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# The Property Value Study and How to Protest

**SUSAN COMBS, Texas Comptroller**





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# The Property Value Study and How to Protest

This booklet presents an overview of the property value study, explains the study procedures in detail for those who want more in-depth knowledge of the study and includes a step-by-step explanation of how to protest the results of the study.

**SUSAN COMBS, Texas Comptroller**





# The Property Value Study and How to Protest

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# Definitions

**Appraisal Ratio** – The ratio of an individual property’s appraised value shown on the appraisal roll to its market value.

**Appraisal Roll Value** – The property value estimated by the local appraisal district.

**Coefficient of Dispersion (COD)** – Measures how tightly or loosely the individual sample ratios are clustered around the median. The lower the COD, the more ratios are found close to the median.

**Confidence Interval** – Measure of the reliability of the Comptroller’s estimate of school district value; expressed as a plus or minus margin of error range around the sum of Property Tax Division value estimates for tested categories.

**Grace Period** – A two-year period when local appraisal roll value is used to estimate the total taxable value in an eligible school district even though the local appraisal roll values are invalid.

**Invalid Value** – Local values outside the margin of error.

**Local Value** – The locally appraised value in a school district.

**Margin of Error** – An acceptable range of values within a school district or one-half of the confidence interval (expressed as a percentage).

**Market Value** – The price for which a property would sell under normal conditions. See Section 1.04(7), Tax Code, for the legal definition.

**Median Level of Appraisal** – Measure of accuracy of an appraisal district’s appraisals in relation to the standard of 100 percent of market value. The middle ratio in a list of appraisal ratios from a property category or appraisal district sorted by size (low ratio to high ratio or vice versa).

**Outliers** – Properties with abnormally high or low ratios that can distort ratio studies.

**Property Tax Division (PTD)** – The division of the Comptroller’s office responsible for conducting the Property Value Study.

**Price-Related Differential (PRD)** – Measure of inequity that may arise from systematic differences in the appraisal of low-value and high-value properties. Only an indicator—cannot alone prove vertical equity or inequity.

**Sales Chasing** – Practice of using the sale of a property to trigger a change in appraised value of that property to the property’s selling price.

**State Value** – The total taxable value in a school district as determined in the state’s property value study.

**Stratify** – Placing similar properties into a group based on use or value.

**Valid Value** – Local values inside the margin of error.

**Value-Stratified Weighted Mean Appraisal** – Ratio mechanism to adjust the sample to be representative of the values in the property population from which it is taken; considers value and construction.

**Weighted Mean Appraisal Ratio** – Giving more weight to higher values of individual properties in a sample. Calculated by dividing the sum of the CAD appraisal roll values by the sum of the market values on properties in a sample.

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# Section One

## The Property Value Study

This section presents an overview of the Property Value Study and then explains the study procedures in detail for those who want more in-depth knowledge of the process. References are made to provisions of the Tax Code, the Government Code and the Education Code. These laws collectively provide the basis for conducting the study, determinations of value and distribution of state funding to schools.

### **The Property Value Study – Overview**

The Property Value Study (study) is conducted annually by the Comptroller to estimate the taxable property value in each school district and to measure county appraisal district performance. It is often referred to as a ratio study, because it uses the appraisal roll value divided by its market value to calculate a ratio to measure effectiveness of the appraisal districts. The appraisal roll value is the property value estimated by the local appraisal district. The market value, in simple terms, is the price for which a property would sell under normal conditions.

Another component of the study is the Comptroller's annual appraisal district ratio analysis. It determines the level and uniformity of appraisals using data collected in the school district ratio study.

### **What is the Primary Purpose of the Property Value Study?**

The primary purpose of the study is to help ensure that state funds for public schools are distributed equitably.

In Texas, public education is funded through a combination of state and local funds. Local funding comes from local property taxes. The chief appraiser of each county appraisal district (CAD) determines local property values and school districts set tax rates that determine the amount of local tax revenue. State funding is based on the total taxable property value within each school district as determined by the Property Value Study.

A school district's state funding is affected by the results of the study. School districts may use the study to monitor their appraisal district's performance. Consulting the study and working regularly with the appraisal district will help ensure that values are uniform and as close to market as possible.

The Commissioner of Education uses the study to ensure equitable distribution of education funds so that school dis-

tricts have roughly the same number of dollars to spend per student, regardless of the school district's property wealth, or lack of wealth. School districts with less taxable property value per student receive more state dollars for each pupil than districts with more value per student.

### **School Funding Equity Example**

If the state were to rely solely on the values set by the 253 Texas appraisal districts, inequitable school funding could result in some school districts. For example, assume that two school districts, school district A and school district B, are identical in every respect, except that the appraisal district for school district B does a better job appraising property than the appraisal district for school district A. Appraisal districts are required to appraise most property at market value—in short, a property's fair selling price. If property values in school district A are at 75 percent of market value, while property values in school district B are at 100 percent of market value, school district A would appear to have less taxable property value per student than school district B. Accordingly, more state funding would flow to school district A, even though the two districts have the same number of students, the same taxable property value and are alike in every way. This is clearly an unfair result.

### **Court Challenges/State Response**

A series of court cases brought in the 1980s by poor school districts challenged the Texas funding system. One of the issues was that property values were not set at uniform percentages of market value in each school district, resulting in an unfair distribution of funds. As part of its response to these court challenges, the legislature required an independent estimate of taxable property value in each school district to ensure fair school funding—providing more money to those districts that are less able to raise money locally because of insufficient taxable property wealth.

The independent estimate is accomplished through the study by adjusting school district property values to market value. If the locally appraised value in a school district (local value) is within an acceptable range of the adjusted value (state value), the Comptroller's Property Tax Division (PTD) certifies the local value to the Commissioner of Education. If the local value is outside the acceptable range, PTD certifies the state value, unless the school district is eligible for a grace period—a two-year period when local value is used even though it is not at market value.

The state funds districts based on either the local value, or the state value—depending on which was certified. The state values do not directly affect local property taxes, which are based on the local appraised values provided by each appraisal district. If state value is used in the funding formula, however, it normally is higher than the local value and causes the school district to receive less money than expected.

Chapters 41 and 42 of the Education Code describe how the findings of the study are used in the school funding formula to determine state aid. For questions about state aid or the funding formula, contact the Texas Education Agency at (512)463-9238.

### **Secondary Purpose**

The secondary purpose of the study is to provide taxpayers, school districts, appraisal districts and the Legislature with measures of appraisal district performance. PTD staff achieves this by publishing measures of appraisal level and uniformity, by conducting performance audits and by conducting appraisal standards reviews.

### **Appraisal Level and Uniformity**

Section 5.10 of the Tax Code requires the Comptroller to measure appraisal district performance annually and to publish the results. PTD measures the level and uniformity of property tax appraisals in each appraisal district using data collected in the annual school district study. The level of appraisal shows whether the district has appraised typical properties at 100 percent of the legally required level—normally the market value. The uniformity of appraisal indicates how much the percentage of market value varies from property to property.

### **Performance Audits**

Section 5.12 of the Tax Code requires the Comptroller to conduct a performance audit in any appraisal district that fails to attain specified appraisal level and uniformity measures in the study. This section also requires the Comptroller, under certain circumstances, to perform an audit upon the written request of taxing units or taxpayers in the appraisal district. If an audit is done, the Comptroller's office will send a copy of the findings to the affected school districts so that they can work with their appraisal districts to remedy identified concerns.

### **Appraisal Standards Reviews**

In addition to the performance audits, Section 5.102, Tax Code, requires the Comptroller to perform an appraisal standards review of the appraisal district(s) serving a school district that receives a grace period. This review produces a report with recommendations for appraisal districts to improve their appraisal procedures so that their property will be appraised at market value. And, as with the performance audits, the affected school districts will receive a copy of the Comptroller's findings so that they can work directly with their appraisal district to remedy any problems.

The school district, through its appraisal district, can prevent any adverse funding consequences by achieving valid values in the year after the two-year grace period and can meet an important requirement for reestablishing eligibility for a future grace period by achieving valid values for two years in a row. If the appraisal district fails to take remedial action within a year of the report's issuance, the Comptroller is required to notify the judge of each district court in the county. The district judges would be required to appoint a five-member board of conservators to take control of the appraisal district. The board of conservators would supervise the appraisal district until all its component school districts' values are found valid in the study.

### **Other Legal Requirements**

The Government Code, in Section 403.302, requires the Texas Comptroller to conduct the school district taxable value portion of the study.

### **Taxable Value**

Taxable value is the estimated property wealth of each school district. By law, it equals the market value of all property in a district, minus certain exemptions and deductions. The Comptroller's estimated taxable value reflects deductions for state-mandated homestead, disabled veterans' exemptions and value limitations. Deductions are also made for reinvestment zones, freeport exemptions, productivity appraisal of qualified agricultural lands, the school tax ceiling for homeowners age 65 and older or disabled and other state-mandated exemptions.

In estimating school district taxable values, the Government Code requires the Comptroller to:

- use generally accepted sampling, valuation and statistical techniques;
- ensure that different levels of appraisal on sold and unsold property do not adversely affect the accuracy of the study; and
- test the validity of taxable values and presume that appraisal roll values are correct when values are valid.

### **Margin of Error**

The Comptroller tests the validity of the taxable values assigned to each category of property by the appraisal district as required by the Code by constructing a statistical margin of error around the Comptroller's estimate of value for selected property categories in each school district. Values are assumed **valid**, or acceptable, when they are within the error margin. The margin of error is plus or minus five percent of the state value at a minimum, but may be higher. Values outside this margin of error are considered **invalid**.

### **Local Value Above Market Value**

Even though a school district's local value is invalid, the law requires the Comptroller to certify the local value if the local value is higher than the state value. This requirement



prevents a school district from receiving extra state funding based on a lower state value, while receiving local funds from taxes on property that is appraised above market value.

**Grace Period**

The Government Code also requires the Comptroller to use the local appraisal roll values to estimate the total taxable value in an eligible school district for up to two years even when the local appraisal roll values are invalid. This is known as a grace period. A school district is eligible for the grace period if it meets three conditions:

- the district’s values are invalid in the most recent Property Value Study;
- the district’s values were valid in the two studies preceding the most recent study; and
- the district’s local test value is above 90 percent of the lower threshold of the margin of error.

**Chart 1** illustrates how a school district could be eligible for a grace period if its values are invalid.

**Study Timeline**

The study is an annual project by PTD staff with the assistance of appraisal districts and taxpayers. The study begins in February each year and concludes in July of the following year. A new study begins while the previous year’s study is being modified by protests, so there is considerable overlap.

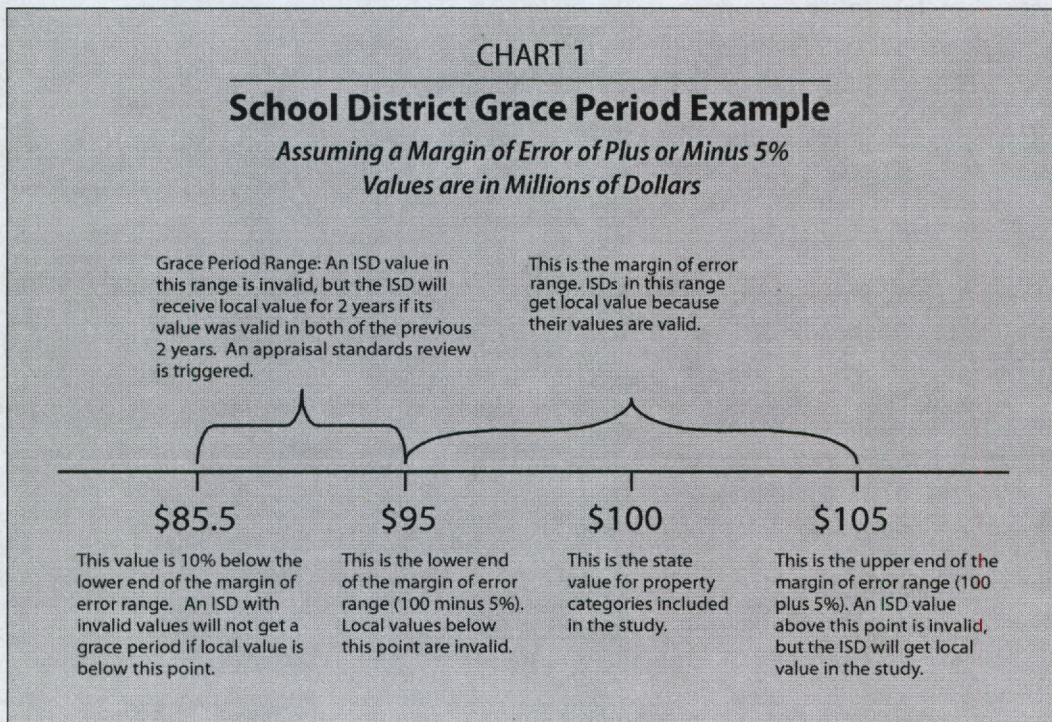
Under the Government Code, the agency must certify the preliminary findings of taxable value for each district before February 1 of the year following the year under study. The agency delivers the findings to school and appraisal districts and also certifies them to the Commissioner of Education. Districts that wish to protest preliminary value findings must do so within 40 days after the date of amended preliminary certification or certification of preliminary findings [see Rule 9.109(d)(11)].

The Comptroller publishes the results of the appraisal district study simultaneously with the school district study and distributes copies to all appraisal districts and members of the Legislature. Although the Tax Code does not give appraisal districts the right to protest study findings, the Comptroller allows appeals of level and uniformity measures in an effort to enhance fairness and accuracy.

After study protests are complete on or about July 1, the Comptroller certifies final values to the Commissioner of Education, who uses the final values to adjust school district funding the following September.

**The Property Value Study – Detailed Procedures**

This section lists the property categories used in the study, gives an overview of school district taxable value calculation, then describes the procedures and calculations used in the study. This section then describes procedures that are specific to each property category.



## Property Categories

The Government Code and the Tax Code require the Comptroller to develop ratios and value estimates for property categories and to combine information on the various property categories into overall estimates.

