estimated_unit_value_fee	int(11)	No	0	
estimated_value_by_sale_comparison_approach	int(11)	No	0	
land_sale_supplement1_id	int(11)	No	0	
land_sale_supplement2_id	int(11)	No	0	
land_sale_supplement3_id	int(11)	No	0	
adjustment_explanation_financing_terms	varchar(255)	No		
adjustment_explanation_conditions_of_sale	varchar(255)	No		
adjustment_explanation_date_of_sale	date	No	0000-00-00	
adjustment_explanation_location	text	No		
adjustment_explanation_physical_characteristics	varchar(255)	No		
adjustment_explanation_size	varchar(255)	No		
adjustment_explanation_utilities	varchar(255)	No		
adjustment_explanation_zoning	varchar(255)	No		
adjustment_explanation_other1	varchar(255)	No		
adjustment_explanation_other2	varchar(255)	No		
adjustment_explanation_remarks	text	No		
estimate_replacement_reproduction_cost_ids	varchar(255)	No		
contributory_value_of_all_improvements	int(11)	No	0	
contributory_value_of_accessory_improvements	int(11)	No	0	
contributory_value_of_site_improvements	int(11)	No	0	
unit_land_value	int(11)	No	0	
estimated_value_by_cost_approach	int(11)	No	0	
cost_approach_description	varchar(255)	No		
depreciation_explanation	varchar(255)	No		
cost_approach_source_of_information	varchar(255)	No		
sales_comparison_approach_whole_and_improved_subject_property_id	int(11)	No	0	
sales_comparison_approach_whole_and_improved_comparable1_id	int(11)	No	0	
sales_comparison_approach_whole_and_improved_comparable2_id	int(11)	No	0	
sales_comparison_approach_whole_and_improved_comparable3_id	int(11)	No	0	
sales_comparison_approach_whole_and_improved_comparable4_id	int(11)	No	0	
sales_comparison_approach_whole_and_improved_gross_income	varchar(255)	No		
sales_comparison_approach_whole_and_improved_estimate_value_fee	int(11)	No	0	
sales_comparison_approach_whole_and_improved_value_excess_land	int(11)	No	0	
improved_estimated_value_by_sales_comparison_approach	int(11)	No	0	
improved_sales_supplement1_id	int(11)	No	0	
improved_sales_supplement2_id	int(11)	No	0	
improved_sales_supplement3_id	int(11)	No	0	
improved_adjustment_explanation_financing_terms	varchar(255)	No		
improved_adjustment_explanation_conditions_of_sale	varchar(255)	No		
improved_adjustment_explanation_date_of_sale	date	No	0000-00-00	
improved_adjustment_explanation_location	text	No		
improved_adjustment_explanation_physical_characteristics	varchar(255)	No		
improved_adjustment_explanation_size	varchar(255)	No		
improved_adjustment_explanation_utilities	varchar(255)	No		
improved_adjustment_explanation_zoning	varchar(255)	No		
improved_adjustment_explanation_other1	varchar(255)	No		
improved_adjustment_explanation_other2	varchar(255)	No		
improved_adjustment_explanation_remarks	text	No		
improved_adjustment_explanation_map_id	int(11)	No	0	
income_approach_potential_gross_income	int(11)	No	0	
income_approach_market_rent	int(11)	No	0	
income_approach_other_income	int(11)	No	0	
income_approach_vacancy_percentage	varchar(255)	No		

income_approach_vacancy_dollar	int(11)	No	0
income_approach_effective_gross_income	int(11)	No	0
fixed_taxes	int(11)	No	0
insurance	int(11)	No	0
fixed_expenses_other_expenses	varchar(255)	No	
management	int(11)	No	0
variable_expenses_other_expenses	int(11)	No	0
repairs	int(11)	No	0
reserves	int(11)	No	0
total_expenses	int(11)	No	0
noi	int(11)	No	0
capitalization_rate	varchar(255)	No	
capitalizaed_value	int(11)	No	0
value_of_excess_land	int(11)	No	0
estimated_value_by_income_approach	int(11)	No	0
rental_data_supplement1_id	int(11)	No	0
rental_data_supplement2_id	int(11)	No	0
rental_data_supplement3_id	int(11)	No	0
representative_comparison_subject_id	int(11)	No	0
representative_comparison_comparable1_id	int(11)	No	0
representative_comparison_comparable2_id	int(11)	No	0
representative_comparison_comparable3_id	int(11)	No	0
representative_comparison_comparable4_id	int(11)	No	0
estimated_rental_rate	int(11)	No	0
estimated_annual_base_rent	int(11)	No	0
description_of_individual_adjustments	varchar(255)	No	
discussion_of_expenses	varchar(255)	No	
percentage_vacancy	varchar(255)	No	
average_rent	int(11)	No	0
contract_rent_range	varchar(255)	No	
effective_rent_range	varchar(255)	No	
expense_pass_through	varchar(255)	No	
improvement_allowance_for_tenants	varchar(255)	No	
remarks	varchar(255)	No	
descriptive_analysis_of_capitalization_rate	int(11)	No	0
capitalized_value_indication	varchar(255)	No	
cost_approach	int(11)	No	0
sales_comparison_approach	int(11)	No	0
income_approach	int(11)	No	0
final_conclusion_of_fee_simple_value	int(11)	No	0

