



Liberty County Central Appraisal District Summary Appraisal Report



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Chief Appraiser

Dated: December 1, 1999
Updated: September 20, 2018

**Liberty County Central
Appraisal District
Mass Summary Appraisal Report**



2018

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INTRODUCTION

Scope of Responsibility

The Liberty County Central Appraisal District has prepared and published this report to provide our citizens and taxpayers with a better understanding of the district's responsibilities and activities. This mass appraisal report was written in compliance with Standards Rule 6-7 of the Uniform Standards of Professional Appraisal Practice (USPAP) as promulgated by the Appraisal Standards Board of The Appraisal Foundation. This report has several parts: a general introduction and then several sections describing information specific to particular appraisal divisions. The CAD also adheres to the IAAO Standards, see addendum.

The 2018 mass appraisal was prepared under the provisions of the Texas Property Tax Code. Taxing jurisdictions that participate in the district must use the appraisals as the basis for imposition of property taxes. The State of Texas allocates state funds to school districts based upon the district's appraisals, as tested and modified by the State Comptroller of Public Accounts.

The 2018 mass appraisal results in an estimate of the market value of each taxable property within the district's boundaries. Where required by law, the district also estimates value on several bases other than market value. These are described where applicable later in this report.

General Assumptions and Limiting Conditions

The appraised value estimates provided by Liberty County Central Appraisal District are subject to the following conditions:

- The appraisals were prepared exclusively for ad valorem tax purposes.
- The property characteristics data upon which the appraisals are based is assumed to be correct.
- Physical inspections of the property appraised were performed as staff resources and time allowed.
- Validation of sales transactions occurred through questionnaires to buyer and seller, telephone survey and field review. In the absence of such confirmation, residential sales data obtained from vendors was considered reliable.
- No responsibility is assumed for the legal description or for matters including legal or title considerations. Title to any property is assumed to be good and marketable, unless otherwise stated.
- All property is appraised as if free and clear of any or all liens or encumbrances, unless otherwise stated. All taxes are assumed to be current.
- All property is appraised as though under responsible, adequately capitalized ownership and competent property management.
- All engineering is assumed to be correct. Any plot plans and/or illustrative material contained with the appraisal records are included only to assist in visualizing the property.
- It is assumed that there is full compliance with all applicable federal, state and local environmental regulations and laws unless noncompliance is stated, defined and considered in this mass appraisal report.

- It is assumed that all applicable zoning and use regulations and restrictions have been complied with unless non-conformity has been stated, defined and considered in this mass appraisal report.
- It is assumed that all required licenses, certificates of occupancy, consents or other legislative or administrative authority from any local, state or national government or private entity or organization have been or can be obtained or renewed for any use on which the value estimate contained in this report is based.
- It is assumed that the utilization of the land and improvements of the properties described are within the boundaries or property lines, and that there are no encroachments or trespasses unless noted on the appraisal record.

Unless otherwise stated in this report, the appraiser is not aware of the existence of hazardous substances or other environmental conditions. The value estimates are predicated on the assumption that there is no such condition on or in the property or in such proximity thereto that it would cause a loss in value. No responsibility is assumed for any such conditions, or for any expertise or engineering knowledge required to discover them.

Effective Date of Appraisal and Date of the Report

With the exception of certain inventories for which the property owner has elected a valuation date of September 1, 2017; all appraisals are as of January 1, 2018. The date of this report is September 20, 2018.

Definition of Value

Except as otherwise provided by the Texas Property Tax Code (hereafter “Tax Code”), all taxable property is appraised at its “market value” as of January 1. Under the tax code, “market value” means the price at which a property would transfer for cash or its equivalent under prevailing market conditions if:

- exposed for sale in the open market with a reasonable time for the seller to find a purchaser;
- both the seller and the buyer 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;
- both the seller and buyer seek to maximize their gains and neither is in a position to take advantage of the exigencies of the other.

The Tax Code defines special appraisal provisions for the valuation of several different categories of property. Specially appraised property is taxed on a basis other than market value as defined above. These categories include residential homestead property (Sec. 23.23, Tax Code), agricultural and timber property (Chapter 23, Subchapters C and D, Tax Code), real and personal property inventory (Sec. 23.12, Tax Code), certain types of dealer inventory (Sec. 23.121, 23.124, 23.1241 and 23.127), and nominal (Sec. 23.18) or restricted use properties (Sec. 23.83).

“Agricultural or Timber Use Value” means land designated for agricultural or timber use is appraised at its value based on the land’s capacity to produce agricultural or timber products but this value cannot exceed the market value of the land.

“Real Property Inventory Value” the market value of an inventory is the price for which it would sell as a unit to a purchaser who would continue the business. An inventory is defined as residential real property which has never been occupied as a residence and is held for sale in the ordinary course of a trade or business, provided that the residential real property remains unoccupied, is not leased or rented, and produces no income.

“Dealer Inventory Value” means the market value of a dealer’s inventory on January 1, is the total annual sales from the dealer’s inventory, less sales to dealer’s fleet transactions, and subsequent sales, for the twelve (12) month period corresponding to the prior tax year, divided by twelve (12).

“Nominal Value” means a trivial value placed on the property nominally owned by a non-profit organization for the benefit of its members.

“Restricted Use Value” means the value of land devoted exclusively to recreational, park, or scenic uses considering only those factors relating to the value of land as restricted and sales of comparable land not similarly restricted may not be used to determine value.

Properties Appraised

The Liberty County Central Appraisal District operates a computer assisted mass appraisal system utilizing recognized mass appraisal techniques in conformance with USPAP and IAAO standards. Annually the District appraises in excess of 100,000 properties. These properties make up the appraisal roll for the district and are described in the District’s property records maintained by the Chief Appraiser. These properties are categorized in accordance with the use classification codes established by the State Comptroller’s Office Property Tax Division (PTD). Please see addendum for a list of these codes.

All the above definitions established by the State Property Tax Code differ from the definitions established by USPAP; therefore, a jurisdictional exception applies. Please reference Section 23 of the Property Tax Code for further guidance on appraisal methods and special valuation provisions.

All properties rights are appraised in fee and in compliance with Texas Property Tax Code Sec. 25.06. The District will take into consideration the extent to which any restriction on use of the property or how other individual characteristics of the property may affect market value.

Furthermore, the LCCAD property records contain data on property characteristics, ownership, address, situs, legal descriptions, certain allowable exemptions and new construction. These property record cards and frequently used forms may be accessed on-line at www.libertycad.com

Personnel Resources/Scope of Work Used to Develop the Appraisal

This mass appraisal valued all taxable real and tangible personal property within the boundaries of the Liberty County Central Appraisal District, which encompasses all of Liberty County, Texas.

The Chief Appraiser, who is the chief executive officer of the appraisal district, manages the district. All district departments report to the chief appraiser. The district's appraisers are subject to the provisions of the Property Taxation Professional Certification Act and must be duly registered with The Texas Department of Licensing and Regulation. Please see attachment C for the list of employees who contributed to the mass appraisal of property.

While the appraisal district staff conducted most of the appraisal activities, the district received assistance from Hugh Landrum & Associates and from the staffs of those appraisal districts whose boundaries overlap ours. The district complies with procedures whereby ownership and property data information are routinely exchanged. The staff is assigned to oversee the ongoing exchange of data with overlap districts. Liberty County Central Appraisal District staff and adjacent appraisal districts discuss data collection and valuation issues to minimize the possibility of differences in property characteristics, legal descriptions, and other administrative data.

The law governing the responsibility of overlapping appraisal districts was recently amended in the 80th legislative session. Effective January 1, 2008, HB 1010 sets the appraisal district's boundaries the same as the county's boundaries. The need to share property record and maintenance data is no longer necessary for parcels located within the Liberty County boundaries.

Determination of Highest and Best Use for Real Property

The district's market value appraisals are performed pursuant to Article VIII, Sec. 1., Texas Constitution, which provides that property must be taxed in proportion to its value as determined by law, Sec. 23.01; Tax Code implements this provision as follows:

§ 23.01. Appraisals Generally

- (a) Except as otherwise provided by this chapter, all taxable property is appraised at its market value as of January 1.
- (b) The market value of property shall be determined by the application of generally recognized appraisal methods and techniques. If the appraisal district determines the appraised value of a property using mass appraisal standards, the mass appraisal standards must comply with the Uniform Standards of Professional Appraisal Practice. The same or similar appraisal methods and techniques shall be used in appraising the same or similar kinds of property. However, each property shall be appraised based upon the individual characteristics that affect the property's market value.

While there is no specific statute defining highest and best use as it applies in appraisals conducted under the Property Tax Code, Texas courts have acknowledged that highest and best use is a factor that must be considered in determining market value. King v. Real 466 S.W.2d 1 TEX.Civ.App., 1971, Exxon Pipeline Co. v. Zwahr 2002 WL 1027003 Tex.,2002.