The property categories generally used are:

- A. real property: single-family, residential;
- B. real property: multifamily, residential;
- C. real property: vacant lots and tracts;
- D/E. real property: acreage at market value and farm and ranch improvements;
- D1. real property: acreage at productivity value;
- F1. real property: commercial;
- G. real property: oil, gas and other minerals;
- J. real and tangible personal property: utilities; and
- L1. personal property: commercial.

The Comptroller may group properties into any other category or subcategory necessary for the efficient and accurate completion of the study. Pages 13-15 provide more information about these categories

## Calculating Taxable Value – Overview

The PTD calculates the total taxable value in a school district, referred to as *state value*, by estimating market value or by accepting the local appraised value in each property category in the district and then adding these category values for an overall school district value. (See pages 2 and 3 for more information.)

To estimate most category values, PTD obtains a representative sample of properties in each category, computes a weighted mean ratio from this sample and divides this ratio into the school district's self-reported appraisal roll value for the category.

There are several property categories for which the Comptroller does not develop ratios or value estimates. These categories are included in the study at the local appraised value reported by the district.

### Step 1. — Gather and Prepare Market Data

PTD gathers and prepares market data, including property sales, building costs and income information. If enough recent sales information is available, this data will become the basis of the study. PTD staff gathers sales information from any available source, including CADs, multiple listing services, realtors, appraisers, title companies and taxpayers. The sales prices must be verified, edited and adjusted as necessary for financing, personal property and time of sale. Building costs and income information become important when sales are scarce, because in this situation, PTD staff is required to appraise sample property to meet sample size requirements. The appraisals may be based on comparable sales information, building costs, market rents and vacancy rates, or other market information.

## Step-by-Step Study Summary

Page

### Step 1. — Gather and Prepare Market Data .....5

The first step in the study is to gather and prepare market data, which includes information on property sales, building costs and income information. If enough recent sales information is available, this data will become the basis of the study.

### Step 2. — Select a Sample .....5

The second step is to select a sample. Headquarters staff assigns sample sizes for each property category in each school district based on a statistical model. The statistical model is designed to achieve a uniform 5 percent margin of error in each school district to the extent practicable.

### Step 3. — Appraise Property .....5

PTD appraises sample properties to achieve the required sample size when insufficient sales are available.

### Step 4. — Match PTD Values with Local Values.....5

PTD staff must match each sample property with the corresponding CAD records and obtain several items from the records.

### Step 5. — Compute Property Ratios.....5

Step five is to compute individual property appraisal ratios. An appraisal ratio for an individual property is the ratio of the property's appraised value as shown on the appraisal roll to its market value.

### Step 6. — Stratify .....6

The next step is to stratify, or group, properties by common features. Stratifying properties so that similar kinds of property are in each group before calculating study statistics makes the results more meaningful and accurate.

### Step 7. — Statistical Analysis .....7

The next step is to compute several statistics that will enable PTD to adjust reported school district values to market value and that will provide a means to interpret the study results.

### Step 8. — Use the Results .....13

The Texas Education Agency uses the Texas property value study results to equalize school funding. Property owners use the study to evaluate whether they are being taxed fairly. Appraisal districts use the study to evaluate their performance and to determine the need for reappraisal.

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### **Step 2. — Select a Sample**

PTD supervisory staff assigns sample sizes for each property category included in the study in each school district based on a statistical model, designed to achieve a uniform 5 percent margin of error in each school district to the extent practicable. The sample includes a census of all recent sales when the number of sales is smaller than, or does not greatly exceed, the target sample size. If the number of available sales greatly exceeds the required sample size, the sample is randomly selected from the sales population. If there are not enough sales to achieve the assigned sample size, PTD randomly selects enough properties to fill the gap and then appraises those properties. In any case, supervisors are responsible for adjusting sample sizes to match available staff resources.

PTD does not sample industrial property because of the lack of publicly available appraisal information and the cost of performing appraisals of this kind of property. If a property category is appraised at less than \$250 million and includes less than five percent of the value in a school district (excluding industrial property), PTD generally does not include that category in the study.

PTD's samples of properties may sometimes include outliers. Outliers are properties with abnormally high or low ratios. If PTD determines that an outlier is the result of an appraisal district error or unusual market variability, the outlier remains in the study. If the outlier was caused by a clerical error, a property mismatch or an error in appraisal judgment, PTD attempts to correct the error so that the property can remain in the study. If the staff finds that the outlier is a non-market transaction, the staff excludes the outlier from the sample. To improve sample representativeness, PTD may exclude extreme outliers that remain after the process described above is concluded.

See **Appendix A** for a discussion of the modified sampling procedures used when sales chasing is suspected.

### **Step 3. — Appraise Property**

PTD appraises sample properties to achieve the required sample size when insufficient sales are available. After randomly selecting property for appraisal, PTD staff physically inspects each property. A CAD staff member may assist with routing these inspections. If physical inspection of an unimproved property (no buildings) is impossible or unnecessary, PTD may use appraisal cards, aerial photographs, soil maps and other relevant information to perform the appraisal.

For each property, PTD records the property class, construction type, condition, age, amenities, and any outbuildings or other additives such as pools. Staff notes property specifics such as neighborhood influences, restrictions, etc. and checks to determine that the square footage recorded by the CAD is reasonable. If the CAD record is incorrect, staff measures the property to obtain an accurate square footage.

Appraisals must reflect a property's market value as of January 1 of the study year. PTD appraisers must use the Comptroller's procedures in conjunction with the Comptroller's computerized Field Appraiser System to classify and appraise residential and commercial sample property unless better information is available or unless that kind of property is not included in the procedures or the Field Appraiser System. PTD staff use other specialized computer software to appraise oil and gas reserves and other complex property types and develops separate appraisal schedules for vacant land.

Along with properties entered in the sample as appraisals, PTD staff also selects and appraises sold properties to develop a local modifier. A local modifier adjusts the PTD appraisal system values to account for differences in local markets.

### **Step 4. — Match PTD Values with Local Values**

PTD staff matches each sample property with the corresponding CAD records and obtains several items from the CAD records. These include the CAD and ISD identification codes, the category code, the account number, the legal description, the parcel address, the sale/appraisal code, the sale date, the sale price, the source code, the CAD improvement value, the CAD land value, the furniture, fixtures and equipment value and the inventory value, if applicable to the sample property.

A proper match between the sample property and the CAD property records is important to ensure that the comparison of PTD's value for the sample property and the CAD's value for the sample property results in a meaningful ratio.

### **Step 5. — Compute Property Ratios**

An appraisal ratio for an individual property is the ratio of the property's appraised value as shown on the appraisal roll to its market value. The market value is indicated by the sales price or PTD appraised value. **Table One** shows appraisal ratios for a sample consisting of both sales and appraisals as indicators of market value. For example, Sale Number 1 in Table One has an appraisal roll value of \$65,834 and an adjusted sale price of \$83,113. Dividing \$65,834 by \$83,113 yields an appraisal ratio of 0.79 for this parcel. No judgment about appraisal district performance should be made on the basis of a single property ratio. Statistics based on aggregated ratios are intended for performance measurement.

### **Step 6. — Stratify**

Stratifying properties so that similar kinds of property are in each group before calculating study statistics makes the results more meaningful and accurate. A sample is selected for each property category, or other stratum included in the study. At this point PTD has already stratified properties by their use—single-family residential properties are grouped together, for instance.

In addition to categorizing property by its use, PTD uses a further level of stratification—that is, value stratification.

Value stratification is used only in the school district study—not in the appraisal district study. PTD obtains the information needed to value-stratify appraisal roll values from prior year stratification surveys, or the appraisal rolls, depending upon availability. In a few school districts, value stratification information is not available.

PTD has established a value-stratification procedure that results in as many as six strata. For the most part, the value ranges within the strata vary from school district to school district, and from year to year depending entirely on the distribution of property value within each school district.

The six value strata are:

**Stratum #1** – The low-value stratum. After sorting all the properties in the category from lowest value to highest value, and beginning with the lowest valued property, this stratum contains the low-valued properties that collectively equal 5 percent of the category's total appraised value.

PTD does not study this stratum. Instead, PTD accepts the locally determined value.

**Stratum #2** – This stratum contains all properties that individually exceed 20 percent of the value in the property category. PTD may or may not study these high-valued properties.

**Stratum #3** – After the remaining properties are sorted from lowest value to highest value, properties representing about the first 25 percent of the remaining appraisal roll value in the category comprise stratum 3.

**Stratum #4** – Properties representing about the second 25 percent of the remaining appraisal roll value in the category comprise stratum 4.

**Stratum #5** – Properties representing about the third 25 percent of the remaining appraisal roll value in the category comprise stratum 5.

**Stratum #6** – Properties representing about the fourth 25 percent of the remaining appraisal roll value in the category comprise stratum 6.

PTD generally studies strata 3-6 using random sampling procedures.

In some school districts, the staff finds certain properties in a category sample suf-

**Table One**  
**Sample Calculation of**  
**Weighted Mean Appraisal Ratio**  
**School District ABC**  
**Category A: Single-family Residential**

<b>Sales</b>			
Sale Number	Appraisal Roll Value	Adjusted Sale Price	Individual Appraisal Ratio
1	\$ 65,834	\$ 83,113	0.79
2	75,254	90,720	0.83
3	94,420	135,610	0.70
4	99,880	113,310	0.88
5	82,253	109,250	0.75
6	89,654	94,715	0.95
7	76,502	91,680	0.83
8	111,020	128,048	0.87
9	44,441	62,370	0.71
10	64,519	75,905	0.85
11	64,842	81,127	0.80
12	39,479	41,925	0.94
13	193,344	245,700	0.79
14	98,885	127,493	0.78
15	114,788	118,898	0.97
16	92,088	113,645	0.81
17	84,449	84,995	0.99
18	21,090	25,988	0.81
19	22,080	27,398	0.81

<b>Appraisals</b>			
Appraisal Number	Appraisal Roll Value	Appraisal Value for Study	Individual Appraisal Ratio
1	\$ 97,576	\$ 110,741	0.88
2	60,437	70,964	0.85
3	107,543	148,828	0.72
4	60,264	86,303	0.70
5	69,708	76,117	0.92
6	76,935	98,327	0.78

<b>Total Sales and Appraisals</b>			
Total Appraisal Roll Value for Test	Total Value of Sales and Appraisals	=	Weighted Mean Appraisal Ratio
\$2,007,285	\$ 2,443,170	=	.8216
Total Appraisal Roll Category Value	Weighted Mean Appraisal Ratio	=	Estimated Category Market Value
\$27,621,400	.8216	=	\$33,619,036

ficiently different from the remaining sample properties to warrant treatment as “exception” properties. An exception property is a property placed in its own separate stratum. The rationale is to offset the potential bias that an exception property might have on the estimated ratio. PTD uses other stratification methods in special circumstances, such as the resolution of a protest, when the evidence shows that some property characteristic other than use or value is distorting the appraisal level.

### **Step 7. — Statistical Analysis**

The next step is to compute several statistics that will enable PTD to adjust reported school district values to market value, and that will provide a means to interpret the study results. These statistical computations will be shown below in two sections. The first will explain statistics computed for the school district study required by Section 403.302 of the Government Code, and the second will explain statistics computed for the appraisal district study required by Section 5.10 of the Tax Code.

PTD uses different statistical measures for school districts and appraisal districts.

#### **School District Statistics**

The statistics used in the school district study are the weighted mean ratio, the stratified weighted mean ratio and the margin of error.

**Weighted mean** – Table One shows the computation of a weighted mean appraisal ratio. A weighted mean appraisal ratio takes into account the different values of the individual properties making up the sample by giving more weight to higher values. It is calculated by totaling the appraisal roll values, totaling the sales prices and staff appraisals and dividing the first sum by the second. As shown in Table One, the total appraisal roll value for this sample is \$2,007,285, and the total value of sales and appraisals is \$2,443,170. Dividing the former by the latter produces the weighted mean appraisal ratio of 0.8216. Finally, dividing the district’s total self-reported appraisal roll category value of \$27,621,400 by the weighted mean appraisal ratio of 0.8216 produces an estimated category market value of \$33,619,036. This result shows below market appraisal, and could reduce the school district’s funding.

**Stratified weighted mean** – A stratified weighted mean appraisal ratio is an overall property category ratio calculated by combining the weighted mean ratios of various sub-categories or strata. As discussed above, PTD uses property use and property value to define each stratum. PTD uses these value-stratified weighted mean appraisal ratios whenever feasible to estimate market values for residential properties (Categories A and B), vacant lots (Category C), commercial properties (Categories F1 and L1), and minerals (Category G). PTD stratifies these ratios by value stratum within each category if reasonably accurate stratification data are available.

A value-stratified weighted mean appraisal ratio is a mechanism used to automatically adjust the sample to be representative of the property population from which it is taken. For example, low-valued properties tend to be clustered in certain geographic areas, while mid-range and high-valued properties tend to be clustered in others. Similarly, construction types tend to vary with value. A value-stratified weighted mean appraisal ratio adjusts for location effect and for the effects of varying construction types. In addition, it is a particularly useful tool for enhancing sample representativeness when appraisal levels in a category vary significantly between lower-valued and higher-valued properties.

**Tables Two, Three and Four** show how a stratified weighted mean appraisal ratio is calculated and how it differs from a weighted mean and a simple mean appraisal ratio. The stratified weighted mean appraisal ratio for a category is calculated by:

- grouping sample properties by appraisal roll value stratum;
- calculating a weighted mean appraisal ratio for each value stratum;
- dividing the weighted mean appraisal ratio into the CAD total appraisal roll value for each value stratum to estimate a market value;
- adding these individual market value stratum estimates; and
- dividing the sum of the CAD values in each stratum by the sum of PTD’s individual market value stratum estimates.

**Table Two** lists the properties in a hypothetical random sample. The sample properties are grouped in six strata. A ratio is calculated for each property, by dividing the CAD value by the PTD appraisal value or sale price. A weighted mean ratio is calculated for each stratum by dividing the sum of the CAD values by the sum of the PTD appraisal or sale amounts. A weighted mean ratio is calculated for the entire property category by dividing the sum of the CAD values in every strata by the sum of the PTD values in every strata. A simple mean ratio is calculated by summing all the individual property ratios in the entire category and dividing by the number of ratios. The weighted mean and simple mean are calculated for comparison to the stratified weighted mean in **Table Four** and for use in calculating the price-related differential (PRD). The PRD is calculated by dividing the simple mean by the weighted mean. See an explanation of the PRD under *Appraisal District Statistics* below.