appraisal_forms_section4

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
appraisal_id	int(11)	No	0	
contributory_value_building	int(11)	Yes	*NULL*	
contributory_value_paving	int(11)	Yes	*NULL*	
contributory_value_sidewalks	int(11)	Yes	*NULL*	
contributory_value_landscaping	int(11)	Yes	*NULL*	
contributory_value_total_contributory_value_of_improvements	int(11)	Yes	*NULL*	
contributory_value_easement_area	int(11)	Yes	*NULL*	
contributory_value_easement_unit_value	float	Yes	*NULL*	
contributory_value_easement_value	int(11)	Yes	*NULL*	
contributory_value_fee_area	int(11)	Yes	*NULL*	
contributory_value_fee_unit_value	float	Yes	*NULL*	
contributory_value_fee_value	int(11)	Yes	*NULL*	
contributory_value_total_land	int(11)	Yes	*NULL*	
contributory_value_total_value_as_a_unit	int(11)	Yes	*NULL*	
remainder_building	int(11)	Yes	*NULL*	
remainder_paving	int(11)	Yes	*NULL*	
remainder_sidewalks	int(11)	Yes	*NULL*	
remainder_landscaping	varchar(255)	Yes	*NULL*	
remainder_total_contributory_value_of_improvements	int(11)	Yes	*NULL*	
remainder_easement_area	int(11)	Yes	*NULL*	
remainder_easement_unit_value	float	Yes	*NULL*	
remainder_easement_value	float	Yes	*NULL*	
remainder_fee_area	int(11)	Yes	*NULL*	
remainder_fee_unit_value	float	Yes	*NULL*	
remainder_fee_value	int(11)	Yes	*NULL*	
remainder_total_land	int(11)	Yes	*NULL*	
remainder_total_value_as_a_unit	int(11)	Yes	*NULL*	