In an unpublished opinion, the Houston Court of Appeals approved the following definition of highest and best use:

"Highest and best use" is the reasonably probable and legal use of vacant land or an improved property, which is physically possible, appropriately supported, financially feasible, and results in the highest value. The four criteria the highest and best use must meet are legal permissibility, physical possibility, financial feasibility, and maximum profitability. Clear Creek Drainage Dist. of Galveston County v. Manison Not Reported in S.W.3d Tex.App.-Houston [14 Dist.],1997.

Appraisal Performance Tests and Performance Measures Attained

The Texas Comptroller of Public Accounts conducts a biannual study to determine the degree of uniformity of and the median level of appraisals by the appraisal district within each major category of property, as required by Section 5.10, Property Tax Code.

If the locally appraised value in a school district is within the statistical margin of error of the state value, the Comptroller's Property Tax Division (PTD) certifies a school district's local tax roll value to the Commissioner of Education. A 5% margin of error is used to establish the upper and lower value limit for each school district. If the local value is outside the acceptable range, the PTD certifies the state value, unless the school district is eligible for a grace period, which is a two-year period when local value is used even though it is determined to be invalid.

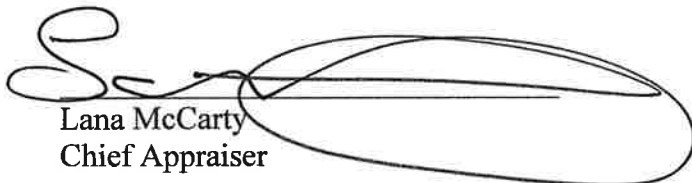
HB 8 changes the frequency of the PVS from every year to every other year, unless the study reveals invalid findings, in which case, the study is conducted every year until the school district receives valid findings. The bill creates the Comptroller's Property Value Study Advisory Committee, including a Speaker-appointed House member, a Lieutenant Governor-appointed Senate member, two Comptroller-appointed appraisal district representatives, two Comptroller-appointed school district representatives, and three additional appointments by the Comptroller. The bill directs the Comptroller to review each CAD every other year concerning governance, taxpayer assistance and compliance with generally accepted appraisal standards, procedures and methodology. This is commonly referred to as MAPS (Methods and Procedures Study).

Certification Statement:

"I certify that, to the best of my knowledge and belief:

- The statements of fact contained in this report are true and correct.
- The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are my personal, impartial, and unbiased professional analyses, opinions, and conclusions.
- I have no present or prospective interest in the property that is the subject of this report, and I have no personal interest with respect to the parties involved.
- I have performed no services, as an appraiser or in any other capacity, regarding the property that is the subject of this report within the three year period immediately preceding acceptance of this assignment.
- My engagement in this assignment was not contingent upon developing or reporting predetermined results.
- My compensation for completing this assignment is not contingent upon the reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this appraisal.
- My analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the *Uniform Standards of Professional Appraisal Practice*.
- I have not made a personal inspection of the properties that are the subject of this report.
- No one provided significant mass appraisal assistance to the person signing this certification, aside from the parties named on attachment "C".

"I, Lana McCarty, Chief Appraiser for the Liberty County Central Appraisal District, solemnly swear that I have made or caused to be made a diligent inquiry to ascertain all property in the district subject to appraisal by me, and that I have included in the records all property that I am aware of at an appraised value which, to the best of my knowledge and belief, was determined as required by law."


Lana McCarty
Chief Appraiser

Area and Neighborhood Analysis

Liberty County is located Northeast of Harris County, South of San Jacinto County, West of Jefferson County, and North of Chambers County. Downtown Houston is located approximately thirty (30) miles to the Southeast. LCCAD encompasses all of Liberty County.

The District analyzes social, economic, governmental, and environmental forces which influence property values in the area. This area of influence is delineated into neighborhoods. A “neighborhood” is defined as a group of complimentary land uses. A “District” is a type of neighborhood with homogeneous land use.

The primary neighborhood boundaries for LCCAD is the seven (7) school district neighborhoods based on land use, type of structures, transportation arteries or topography. Market and sales data is gathered and analyzed by neighborhood or district.

Data Collection and Valuation

The District has developed a separate appraisal manual for real and personal property. These manuals contain appraisal procedures, codes, model specifications and value schedules. Annually, these manuals are reviewed to meet changing requirements, neighborhoods and market conditions. Copies of these manuals are maintained in the Appraisal District’s Office. The Appraisal of industrial and mineral properties is contracted out to Hugh Landrum & Associates in Houston, Texas. See Addendum for copies of their summary reports.

Specific data on individual properties is collected from inspection, property owners, brokers, appraisers, land men, etc. Additionally, data obtained from existing public records, published sources and regulatory reports.

Field inspections are the primary source of data on individual properties. An efficient field data collection system requires organization, planning and supervision. LCCAD has seven (7) supervisors and eleven (11) staff appraisers. Three (3) of these appraisers are primarily assigned to appraise personal property but are cross-trained in real property. The remaining staff members specialize in real property. Information gathered from inspections is recorded on an appraisal card or field inspection data sheet and then key punched into the automated appraisal system. Appraisal cards may be printed from the system.

For personal property appraisal the county is divided into two (2) zones – one consisting of all properties east of the Trinity River and the other consisting of all property west of the Trinity River. Real property zones coincide with the boundaries of the County’s seven (7) school districts. Appraisers are assigned primary appraisal responsibility to one (1) zone but may be assigned to assist in other zones depending on the District’s resources and workload.

Supervisors are charged with the responsibility of ensuring the appraisers follow procedures and are adequately trained. They are also responsible for reviewing the field appraisers’ work.

Model Specification and Calibration

Market Analysis

A market analysis relates directly to market forces affecting supply and demand. This study involves the effect of social, environmental, economic, governmental, and site conditions on the universe of property appraised by the Liberty County Central Appraisal District.

The district reviews weekly local newspapers including the Liberty Gazette, Liberty Vindicator the Cleveland Advocate to stay abreast on changes in the local market. In addition, on a daily basis the District reviews the Houston Chronicle and the Beaumont Enterprise for information on both local and regional influences affecting supply and demand. State wide publications such as the Texas Real Estate Center's "Trends" magazine, Texas Association of Appraisal District's "The Appraiser" and the Texas Association of Assessing Officers' "Texas Assessor's News" are reviewed periodically. Other local sources include Chamber of Commerce newsletters.

Since Liberty County does not have the advantage of a multiple listing service for real estate sales information, the Appraisal District maintains its own sales data base. The information in this data base is gathered from contact with buyers, sellers, appraisers and brokers. This data base is used extensively by outside appraisers and brokers.

The District's valuation schedules are divided into four (4) main classifications; land; residential improvements, commercial improvements and personal property.

Land Schedules

The land tables are built primarily from a market analysis of comparable sales. These sales must be stratified into homogeneous groups reflecting geographic areas subject to different market influences. Within strata, land tables should be built using units of comparison found in the market (i.e., acre, square foot, front foot, etc.). In some cases the appraisal staff may use the abstraction method to determine, adjust or reconcile land values. The base values reflected in the land tables are built around three (3) primary influences: location, size and access. Adjustment for special influences such as drainage, easements, and frontage may be necessary to reconcile base values to individual properties.

Residential and Commercial Schedules

All residential and commercial parcels are valued using schedules which are cost based tables adjusted by sales or income data from Liberty County. The comparative unit of measure used in these tables is price per square foot. Base values are established based on quality of construction and size and modified for locational factors by neighborhood. Additional adjustments to these bases values are made for condition of improvements based on the District's depreciation schedules. These schedules are calibrated from cost and sales data and are tested to ensure they reflect current market conditions. Adjustment factors for functional and external obsolescence are applied to individual properties or specific locations when warranted. The value of improvements not included in the base

values will be estimated based on their contributory value to the property. These contributory values may be estimated by square foot or as a lump sum adjustment.

The income approach to value may be used to reconcile market value estimates derived from the District's schedules when appropriate and reliable data is available. This approach is applied to those properties typically viewed as income producing and the income methodology is considered a leading value indicator. Reliability of this approach depends on accurate estimates of stabilized income, vacancy and collection losses and expenses. Estimates of market rent are derived from market surveys or actual rents from property owners. Vacancy and collection loss must account for periodic fluctuations in occupancy above and below estimated stabilized level. Allowable expenses estimates are based on a study of the local market assuming prudent management. Capitalization rates may be derived from the market or from the band of investment method. The band of investment relates to satisfying the market return requirements of both debt and equity positions.