**Table Three** lists the strata shown in **Table Two** and shows the number of sample parcels, the CAD value of the sample properties, the PTD value of the sample properties and the weighted mean ratio for each stratum. **Table Three** also shows how the weighted mean stratum ratios are calculated by dividing the CAD value in each stratum by the PTD value in each stratum.

**Table Two**  
**Sample Calculation of a**  
**Value-Stratified**  
**Weighted Mean Appraisal Ratio**  
**(Step 1)**

	Appraisal Roll Value <i>in the sample</i>	Appraisal/ Sale Price <i>in the sample</i>	Ratio* CAD / PTD <i>in the sample</i>
<b>STRATUM 1: \$-0- to \$2,500</b>			
Stratum 1 Total:	not sampled	not sampled	
<b>STRATUM 2: \$1,205,000 and up</b>			
	1,205,000	1,209,961	0.9959
Stratum 2 Total:	1,205,000	1,209,961	= 0.9959
<b>STRATUM 3: \$2,501 to \$15,300</b>			
	11,243	8,000	1.4054
	13,510	10,000	1.3510
	14,194	11,500	1.2343
	14,800	12,000	1.2333
	15,001	13,000	1.1539
Stratum 3 Total:	68,748	54,500	= 1.2614
<b>STRATUM 4: \$15,301 to \$47,573</b>			
	20,374	20,000	1.0187
	20,477	20,000	1.0238
	20,994	20,000	1.0497
	25,806	24,800	1.0405
	28,166	27,000	1.0432
Stratum 4 Total:	115,816	111,800	= 1.0359
<b>STRATUM 5: \$47,574 to \$110,625</b>			
	51,007	52,000	0.9809
	52,191	52,000	1.0037
	53,217	54,000	0.9855
	54,141	54,000	1.0026
	57,396	57,000	1.0070
Stratum 5 Total:	267,952	269,000	= 0.9961
<b>STRATUM 6: \$110,626 to \$465,581</b>			
	111,648	125,000	0.8932
	114,140	135,000	0.8455
	139,498	150,000	0.9300
Stratum 6 Total:	365,286	410,000	= 0.8909
<b>Grand Totals:</b>	<u>\$2,022,802</u>	<u>\$2,055,261</u>	
<i>totals based on 19 parcels</i>			
<b>Mean Ratio</b> ( <i>unweighted average</i> )			<b>1.0631</b>
<i>average based on 19 parcels</i>			
<b>Weighted Mean Ratio</b>			<b>0.9842</b>
<i>\$2,022,802/\$2,055,261</i>			
<b>Price-Related Differential</b>			<b>1.0802</b>
<i>mean ratio 1.0631 / weighted mean ratio 0.9842</i>			

\*Rounded four places

**Table Four** lists the strata shown in **Table Two** and **Table Three** and shows the number of parcels in the stratum, the CAD value in the stratum, the stratum ratio (from **Table Two** or **Table Three**) and the PTD market value estimate for each stratum. **Table Four** also shows the calculation of the stratified weighted mean ratio by dividing the sum of the CAD values for each stratum by the sum of the PTD market value estimated for each stratum. This stratified weighted mean ratio is divided into the appropriate self-reported category total to develop the PTD's market value estimate for the category. Refer to the *ISD Summary Worksheet* to see this final calculation.

There are substantial differences in the level of appraisal among value strata in **Table Two**. Lower-valued properties are appraised at higher levels than higher-valued properties, as indicated by a price-related differential well above 1.03. Using a stratified weighted mean appraisal ratio will adjust for these differences so that they will not bias the sample ratio and the resulting market value estimate for the category.

If stratification data are not available for a school district, stratified weighted mean appraisal ratios cannot be calculated. If the data to calculate a value-stratified ratio becomes available at any time during the process, including the protest process, PTD may calculate a value-stratified ratio.

**Margin of error** – The margin of error is equal to one half of the confidence interval expressed as a percent of total value studied in a school district. The confidence interval is a computed range of school district values for which the Property Value Study has not proven that the state's estimate of value is significantly different from the local value. If the school district's local value is outside the range, the study has proven, statistically at least, that the school district's value is incorrect because it is significantly different from the state's estimate.

For example, assume that PTD staff estimates market value in sampled property categories in school district ABC to be \$100 million before exemptions. The margin of error is computed to be plus or minus 5 percent of \$100 million. Market value plus 5 percent is \$105 million; market value minus 5 percent is \$95 million. The \$100 million estimate is known as a **point estimate**; the confidence interval of \$95 million to \$105 million is often called an *interval estimate*. The PTD uses the margin of error to determine whether local value is valid. If the school district's value is inside the margin of error range, it is accepted as valid. If not, it is considered invalid.

The Legislature has instructed the Comptroller's office to include enough samples to obtain a margin of error that does not exceed 5 percent, if resources permit. The

**Table Three**  
**Sample Calculation of a Value-Stratified Weighted Mean Appraisal Ratio**  
**Step 2**

Stratum Number	Number of Parcels in the sample	CAD Value in the sample	÷	PTD Estimate in the sample	=	Stratum Ratio weighted mean ratio in the sample*
(#)	(n <sub>sample</sub> )	(TX <sub>sample</sub> )		(TY <sub>sample</sub> )		(r <sub>1sample</sub> )
1	n/a	n/a		n/a		1.0000
2	1	1,205,000	÷	1,209,961	=	.9959
3	5	68,748	÷	54,500	=	1.2614
4	5	115,816	÷	111,800	=	1.0359
5	5	267,952	÷	269,000	=	0.9961
6	3	365,286	÷	410,000	=	0.8909

\*Rounded four places.

**Table Four**  
**Sample Calculation of a Value-Stratified Weighted Mean Appraisal Ratio**  
**Steps 3-5**

Stratum Number	Number of Parcels in the Stratum	CAD Value in the Stratum	÷	Stratum Ratio weighted mean ratio in the sample	=	PTD Estimate in the Stratum**
(#)	(N <sub>Stratum</sub> )	(TX <sub>Stratum</sub> )		(r <sub>1sample</sub> )		(TY <sub>Stratum</sub> )
1	711	300,224	÷	1.0000	=	\$ 300,224
2	1	1,205,000	÷	.9959	=	1,209,961
3	259	1,495,515	÷	1.2614	=	1,185,570
4	56	1,463,787	÷	1.0359	=	1,413,029
5	22	1,500,526	÷	0.9961	=	1,506,395
6	7	1,544,658	÷	0.8909	=	1,733,737
	+	+				+
	=	=				=
	1,056	7,509,710		1.0219		\$7,348,916
	Total Stratum Parcels	Total CAD Value		(7,509,710 ÷ 7,348,916) Stratified Ratio		Total PTD Estimate

\*\*Rounded to the nearest dollar.

PTD, to make the study more uniform, has set a 5 percent floor on the margin of error. This means that if the statistically calculated margin of error is less than 5 percent it is set at 5 percent. On the other hand, if PTD's margin of error is more than 5 percent, PTD will use the higher margin of error to decide whether the local value is valid.

More detailed explanations of the confidence interval and margin of error computations can be found in **Appendix B** and **Appendix C**.

### Appraisal District Statistics

For the appraisal district study, PTD aggregates samples collected for the school district study to the appraisal district level. PTD then calculates statistical measures of appraisal level and uniformity in each property category and for the CAD overall. The measure of appraisal level is the median. The measures of appraisal uniformity include the coefficient of dispersion (COD), the percentage of properties within 10 and 25 percent of the median, and the price-related differential (PRD). Together, the median level of appraisal, the COD, the percentage of properties within 10 or 25 percent of the median and the PRD enable the Property Value Study to address the legal requirements that appraisals be equal, uniform and at 100 percent of market value.

Samples from each category are aggregated to the appraisal district level, with one exception. The ratio derived for agricultural acreage receiving productivity appraisal is not a median derived from a property sample. Consequently, PTD does not calculate measures of appraisal uniformity for acreage receiving productivity appraisal. The appraisal district performance measures listed under "D. Rural Real-Market Value" on the appraisal district summary worksheet are derived from the property samples used to compute the weighted mean appraisal ratios for estimating the market values of non-qualified acreage and farm and ranch improvements.

**Median** – The median level of appraisal measures, or the accuracy of an appraisal district's appraisals in relation to the standard of 100 percent of market value. The International Association of Assessing Officers (IAAO) *1999 Standard on Ratio Studies* sets the standard for appraisal level at 95 – 105 percent of market value when the study results are used for funding equalization programs, and at 90 – 110 percent of market value when the results are used for other purposes.

Section 1.12(c) of the Tax Code defines the median appraisal ratio as:

The median appraisal ratio for a sample of properties is, in a numerically ordered list of the appraisal ratios for the properties: (1) if the sample contains an odd number of properties, the appraisal ratio above and below which there is an equal number of appraisal ratios in the list; or (2) if the sample contains an even number of properties, the average of the two consecutive appraisal ratios

above and below which there is an equal number of appraisal ratios in the list.

The value of individual properties does not influence the median ratio; only the ranking of individual ratios within the sample matters. The median ratio falls at the middle of a group of ratios ranked from highest to lowest or lowest to highest.

**Table Five** uses 19 sales (marked "S1" to "S19") and six appraisals (marked "A1" to "A6") to show how to identify the median ratio. In this table, the appraisal ratios are ranked from the highest ratio to the lowest. Twenty-five properties make up the sample. The median ratio, 0.81, is 13th on the list. Twelve properties are ranked above it, and 12 are ranked below it.

An easy way to find the median for a sample containing an odd number of properties is to divide the total count by two, then round the result upward to the nearest whole number. The sample shown in **Table Five** contains 25 parcels. Dividing 25 by two yields 12.5. Rounding upward to the nearest whole number produces 13. The 13th ratio is the median.

For an even-numbered sample, the median is the average of the two middle ratios. If there were 24 properties in the sample, the median would be the average of ratios 12 and 13. Eleven ratios would be above 12 and below 13.

PTD calculates a median appraisal level for each major category of property in each appraisal district, provided there were at least five properties in the sample. PTD then combines the properties making up the sample for each category into a larger sample of all properties in the appraisal district. The median ratio from the larger sample is listed as the overall ratio for the appraisal district.

**Coefficient of dispersion** – The COD measures how tightly or loosely the individual sample ratios are clustered around the median. The Code requires the agency to calculate a coefficient of dispersion around the median for each major property category. The COD is one measure of appraisal uniformity.

Technically, the COD expresses as a percentage of the median the average absolute deviation of the appraisal ratios in a sample from the sample's median. A high COD indicates high variation—few ratios close to the median and low appraisal uniformity. A low COD indicates low variation—ratios clustered tightly around the median and high appraisal uniformity. The IAAO's *1999 Standard on Ratio Studies* contains standards for CODs. These are:

1. single-family residential and condominiums—15 or less; in areas of newer or fairly similar residences—10 or less; heterogeneous rural residences and seasonal homes—20 or less;
2. vacant land: 20 or less;
3. income properties in large, urban jurisdictions: 15 or less; and



**Table Five**  
**Sample Calculation of Median Appraisal Ratio**  
**XYZ County Appraisal District**  
**Category A: Single-family Residential**  
**Sales and Appraisals**

Number Sale or Appraisal	Appraisal Roll Value	Adjusted Sale Price or Appraised Value	Individual Appraisal Ratio
S 17	\$ 84,449	\$ 84,995	0.99
S 15	114,788	118,898	0.97
S 6	89,654	94,715	0.95
S 12	39,479	41,925	0.94
A 5	69,708	76,117	0.92
S 4	99,880	113,310	0.88
A 1	97,576	110,741	0.88
S 8	111,020	128,048	0.87
S 10	64,519	75,905	0.85
A 2	60,437	70,964	0.85
S 2	75,254	90,720	0.83
S 7	76,502	91,680	0.83
S 16	92,088	113,645	<b>0.81*</b>
S 18	21,090	25,988	0.81
S 19	22,080	27,398	0.81
S 11	64,842	81,127	0.80
S 1	65,834	83,113	0.79
S 13	193,344	245,700	0.79
S 14	98,885	127,493	0.78
A 6	76,935	98,327	0.78
S 5	82,253	109,250	0.75
A 3	107,543	148,828	0.72
S 9	44,441	62,370	0.71
S 3	94,420	135,610	0.70
A 4	60,264	86,303	0.70

Total = 25

\* **0.81** - Median Appraisal Ratio for Category A, XYZ Appraisal District

4. income properties in other jurisdictions: 20 or less.

The IAAO does not publish standards for other real and personal property, but notes that they vary with local conditions.

The COD measures appraisal uniformity independently of the median level of appraisal. As a result, CODs allow comparison of appraisal uniformity among districts or property categories where median levels of appraisal differ significantly.

Calculating a COD requires six steps:

1. subtract the median ratio for the sample from each individual ratio making up the sample. The result is the deviation for each ratio;
2. convert each deviation to its absolute value;
3. total the absolute values of each deviation;
4. divide the total deviation by the number of properties in the sample to get the average absolute deviation;
5. divide the average absolute deviation by the median ratio; and
6. multiply the result by 100.

**Table Six** shows a sample calculation of a COD.

**Table Six**  
**Sample Calculation for Coefficient of Dispersion**  
**County Appraisal District**  
**Category A: Single-family Residential**

Sale or Appraisal Number	Individual Property Ratio %	Difference from Median (81%)	Absolute Value of Difference
S 17	99	+ 18	18
S 15	97	+ 16	16
S 6	95	+ 14	14
S 12	94	+ 13	13
A 5	92	+ 11	11
S 4	88	+ 7	7
A 1	88	+ 7	7
S 8	87	+ 6	6
S 10	85	+ 4	4
A 2	85	+ 4	4
S 2	83	+ 2	2
S 7	83	+ 2	2
S 16	81	0	0
S 18	81	0	0
S 19	81	0	0
S 11	80	- 1	1
S 1	79	- 2	2
S 13	79	- 2	2
S 14	78	- 3	3
A 6	78	- 3	3
S 5	75	- 6	6
A 3	72	- 9	9
S 9	71	- 10	10
S 3	70	- 11	11
A 4	70	- 11	11

Total of Absolute Values = 162

162	- Total of Absolute Values
÷ 25	- Number of Sample Properties
= 6.48	- Average Absolute Deviation
÷ 81	- Median Appraisal Ratio
= .08	
x 100	
= 8.0	- Coefficient of Dispersion

PTD calculates a COD for each major category of property in an appraisal district if the sample has at least five properties and combines the samples for each category into a larger sample to calculate the overall COD.