appraisal_forms_section5

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
appraisal_id	int(11)	No	0	
sales_comparison_approach_whole_land_value_subject_property_id	int(11)	No	0	
sales_comparison_approach_whole_land_value_comparable1_id	int(11)	No	0	
sales_comparison_approach_whole_land_value_comparable2_id	int(11)	No	0	
sales_comparison_approach_whole_land_value_comparable3_id	int(11)	No	0	
sales_comparison_approach_whole_land_value_comparable4_id	int(11)	No	0	
estimated_unit_value -fee	int(11)	No	0	
estimated_value_by_sale_comparison_approach	int(11)	No	0	
land_sale_supplement1_id	int(11)	No	0	
land_sale_supplement2_id	int(11)	No	0	
land_sale_supplement3_id	int(11)	No	0	
adjustment_explanation_financing_terms	varchar(255)	No		
adjustment_explanation_conditions_of_sale	varchar(255)	No		
adjustment_explanation_date_of_sale	date	No	0000-00-00	
adjustment_explanation_location	text	No		
adjustment_explanation_physical_characteristics	varchar(255)	No		
adjustment_explanation_size	varchar(255)	No		
adjustment_explanation_utilities	varchar(255)	No		
adjustment_explanation_zoning	varchar(255)	No		
adjustment_explanation_other1	varchar(255)	No		
adjustment_explanation_other2	varchar(255)	No		
adjustment_explanation_remarks	text	No		
estimate_replacement_reproduction_cost_ids	varchar(255)	No		
contributory_value_of_all_improvements	int(11)	No	0	
contributory_value_of_accessory_improvements	int(11)	No	0	
contributory_value_of_site_improvements	int(11)	No	0	
land_area	int(11)	No	0	
land_value	int(11)	No	0	
unit_land_value	int(11)	No	0	
estimated_value_by_cost_approach	int(11)	No	0	
cost_approach_description	varchar(255)	No		
depreciation_explanation	varchar(255)	No		
cost_approach_source_of_information	varchar(255)	No		
sales_comparison_approach_whole_and_improved_subject_property_id	int(11)	No	0	
sales_comparison_approach_whole_and_improved_comparable1_id	int(11)	No	0	
sales_comparison_approach_whole_and_improved_comparable2_id	int(11)	No	0	
sales_comparison_approach_whole_and_improved_comparable3_id	int(11)	No	0	
sales_comparison_approach_whole_and_improved_comparable4_id	int(11)	No	0	
sales_comparison_approach_whole_and_improved_gross_income	varchar(255)	No		
sales_comparison_approach_whole_and_improved_estimate_value_fee	int(11)	No	0	
sales_comparison_approach_whole_and_improved_value_excess_land	int(11)	No	0	
improved_estimated_value_by_sales_comparison_approach	int(11)	No	0	
improved_sales_supplement1_id	int(11)	No	0	
improved_sales_supplement2_id	int(11)	No	0	
improved_sales_supplement3_id	int(11)	No	0	
improved_adjustment_explanation_financing_terms	varchar(255)	No		
improved_adjustment_explanation_conditions_of_sale	varchar(255)	No		
improved_adjustment_explanation_date_of_sale	date	No	0000-00-00	
improved_adjustment_explanation_location	text	No		
improved_adjustment_explanation_physical_characteristics	varchar(255)	No		
improved_adjustment_explanation_size	varchar(255)	No		
improved_adjustment_explanation_utilities	varchar(255)	No		
improved_adjustment_explanation_zoning	varchar(255)	No		
improved_adjustment_explanation_other1	varchar(255)	No		
improved_adjustment_explanation_other2	varchar(255)	No		
improved_adjustment_explanation_remarks	text	No		
improved_adjustment_explanation_map_id	int(11)	No	0	
income_approach_potential_gross_income	int(11)	No	0	

income_approach_market_rent	int(11)	No	0
income_approach_other_income	int(11)	No	0
income_approach_vacancy_percentage	varchar(255)	No	
income_approach_vacancy_dollar	int(11)	No	0
income_approach_effective_gross_income	int(11)	No	0
income_remarks	text	No	
fixed_taxes	int(11)	No	0
insurance	int(11)	No	0
fixed_expenses_other_expenses	varchar(255)	No	
management	int(11)	No	0
variable_expenses_other_expenses	int(11)	No	0
repairs	int(11)	No	0
reserves	int(11)	No	0
total_expenses	int(11)	No	0
noi	int(11)	No	0
capitalization_rate	varchar(255)	No	
capitalizaed_value	int(11)	No	0
value_of_excess_land	int(11)	No	0
estimated_value_by_income_approach	int(11)	No	0
rental_data_supplement1_id	int(11)	No	0
rental_data_supplement2_id	int(11)	No	0
rental_data_supplement3_id	int(11)	No	0
representative_comparison_subject_id	int(11)	No	0
representative_comparison_comparable1_id	int(11)	No	0
representative_comparison_comparable2_id	int(11)	No	0
representative_comparison_comparable3_id	int(11)	No	0
representative_comparison_comparable4_id	int(11)	No	0
estimated_rental_rate	int(11)	No	0
estimated_annual_base_rent	int(11)	No	0
description_of_individual_adjustments	varchar(255)	No	
discussion_of_expenses	varchar(255)	No	
percentage_vacancy	varchar(255)	No	
average_rent	int(11)	No	0
contract_rent_range	varchar(255)	No	
effective_rent_range	varchar(255)	No	
expense_pass_through	varchar(255)	No	
improvement_allowance_for_tenants	varchar(255)	No	
remarks	varchar(255)	No	
descriptive_analysis_of_capitalization_rate	int(11)	No	0
capitalized_value_indication	varchar(255)	No	
cost_approach	int(11)	No	0
sales_comparison_approach	int(11)	No	0
income_approach	int(11)	No	0
final_conclusion_of_fee_simple_value	int(11)	No	0