In addition, the sales comparison or market approach may be used to reconcile market value estimates derived from the District's schedules when appropriate and sales are available. This approach is utilized not only for estimating land value but also in comparing sales of similarly improved properties to the District's appraised values. Sales may also provide a basis for depreciation schedules or capitalization rates. Sales are used in ratio studies which affords the analyst an excellent means of judging the present level and uniformity of the District's appraised values.

Personal Property Schedules

Four digit codes called Standard Industrial Classification Codes (sic) developed by the Federal Government are used by LCCAD to classify personal property by business type. The District's personal property schedules are developed by analyzing data from personal property renditions, ARB hearings, state schedules, published cost guides and neighboring appraisal districts. The schedules are reviewed as necessary to conform to changing market conditions. Depreciation schedules and trending factors are used to adjust historical cost to a market value estimate.

Sales Review

The District gathers sales information on vacant land, lots, improved residential, commercial properties and industrial properties. These sales are confirmed by property owners, appraisers and brokers. Next, the District's Review Appraiser compiles this sales data and compares it to the District's appraised values. When warranted, field inspections and photographs are ordered.

This sales data assists the District in identifying changes in property uses neighborhoods and market trends. If justified by the sales data, the District may schedule reappraisals of neighborhoods, areas or districts.

Also, individual sales are analyzed to meet the test of market value. Only arm's length transactions are considered unless there is an abundance of foreclosures that represent the

market. Please see addenda for a comparison of value definitions and a list of questionable or invalid sales.

In prior years, district-acquired sales information was made public on our website and in Information & Assistance. HB 2188, a new Texas law that became effective June 18, 2007, makes confidential any information about properties that an appraisal district obtains from private sources. Because of this change in law, we are no longer able to publicly disclose (or display on our website) property sales information we obtain from private sources. The sales books, listing only public information are available for public inspection at the Liberty office, and sales information has been removed from the LCCAD website.

Statistical Analysis

Statistics is a way to analyze data and study characteristics of a collection of properties. In general, it is not feasible to study the entire population; therefore, statistics are introduced into the process. The District performs statistical analysis periodically to evaluate whether appraisal roll values are equitable and consistent with market values. Appraisal statistics of central tendency and dispersion are generated from sales ratios through the District's computer sales module. These ratio studies are conducted by neighborhood, property type and/or class for a predetermined time period. Ratio studies are conducted in accordance with IAAO Standards. Please see IAAO Standards on ratio studies in the addenda.

An independent test of the District's appraisal performance is conducted biannually by the Property Tax Division of the State Comptroller's Office. This study is performed and published by school district and includes those statistical measures that the Comptroller considers appropriate. In addition, a summary of the median levels of appraisal is prepared for the appraisal district by property category.

Taxing Units

Liberty County

Hospital District

Chambers Liberty Navigation District

Navigation—North

Navigation—South

Schools

Cleveland Independent School District

Dayton Independent School District

Devers Independent School District

Hardin Independent School District

Hull-Daisetta Independent School District

Liberty Independent School District

Tarkington Independent School District

Cities

Ames

Cleveland

Daisetta

Dayton

Dayton Lakes

Devers

Hardin

Liberty

Mont Belvieu

Drainage Districts

Drainage District #1—Old River

Drainage District #2—Raywood

Drainage District #4—Devers

Emergency Service Districts

Emergency Service District #2—Hull

Emergency Service District #3—Dayton

Emergency Service District #1—Kenefick

Emergency Service District #7—Hardin

Water Districts

Water Control Improvement District #1—Eastgate

Water Control Improvement District #5—Liberty

Special Districts

Reinvestment Zone 1 "Grand Oaks"—Cleveland

River Ranch Improvement District #1 — Dayton

Mud District #1 River Ranch—Dayton

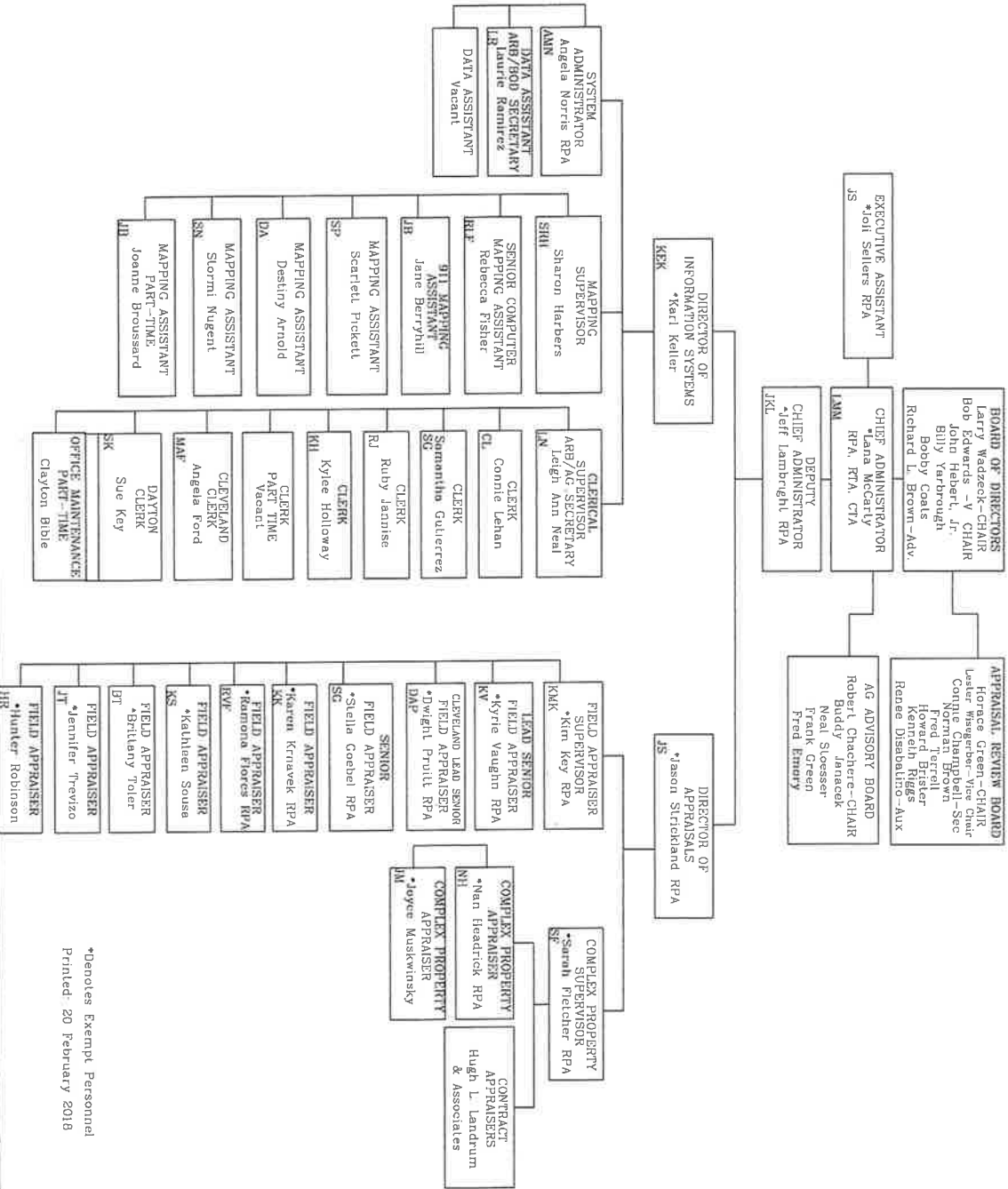
Mud District #3 River Ranch—Dayton

Property Use Category

<u>Code</u>	<u>Description</u>
A	Real, Residential, Single Family
B	Real, Residential, Multi-Family
C1	Real, Vacant, Platted Lots/Tracts
D1	Real, Qualified Open-Space Land
D2	Real, Farm and Ranch Improvements Qualified Open-Space Land
E	Real, Rural Land, not qualified for Open-Space Appraisal, and Residential Improvements
F1	Real, Commercial
F2	Real, Industrial
G	Real, Oil, Gas and other Mineral Reserves, Subsurface Interests
H1	Tangible Personal, Personal Vehicles, not used for Business Purposes
H2	Tangible Personal, Goods in Transit
J	Real and Intangible, Personal, Utilities
L1	Tangible Personal, Business
L2	Tangible Personal, Industrial and Manufacturing
M	Tangible Personal, Mobile Homes & Other
N	Intangible Personal
O	Real, Inventory
S	Special Inventory
X	Exempt Property and subcategories

ATTACHMENT "C"

LIBERTY COUNTY CENTRAL APPRAISAL DISTRICT
ORGANIZATIONAL CHART



*Denotes Exempt Personnel
Printed: 20 February 2018

ATTACHMENT "D"

2019 - 2020
Mass Appraisal Methodology Manual
&
Reappraisal Plan

for

Liberty County Central Appraisal District

Hugh L. Landrum & Associates, Inc.
A Registered Professional Engineering Firm

Hugh L. Landrum & Associates, Inc. Mass Appraisal Methodology Manual

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Hugh L. Landrum & Associates, Inc.