**Percentage of properties within 10 percent and 25 percent of the median** – To calculate the first of these, multiply the median appraisal ratio by 10 percent. Adding this result to the median yields the ratio that exceeds the median by 10 percent. Subtracting the result from the median yields the ratio 10 percent below the median. Count the number of properties in the sample that have ratios equal to or between these two numbers. Dividing that count by the total number of properties shows the percentage within 10 percent of the median.

To calculate the percentage within 25 percent of the median, multiply the median times 25 percent and then add and subtract the result to find the upper and lower end of the range. The percentages are computed if the sample contains at least six properties.

The COD and the percentage of properties within 10 percent and 25 percent of the median are measures of "horizontal" ratio dispersion. They measure how consistently appraisal districts appraise properties at the same level (percentage of market value) without regard to the value of the properties. A low COD and high percentages indicate equitable appraisals, while a high COD and low percentages indicate inequitable appraisal.

In **Table Six**, the properties in the sample that have ratios between 89.1 percent and 72.9 percent are within 10 percent of the median, and properties that have ratios between 101.2 percent and 60.7 percent are within 25 percent of the median. In **Table Six**, all properties fall within 25 percent of the median.

**Price-related differential** – The PRD measures another form of inequity that may arise from systematic differences in the appraisal of low-value and high-value properties. According to the IAAO 1999 *Standard on Ratio Studies*, "When low-value properties are appraised at greater percentages of market value than high-value properties, assessment regressivity is indicated. When low-value properties are appraised at smaller percentages of market value than high-value properties, assessment progressivity results. Appraisals made for tax purposes, of course, should be neither progressive nor regressive." Progressive and regressive appraisal are forms of inequity called "vertical" inequity.

PTD calculates the PRD for each property category included in the study if the sample contains at least five properties. The PRD is calculated by dividing a sample's mean ratio by its weighted mean ratio. The IAAO standard for this measure is 0.98 to 1.03, with PRDs below this range indicating progressivity, and measures above this range indicating regressivity. A PRD inside this range indicates that low-value and high-

value properties are treated uniformly in regard to level of appraisal. **Table Seven** shows a sample PRD calculation. In this example the PRD is 1.01, which indicates uniformity.

The IAAO warns that the PRD is not a reliable statistic when the sample is small or when the sample is heavily influenced by extreme sales prices. For this reason, staff publishes the sample size on the CAD summary worksheet. The PRD is only an indicator; it alone cannot prove vertical equity or inequity. Additional tests are required to prove vertical inequity.

**Step 8. — Use the Results**

While the primary use of the study is to help equalize school funding, the secondary, but still very important, use of

**Table Seven**  
**Sample Calculation of**  
**Price-Related Differential**  
**XYZ County Appraisal District**  
**Category A. Single-family Residential**  
**Sales and Appraisals**

	Number Sale or Appraisal	Appraisal Roll Value	Adjusted Sale Price or Appraised Value	Individual Appraisal Ratio
S	17	\$ 84,449	\$ 84,995	0.99
S	15	114,788	118,898	0.97
S	6	89,654	94,715	0.95
S	12	39,479	41,925	0.94
A	5	69,708	76,117	0.92
S	4	99,880	113,310	0.88
A	1	97,576	110,741	0.88
S	8	111,020	128,048	0.87
S	10	64,519	75,905	0.85
A	2	60,437	70,964	0.85
S	2	75,254	90,720	0.83
S	7	76,502	91,680	0.83
S	16	92,088	113,645	0.81*
S	18	21,090	25,988	0.81
S	19	22,080	27,398	0.81
S	11	64,842	81,127	0.80
S	1	65,834	83,113	0.79
S	13	193,344	245,700	0.79
S	14	98,885	127,493	0.78
A	6	76,935	98,327	0.78
S	5	82,253	109,250	0.75
A	3	107,543	148,828	0.72
S	9	44,441	62,370	0.71
S	3	94,420	135,610	0.70
A	4	60,264	86,303	0.70
Totals	25	\$2,007,285	\$2,443,170	20.71

Mean =  $20.71 \div 25 = .8284$   
 Weighted Mean =  $\$2,007,285 \div \$2,443,170 = .8216$   
 Price Related Differential = Mean  $\div$  Weighted Mean  
 =  $.8284 \div .8216 = 1.01$  (rounded)  
 \*Price-Related Differential

the study is for appraisal district performance evaluation. Property taxpayers may use the study to evaluate whether they are being treated fairly in comparison to owners of similar property in the same area, or in other areas across the state. Taxpayers may also compare their treatment to the treatment of owners of other kinds of property. Appraisal districts and school districts may use the study to evaluate the need for reappraisal, although they should be conducting on-going ratio studies to obtain this information on a more timely basis. The state uses the study to trigger mandatory audits and reviews in some instances.

School district officials should pay particular attention to local ratio studies, and to the study, because their school funding may be affected. These officials should consult with their appraisal districts on a regular basis, and work with them to ensure that values are uniform and as close to market value as possible.

#### **Individual Property Category Details**

This section defines local properties and technical properties, and explains how PTD studies the various property categories. PTD publishes several documents that explain appraisal procedures used in the study in more detail. Contact PTD toll-free at 1-800-252-9121 or visit our Web site at <http://taxstar.cpa.state.tx.us/proptax/ptd.html> for more information.

#### **Local properties**

Local properties consist of residential properties and vacant lots, rural real property not qualified for productivity appraisal, commercial real and personal property and other taxable property. PTD field appraisers gather almost all of the data used in the local properties portion of the study. These employees, assigned to different regions throughout the state, appraise individual properties and collect sales data and other market information.

As a general rule, PTD staff will sample properties in a local property category in a school district if the category has at least 5 percent of total school district value or \$250 million in value based on the preceding year's study. However, a category may be sampled at any time, regardless of whether its value falls within the general rule. Categories not sampled are assigned reported appraisal roll value (local value).

**Residential properties and vacant lots** – These properties consist of Categories A (single-family residential real property), B (multi-family residential real property) and C (vacant lots and tracts).

For each of these property categories sampled, field appraisers collect sales information and perform appraisals to develop a sample of tested parcels. Using this sample information, the staff then develops a weighted mean appraisal ratio for each category. A stratified ratio is developed whenever possible. This estimated ratio, when divided into the school

district's total self-reported value for the category, produces the staff's estimated value for the category.

**Rural real property at market value** – These properties consist of the portion of Category D (rural acreage) that is appraised at market value and all of Category E (farm and ranch improvements). Although Categories D and E remain separate categories on the property value reports, these categories were merged in 1989 for study purposes. This merger was necessary since rural improvements and land are often sold together. Consequently, this merger makes it easier to compare total sales prices for land and buildings with the total appraised values on the appraisal roll without making artificial allocations between land and buildings. Land that is qualified for productivity valuation is not appraised at market value and is discussed separately under Technical Properties, below.

The staff collects sales and performs appraisals to develop a property sample based on market values. This sample may include some property receiving productivity appraisal, but the ratios for those individual parcels are calculated on the basis of the appraisal district's reported market values, not their productivity values.

From this market value sample, the staff develops a non-stratified weighted mean appraisal ratio and divides this ratio into the school district's reported value of rural real property that did not qualify for productivity appraisal. The result is PTD's estimated market value for acreage not receiving productivity appraisal and the value of farm and ranch improvements. See below for a discussion of rural real property that is qualified for productivity valuation and that appraisal districts are not required to appraise at market value.

**Commercial real and personal property** – Category F1 contains commercial real property (land and improvements), while Category L1 contains commercial personal property (furnishings, fixtures, movable machinery, equipment and inventories). To estimate market values in these two categories, the staff collects sales information and, if necessary, performs appraisals for each school district category sampled. The staff develops either a stratified or non-stratified weighted mean appraisal ratio from the sampled properties and divides each school district's reported category value by the weighted mean ratio to generate PTD's estimate of category market value. This procedure is the same used to estimate value in other local property categories, with the exception of agricultural land qualified for productivity appraisal.

#### **Complex properties**

Complex properties consist of oil, gas and other mineral properties; utility properties; and qualified agricultural land. With the exception of agricultural properties, these properties are not sold often and if they are, the sales data are rarely available. As a result the staff must obtain and analyze volumes of

data and develop computer models to value these properties. The PTD's Austin-based appraisers perform all of the necessary work to review and appraise these properties.

As a general rule, the staff will sample properties in each technical property category in each school district if the category has a minimum percentage of district value and a minimum dollar amount. Categories not sampled are assigned the local reported appraisal roll value.

### **Productivity Appraisal**

Texas law requires appraisal districts to appraise property at market value. Constitutional amendments, however, allow taxation of much of the state's agricultural land based on its productive capacity rather than its market value. Chapter 23, Subchapter C and D require appraisal of qualified agricultural land at its productivity value. Agricultural land qualified for productivity appraisal is in Category D1. These provisions require appraisal districts to classify qualified land according to its agricultural productivity, determine the net income to land for each land class over a five-year period, and capitalize the average to estimate productivity value. The Tax Code sets the capitalization rate at the greater of 10 percent or 2.5 points above the Farm Credit Bank of Texas' lending rate for December 31 of the prior year. Property taxes are based on the productivity appraisal, but appraisal districts also must estimate the market value of any land receiving productivity appraisal.

Section 23.71 of the Tax Code establishes the procedures for productivity appraisal of timberland. This process differs only slightly from the procedure for agricultural land. Timberland is classified according to soil type and the type of timber grown. For each class, the estimated net income to land is capitalized into a value per acre.

To develop the productivity ratio, the division staff uses the appraisal district's report of total acreage in each of the agricultural land classes for each school district. Staff uses information provided by published sources and persons in each county who are familiar with local agricultural conditions. The Austin-based staff develops an estimate of net return to land over a five-year period and capitalizes the average using the legally mandated rate to reach an estimated value per acre for each land class. Multiplying the value for each class times the reported acreage in the class yields the total taxable value per land class. The total of the values for each land class is the total taxable value for all acreage receiving productivity appraisal in a school district.

On the report of property value, school districts report the total appraised value of all land receiving productivity appraisal. The division divides this reported value by its own estimate of productivity value. The resulting ratio shows the general level of appraisal of all land receiving productivity appraisal in a school district.

An appraisal district's ratio is calculated similarly and is based on the sum of the school district calculations. This ratio is not a median derived from a property sample. As a result, agency staff does not calculate measures of appraisal uniformity for land receiving productivity appraisal.

Finally, staff adds the estimated market value of rural real property not receiving productivity appraisal and the estimated productivity value for land receiving productivity appraisal. The total is the estimated total taxable value of Category D (rural acreage).

**Oil, gas and other minerals** – The minerals category consists primarily of oil- and natural gas-producing properties (Category G1) and lignite and sulfur mines (Category G2).

PTD samples mineral properties in school districts if the minerals category represents 5 percent or more of the total school district value. Mineral categories not meeting this criterion are assigned local value. The G1 sample is selected from the current year data provided by county appraisal districts and appraisal firms representing them. The low-value stratum is assigned the local tax roll value and contains property that makes up the lowest 5 percent of the property category's value in the school district.

After removing low-value properties, and placing high-valued properties in a separate stratum, staff stratifies the remaining properties into four strata. Then PTD randomly selects the leases to be appraised for the study.

The staff uses computer models and specialized software to carry out discounted cash flow evaluations of mineral properties. Using computer models and information from a variety of sources including an in-house database, PTD calculates economic parameters such as wellhead prices, operating expenses, equipment costs, net salvage values and discount rates. The future cash flow is generated based on forecasted production and economic parameters and then discounted to present value. The discounted equipment salvage value is then added to derive the market value for each oil and gas property. PTD may also use discounted cash flow analysis to appraise lignite and sulphur properties.

To produce the individual appraisal ratio for each minerals property in the sample, the staff divides the appraisal district's value by the estimated market value. Category G ratios are calculated similarly to Category A, but Category G is divided into three subcategories.

PTD then calculates a stratified weighted mean ratio based on the strata discussed above.

**Utilities** – The utilities category (Category J) consists of the real property and tangible personal property of telephone, electric, gas distribution, railroad and pipeline companies, as

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well as the property of other companies commonly thought of as utilities, such as water systems.

PTD staff chooses utility samples by a method that ensures sampling the highest-valued properties and other properties as appropriate. Utility staff use recognized unitary valuation methods, including the cost, income, and market approaches, as applicable. Appraisals are based on information published in annual company reports filed with federal and state regulatory agencies and furnished directly to the Comptroller by the utility companies. The staff also obtains information from business and industry publications. PTD determines the percentage

of unit value attributable to each company's Texas operations to develop an overall estimated value for the Texas portion of the company. Using information provided by the utilities or appraisal districts, the staff allocates this Texas value to the various school districts in which the utility owns property.

The total appraisal roll value for the sampled utility properties divided by the total estimated market values produces a non-stratified weighted mean ratio for utilities. Dividing this ratio into the school district's total reported value for utilities generates the division's estimated total value of all utility property in the school district. ★



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# Section Two

## How to Protest

This section explains how to build an effective protest of the Property Value Study's preliminary findings. "Preliminary findings" refer to the initial taxable values determined for each school district. These preliminary findings may be amended at any time before final certification to the Commissioner of Education; therefore, **school districts should not rely on preliminary findings in setting their budgets or tax rates.**

### Who may protest preliminary study findings?

The law gives school districts and some property owners a right to protest the Comptroller's preliminary findings of taxable property value certified to the Commissioner of Education. Property owners may protest if their property is used in a school district study and the total tax liability on all of the owner's property in the school district's category sample is \$100,000 or more. Individual owners may request information about values placed on their properties to determine if they wish to protest. To obtain this information, contact staff in the Complex Properties or Field Studies sections, at 1-800-252-9121. For more information about the Comptroller's Property Tax Division, relevant publications and other information, please visit our Web site at <http://www.window.state.tx.us/taxinfo/proptax/proptax.html>.