appraisal_forms_section6

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
appraisal_id	int(11)	No	0	
explanation_as_cost_to_cure	text	Yes	*NULL*	
market_value_for_whole_property	int(11)	Yes	*NULL*	
value_of_part_acquired	int(11)	Yes	*NULL*	
remaining_property_before	int(11)	Yes	*NULL*	
remaining_property_after	int(11)	Yes	*NULL*	
net_mamages	int(11)	Yes	*NULL*	
net_enhancements	int(11)	Yes	*NULL*	
total_compensation	int(11)	Yes	*NULL*	

data_supplement

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
data_supplement_id	int(11)	No	0	
appraisal_id	int(11)	No	0	
supplement_data_type	varchar(255)	No		
parcel_number	int(11)	No	0	
csj_control	varchar(255)	No		
csj_section	varchar(255)	No		
csj_job	varchar(255)	No		
highway	varchar(255)	No		
district	varchar(255)	No		
county	varchar(255)	No		
row_account_number	varchar(255)	No		
grantor_lessor_fname	varchar(255)	No		
grantor_lessor_lname	varchar(255)	No		
grantee_lessee_fname	varchar(255)	No		
grantee_lessee_lname	varchar(255)	No		
date_of_sale	varchar(255)	No		
recording_information	varchar(255)	No		
key_map	varchar(255)	No		
property_address_street_number	varchar(255)	No		
property_address_street_name	varchar(255)	No		
property_address_city	varchar(255)	No		
property_address_state	varchar(255)	No		
property_address_zip_code	tinyint(4)	No	0	
legal_description	varchar(255)	No		
confirmed_price	varchar(255)	No		
verified_with	varchar(255)	No		
terms_and_conditions_of_sale	varchar(255)	No		
land_size_ac	varchar(255)	No		
land_size_ft2	varchar(255)	No		
street_type	varchar(255)	No		
current_use	varchar(255)	No		
unit_price_as_vacant	varchar(255)	No		
utilities	varchar(255)	No		
highest_and_best_use	varchar(255)	No		
flood_plain	varchar(255)	No		
zoning	varchar(255)	No		
date_of_inspection	varchar(255)	No		
remarks	varchar(255)	No		
name_of_appraiser_fname	varchar(255)	No		
name_of_appraiser_lname	varchar(255)	No		
appraisal_date	varchar(255)	No		
photograph_id	varchar(255)	No		
map_id	varchar(255)	No		

estimate_replacement_reproduction_cost

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
id	int(11)	No	0	
improvement	varchar(255)	No		
area	int(11)	No	0	
replacement_value	int(11)	No	0	
depreciation_in_unit_value	int(11)	No	0	
contributory_value	int(11)	No	0	

maps

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
map_id	int(11)	No	0	
appraisal_id	int(11)	No	0	
property_id	int(11)	No	0	
map_link	varchar(255)	No		
description	varchar(255)	No		

photos

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
photo_id	int(11)	No	0	
appraisal_id	int(11)	No	0	
property_id	int(11)	No	0	
date_taken	date	No	0000-00-00	
photo_taken_by	varchar(255)	No		
parcel	varchar(255)	No		
description	text	No		
photo_link	varchar(255)	No		

representative_comparable_rentals_grid

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
comparison_id	int(11)	No	0	
appraisal_id	int(11)	No	0	
building_size	int(11)	No	0	
land_size	int(11)	No	0	
relative_location	varchar(255)	No		
office_space	varchar(255)	No		
land_to_building_ratio	varchar(255)	No		
others	varchar(255)	No		
age	year(4)	No	0000	
rental_rate	varchar(255)	No		
conditions_of_lease	varchar(255)	No		
market_conditions	varchar(255)	No		
adjusted_rate	varchar(255)	No		
location_access	varchar(255)	No		
physical_characteristics	varchar(255)	No		
age_condition_untilities	varchar(255)	No		
adjusted_office_space	varchar(255)	No		
adjusted_land_to_building_ratio	varchar(255)	No		
adjusted_other	varchar(255)	No		
indicated_rate	float	No	0	