Mass Appraisal Methodology Manual

INTRODUCTION

Hugh L. Landrum & Associates, Inc. is a Registered Professional Engineering Firm in the State of Texas specializing in the mass appraisal of complex properties. In this role HLL&A recommends to its clients appraised values for selected properties. The recommended values are intended to be used by each client as part of the tax base of the taxing jurisdictions served by the client.

***THIS MANUAL IS SUBJECT TO CHANGE WITHOUT NOTICE.
IT IS ROUTINELY UPDATED TO MEET THE REQUIREMENTS OF
THE LEGISLATURE, THE COMPTROLLER AND OUR CLIENTS.***

SCOPE OF RESPONSIBILITY

The specific responsibilities of HLL&A to each of its clients are described in the contract between them. HLL&A's general responsibilities are to discover certain types of property, as required; to inspect the subject properties, where possible; and to appraise the properties or classes of property that are listed in the contract. An owner name and address record is also maintained for each property that is appraised. This set of services is typically provided to all of HLL&A's appraisal clients. These services are also typically supplied to other Texas appraisal districts by competing mass appraisal firms. Appraisal techniques and model types employed by HLL&A are similar to and/or derived from techniques and model types found in a variety of appraisal texts and appraisal courses, including but not limited to the Texas Property Tax Code, the Texas State Comptroller's guidelines, and the Uniform Standards of Professional Appraisal Practices (USPAP).

TYPES OF PROPERTY

In general, Hugh L. Landrum & Associates, Inc. is retained by its clients to appraise one or more of the following types of property:

- Industrial Property, Real and Personal
- Utility, Railroad, and Pipeline Properties
- Special Purpose Properties
- Business Personal Property
- Oil and Gas Reserves

Attached to this report are individual appraisal methods and a reappraisal plan for each type of property that Hugh L. Landrum & Associates, Inc. appraises. HLL&A's methodologies set out herein are derived from USPAP standards, the Texas Property Tax Code, State Comptroller guidelines and other relevant industry standards.

EXEMPT OR ABATED PROPERTIES

All properties appraised by HLL&A that are exempt as determined by either the Chief Appraiser or some governmental agency, will be treated as exempt as set out in Chapter 11 of the Texas Property Tax Code.

Pollution control exemptions are applied as determined by the Texas Commission on Environmental Quality, to the market value established for the subject property each year.

Abatements and value limitations are applied as set out in the respective Abatement or Value Limiting Agreement associated with the property, for those jurisdictions party to the Agreement. The Abatement or Value Limitation Agreements are provided to HLL&A by the CAD. The percentages used in abating or limiting the value, are applied to the market value established for the abated property for that year.

MARKET DATA AVAILABILITY

To the extent possible and where available, HLL&A researches, reviews compiles and maintains market data information on the various types of industries in which the properties that it appraises belong. HLL&A utilizes this market data to support its property values and makes all non-confidential and non-proprietary market data available to the CAD and to property owners for inspection upon request.

PERSONNEL RESOURCES

HLL&A maintains a staff that is skilled in appraisal, engineering, finance, information services, and property tax administration. All staff members participating in appraisal assignments are involved in a program of continuously improving his or her mass appraisal skills. Appraisal staff members are either advancing towards designation as a Registered Professional Appraiser by the Texas Department of Licensing and Regulation or, if they already hold such a designation, attend various classes and conferences designed to supplement their knowledge and abilities.

A list of appraisers and supporting staff members is attached. In general, the appraiser assigned to appraise a particular property is responsible for inspecting the property, analyzing it for characteristics that have a significant impact on value, gathering appropriate data, model development and model calibration, and arriving at an opinion of value. Centering these functions in the same appraiser tends to ensure that data that would have a material or significant effect on the resulting opinions or conclusions are correctly identified. The individual appraiser is involved in calibrating model structures to determine the contribution of the individual characteristics affecting value, applying the conclusions reflected in the model to the characteristics of the properties being appraised, and reviewing his or her results. The list of properties assigned to each individual appraiser is maintained in the appraisal files at Hugh L. Landrum & Associates, Inc. and by each respective client.

TAXPAYER ASSISTANCE


HLL&A trains its entire staff in providing assistance to taxpayers as set out in the IAEO's *Standard on Public Relations*. Our staff is trained to timely and professionally respond to taxpayer phone calls and e-mails, as well as, being able to instruct taxpayers on the appraisal process from the initial appraisal of their property through the protest process. HLL&A works closely with each appraisal district to see that any specific requirements of each CAD are being met and to keep them apprised of our progress throughout the process.

CERTIFICATION STATEMENT:

I certify that, to the best of my knowledge and belief:

- The statements of fact contained in this report are true and correct.
- The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are my personal, impartial, and unbiased professional analyses, opinions, and conclusions or are the impartial and unbiased professional analyses, opinions, and conclusions of the other appraisers who are appraising property for the appraisal district to which this report is submitted. A list of the appraisers who are appraising property for the **Liberty County Central Appraisal District** is attached. Based on my personal knowledge of the education, background, and experience of the appraisers listed in this report, I believe that those appraisers are competent and that their work is credible.
- I have no present or prospective interest in the property that is the subject of this report, and have no personal interest with respect to the parties involved.
- Other than the appraisal services performed under contract for the appraisal district for prior years, I have performed no other services, as an appraiser or in any other capacity, regarding any property that is the subject of this report within the three-year period immediately preceding my acceptance of this assignment.
- I have no bias with respect to any property that is the subject of this report or to the parties involved with this assignment.
- My engagement in this assignment was not contingent upon developing or reporting predetermined results.
- My compensation for completing this assignment is not contingent upon the reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this appraisal.
- The analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the *Uniform Standards of Professional Appraisal Practices*.
- I have not made a personal inspection of all of the properties that are the subject of this report. However, the properties have been inspected by one or more of the appraisers assigned to appraise properties in the appraisal district to which this report is submitted.
- No one provided significant mass appraisal assistance to the person signing this certification except the appraisers assigned to appraise properties in this appraisal district, a list of which is attached.

Subscribed and sworn to this 19 day of March, 2019.



Hugh L. Landrum, Jr.
President
Hugh L. Landrum & Associates, Inc.

APPRAISER & STAFF LISTING
FOR
LIBERTY COUNTY APPRAISAL DISTRICT
2020 & 2020

APPRAISERS:

Hugh L. Landrum, Jr., PE, RPA
Tracey L. Foster, JD, RPA, RTA, CTA
Douglass Warren, RPA
Michael Rigsby, RPA
Max W. Yu, BS
Kirk L. Slaughter, BS

ADMINISTRATIVE STAFF:

Shawnel Harris
Deja Harrell
Rebecca "Betsy" Welker
Brandy Dees

***THIS LIST IS SUBJECT TO CHANGE AS NEEDED
AND WITH NOTICE TO THE CAD.***

**VALUATION METHODOLOGY SUMMARY
FOR
INDUSTRIAL PROPERTY
APPRAISED BY HUGH L. LANDRUM & ASSOCIATES, INC.
2019 - 2020**

A. Overview

This type of property consists of processing facilities and related personal property. Hugh L. Landrum & Associates, Inc. is contracted to reappraise this type of property annually for the appraisal district. The completed appraisals are all retrospective in nature. The purpose of the appraisals is to estimate market value as of January 1 in accordance with the definition of market value established in the Texas Property Tax Code (Sec. 1.04). "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.

The effective date of the appraisals is January 1 of the year for which this report is submitted unless the property owner or agent has applied for and been granted September 1 inventory valuation as allowed by Section 23.12(f) of the Texas Property Tax Code.

The client for the mass appraisal is the Texas appraisal district named on the certification page of this report. The intended users of this report are the client and the property owners of the client appraisal district.

The appraisal results will be used as the tax base upon which a property tax will be levied. A listing of the industrial properties appraised by Hugh L. Landrum & Associates, Inc. for the appraisal district is available at the appraisal district office. Industrial properties are normally re-inspected annually.

Documents relevant to an understanding of these appraisals include the confidential rendition, if any, filed with the appraisal district by the owner or agent of the property; other reports described in the Texas Property Tax Code; asset lists and other confidential data supplied by the owner or agent; Property Appraisal & Assessment Administration published by the International Association of Assessing Officers and adopted by the Texas Comptroller of Public Accounts; and Engineering Valuation and Depreciation by Marston, Winfrey, and Hempstead; the Texas Property Tax Code and other codified statutes.