Comptroller rule allows appraisal districts to protest appraisal performance measures in the same way that school districts protest preliminary value findings.

### Protest Timeline and Procedure Summary

Petitioners have 40 days after preliminary findings are certified to protest. **If a protest is necessary, school districts, appraisal districts and property owners must file a protest petition by March 12, 2007.**

Hearing examiners will hear protests in May and will issue written proposed decisions. After proposed decisions are issued, any party who disagrees may file an exception to the proposed decisions. If an exception is not filed within 10 days after the date the proposed decision is sent by facsimile machine or delivered to an overnight delivery service, the proposed decision becomes final. If exceptions are filed, final decisions will be issued in June. The Comptroller will certify final results to the Commissioner of Education in time for the Texas Education Agency (TEA) to use the findings to distribute state education funds, normally in early July following the hearings.

Comptroller rules combine school district, taxpayer and appraisal district protests into a single hearing. For example, an appraisal district will give evidence to the hearing examiner at the same time a school district within that appraisal district gives its evidence to the hearing examiner.

By law, only school districts can appeal the result of their protest to district court. If the school district has filed a timely protest petition signed by the superintendent, the district may appeal to district court. This is true if the school district filed a joint protest with the appraisal district or if the school appoints the appraisal district as its agent.

### Protest Questions

Call PTD staff at 1-800-252-9121 if you have any questions about your preliminary findings or your protest.

## Step-by-Step Protest Summary

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### Step 1. Review Preliminary Findings .....18

Check your preliminary findings for clerical errors, reasonableness, sample representativeness and accuracy.

### Step 2. Prepare Protest Evidence .....19

If you choose to protest, use the protest forms enclosed with your preliminary findings, gather the necessary evidence and organize it.

### Step 3. Prepare and File Protest Petition .....24

Prepare and mail the petition, forms and all supporting evidence and statements by March 12, 2007.

### Step 4. PTD Staff Review, Recommendation, and Informal Conferences .....26

Staff will review your protest and make a recommendation. If you agree, no hearing is required. If you disagree, the protest could still be resolved in an informal conference.

### Step 5. The Hearing .....27

If you and staff cannot agree, a hearing examiner will review your evidence and hear arguments. After the hearing, you will receive the examiner's proposed decision.

### Step 6. Written Exceptions .....27

If you disagree with the hearing examiner, the law permits you to file written exceptions. Other parties may respond to your exceptions. The examiner may change the proposed decision based on the exceptions. You will receive notice of the final decision in June following the hearing.

### Step 7. Appealing a Final Decision .....27

School districts have 30 days from the date the notice is mailed to file an appeal in Travis County District Court. If you do not file suit, the values are final. Appraisal districts and property owners have no right to appeal.

### Step 1. — Review Preliminary Findings

Chief appraisers, school superintendents and property owners should carefully review their preliminary findings.

**Cooperation between school districts and appraisal districts is essential throughout the process.**

At a minimum, pay close attention to the following when you receive your findings and supporting data:

#### Are the local values the same as on the self report?

When used in this booklet, the term *self-report* means the information required on the *School District Report of Property Value* and the *Report on Value Lost Because of the School Tax*

*Limitation on Homesteads for the Elderly* whether the district submitted the information in electronic or paper form. The study uses values from the self-report as the basis for the study. To verify the self-reported values, a school district should compare the study data against the certified values reported by the school's appraisal district.

- Are the category values on the summary worksheet the same as those reported on the self-report?
- Are the homestead exemptions correct?
- Are the tax abatement, pollution control, freeport and other exemptions reported correctly? Is the projected tax paid to a tax increment financing fund reported correctly?
- Is the levy lost to the over-65 tax freeze correct?
- Is the levy lost to the 10 percent homestead value limitation correct?

#### Are there clerical errors in the sample properties?

- Are the correct appraisal roll values listed?
- Is each sample property located in the right school district?
- Are the selling prices and sale dates correct?
- Are the appraisal details correct?

#### Is there a mismatch in the sample?

For instance, if any sales in the commercial real property Category (F1) study include the value of property listed as business personal property (L1), the category ratio may be incorrect. Staff may be comparing a total sales price to a partial appraisal district value. This error typically occurs when an ongoing business is transferred to another party that continues to operate the business. Another common mismatch is when the appraisal roll value represents a vacant lot and the sales price in the sample represents the lot with a new improvement.

#### Does the property sample accurately represent the category?

Generally, look for gaps in the sample's coverage of your district. As long as your level of appraisal (ratio) in un-sampled areas is similar to the ratio in sampled areas, the findings will not be significantly affected. However, if your level of appraisal is different in un-sampled areas, the findings may be affected.

- Are the sales included in the sample accurate market transactions? You should examine all sales for unusual terms or conditions, and check whether each sales price is accurate. See the list of sales that are often non-market transactions under Adding or Deleting Sales below.
- Does the sample fairly represent all areas of the school district?
- Does the sample include a representative and reasonable range of building types and ages?
- Does the sample include a reasonable and representative range of property values within the category?
- Does the sample reasonably represent market conditions that existed on January 1 of the study year?



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**Do the sample averages seem appropriate for your district?**

- Is the average value per square foot or per acre used in appraisals about right?
- Is the average value per parcel or per structure correct? (Divide the total category or stratum value by the number of parcels or accounts in the category or stratum.)

**Do the appraisal performance measures seem reasonable?**

- Given the last time the appraisal district reappraised the category, do the ratios appear reasonable?
- If the school or appraisal district has a ratio study of its own, are the ratios and coefficients of dispersion comparable?

**Reviewing Category J: Utilities**

In addition to asking the questions listed above, districts may want to review the results of the utility study, which is based entirely on appraisals of utility companies. The Comptroller's PTD will release copies of utility company appraisals on request. PTD complex property staff can also supply non-confidential allocation information to help in your review.

Included in the school and appraisal districts' preliminary findings is a list of the companies that are in the utility sample. The school district weighted mean appraisal ratio appears at the bottom of the listing. In addition, the list shows the company number, appraised value, staff market value estimate and an appraisal ratio for the company tested. A review of this printout will help determine which company's appraisal may be in error. In addition to the information shown on the printout, you may request:

- a table showing company names and numbers;
- a listing of railroad trackage, type of track and assessed values for railroad companies included in your district's utility sample;
- a list of pipeline company segments included in your district's utility sample, including the age, diameter and mileage of each segment sampled; and
- the appraisals of utility companies included in the Property Value Study.

Review the appraisal roll values used to determine if they are correct. Review all mileage and other physical characteristics listed on the printout to find any errors. Review the staff appraisal for errors.

**Step 2. — Prepare Protest Evidence**

You may present any relevant evidence for the hearing examiner's consideration. This section outlines the kinds of evidence staff considers when reviewing the evidence to make recommendations to resolve the protest.

Your preliminary findings may be changed only if you file a written protest petition with the Property Tax Division Manager that includes all of your supporting evidence, along

with two copies of the petition and evidence by March 12, 2007. Until March 12, you may amend your petition or deliver additional evidence. Petitions or additional evidence filed, faxed or postmarked after March 12 cannot be accepted.

This booklet refers to forms the agency provides for protests. Completing the forms as suggested in this booklet assures that you have met Government Code requirements for protesting. Copies of the forms were mailed to each district with the preliminary findings. For additional copies of the forms, visit our Web site at <http://www.window.state.tx.us/taxinfo/taxforms/02-forms.html#Study>.

A Comptroller rule requires you to organize your evidence by property category. The rule also requires you to list each specific change and state the reason why the change will make the study more accurate. The rule also requires all evidence you intend to use to be included with your appeal. The Comptroller cannot review any petition in which changes requested are not identified and adequately explained. To avoid confusion, you should identify each protested property by its PTD-assigned account number. List all corrections you want on the Sale/Appraisal Ratio Study form for the property category (or an equivalent form).

**Correcting a Report of Property Value**

Districts must protest to correct errors in their Report of Property Value (self-report).

Late changes to the appraisal roll also may require self-report changes. To correct a self-report (SR) after the study's preliminary release, you must file a protest by March 12 and should:

- summarize requested changes on the *Statement of Evidence* form;
- include an amended self-report signed by the authorized agent;
- include an amended freeze loss form signed by the chief appraiser (while the agent can sign the self-report, only the chief appraiser may sign the freeze form);
- include a corrected copy of the appraisal roll's real or personal property tax roll summary, including appraisal roll supplements, appraisal review board orders, court orders requiring value changes and other evidence of the value change;
- include a copy of the exemption summary to correct the self-report's exemptions;
- include a collection report verifying the loss to tax deferrals (report should include account number, taxable value and the amount of taxes deferred);
- include any TIF agreement and amendments, if not provided during PVS, for TIF eligible payment changes;
- include a copy of the special appraisal (timber or other special agricultural use) tax roll summary to correct your self-report's productivity appraisal data and
- write SR in the category blank on your *Statement of Evidence* form.

Refer to the Comptroller's *Property Classification Guide* for information on how to classify property correctly.

Please call the Complex Properties Section at 1-800-251-9121 if you have any questions about classifying special appraisal (timber, agricultural or other special uses).

#### **Correcting a Clerical Error**

A clerical error is a transcription error, such as an error in listing the appraisal district value, a date, a sales price, an account number, the location of the property in a particular district or other error that does not reflect the data PTD intended to record. To correct a clerical error in the preliminary findings, you must:

- file a petition before March 12;
- use the Sale/Appraisal Ratio Study form for the property category in which you found the clerical error;
- list the data you want to correct; and
- file copies of documents that verify the correction, such as the correct appraisal card, deed or other supporting evidence.

Usually, the staff resolves clerical error and self-report protests before hearings are held.

#### **Correcting Sample Representativeness**

If the makeup of the sample is significantly different from the makeup of all properties in the category, you may want to challenge representativeness. For example, if the sample does not include sales of a particular subcategory such as brick veneer houses, from a particular area such as lake front lots or a new subdivision or from a particular value range, such as lots selling at \$5,000 to \$10,000, that constitutes a significant portion of category value, the representativeness of the sample may be questionable.

To assess whether or not the sample is representative, you will need data on the characteristics of properties in the category and information showing how the particular characteristic of concern is distributed in the property population. If your sample is broken into groups (stratified), you should show that the issue of sample representativeness is better resolved with your groupings than with the Comptroller's value groupings (value strata).

The fact that the sample excludes some kinds of property does not necessarily mean that the Comptroller's value is inaccurate. Only if the omitted property type is a significant portion of the category value and appraised at a level different from the properties in the sample is the category value likely to be inaccurate. If you believe this is the case, your protest should include supporting evidence.

Your protest should include a statement detailing your reasons for challenging the representativeness of the sample and propose a different stratification. Include in your evidence your proposed stratification and its basis. Consider

including a comparative analysis for the sample and the category. Value stratification is an efficient method of increasing sample representativeness when properties of different values are on the roll at different appraisal levels. If you would like more details about stratification please see page 6 or call 1-800-252-9121 toll-free or (512) 305-9744.

#### **Submitting Your Own Ratio Study**

If you have conducted an independent ratio study in the district other than gathering additional sales, you may submit the entire ratio study. You should provide a statement showing how you conducted your study and explaining why your ratio study is more accurate than the Comptroller's study. Include the data you used to stratify your ratio study samples. Also include all the sales and appraisal information you used. Be sure and include the sales dates, sale prices, CAD values, time adjustment data, and any other information used as the basis for adjusting the sales prices. Please submit the information in an electronic file if possible.

#### **Challenging Individual Sales in a Sample**

You may want to challenge specific sales. If so, Comptroller rules require that you proceed as follows:

- List the challenged sales on the Sale/Appraisal Ratio Study form for the property's category and include all the information requested on the form. Give the property's appraisal roll account number, legal description or address, sale date, selling price and 2006 appraisal roll value. Appraisal roll values you list should reflect the property's value before exemptions are subtracted.
- Attach a statement for each sale stating why you are challenging it. This statement is required by Comptroller rules. Conclusive statements, such as "the sale is not a market transaction" are not convincing. Instead, state why the sale is not a market transaction and include evidence that shows why. You may want to attach a photograph of the property and a copy of the appraisal card. If the sale is not a market transaction or involves unusual terms, documentation—such as a sales contract or written statement from the buyer—is helpful.
- State whether you want the sale adjusted or deleted.
- Provide supporting documentation for any requested adjustments, such as an analysis of the market in which the property is located.

#### **Challenging Individual Appraisals in a Sample**

Samples often include appraisals, particularly when sales are scarce, the sales under-represent property types or when the appraisal district reappraises sold properties without reappraising comparable unsold properties. In most cases, an appraisal by an appraiser independent of the appraisal district carries more weight than one by an appraisal district. Comptroller rules require you to do the following:

- List the challenged appraisals on the appropriate *Sale/Appraisal Ratio Study* form, including all information requested on the form. If you think the appraisal is basically correct, but that one or more variables such as construc-

tion class or percent good are incorrect, include corrected variables with a detailed explanation and documentation of why it is correct and recalculate the values and ratios. Show your changes. Appraisal roll values should reflect the property's value before subtracting exemptions.

- Attach a statement for each appraisal indicating why you are challenging it. Conclusive statements such as "this appraisal is not representative" or "the percent good is wrong" are not convincing. Instead, state why the appraisal is not representative.

Although Comptroller rules do not require it, these additional steps could make your protest more convincing.

- If you think some aspect of the appraisal method should be changed, state all assumptions and sources of the data you used.
- Use a generally accepted manual for cost data and identify the manual you used. Submit all documentation for the schedules you use.
- Justify your depreciation estimates.
- Document your comparable sales and provide a sales adjustment grid.
- If you use the income approach, your statement should document the market data you used, as well as your calculation of market rents, vacancies and expenses. Attach the income and expense analysis you used. Document capitalization rates with a sales analysis, a band-of-investment analysis, or another generally accepted method. You should adequately explain and document income and expense projections.
- If you think a sample is not representative, explain why and submit documentation.
- Submit a clear photograph of the property and a copy of the appraisal card for each challenged appraisal. You may need more than one photograph to document the property's characteristics. Keep copies of the photographs you send.