sales_comparison_approach_whole_and_improved

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
comparison_id	int(11)	No	0	
appraisal_id	int(11)	No	0	
grantor	varchar(255)	No		
grantee	varchar(255)	No		
date_of_sale	date	No	0000-00-00	
building_size	int(11)	No	0	
land_size	int(11)	No	0	
land_to_building_ratio	varchar(255)	No		
year_built	year(4)	No	0000	
sale_price	int(11)	No	0	
sale_price_per_ft2	float	No	0	
property_rights	varchar(255)	No		
financing	varchar(255)	No		
conditions_of_sale	varchar(255)	No		
market_conditions	varchar(255)	No		
adjusted_price_per_ft2	varchar(255)	No		
location_access	varchar(255)	No		
physical_characteristics	varchar(255)	No		
age_condition_utilities	varchar(255)	No		
location_land_to_building_ratio	varchar(255)	No		
zoning	varchar(255)	No		
other1	varchar(255)	No		
other2	varchar(255)	No		
indicated_unit_value	float	No	0	

sales_comparison_approach_whole_land_value

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
comparison_id	int(11)	No	0	
appraisal_id	int(11)	No	0	
comparison_subject	varchar(255)	No		
grantor	varchar(255)	No		
grantee	varchar(255)	No		
date_of_sale	date	No	0000-00-00	
relative_location	varchar(255)	No		
size_ft	int(11)	No	0	
sale_price	int(11)	No	0	
unit_price	float	No	0	
financing	varchar(255)	No		
condition_of_sale	varchar(255)	No		
date_of_sale_financing	date	No	0000-00-00	
adjusted_price	float	No	0	
location	varchar(255)	No		
physical_characteristics	varchar(255)	No		
size_acres	int(11)	No	0	
utilities	varchar(255)	No		
zoning	varchar(255)	No		
other1	varchar(255)	No		
other2	varchar(255)	No		
estimated_unit_value	float	No	0	

site_improvements

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
appraisal_id	int(11)	No	0	
paving_number_of_sf	int(11)	No	0	
paving_replacement_value	int(11)	No	0	
paving_depreciation_in_unit_value	int(11)	No	0	
paving_contributory_value	int(11)	No	0	
fencing_number_of_sf	int(11)	No	0	
fencing_replacement_value	int(11)	No	0	
fencing_depreciation_in_unit_value	int(11)	No	0	
fencing_contributory_value	int(11)	No	0	
landscaping_number_of_sf	int(11)	No	0	
landscaping_replacement_value	int(11)	No	0	
landscaping_depreciation_in_unit_value	int(11)	No	0	
landscaping_contributory_value	int(11)	No	0	
sidewalk_number_of_sf	int(11)	No	0	
sidewalk_replacement_value	int(11)	No	0	
sidewalk_depreciation_in_unit_value	int(11)	No	0	
sidewalk_contributory_value	int(11)	No	0	
other_number_of_sf	int(11)	No	0	
other_replacement_value	int(11)	No	0	
other_depreciation_in_unit_value	int(11)	No	0	
other_contributory_value	int(11)	No	0	

subject_lease_summary

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
lease_id	int(11)	No	0	
appraisal_id	int(11)	No	0	
name_of_tenant	varchar(255)	No		
rented_area	varchar(255)	No		
start_date_of_rental	date	No	0000-00-00	
end_date	date	No	0000-00-00	
present_rent	int(11)	No	0	
effective_fent	float	No	0	
estimated_market_rent	int(11)	No	0	

subject_properties

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
property_id	int(11)	No	0	
property_street_number	varchar(255)	No		
property_street_name	varchar(255)	No		
property_city	varchar(255)	No		
property_state	varchar(255)	No		
property_zip_code	varchar(255)	No		
property_owner_fname	varchar(255)	No		
property_owner_lname	varchar(255)	No		
property_owner_street_number	varchar(255)	No		
property_owner_street_name	varchar(255)	No		
property_owner_city	varchar(255)	No		
property_owner_state	varchar(255)	No		
property_owner_zip_code	varchar(255)	No		
occupant_fname	varchar(255)	No		
occupant_lname	varchar(255)	No		
occupant_generic_name	varchar(255)	No		
district	varchar(255)	No		
highway	varchar(255)	No		
county	varchar(255)	No		

users

Table comments: InnoDB free: 9216 kB

Field	Type	Null	Default	Comments
user_id	mediumint(9)	No		
username	varchar(255)	No		
user_password	varchar(255)	No		
user_level	varchar(255)	No		
user_active	tinyint(4)	No	0	
user_fname	varchar(255)	No		
user_lname	varchar(255)	No		
appraiser_affiliation	varchar(255)	No		
appraiser_certification_number	varchar(255)	No		
appraiser_certification_state	varchar(255)	No		
user_lastvisit	varchar(255)	No		
user_email	varchar(255)	No		
user_ip	varchar(255)	No		