HLL&A's industrial appraisal staff includes Registered Professional Engineers as well as experienced appraisers who are knowledgeable in all three approaches to value. Industrial appraisal staff stays abreast of current trends affecting industrial properties through review of published materials, attendance at conferences, course work, and continuing education. All industrial appraisers are registered with the Texas Department of Licensing & Regulation.

B. Assumptions and Limiting Conditions

All appraisals are subject to the following assumptions and limiting conditions:

1. Title to the property is assumed to be good and marketable and the legal description correct.
2. No responsibility for legal matters is assumed. All existing liens, mortgages, or other encumbrances have been disregarded and the property is appraised as though free and clear, under responsible ownership and competent management.
3. All sketches on the appraisal documents are intended to be visual aids and should not be construed as surveys or engineering reports unless otherwise specified.
4. All information in the appraisal documents has been obtained by members of HLL&A's staff or by other reliable sources.
5. The appraisals were prepared exclusively for ad valorem tax purposes.
6. The appraisers have inspected as far as possible, by observation, the improvements being appraised, however, it is not possible to personally observe conditions beneath the soil or hidden structural components within the improvements. Therefore no representations are made as to these matters unless specifically considered in an individual appraisal.

C. Data Collection and Validation

Data on the subject properties is collected as part of the inspection process and through later submissions by the property owner. Submitted data may be on a rendition form or in other means which require confidentiality. HLL&A receives renditions from either the CAD or directly from the taxpayer. HLL&A is responsible for identifying the accounts that have been properly rendered to the CAD. Subject property data is verified through previously existing records and through published reports. Additional data are obtained and verified through published sources, regulatory reports, and through analysis of comparable properties, if any. Due to the unique nature of many industrial properties there is no standard data collection form or manual.

D. Market Data Availability

Market data is collected and maintained for each of the various industries appraised. This data includes, but is not limited to, cap rate studies and the supporting evidence, value allocation methodologies, cost tables and expense ratio data applicable to the specific industries being appraised. All non-proprietary and non-confidential market data is available to the CAD and to taxpayers upon request.

E. Identification of New Property

Identifying new industrial properties &/or new construction is the responsibility of HLL&A. This is accomplished through a variety of means including, but not limited to obtaining and reviewing building permit and abatement requests; a visual inspection of an area; the input from others in the County who might identify any new properties in the area.

F. Valuation Approach and Analysis

Industrial properties are appraised using replacement/reproduction cost new less depreciation models. Replacement costs are estimated from published sources, other publicly available information, and comparable properties. Reproduction costs are based on actual investment in the subject or comparable properties adjusted for typical changes in cost over time. Depreciation is calculated on the age/life method using typical economic lives and depreciation rates based on published sources, market evidence, and the experience of knowledgeable appraisers. Adjustments for functional and economic obsolescence may be made if utilization and income data for the subject property justify such. Income Approach models (direct capitalization and discounted cash flow) are also used when economic and/or subject property income information is available. Capitalization and discount rates are based on published capital costs for the industry of the subject property. A market data model based on typical selling prices per unit of capacity is also used when appropriate market sales information is available.

Because cost information is the most readily available type of data, the cost approach model is always considered and used. If sufficient data is available either of both of the other two models may also be considered and used. The market data and income approach models may need to be reduced by the value of the land in order to arrive at a value of improvements and personal property.

Model calibration in the cost approach involves the selection of the appropriate service life for each type or class of property. Further calibration can occur through the use of utilization or through-put data provided by the owner or agent. Income approach calibration involves the selection of the cost of capital or discount rate appropriate to the type of property being appraised as well as adjusting the projected income stream to reflect the individual characteristics of the subject property. Model calibration in the market data approach involves adjusting sales prices of comparable properties to reflect the individual characteristics of the subject property.

The mathematical form of each model is described below.

Cost Approach

$$RCN - PD - FO - EO = \text{Cost Indicator of Value}$$

Where:

RCN = Replacement or Reproduction Cost New

PD = Physical Depreciation

FO = Function Obsolescence

EO = Economic Obsolescence

Income Approach

$$PGR - VCL - FE - VE = NOI$$

$$NOI/R = \text{Income Indicator of Value}$$

Where:

PGR = Potential Gross Rent

VCL = Vacancy and Collection Loss

FE = Fixed Expenses
VE = Variable Expenses
R = Discount Rate or Cost of Capital

A variation of the income model is:

NOI for year 1 x DF for year 1 = PW of year 1 NOI
NOI for year n x DF for year n = PW of year n NOI
Net Reversion x DF for year n = PW of Reversion
Sum of PW's for all years 1 – n = Income Indicator of Value

Where:

NOI = Net Operating Income
DF = Discount Factor
PW = Present Worth
n = Last year of holding period

Market Data Approach

ASPCP/U = PU
ASPU x SU = Market Data Indicator of Value

Where:

ASPCP = Adjusted Sales Price of Comparable Property
U = Unit of Comparison
PU = Price per Unit of comparison
ASPU = Adjusted Sales Price per Unit of comparison
SU = Subject Property's number of Units of comparison

In reconciling multiple model results for a property the appraiser considers the model results that best address the individual characteristics of the subject property and that are based on the most reliable data while maintaining equalization among like properties. Final results for each property may be found on the appraisal district's appraisal roll.

Land valuation for industrial properties is the responsibility of appraisal district staff as is the highest and best use analysis of the site. Sites are analyzed for highest and best use as though they were vacant. Highest and best use analysis of the improvements is based on the likelihood of the continued use of the improvements in their current and/or intended use. An appraiser's identification of a property's highest and best use is always a statement of opinion, never a statement of fact.

G. Review and Testing

Field review of appraisals is performed through the regular inspection of subject properties. The periodic reassignment of properties among appraisers or the review of appraisals by an experienced appraiser also contributes to the review process. A computer-assisted statistical review of property value changes is also conducted.

Appraisal-to-sales ratios are the preferred method for measuring performance, however sales are very infrequent. Furthermore, market transactions normally occur for multiple sites and include both real and personal property, tangible and intangible, making

analysis difficult and subjective. Performance is also measured through comparison with valid single-property appraisals submitted for staff review.

H. Review, Verification & Evaluation by the CAD

Prior to submission of the Appraisal Roll to the ARB, the Chief Appraiser shall request a random sampling of appraisals from HLL&A. HLL&A shall provide the Chief Appraiser with the requested appraisals and all non-privileged and non-proprietary supporting data and review the information with the Chief Appraiser in order for the CAD to evaluate the appraisal results of HLL&A. The HLL&A appraiser responsible for each property sampled will review the appraisal, including but not limited to methodology, technique, data used and final outcome, with the Chief Appraiser or other employee of the CAD designated by the Chief Appraiser to review the contracted work. The Chief Appraiser or designee will verify that all assigned properties were indeed appraised and valued as set out in the contract and here-in and document any failure to do so, noting what if anything is required to fulfill the contract requirements.

Further, a computer-assisted statistical review of property value changes is also conducted at various times throughout the year allowing the CAD to verify that the properties called for in the Contract were appraised and values were entered. Finally, HLL&A will make any non-privileged and non-proprietary market data supporting the values of the properties it appraises, available to the CAD and for inspection by property owners on request.

I. Reappraisal Plan for Industrial Properties

Industrial Properties covered by the contract between the CAD and HLL&A shall be reappraised each year. For each year of the contract, the following activities will be undertaken for all industrial properties assigned to HLL&A under its contract with the CAD. Estimates of value are typically provided to the CAD in mid to late May of each Tax Year, but in any event will be available as requested by the Chief Appraiser each year.

1. Identify properties to be appraised through physical inspection or by other reliable means of identification, including deeds or other legal documentation, aerial photographs, land-based photographs, surveys, maps and/or property sketches;
2. Identify and update relevant characteristics of each property in the property records of the CAD;
3. Define market areas in the CAD, where applicable;
4. Identify property characteristics that affect property value in each market area or for each property, including:
 - a. The location and market area of the property;
 - b. Physical attributes of the property such as size, age and condition;
 - c. Legal and economic attributes, if any;
 - d. Easements, covenants, leases, reservations, contracts, declarations, special assessments, exemptions or legal restrictions;
5. If applicable, develop an appraisal model that reflects the relationship among the property characteristics affecting the value in each market area and determines the contribution of individual property characteristics;
6. Apply conclusions reflected in the model to the characteristics of the property appraised; and

7. Review the appraisal results to determine value.

Generally, industrial properties will be valued on a cost approach basis since these properties have a low frequency of being bought and sold in the open market. In addition, since these properties are owner occupied, the income information is difficult to obtain and rarely applicable to industrial properties.