### **Challenging a Time Adjustment Factor**

The law requires the appraisal of property at its market value on January 1 of the tax year. When a property sells on a different date, a time adjustment factor increases or decreases a property's sales price to adjust for market appreciation or depreciation. The objective is to calculate what the property would have sold for on January 1 of the tax year. If you think the staff's time adjustment factor is wrong, you should submit the following:

- A list of the staff's sample on the appropriate *Sale/Appraisal Ratio Study* form. Provide all data requested by the form, but substitute your time adjustment factor and recalculate the values and ratios. Highlight the time adjustment factor.
- A resale, matched pair or other analysis supporting your time adjustment factor.

If you are submitting new sales solely to challenge the time adjustment factor, check the "other" space at the top of the

*Sale/Appraisal Ratio Study* form and write "time adjustment" in the space provided.

### **Adding or Deleting Sales**

PTD staff selected the sales in each sample by one of these two methods:

- Census. Staff selects all the market sales that occurred in a given time period.
- Random selection. Staff selects the sample randomly so that all the market sales in a given time period have an equal chance of selection.

PTD staff will not recommend adding sales to a randomly selected sample unless the evidence proves that the existing sample is not representative of the property population or the sample has some other specific flaw.

Also, your sales must be accurate, arm's-length indicators of market value; and must be selected without bias. Make sure these sales do not duplicate the staff's sample properties and each has a date within the existing study time frame. If the sales you want to add were selected from a population of sales, you must include the entire population from which they were drawn. If you think some of the sales from the population should not be included because they are not market transactions, or for some other reason, you must provide supporting evidence.

To request adding sales to the sample, you should:

- List all sales on the appropriate *Sale/Appraisal Ratio Study* form, and include all information requested on the form. Show appraisal roll account number, legal description or address, sale date, selling price and 2006 appraisal roll value. Appraisal roll values should reflect the property's value before subtracting exemptions. Please attach any relevant information about the terms and conditions of the sale.
- Include only market transactions. According to the International Association of Assessing Officers (IAAO), non-market sales should not be used in a ratio study. See the IAAO's 1999 Standard on Ratio Studies for more details about non-market sales and for a discussion of sales with special conditions and sales by large business entities. Some typical examples of sales often found to be invalid for ratio studies, according to the IAAO, are:
  - Sales involving governmental entities or public utilities. These are generally forced sales, such as condemnation sales.
  - Sales involving charitable, religious or educational institutions. These are often full or partial gifts and thus not representative of market value.
  - Sales in which a financial institution is the buyer. These sales are often made in lieu of a foreclosure and are not exposed to the open market. However, open-market sales in which a financial institution is a willing buyer, such as the purchase of vacant

land for a branch bank, are likely to be valid. Sales in which a financial institution is the seller should be viewed cautiously but may be valid if made on the open market.

- Sales between relatives or corporate affiliates. These are not usually open-market sales and are usually made at prices favorable to the buyer. Corporate sales often require considerable research to determine legal relationships.
- Sales of convenience. Sales of this kind are made to change or correct the title or deed. The grantee and grantor may be the same and the sale price is usually nominal. A review of the deed is usually the best way to identify whether the transaction is a sale of convenience.
- Estate sales. Sales in which the buyer is an executor or trustee are usually non-market sales at a nominal sales price. Sales from an estate may be used to satisfy the debts of the deceased or the wishes of an heir; otherwise, sales in which an estate is the seller may well be valid market sales.
- Forced sales. Forced sales sometimes result from a judicial order. The seller is normally a sheriff, receiver, or other court officer. If the auction is well advertised and well-attended, the sale price may be at market value. On the other hand, an auction in which the receiver is required to accept whatever bid is offered is known as an absolute auction and produces sales that are always invalid for ratio studies.
- Sales of doubtful title. Sales in which the title is in doubt tend to be below market value. Properties that sell with a quitclaim deeds or trustee's deeds may not have a merchantable title.
- Submit the correct sale price and supporting evidence to validate the sale price. Warranty deeds are not good evidence unless the full consideration is stated. Closing statements, sales agreements, written confirmations and sales reporting service documents are good documentation.
- Use the staff's time adjustment (if any), unless you are protesting the time adjustment factor.

If you find non-market transactions in the sample, you should provide documentation proving that the property sold for more or less than market value, and request their deletion or adjustment.

#### **Adding Appraisals to a Sample**

Appraisals are most appropriate as evidence when there are no sales for a category or the sales available do not properly represent the category. If you want to add appraisals to improve representativeness, include data indicating why the staff's sample is not representative. If you plan to submit a number of appraisals, either select the properties to be appraised randomly or justify your alternate selection process. The final sample should represent an appropriate range of values and property types within the category. No matter how accurate

the appraisals, a sample has little or no weight if it appears the properties were selected to achieve a particular ratio or value.

Appraisals are sometimes difficult to support as evidence because of the assumptions required in the process. Addressing errors or non-representativeness in the sample is usually more efficient than submitting alternate appraisals. Appraisals have more weight if performed by an independent expert representing the district, someone who follows recognized professional appraisal standards and whose personal interests are not tied to the outcome of the hearing.

Information for appraisals should be submitted with the items listed below in mind.

- Use the study's appraisal date of January 1 of the study year. You should justify using appraisals for other dates and document all time adjustments.
- List all appraisals on the appropriate *Sale/Appraisal Ratio* Study form and include all information requested on the form. Appraisal roll values should reflect value before subtracting exemptions.
- Use **market value**, as opposed to another value criteria such as loan value, for appraisals you submit. Market value is defined in Section 1.04(7), Property Tax Code (see box below).
- Submit a clear photograph of the property and a copy of the appraisal card for each property you appraised. You may need more than one photograph to document the property's characteristics.
- Submit a supporting statement for each appraisal that identifies the appraiser and describes the appraiser's qualifications. This statement also should show the appraiser's assumptions and identify all data sources, particularly for cost, income and expense data. The statement should state and support depreciation estimates. It should list comparable sales and include an adjustment grid. If the appraiser used an income approach, the statement should document rent calculation, capitalization rate selection, income projection methods and sources of the data. Finally, the statement should give the date for which the appraiser estimated market value.

**Market value** means the price at which a property would transfer for cash or its equivalent under prevailing market conditions if:

- (A) exposed for sale in the open market with a reasonable time for the seller to find a purchaser;
- (B) both the seller and the purchaser know of all the uses and purposes to which the property is adapted and for which it is capable of being used and of the enforceable restrictions on its use; and
- (C) both the seller and purchaser seek to maximize their gains and neither is in a position to take advantage of the exigencies of the other.

### **Protesting the Productivity Value in Category D: Rural Real Property**

Category D includes rural real property that qualifies for productivity valuation (Category D1) and rural real property that does not qualify (Category D/E). The property that does not qualify is appraised at market value and is protested similarly to Categories A, B and C.

The Property Tax Code requires appraisal districts to appraise qualified property at both market value and productivity value. Productivity value is based on an agricultural property's ability to produce agricultural or timber products. For detailed information about the appraisal of qualified agricultural and timberland, see the *Manual for the Appraisal of Agricultural Land* and the *Manual for the Appraisal of Timberland*.

Protests of agricultural land's productivity value estimates frequently challenge the landowner's income or expenses for the land. The most effective evidence for these protests includes actual lease agreements specifying the terms of a cash lease or the shared crop proceeds and expenses. Since values are determined based on landowner income and expenses in a typical lease, affidavits from owners detailing their income from these leases and expenses they incur are good evidence. Actual receipts supporting the amount of landowner expenses could be included as evidence. Summaries of cash or share lease information are also acceptable if the summary includes the names of the leasing parties, the acreage involved and the terms of the lease. Protests should identify the specific income and/or expense items being protested. Since agricultural land's productivity values are based on five years of information, any evidence submitted should identify the year the information covers.

Information supporting protests of timberland value estimates will be more effective if supported by any of the four recognized sources of information specified in Section 23.71 of the Property Tax Code. Those sources are: U.S. Forest Service, the Natural Resources Conservation Service, the Texas Forest Service and colleges and universities within this state.

### **Protesting Categories F1 and L1**

The study's appraisal ratios and district value estimates for commercial property are divided into two categories. Category F1 is commercial real property and Category L1 is commercial personal property.

Correcting sample representativeness, sales, and other issues discussed previously for other categories also apply to Categories F1 and L1.

### **Challenging Individual Appraisals in an F1 or L1 Sample**

Challenging appraisals included in a Category F1 or L1 sample may require the staff and district to make conclusions without sales as evidence of value. In these cases, the most efficient way to structure a protest is to perform and

submit a detailed examination of the property. The examination should identify any erroneous information and appraisal assumptions. Evidence that supports errors identified in appraisals may include photographs of the real estate or personal property, construction costs, comparative sales analysis, or other supportable appraisal techniques.

If you are protesting particular personal property (Category L1) values, the best evidence is copies of company accounting records, income tax returns, asset listings showing original costs and dates of acquisition, supportable evidence of year-end inventories, or photographs showing inventory levels and equipment conditions.

### **Adding Sales or Appraisals of Commercial Properties**

To add sales or appraisals of commercial properties, you should follow the same general guidelines for sales information discussed previously, include a copy of the appraisal card showing the property's appraisal roll value and include all properties that were part of the sale.

### **Protesting Category G: Oil, Gas and Other Minerals**

Mineral properties in Texas are usually appraised using the income approach. The appraiser estimates the value by computing the present worth of a property's expected income, using discounted cash flow analysis. Assumptions about the size, distribution and duration of expected income flows generally define these estimates.

Production decline curves, such as rate vs. time, rate vs. cumulative production, surface pressure vs. cumulative production, bottom hole pressure/Z factor vs. cumulative production and type curves, are used to appraise oil and gas properties. The production forecast and economic evaluation methods are based on the principle that a mineral lease's future production can be predicted and its economic value can be estimated, based on past performance and related reservoir characteristics.

### **Challenging Individual Appraisals in a Category G Sample**

Projections of future lease production, product prices, lease operating costs and the rate at which future income is discounted to the present (the discount rate) are important variables in appraising mineral properties. Your protest should center on why you think one or more of the variables used by the staff were not correct. Whether local mineral properties are appraised through contract with a professional valuation firm or in-house by appraisal district staff, please supply the following data:

- Lease name of protested property;
- PTD Property ID Number;
- CAD/Firm Lease Number;
- CAD's total 8/8ths appraised value;
- Allocation and value assigned to school district;
- Undiscounted salvage value;

- Contested appraisal parameters and reason for protest (e.g., *gas decline rate and lease operating expenses*);
- Exact changes requested and the rationale for each change (e.g., *change the gas decline rate to 25 percent to reflect the decline rate during the last six months and change the first-year lease operating expenses to \$25,550 to reflect the actual operating expenses incurred by the operator*); and
- Supporting documentation for each requested change (e.g., *provide a copy of your appraisal's gas decline curve and a copy of the operator's itemized lease operating expenses*).

The following data should be submitted to support your protest:

- Your original appraisal;
- Copy of the itemized lease operating expenses provided by the operator;
- Historical and projected production decline curves;
- Pressure/production decline curves and other pressure information;
- Water cut vs. production information;
- Oil and gas price information and starting production rates;
- Remaining recoverable reserves;
- Workover and well treatment information; and
- Any other information that supports your protest.

Please check the appraisal roll values for the properties. If you or your appraisal firm disagree with any of the variables used in the staff's appraisals, you should document the differences or areas of disagreement and file a protest.

### **Correcting Category G Sample Representativeness**

Category G consists primarily of oil and natural gas producing properties, lignite and sulfur mines and non-producing minerals. These mineral properties are divided into three subcategories. Subcategory G1 consists of oil and natural gas producing properties. Subcategory G2 consists of mines and quarries including lignite, sulfur and other mineral reserves. Only properties valued at 20 percent or more of the overall Category G value (exception properties) are selected for the Category G2 sample. Subcategory G3 consists of non-producing mineral properties defined as real property. Subcategory G3 typically consists of little value and is assigned the local tax roll value.

You may challenge the representativeness of the sample by the same methods discussed earlier under Correcting Sample Representativeness.

When submitting additional appraisals, you should provide for staff review all necessary variables for each property (see list of variables under "Challenging individual appraisals in a Category G sample" above). When requesting removal of an individual property in the sample, you should document why the particular property should not be included. In either case, you should provide information about the amount of value and number of leases for each kind of lease in the district.

### **Protesting Category J: Utilities**

The utility sample in each school district is based entirely on appraisals. PTD staff appraises each utility company as a unit and then allocates this unit value to school districts that have the utility company's property. Next, the staff compares the allocated values to the appraisal district's values to develop ratios and estimate taxable values. If you find appraisal or allocation problems, you should document them with sufficient evidence to support a change.

If you think the properties included in the Category J sample are not representative, you should submit evidence that supports the exclusion of property or the inclusion of additional properties following the guidelines for challenging representativeness presented previously.

If you think that the staff's value or allocation of value is incorrect, your protest should include all evidence necessary to support your position. This evidence may include:

- your unit value appraisal;
- valuation schedules;
- detailed listings of the physical property;
- investment information; and
- other valuation data.

If you find an error in the appraisal roll values, you should provide a copy of the appraisal card or appropriate portion of the tax roll.

### **Step 3. — Prepare and File Protest Petition**

A school district, appraisal district, or property owner must file a petition by March 12, 2007 to protest the Comptroller's preliminary findings.

Use Comptroller forms to help you organize your evidence and present it in a standard format to help staff more quickly review the protest.

Protest forms are available on the Comptroller's Web site at <http://www.window.state.tx.us/taxinfo/taxforms/02-forms.html#Study>. You may also call the Reporting Section at 1-800-252-9121 for self-report forms and protest forms.

There are four types of protests: a school district (ISD) protest; an appraisal district protest; a joint school and appraisal district protest; and a property owner protest.

An appraisal district doesn't have to protest—jointly or otherwise—just because one of its component school districts is protesting. Likewise, an ISD doesn't have to protest when its appraisal district protests. However, the Comptroller's rule requires a school district to notify each appraisal district that appraises property for the district about its protest. In addition, a protesting appraisal district must send its notice of protest to each school district that participates in the appraisal district.