**VALUATION METHODOLOGY SUMMARY
FOR
UTILITY, RAILROAD, AND PIPELINE PROPERTIES
APPRAISED BY HUGH L. LANDRUM & ASSOCIATES, INC.
2019 - 2020**

A. Overview

This type of property consists of operating property, excluding land, owned by utility, railroad, and pipeline companies, and related personal property and improvements. Hugh L. Landrum & Associates, Inc. is contracted to reappraise this type of property annually for the appraisal district. The completed appraisals are all retrospective in nature. The purpose of the appraisals is to estimate market value as of January 1 in accordance with the definition of market value established in the Texas Property Tax Code (Sec. 1.04). "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.

The effective date of the appraisals is January 1 of the year for which this report is submitted unless the property owner or agent has applied for and been granted September 1 inventory valuation as allowed by Section 23.12(f) of the Texas Property Tax Code.

The client for the mass appraisal is the Texas appraisal district named on the certification page of this report. The intended users of this report are the client and the property owners of the client appraisal district

The appraisal results will be used as the tax base upon which a property tax will be levied. A listing of the utility, railroad, and pipeline properties appraised by Hugh L. Landrum & Associates, Inc. for the appraisal district is available at the appraisal district office. Such utility, railroad, and pipeline properties that are susceptible to inspection (e.g. compressor stations, pump stations, buildings, and power plants) are normally re-inspected at least every three years.

HLL&A's utility, railroad, and pipeline appraisal staff includes licensed engineers as well as experienced appraisers who are knowledgeable in all three approaches to value. The appraisal staff stays abreast of current trends affecting utility, railroad, and pipeline properties through review of published materials, attendance at conferences, course work, and continuing education. All appraisers are registered with the Texas Department of Licensing & Regulation.

B. Assumptions and Limiting Conditions

All appraisals are subject to the following assumptions and limiting conditions:

1. Title to the property is assumed to be good and marketable and the legal description correct.
2. No responsibility for legal matters is assumed. All existing liens, mortgages, or other encumbrances have been disregarded and the property is appraised as though free and clear, under responsible ownership and competent management.
3. The appraisers do not necessarily inspect every property every year.
4. All sketches on the appraisal documents are intended to be visual aids and should not be construed as surveys or engineering reports unless otherwise specified.
5. All information in the appraisal documents has been obtained by members of HLL&A's staff or by other reliable sources.
6. The appraisals were prepared exclusively for ad valorem tax purposes.
7. The appraisers have inspected as far as possible, by observation, the improvements being appraised, however, it is not possible to personally observe conditions beneath the soil or hidden structural components within the improvements. Therefore no representations are made as to these matters unless specifically considered in an individual appraisal.

C. Data Collection and Validation

Data on the subject properties is collected as part of the inspection process and through later submissions by the property owner. Submitted data may be on a rendition form or in other means which require confidentiality. HLL&A receives renditions from either the CAD or directly from the taxpayer. HLL&A is responsible for identifying the accounts that have been properly rendered to the CAD. Subject property data is verified through previously existing records and through published reports. Additional data are obtained and verified through published sources, regulatory reports, and through analysis of comparable properties. Due to the varied nature of utility, railroad, and pipeline properties there is no standard data collection form or manual.

D. Market Data Availability

Market data is collected and maintained for each of the various types of utility or pipeline being appraised. This data includes, but is not limited to, cap rate studies and the supporting evidence, value allocation methodologies, cost tables and expense ratio data applicable to the specific type of pipeline or utility company being appraised. All non-proprietary and non-confidential market data is available to the CAD and to taxpayers upon request.

E. Identification of New Property

Identifying new properties &/or new construction is the responsibility of HLL&A. This is accomplished through a variety of means including, but not limited to obtaining and reviewing building permit and abatement requests; a visual inspection of an area; the input from others in the County who might identify any new properties in the area.

F. Valuation Approach and Analysis

For all pipelines a value is calculated using a Replacement Cost New Less Depreciation (RCNLD) model. This involves first calculating the cost of building a new pipeline of equal utility using current prices. The Replacement Cost New (RCN) is a function of location, length, diameter, and composition. Depreciation is then subtracted from RCN to produce the final value estimate. Depreciation is defined as the loss of value resulting from any cause. The three common forms of depreciation are physical, functional, and economic. Physical depreciation is accounted for on the basis of the age of the subject pipeline. Functional and economic obsolescence (depreciation) can be estimated through the use of survivor curves or other normative techniques. Specific calculations to estimate abnormal functional and/or economic obsolescence can be made on the basis of the typical utilization of the subject pipeline. After deductions from RCN have been made for all three forms of depreciation the remainder is the RCNLD or cost approach model indicator of value.

In addition to the RCNLD indicator, a unit value model may also be used for those pipelines for which appropriate income statements and balance sheets are also available. Generally, this model is used for those pipelines that by regulation are considered to be common carriers. The unit value model must be calculated for the entire pipeline system. The unit value model typically involves an income approach to value and a rate base cost approach. The income approach is based on a projection of expected future typical net operating income (NOI). The projected NOI is discounted to a present worth using a current cost of capital that is both typical of the industry and reflective of the risks inherent in the subject property.

The unit value model cost approach is typically an estimation of the current rate base of the subject pipeline (total investment less book depreciation allowed under the current form of regulation). An additional calculation is made to detect and estimate economic obsolescence. Any economic obsolescence is deducted from the rate base cost less book depreciation to achieve a final cost indicator. The unit value model may also include a stock and debt approach in lieu of a market data approach. The stock and debt approach involves finding the total value of the owner's liabilities (equity and debt) and assuming that they are equal to the value of the assets. The two (or three, if the stock and debt approach is included) unit value indicators are then reconciled into a final unit appraisal model indicator of value. The unit value must then be reconciled with the RCNLD model indicator of value for the entire pipeline system being appraised. The final correlated value of the system can then be allocated among the various components of the system to determine the tax roll value for each pipeline segment.

Utility and railroad properties are appraised in a manner similar to pipeline except the RCNLD model is not used. For all three types of property (utility, railroad, and pipeline) the appraiser must first form an opinion of highest and best use. If the highest and best use of the operating property is the current use under current regulation, the unit value model is considered highly appropriate. If the highest and best use is something different, then the RCNLD model may be more appropriate. Compressor stations, pump stations, improvements, and related facilities are appraised using a replacement cost new less depreciation model.

Model calibration in the RCNLD model involves the selection of the appropriate service life for each type or class of property. Further calibration can occur through the use of utilization or through-put data provided by the owner or agent. Model calibration in the unit

value cost approach involves the selection of the appropriate items to include in the rate base calculation and selection of the best measure of obsolescence, if any. Income approach calibration involves the selection of the cost of capital or discount rate appropriate to the type of property being appraised as well as adjusting the projected income stream to reflect the individual characteristics of the subject property. Model calibration in the stock and debt approach involves allocating sales prices of debt and equity to reflect the contribution to value of the operating property of the subject company.

The mathematical form of each model is described below.

RCNLD Approach

$$RCN - PD - FO - EO = \text{RCNLD Indicator of Value}$$

Where:

RCN = Replacement or Reproduction Cost New

PD = Physical Depreciation

FO = Functional Obsolescence

EO = Economic Obsolescence

Unit Cost Approach

$$OC - AD - EO = \text{Unit Cost Approach Indicator of Value}$$

Where:

OC = Original Cost

AD = Allowed Depreciation

EO = Economic Obsolescence

Unit Income Approach

$$PGR - VCL - FE - VE = \text{NOI}$$

$$\text{NOI}/R = \text{Income Indicator of Value}$$

Where:

PGR = Potential Gross Rent

VCL = Vacancy and Collection Loss

FE = Fixed Expenses

VE = Variable Expenses

R = Discount Rate or Cost of Capital

A variation of the income model is:

NOI for year 1 x DF for year 1 = PW of year 1 NOI

NOI for year n x DF for year n = PW of year n NOI

Net Reversion x DF for year n = PW of Reversion

Sum of PW's for all years 1 - n = Income Indicator of Value

Where:

NOI = Net Operating Income

DF = Discount Factor

PW = Present Worth

n = Last year of holding period

Stock and Debt Approach

MVE + MVD = Market Value of Assets

Where:

MVE = Market value of Equity

MVD = Market value of Debt

In reconciling multiple model results for a property the appraiser considers the model results that best address the individual characteristics of the subject property while maintaining equalization among like properties. Final results for each property may be found on the appraisal district's appraisal roll.

Land valuation for utility and pipeline properties is the responsibility of appraisal district staff as is the highest and best use analysis of the site. Sites are analyzed for highest and best use as though they were vacant. Highest and best use analysis of the improvements is based on the likelihood of the continued use of the improvements in their current and/or intended use. Railroad corridor land is included in the appraisal of the operating property. The highest and best use of railroad corridor land is presumed to be as operating property. An appraiser's identification of a property's highest and best use is always a statement of opinion, never a statement of fact.