### **File only one petition**

A petitioner may file one, and only one, protest petition. This requirement is true whether you are protesting one or all categories of property. Although you may submit only one petition, you may have more than one person gather and present evidence. Assume that you want Appraiser B to gather and present Category J evidence and your agent to handle the evidence on all other categories. The correct approach is to file one petition, name the agent and give written authorization for Appraiser B to present Category J evidence. An authorization statement appears at the bottom of each category evidence form. The division will review evidence filed by a person other than the agent only if the person has written authorization from the agent or district to submit the evidence.

### **School or appraisal district and the type of protest**

Provide the name of the school or appraisal district. Specify if you are protesting the Comptroller's preliminary findings on behalf of the school or appraisal district, property owner or a combination.

### **Identify your agent**

Provide the name, address, telephone number and fax number of one person who is knowledgeable about the petition and will be available to discuss the protest and make decisions about it. This individual is the district's agent. A school district and appraisal district that are protesting jointly must agree on one agent to represent both parties. Throughout the review process, staff may need to contact the agent with questions about evidence and to send correspondence. All correspondence about the protest, including the decision, will be delivered to the agent. When reviewing the evidence, the PTD will consider only that evidence submitted by the agent or a person authorized by the agent in writing to present evidence.

PTD must have written authorization from the district to replace the first-named agent with a new agent. After a new agent is named, PTD can accept decisions only from the newly authorized agent. PTD also must send all decisions and other correspondence to the newly named agent.

The person listed in the petition as the district's agent does not have to be the person who appears at a hearing on behalf of the protesting party. The district's attorney may represent the district in a hearing. Also, in a hearing, the district's attorney or authorized agent may designate any other person to argue and present timely submitted evidence. If the agent or attorney will not be present at the hearing but would like another person to represent that district, the agent should submit a written designation in advance.

### **Have the petition authorized by the proper officials**

The superintendent must sign a school district protest. The chief appraiser must sign an appraisal district protest. A property owner or property owner's agent must sign a property owner's

protest. Both the chief appraiser and superintendent must sign a joint protest. The authorization statement does several things:

- it authorizes the protest,
- it appoints an authorized agent (the person to whom PTD will direct all official contacts),
- it states that the information submitted in the protest is true and correct to the best of the signer's knowledge,
- it states that a value claimed to be correct has been stated and
- it states that notice has been given to the proper entities.

### **Complete a statement of value claimed to be correct.**

The Government Code requires a district to state the total value it claims to be correct. This claim may be made on the Comptroller form entitled *Statement of Value Claimed to be Correct*, which is a part of the petition.

Include separate, completed statements of evidence for each challenged property category.

The petition form is a "cover sheet" for the entire protest. The Statement of Protest and Evidence form is a cover sheet for each protested property category. Comptroller rules require you to organize your evidence by property category. An appraisal district that challenges the Comptroller's finding of median level of appraisal should organize its evidence by property category and school district. That way, the staff and the hearing examiner can focus more efficiently on the individual property category samples challenged in each school district. For each category you protest, you must include the following:

- Statement of Protest and Evidence forms. These forms identify the category challenged, describe the types of evidence you have submitted, and set out the statement of your grounds for the protest. For agricultural and timber productivity protests, if your protest deals with appraisal issues, it is a D1 protest. If it deals with changes from land class to land class, or corrects self-reported acreage breakdowns or appraisal district values, it is a self-report protest. The district should write SR in the category blank on the protest. In protesting the Comptroller's preliminary findings, you must specifically state why they are wrong.
- State the action you want the Comptroller to take and state how the action will improve the study's accuracy. The law requires your statement of evidence to be complete enough to confer jurisdiction on the hearing examiner and a district court. So, be clear, detailed and specific.
- All evidence and documents you want staff to review and the hearing examiner to consider. List sales and appraisals on the appropriate Sale/Appraisal Ratio Study forms enclosed with your packet. Attach these and any other supporting data to the statement of evidence forms.
- Written authorization if someone other than the agent will submit evidence. The PTD will not consider evidence submitted by a person other than the agent unless the person has written authorization. Each statement of evidence has a space for this authorization at the bottom of the form.

Submit the original and two copies of every document and item of evidence with your petition on 8½ x 11 paper when possible. Attach originals of any photographs to one of the copies.

#### **File the petition on time**

The petition and evidence, plus two copies of these documents, must be filed by March 12, 2007. A petition is timely if it is addressed to the Property Tax Division Manager, sent by first class mail or express mail and shows a postmark date no later than March 12. A petition of fewer than ten pages may be filed as described above or will be considered timely if received by fax on or before the deadline. However, the original must be mailed to the division within three days of the fax. The fax numbers are: (512) 305-9801 or (512) 463-2427.

A school district, appraisal district or property owner may not file any evidence after March 12. The protesting party may not raise issues or present evidence not contained in the petition either to the hearing examiner or in the exceptions to the proposed decisions. Any petition may be supplemented or changed before March 12.

A protesting party may receive one extension of up to ten days if requested in writing five days in advance of the original deadline. The examiner may grant an extension only for good cause. Good cause is something out of the district's control. Occasionally, staff discovers an error in its study before the deadline to file protests. Staff may make changes, certify new preliminary findings and notify the district of the change. Each district adversely affected by a change has 40 days to protest the results of that change. A change is adverse if the school district value increases as the direct result of the change.

#### **Submit all of your evidence with the petition**

The petition is an evidentiary petition, which means that it must include all evidence that the school district, appraisal district or property owner will rely on to challenge the Comptroller's preliminary findings. This requirement gives the agency's staff enough time to look at all available evidence, try to resolve a protest without a hearing and hold a hearing if necessary. Staff cannot review late-filed evidence and will make a motion to the hearing examiner that late evidence be excluded. The hearing examiner's decision is independent of the staff's recommendation.

#### **Property owner protests**

A property owner may protest the study's preliminary findings if the property tax liability for all of the owner's properties in a school district category sample is \$100,000 or more for the year of the study.

Property owners are subject to the same general protest petition filing requirements, deadlines and other protest procedures. There are, however, some differences.

- The property owner or property owner's agent must sign the protest petition.

- The owner must be prepared to show the hearing examiner that the total tax liability on the property or properties included in a school district's category sample is \$100,000 or more. The Comptroller's rule gives the hearing examiner responsibility for determining whether the hearing examiner has jurisdiction over the protest. If the owner cannot show the total tax liability is \$100,000 or more for the year of the study, the examiner does not have authority to hear the protest.
- The property owner is not required to notify districts that may experience changes as a result of the protest. Districts may call the PTD's Complex Property Section after the filing deadline to find out if a property owner in the district has protested. Likewise, although the Comptroller sends each district a new summary of final values, a district may call the PTD's Complex Property Section to find out if the result of an owner's protest has changed its value or measures.
- If you are a property owner and want more information on submitting a protest, call the Complex Property Section at 1-800-252-9121.

#### **Step 4. — PTD Staff Review, Recommendation, and Informal Conferences**

Division staff will review all submitted evidence and make recommendations for resolving the protest. More often than not, protests are settled informally after the staff recommends adjustments to appraisal performance measures or market value estimates.

#### **Additional evidence rule**

Staff may request additional evidence that could help resolve the protest. Districts have 10 working days from the date of the request to submit this evidence. Evidence requested in this manner but not provided to staff may not be used in a protest hearing.

The 10-day rule is not intended to complete a protest filed without sufficient evidence. The PTD staff will request additional evidence under the 10-day rule only when the issue could be resolved by production of "self-proving" documents such as a warranty deed or closing statement to prove the market nature of a sale.

#### **Staff may recommend other changes**

The Comptroller's duty is to ensure the study's overall accuracy; therefore, staff's review of a protest is not limited to merely those specific items raised by a protest. A full review of protested categories and a recommendation devised to ensure accuracy are necessary for staff to meet its obligation.

For example, a protest requesting that some non-market transactions be deleted from the sample may result in a recommendation that all non-market transactions be deleted from the sample. Likewise, a protest suggesting that some sales be added to the sample could result in a recommenda-



tion that all known sales be added to the sales population and a new sample randomly selected from that population.

If the sample was randomly selected, staff may replace any sales deleted during the protest process with alternative randomly selected sales. If a shortage of alternative sales prevents PTD from reaching its target margin of error, PTD may recommend randomly selecting properties to appraise for inclusion in the sample. **In any event, the recommended new ratio may be higher or lower than the ratio originally protested.**

#### **Your response**

After reviewing your protest, staff mails a *Conference Hearing and Notification* form along with the written recommendation on your protest. You should review the recommendation and tell PTD whether you agree or disagree by completing and returning the form. If you agree, your protest will be resolved and a hearing will not be required. If you disagree, you may request that the hearing be conducted by written submission by selecting that option on the form. The hearing examiner will give your written submission the same weight given to evidence presented in person.

#### **Informal resolution conferences**

**Informal conferences are scheduled for April 30 through May 4, 2007.** Before the hearing on an unresolved protest, the division schedules an informal resolution conference to explore the possibility of resolving the protest without the necessity of a formal hearing. Staff will notify you of the date and time set for your informal conference. These informal resolution conferences may be conducted entirely in writing or, for those who prefer not to travel to Austin, via telephone conference call. Please contact the Property Tax Division at 1-800-252-9121 to discuss the conference call option.

#### **Step 5. — The Hearing**

**Formal hearing dates are scheduled for May 14 through 18, 2007.** The agency will notify each protesting party's agent of the date and time of the hearing after it receives the protest. While the division's goal is to be as accommodating as possible, hearing dates cannot be rescheduled without creating serious difficulty in controlling the flow of protests. Therefore, staff will not reschedule a hearing without a showing of good cause. Consolidation of hearing dates for the convenience of an agent or attorney is not good cause for rescheduling.

Hearings are conducted by hearing examiners who have been specifically chosen to hear all protests. During a hearing, the protesting party may present oral argument to support its challenge. However, the protesting party may not raise an issue or request a remedy that was not specified in the petition and may not present oral or written evidence that was not submitted with the petition. Admissions, proposals, or offers made in attempts to compromise disputed issues in a preliminary conference may not be admitted in a hearing.

The hearing examiner's decision is based on the evidence and arguments of the protesting party and the PTD staff. The examiner must issue a written decision. This decision is faxed to each protesting party or mailed by overnight delivery service.

#### **Guidelines for presenting a protest**

If you appear at a protest hearing, you should present your protest by following these guidelines:

##### **Restrict your comments.**

You may not introduce evidence you did not already submit by March 12 and you may not protest new categories, issues or remedies at the hearing. Oral evidence, presented by an agent or attorney, must reflect evidence timely filed with the petition.

##### **Be organized.**

Unless directed otherwise by the hearing examiner, support your request by:

- stating the name of the school district;
- presenting your protest in category order;
- summarizing the evidence you have provided on that property or issue; and
- continuing with the next issue, category or school district.

##### **Be brief.**

The hearing examiner may set a time limit for the hearing. Brevity will allow time for the hearing examiner to ask questions. You must observe the time limit established for the hearing, regardless of the number of categories you are protesting.

##### **Stick to the point.**

Bringing up issues that the hearing examiner cannot resolve, such as state education aid allocations, will reduce the amount of time you have to discuss your evidence. While the hearing examiner may be sympathetic, he or she will only consider adjusting preliminary ratios and values based on relevant evidence—that is, evidence related to the correct total taxable value for your school district.

#### **Step 6. — Written Exceptions**

The hearing examiner will prepare and deliver to your agent the proposed decision on your protest. You may file written exceptions to it, but you may not submit any more evidence. Exceptions must be delivered no later than ten days after the date the recommendation was sent to the agent. Other parties will have an opportunity to reply to your exceptions. Staff also may choose to file exceptions to a proposed decision. Staff exceptions will be mailed to your agent. You will have 20 days from the date the proposed decision was sent to reply to staff's or any other party's exceptions.

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The examiner will consider all written exceptions and replies. Based on these documents, the examiner may decide to change the proposed decision. However, he or she also may decide to let the proposed decision become final without changes.

If exceptions are not filed within ten days, the proposed decision becomes final. If exceptions are filed, the original or amended decision becomes final when signed by the Deputy Comptroller.

### **Step 7. — *Appealing a Final Decision***

The hearing examiner notifies each protesting party's agent of the final decision if exceptions are filed. The statute permits school districts to appeal the examiner's final decision to the Travis County District Court by filing a petition within 30 days

of the date it receives notice of the Comptroller's final decision. The law does not give taxpayers or appraisal districts the right to appeal to district court.

A school district may appeal to district court only those items and issues raised in its petition and exceptions.

School districts are not barred from appealing to district court simply because they work with their appraisal district to file their protest or protest jointly with the appraisal district. A school district may appeal to district court if it filed a timely protest petition signed by the superintendent. That protest petition may be either a joint school/appraisal district protest or it may be a separate school-district-only petition. Ⓡ

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# Appendices



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# Appendix A

## Selective Re-appraisal of Sales (Sales Chasing)

Beginning with the 1999 property value study, Section 403.302, Government Code required the Comptroller to ensure that “different levels of appraisal on sold and unsold property do not adversely affect the accuracy of the study.” Differing levels of appraisal are often referred to as unequal appraisal, and the most common cause of unequal appraisal is “sales chasing.”

### Definition

Sales chasing is the practice of using the sale of a property to trigger a change in appraised value of that property to (or near) the property’s selling price. In contrast, the appraised value of unsold property is not changed. In addition to causing unequal appraisal in the CAD, the practice of sales chasing may cause invalid findings in ratio studies like the property value study.

### Effect on the Property Value Study

Sales chasing may taint the findings of ratio studies that require large samples of sales. The study depends heavily on sales because the alternative, conducting appraisals, is cost prohibitive. If a CAD is chasing sales, the sample will show appraised values at or near market value. Since the sample is made up of a subgroup of all properties in its category and this subgroup has been treated differently by the CAD than the universe of properties, this sample may not reflect the true nature of the universe of properties. The reality may be that

the majority of appraised values—unsold properties—may be below or above market value. In a rising housing market, sales chasing may cause a study to arrive at an inaccurately low taxable value. Conversely, in a falling market, sales chasing may cause a study to arrive at an inaccurately high taxable value.