The rate-base cost approach, stock and debt approach, and income approach models must be reduced by the value of the land in order to arrive at a value of improvements, personal property, and other operating property.

G. Review and Testing

Field review of appraisals is performed through the regular inspection of subject properties. The periodic reassignment of properties among appraisers or the review of appraisals by an experienced appraiser also contributes to the review process. A computer-assisted statistical review of property value changes is also conducted.

Appraisals to sales ratios are the preferred method for measuring performance, however sales are very infrequent. Furthermore, market transactions normally occur for multiple sites and include both real and personal property, tangible and intangible, making analysis difficult and subjective. Performance is also measured through comparison with valid single-property appraisals submitted for staff review. Selected appraisal results are tested annually by the Property Tax Assistance Division of the Texas Comptroller's Office. The Comptroller's review as well as comparisons with single-property appraisals indicates the validity of the models as well as the calibration techniques employed.

H. Review, Verification & Evaluation by the CAD

Prior to submission of the Appraisal Roll to the ARB, the Chief Appraiser shall request a random sampling of appraisals from HLL&A. HLL&A shall provide the Chief Appraiser with the requested appraisals and all non-privileged and non-proprietary supporting data and review the information with the Chief Appraiser in order for the CAD to evaluate the appraisal results of HLL&A. The HLL&A appraiser responsible for each property sampled will review the appraisal, including but not limited to methodology, technique, data used and final outcome, with the Chief Appraiser or other employee of the CAD designated by the Chief Appraiser to review the contracted work. The Chief Appraiser or designee will verify that all assigned properties were indeed appraised and valued as set out in the contract and here-in and document any failure to do so, noting what if anything is required to fulfill the contract requirements.

Further, a computer-assisted statistical review of property value changes is also conducted at various times throughout the year allowing the CAD to verify that the properties called for in the Contract were appraised and values were entered. Finally, HLL&A will make any non-privileged and non-proprietary market data supporting the values of the properties it appraises, available to the CAD and for inspection by property owners on request.

I. Reappraisal Plan for Utility, Railroad & Pipeline Properties

Utility, Railroad & Pipeline Properties covered by the contract between the CAD and HLL&A shall be reappraised each year. For each year of the contract, the following activities will be undertaken for all Utility, Railroad & Pipeline properties assigned to HLL&A under its contract with the CAD. Estimates of value are typically provided to the CAD in mid to late May of each Tax Year, but in any event will be available as requested by the Chief Appraiser each year.

1. Identify properties to be appraised through physical inspection or by other reliable means of identification, including deeds or other legal documentation, aerial photographs, land-based photographs, surveys, maps and/or property sketches;
2. Identify and update relevant characteristics of each property in the property records of the CAD;
3. Define market areas in the CAD, where applicable;
4. Identify property characteristics that affect property value in each market area or for each property, including:
 - a. The location and market area of the property;
 - b. Physical attributes of the property such as size, age and condition;
 - c. Legal and economic attributes, if any;
 - d. Easements, covenants, leases, reservations, contracts, declarations, special assessments, exemptions or legal restrictions;
5. If applicable, develop an appraisal model that reflects the relationship among the property characteristics affecting the value in each market area and determines the contribution of individual property characteristics;
6. Apply conclusions reflected in the model to the characteristics of the property appraised; and
7. Review the appraisal results to determine value.

Generally, these types of properties will be valued as an entire unit and the result apportioned to the pieces in the whole.

**VALUATION METHODOLOGY SUMMARY
FOR
SPECIAL PURPOSE PROPERTIES
APPRAISED BY HUGH L. LANDRUM & ASSOCIATES, INC.
2019 - 2020**

A. Overview

This type of property consists of real property improvements that by the nature of their design and/or construction are suitable for a single use only. Hugh L. Landrum & Associates, Inc. is contracted to reappraise this type of property annually for the appraisal district. The completed appraisals are all retrospective in nature. The purpose of the appraisals is to estimate market value as of January 1 in accordance with the definition of market value established in the Texas Property Tax Code (Sec. 1.04). "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.

The effective date of the appraisals is January 1 of the year for which this report is submitted unless the property owner or agent has applied for and been granted September 1 inventory valuation as allowed by Section 23.12(f) of the Texas Property Tax Code.

The client for the mass appraisal is the Texas appraisal district named on the certification page of this report. The intended users of this report are the client and the property owners of the client appraisal district.

The appraisal results will be used as the tax base upon which a property tax will be levied. A listing of the properties appraised by Hugh L. Landrum & Associates, Inc. for the appraisal district is available at the appraisal district office. Special purpose properties are normally re-inspected annually.

Documents relevant to an understanding of these appraisals include the confidential rendition, if any, filed with the appraisal district by the owner or agent of the property; other reports described in the Texas Property Tax Code; asset lists and other confidential data supplied by the owner or agent; Property Appraisal & Assessment Administration published by the International Association of Assessing Officers and adopted by the Texas Comptroller of Public Accounts; and Engineering Valuation and Depreciation by Marston, Winfrey, and Hempstead; the Texas Property Tax Code and other codified statutes.

HLL&A's industrial appraisal staff includes licensed engineers as well as experienced appraisers who are knowledgeable in all three approaches to value. Appraisal staff stays abreast of current trends affecting special purpose properties through review of published materials, attendance at conferences, course work, and continuing education. All appraisers are registered with the Texas Department of Licensing & Regulation.

B. Assumptions and Limiting Conditions

All appraisals are subject to the following assumptions and limiting conditions:

1. Title to the property is assumed to be good and marketable and the legal description correct.
2. No responsibility for legal matters is assumed. All existing liens, mortgages, or other encumbrances have been disregarded and the property is appraised as though free and clear, under responsible ownership and competent management.
3. The appraisers do not necessarily inspect every property every year.
4. All sketches on the appraisal documents are intended to be visual aids and should not be construed as surveys or engineering reports unless otherwise specified.
5. All information in the appraisal documents has been obtained by members of HLL&A's staff or by other reliable sources.
6. The appraisals were prepared exclusively for ad valorem tax purposes.
7. The appraisers have inspected as far as possible, by observation, the improvements being appraised, however, it is not possible to personally observe conditions beneath the soil or hidden structural components within the improvements. Therefore no representations are made as to these matters unless specifically considered in an individual appraisal.

C. Data Collection and Validation

Data on the subject properties is collected as part of the inspection process and through later submissions by the property owner. Submitted data may be on a rendition form or in other means which require confidentiality. HLL&A receives renditions from either the CAD or directly from the taxpayer. HLL&A is responsible for identifying the accounts that have been properly rendered to the CAD. Subject property data is verified through previously existing records and through published reports. Additional data are obtained and verified through published sources, regulatory reports, and through analysis of comparable properties. Due to the unique nature of each special purpose property there is no standard data collection form or manual.

D. Market Data Availability

Market data, where available, is collected and maintained for each of the various industries appraised. This data includes, but is not limited to, cap rate studies and the supporting evidence, value allocation methodologies, cost tables and expense ratio data applicable to the specific industries being appraised. All non-proprietary and non-confidential market data is available to the CAD and to taxpayers upon request.

E. Identification of New Property

Identifying new special purpose properties &/or new construction is the responsibility of HLL&A. This is accomplished through a variety of means including, but not limited to obtaining and reviewing building permit and abatement requests; a visual inspection of an area; the input from others in the County who might identify any new properties in the area.

F. Valuation Approach and Analysis

Special purpose properties are appraised using replacement/reproduction cost new less depreciation models. Replacement costs are estimated from published sources, other

publicly available information, and comparable properties. Reproduction costs are based on actual investment in the subject or comparable properties. Depreciation is calculated on the age/life method using typical economic lives and depreciation rates based on published sources, market evidence, and the experience of knowledgeable appraisers. Adjustments for functional and economic obsolescence may be made if utilization and income data for the subject property justify such. Income Approach models (direct capitalization and discounted cash flow) are also used when economic and/or subject property income information is available. Capitalization and discount rates are based on published capital costs for the industry of the subject property. A market data model based on typical selling prices per unit of area, volume, or capacity is also used when appropriate market sales information is available.

Because cost information is the most readily available type of data, the cost approach model is always considered and used. If sufficient data is available either of both of the other two models may also be considered and used. The market data and income approach models must be reduced by the value of the land in order to arrive at a value of improvements and personal property.

Model calibration in the cost approach involves the selection of the appropriate service life for each type or class of property. Further calibration can occur through the use of utilization or through-put data provided by the owner or agent. Income approach calibration involves the selection of the cost of capital or discount rate appropriate to the type of property being appraised as well as adjusting the projected income stream to reflect the individual characteristics of the subject property. Model calibration in the market data approach involves adjusting sales prices of comparable properties to reflect the individual characteristics of the subject property.