### Study Response

PTD’s response to the legal requirement that it ensure that the accuracy of the study is unaffected by unequal appraisal has two primary steps:

1. conduct one or more tests in each CAD to determine if it is likely sales chasing is occurring; and
2. adjust the sample to correct for sales chasing in districts where sales chasing is likely.

In situations where sample adjustments are required, PTD staff ensures that the sample contains properties that had no chance of unequal treatment by sales chasing. This is done by including sales that occurred too late in the study year for the sales price to be used by the CAD, by including sales from sources unavailable to the CAD or by including PTD staff appraisals.

It is important to note that even in districts where samples are adjusted, if sold and unsold property is appraised equally at or near market value, the study findings will not be adverse to the school or CAD. ✦



# Appendix B

## Questions and Answers about Margins of Error and Confidence Intervals in the Property Value Study

### Definitions

**95% confidence interval:** The 95 percent confidence interval or range of values means that, on average, 95 out of 100 samples would result in a value that lies within the computed range of values. The correct value is assumed to be within the computed range of values.

**standard error:** A "standard error" is a commonly used statistical term. It is a measure of the differences between an average and all the numbers that go into determining that average. Conceptually, it is somewhat similar to a coefficient of dispersion.

**"t-value":** The "t-value" is an adjustment factor that increases the margin of error as the sample size decreases.

### 1. What is a margin of error? How is it calculated?

A margin of error (as computed in the Property Value Study) is approximately twice the "standard error" of a school district's estimated value (in the property categories "tested"), expressed as a percentage of such value. Consequently, the margin of error indicates statistical reliability. The following procedures are used to calculate the PTD margin of error:

- (a) Calculate the "standard error" (SE \$) of the school district's estimated value.
- (b) Multiply the "standard error" (SE \$) by the appropriate t-value at the 95 percent "confidence interval." (See definition above.)

(c) Divide the product of the standard error (SE \$) and the t-value (See definition.) by the school district's estimated value.  
formula = (SE \$ \* t-value) / ISD \$ estimate

### 2. How is a margin of error related to a confidence interval?

The margin of error is equal to one half of the confidence interval expressed as a percent of total value "tested" in a school district. For example, assume that PTD staff estimates market value in sampled and censused property categories in school district ABC to be \$100 million (before exemptions). The margin of error is computed to be plus or minus 5 percent of \$100 million. Market value plus 5 percent is \$105 million; market value minus 5 percent is \$95 million (the \$100 million estimate is known as a "point estimate"; the confidence interval of \$95 million to \$105 million is often called an "interval estimate.")

### 3. What is the purpose of a confidence interval?

A confidence interval provides one measure of whether the state's estimate of value in a school district is statistically significantly different from the self-reported appraisal roll value (i.e., local value) in that district. In other words, a confidence interval is a measure of the reliability (or precision) of the Comptroller's estimate of school district value.

Assume that Comptroller staff estimates market value in ABC school district to be \$100 million with a margin of error of 5 percent at the 95 percent confidence level. This means that the actual market value in ABC school district is probably somewhere between \$95 million and \$105 million. This range constitutes the 95 percent confidence interval. The 95 percent confidence interval means that, in repeated sampling of this school district, approximately 95 of every 100 computed confidence intervals would be expected to contain the true market value, which staff has estimated to be \$100 million, while only five of these would not.

If the local value in the ABC school district lies within the calculated confidence interval, then the difference between the local value and the "point estimate" of value is statistically insignificant. This means that the Comptroller's study does not disprove local value. In this case, the Comptroller certifies ABC's local value to the commissioner of education. If the local value lies outside the confidence interval, it is considered invalid. Unless the school district is in a grace period (see page 3), the Comptroller's estimate of value is certified to the Commissioner of Education. If local value lies outside the confidence interval, the study results have disproved local value because the difference between the local value and

the Comptroller's estimate is statistically significant.

The study contains a "hold harmless" feature. This feature means that if the school district's tested value is calculated to be within 5 percent of the PTD estimate of value, the PTD will automatically certify the school district's value. Also, if the school district's margin of error is calculated to be less than 5 percent, then the PTD will calculate (i.e., widen) the confidence interval as if it were 5 percent for purposes of certifying value. The actual percentage used in the calculation is set by management and could vary in future studies.

**4. Is the target margin of error the same in every school district?**

Yes. The target margin of error is also referred to as a "planned" margin of error.

**5. If the target margin of error is the same in every district, is the target confidence interval the same in every district?**

No, because they are expressed in different units. For example, the margin of error is expressed in percentage terms while the confidence interval is expressed in dollar terms. Assume there are two districts, ABC and XYZ. The Comptroller estimates the total value (in tested property categories) to be \$100 million (in ABC) and \$500 million (in XYZ). If the margin of error is 5 percent in both districts, the confidence interval of ABC would be \$95 million to \$105 million, while the confidence interval for XYZ would be \$475 million to \$525 million. Although the margin of error is the same for both districts, the "widths" of the confidence intervals are different because the districts' values are different. However, even if two school districts have identical margins of error and/or confidence intervals, this does not determine whether local or state value will be certified. The critical test is whether local value lies within the PTD computed confidence interval for the district.

**6. Are the confidence interval and margin of error for a school district computed on the basis of all value in the district?**

No. In computing a confidence interval for a school district, staff only includes property categories whose values were estimated from representative (i.e., random) samples taken in that school district. If a property category is not tested, that category value is excluded from the confidence interval and margin of error calculations for that school district.

For example, assume a school district with a Comptroller estimate of market value of \$106 million before exemptions. Total local value in the district as shown on the self report is \$98 million. The estimated margin of error is 5 percent. Assume further that staff does not sample any properties in Multi-family (category B) and Vacant Lots (category C) in the school district because they constitute less than 5 percent of value. The combined value of these "non-sampled" (i.e., non-tested) categories is \$6 million. "Non-sampled" property categories are assigned local value.

The confidence interval for this district is computed as follows:

\$106 million less \$6 million = \$100 million (the point estimate)

\$100 million - 5 percent and \$100 million + 5 percent = \$95 million and \$105 million (the confidence interval).

Since the local value for the "sampled" property categories (excluding categories B and C) lies within the confidence interval, the Comptroller would certify local value for the district.

Remember that the Comptroller computes confidence intervals before deducting exemptions. If a school district's local value, before exemptions, lies within the Comptroller's computed confidence interval, then the Comptroller certifies local taxable value, after exemptions, to the commissioner of education.

**7. Are "technical" properties treated differently than "local" properties?**

Yes. In many cases, technical properties are treated as censused (i.e., "non-random") categories rather than sampled categories. (In a census, one studies every unit in a group to determine some characteristic of the group. In a sample, one studies a portion of the units in a group to estimate some characteristic of the group. Sampling requires far fewer resources than conducting a census.)

Censused properties are not used to calculate the confidence interval, but they are used to calculate the margin of error. All properties in a census are studied so there is no sampling error since the variance and standard error for censused properties is zero.

On the confidence interval detail sheet, censused properties are shown as "non-random" properties. To compute the margin of error, staff adds the value of censused properties to the combined value of the sampled property categories. One half of the confidence interval (as computed from sampled and censused properties) is divided by this total to produce the margin of error for the school district.

In effect, the censused (non-random) properties collectively comprise a separate subcategory.

All properties in the J category (Utilities) as well as the D2 category (qualified agricultural acreage) sample are treated as censused properties.

**8. How does the Comptroller's use of confidence intervals affect the methodology used to select and appraise properties for the Property Value Study?**

It has no effect. Confidence intervals for each school district's market value are calculated after all sales and appraisals are entered into the system and all market values are calculated. ☺



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# **Appendix C**

## **Method Used to Compute Confidence Intervals**

# Definitions

CAD = County Appraisal District

PTD = Property Tax Division of Texas Comptroller's office

For each ISD  $m$ ,  $m = 1, 2, \dots$

Let  $h$  = category value stratum or total category, depending on whether stratification is used ( $h=1, 2, \dots, L$ )  
category A, B, C, D1, F1, L1, M, G, (random portion.)

$i$  = parcels ( $i=1, 2, \dots, n_h$ )

$x_{hi}$  = CAD \$ value (local self-reported appraisal roll value) of  $i^{\text{th}}$  parcel, value stratum or category  $h$

$TX_h$  = total CAD \$ value, value stratum or category  $h$

$y_{hi}$  = PTD \$ value of  $i^{\text{th}}$  parcel, value stratum or category  $h$

$\hat{T}Y_h$  = estimated PTD \$ value, value stratum or category  $h$

$\bar{x}_h$  = sample mean, CAD values, value stratum or category  $h$

$\bar{y}_h$  = sample mean, PTD values, value stratum or category  $h$

$N_h$  = total number of parcels (population), value stratum or category  $h$

$n_h$  = number of sample parcels, value stratum or category  $h$

$L$  = number of value strata/categories in a school district

$$\hat{R}1_h = \frac{\bar{x}_h}{\bar{y}_h} = \text{estimated weighted average level of appraisal, value stratum or category } h$$

$$\hat{R}2_h = \frac{\bar{y}_h}{\bar{x}_h} = \text{inverse of estimated weighted average level of appraisal, value stratum or category } h$$

$$\hat{R}2_h = 1 / \hat{R}1_h$$

$S_h^2$  is the PTD's measure of variability:

$$S_h^2 = RVx_h + RVy_h - 2RVx_hy_h$$

$$RVx_h = \left\{ \frac{1}{n_h-1} \left[ \sum x_{hi}^2 - \frac{(\sum x_{hi})^2}{n_h} \right] \right\} / \bar{x}_h^2$$

$$RVy_h = \left\{ \frac{1}{n_h-1} \left[ \sum y_{hi}^2 - \frac{(\sum y_{hi})^2}{n_h} \right] \right\} / \bar{y}_h^2$$

$$RVx_hy_h = \left\{ \frac{1}{n_h-1} \left[ \sum x_{hi}y_{hi} - \frac{(\sum x_{hi})(\sum y_{hi})}{n_h} \right] \right\} / \bar{x}_h\bar{y}_h$$

# Method Used to Compute Confidence Intervals

1. Compute variance (Var) of  $\hat{R}2_h$  in each value stratum or category of the following property categories, if sampled: A, B, C, D1, F1, L1, M, and the randomly selected portion of G. If the PTD used value-stratified ratios in estimating category values, then compute variances by value stratum. If not, compute variances by category.

$$\text{Recall that } \hat{R}1_h = \frac{\bar{x}_h}{\bar{y}_h}; \quad \hat{R}2_h = \frac{\bar{y}_h}{\bar{x}_h}; \quad \text{and } \hat{R}2_h = 1 / \hat{R}1_h.$$

$$\text{Var} (\hat{R}2_h) = \left[ \left( \frac{N_h - n_h}{N_h n_h} \right) (R2_h)^2 \right] S_h^2.$$

2. Let  $TX_{\text{ran}}$  and  $\hat{T}Y_{\text{ran}}$  equal total CAD \$ value and total PTD \$ value, respectively, of all categories sampled in Step 1 above.

$$TX_{\text{ran}} = \sum_{h=1}^L TX_h$$

$$\hat{T}Y_{\text{ran}} = \sum_{h=1}^L \hat{T}Y_h$$

$$\hat{R}1_{\text{ran}} = \frac{TX_{\text{ran}}}{\hat{T}Y_{\text{ran}}}$$

$$\hat{R}2_{\text{ran}} = \frac{\hat{T}Y_{\text{ran}}}{TX_{\text{ran}}}$$

Note: The subscript "ran" denotes randomly sampled categories or representatively sampled categories.

3. Compute the variance of  $\hat{R}2_{\text{ran}}$  as derived from categories sampled in Step 1.

$$\hat{R}2_{\text{ran}} = \frac{\hat{T}Y_{\text{ran}}}{TX_{\text{ran}}} = \frac{\sum_{h=1}^L R2_h TX_h}{TX_{\text{ran}}}$$

$$\text{Var} (\hat{R}2_{\text{ran}}) = \sum_{h=1}^L \left( \frac{TX_h}{TX_{\text{ran}}} \right)^2 \text{Var} (\hat{R}2_h)$$

4. Calculate the standard error (SE) of  $\hat{R}2_{ran}$

$$SE(\hat{R}2_{ran}) = \sqrt{\text{Var}(\hat{R}2_{ran})}$$

5. Multiply SE ( $\hat{R}2_{ran}$ ) by the "t - value" for  $\hat{R}2_{ran}$  as derived from categories sampled in Step 1 above.

The t values used by the PTD are approximations to those of exact Student's t distributions with corresponding degrees of freedom. To determine the degrees of freedom, subtract the number of value strata (from stratified categories) plus the number of non-stratified categories from the combined samples. In other words,

$$\text{degrees of freedom} = \sum n_h - L.$$

6. Take the product of

$$[ SE(\hat{R}2_{ran}) * t \text{ value} ]$$

as a percent of  $\hat{R}2_{ran}$  as derived from categories sampled in Step 1.

7. Multiply the percent obtained in Step 6 by  $\hat{Y}_{ran}$  as computed from categories sampled in Step 1. Call this ME\$.

$$ME\$ = \left\{ \frac{[ SE(\hat{R}2_{ran}) * t \text{ value} ]}{\hat{R}2_{ran}} \right\} * \hat{Y}_{ran}$$

8. Recall  $TX_{ran}$  and  $\hat{Y}_{ran}$

To these two sums, add the respective appraisal roll values and the PTD values of D1 (minus timber) and the sample in category J, the non-random portion of G and parcels with an "E" flag. Let these two sums be  $TX_{TOT}$  and  $\hat{Y}_{TOT}$  respectively.

9. Compute the confidence interval for the school district. (Note: only tested categories are included in confidence interval computations.)

$$\hat{Y}_{TOT} \pm ME\$$$

If  $TX_{TOT}$  lies within this confidence interval or within the "hold harmless" margin of error (see Appendix B, #3),  $TX_{TOT}$  is valid; otherwise  $TX_{TOT}$  is invalid.



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**Texas Comptroller of Public Accounts**  
**Publication #96-304**  
**Revised January 2007**