The mathematical form of each model is described below.

Cost Approach

$$RCN - PD - FO - EO = \text{Cost Indicator of Value}$$

Where:

RCN = Replacement or Reproduction Cost New

PD = Physical Depreciation

FO = Function Obsolescence

EO = Economic Obsolescence

Income Approach

$$PGR - VCL - FE - VE = NOI$$

$$NOI/R = \text{Income Indicator of Value}$$

Where:

PGR = Potential Gross Rent

VCL = Vacancy and Collection Loss

FE = Fixed Expenses

VE = Variable Expenses

R = Discount Rate or Cost of Capital

A variation of the income model is:

NOI for year 1 x DF for year 1 = PW of year 1 NOI
NOI for year n x DF for year n = PW of year n NOI
Net Reversion x DF for year n = PW of Reversion
Sum of PW's for all years 1 – n = Income Indicator of Value

Where:

NOI = Net Operating Income
DF = Discount Factor
PW = Present Worth
n = Last year of holding period

Market Data Approach

ASPCP/U = PU
ASPU x SU = Market Data Indicator of Value

Where:

ASPCP = Adjusted Sales Price of Comparable Property
U = Unit of Comparison
PU = Price per Unit of comparison
ASPU = Adjusted Sales Price per Unit of comparison
SU = Subject Property's number of Units of comparison

In reconciling multiple model results for a property the appraiser considers the model results that best address the individual characteristics of the subject property while maintaining equalization among like properties. Final results for each property may be found on the appraisal district's appraisal roll.

Land valuation for industrial properties is the responsibility of appraisal district staff as is the highest and best use analysis of the site. Sites are analyzed for highest and best use as though they were vacant. Highest and best use analysis of the improvements is based on the likelihood of the continued use of the improvements in their current and/or intended use. Highest and best use analysis of these improvements is essential to an accurate appraisal. Identification of a highest and best use different from the current or intended use has a significant effect on the cost and market data models. An appraiser's identification of a property's highest and best use is always a statement of opinion, never a statement of fact.

The market data and income approach models must be reduced by the value of the land and perhaps personal property in order to arrive at a value of the improvements.

G. Review and Testing

Field review of appraisals is performed through the regular inspection of subject properties. The periodic reassignment of properties among appraisers or the review of appraisals by an experienced appraiser also contributes to the review process. A computer-assisted statistical review of property value changes is also conducted.

Appraisal-to-sales ratios are the preferred method for measuring performance, however sales are very infrequent. Furthermore, market transactions normally occur for

multiple sites and include both real and personal property, tangible and intangible, making analysis difficult and subjective. Performance is also measured through comparison with valid single-property appraisals submitted for staff review.

H. Review, Verification & Evaluation by the CAD

Prior to submission of the Appraisal Roll to the ARB, the Chief Appraiser shall request a random sampling of appraisals from HLL&A. HLL&A shall provide the Chief Appraiser with the requested appraisals and all non-privileged and non-proprietary supporting data and review the information with the Chief Appraiser in order for the CAD to evaluate the appraisal results of HLL&A. The HLL&A appraiser responsible for each property sampled will review the appraisal, including but not limited to methodology, technique, data used and final outcome, with the Chief Appraiser or other employee of the CAD designated by the Chief Appraiser to review the contracted work. The Chief Appraiser or designee will verify that all assigned properties were indeed appraised and valued as set out in the contract and here-in and document any failure to do so, noting what if anything is required to fulfill the contract requirements.

Further, a computer-assisted statistical review of property value changes is also conducted at various times throughout the year allowing the CAD to verify that the properties called for in the Contract were appraised and values were entered. Finally, HLL&A will make any non-privileged and non-proprietary market data supporting the values of the properties it appraises, available to the CAD and for inspection by property owners on request.

I. Reappraisal Plan for Special Purpose Properties

Special Purpose Properties covered by the contract between the CAD and HLL&A shall be reappraised each year. For each year of the contract, the following activities will be undertaken for all special purpose properties assigned to HLL&A under its contract with the CAD. Estimates of value are typically provided to the CAD in mid to late May of each Tax Year, but in any event will be available as requested by the Chief Appraiser each year.

1. Identify properties to be appraised through physical inspection or by other reliable means of identification, including deeds or other legal documentation, aerial photographs, land-based photographs, surveys, maps and/or property sketches;
2. Identify and update relevant characteristics of each property in the property records of the CAD;
3. Define market areas in the CAD, where applicable;
4. Identify property characteristics that affect property value in each market area or for each property, including:
 - a. The location and market area of the property;
 - b. Physical attributes of the property such as size, age and condition;
 - c. Legal and economic attributes, if any;
 - d. Easements, covenants, leases, reservations, contracts, declarations, special assessments, exemptions or legal restrictions;
5. If applicable, develop an appraisal model that reflects the relationship among the property characteristics affecting the value in each market area and determines the contribution of individual property characteristics;

6. Apply conclusions reflected in the model to the characteristics of the property appraised; and
7. Review the appraisal results to determine value.

Like industrial properties, special purpose properties will be valued on a cost approach basis since these properties have a low frequency of being bought and sold in the open market. In addition, since these properties are owner occupied, the income information is difficult to obtain and rarely applicable.

**VALUATION METHODOLOGY SUMMARY
FOR
BUSINESS PERSONAL PROPERTY
APPRAISED BY HUGH L. LANDRUM & ASSOCIATES, INC.
2019 – 2020**

A. Overview

This type of property consists of tangible personal property owned by a business or individual for the purpose of producing an income. The Uniform Standards of Professional Appraisal practice define personal property as “identifiable portable and tangible objects which are considered by the general public as being ‘personal,’ e.g. furnishings, artwork, antiques, gems and jewelry, collectibles, machinery and equipment; all property that is not classified as real estate.” The Texas Property Tax Code (Sec. 1.04(5)) defines tangible personal property as “...personal property that can be seen, weighed, measured, felt, or otherwise perceived by the senses but does not include a document or other perceptible object that constitutes evidence of a valuable interest, claim, or right and has negligible or no intrinsic value.” The Texas Property Tax Code (Sec. 1.04(4)) defines personal property as “...property that is not real property.”

Hugh L. Landrum & Associates, Inc. is contracted to reappraise this type of property annually for the appraisal district. The completed appraisals are all retrospective in nature. The purpose of the appraisals is to estimate market value as of January 1 in accordance with the definition of market value established in the Texas Property Tax Code (Sec. 1.04). “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.

A separate definition of the value of inventory is found in the Texas Property Tax Code (Sec. 23.12(a)), “...the market value of an inventory is the price for which it would sell as a unit to a purchaser who would continue the business.” Additionally, some inventories may qualify for appraisal as of September 1 in accordance with the provisions of Texas Property Tax Code Section 23.12(f).

The effective date of the appraisals is January 1 of the year for which this report is submitted unless the property owner or agent has applied for and been granted September 1 inventory valuation as allowed by Section 23.12(f) of the Texas Property Tax Code.

The client for the mass appraisal is the Texas appraisal district named on the certification page of this report. The intended users of this report are the client and the property owners of the client appraisal district.

The appraisal results will be used as the tax base upon which a property tax will be levied. A listing of the personal property appraised by Hugh L. Landrum & Associates, Inc.

for the appraisal district is available at the appraisal district office. Personal property is normally re-inspected annually.

Documents relevant to an understanding of these appraisals include the confidential rendition, if any, filed with the appraisal district by the owner or agent of the property; other reports described in the Texas Property tax Code; asset lists and other confidential data supplied by the owner or agent; Property Appraisal & Assessment Administration published by the International Association of Assessing Officers and adopted by the Texas Comptroller of Public Accounts; and Engineering Valuation and Depreciation by Marston, Winfrey, and Hempstead; the Texas Property Tax Code and other codified statutes.

HLL&A's personal property appraisal staff includes licensed engineers as well as experienced appraisers who are knowledgeable in all three approaches to value. Personal property appraisal staff stays abreast of current trends affecting personal property through review of published materials, attendance at conferences, course work, and continuing education. All personal property appraisers are registered with the Texas Department of Licensing & Regulation.

B. Assumptions and Limiting Conditions

All appraisals are subject to the following assumptions and limiting conditions:

1. Title to the property is assumed to be good and marketable and the legal description correct.
2. No responsibility for legal matters is assumed. All existing liens, mortgages, or other encumbrances have been disregarded and the property is appraised as though free and clear, under responsible ownership and competent management.
3. All sketches on the appraisal documents are intended to be visual aids and should not be construed as surveys or engineering reports unless otherwise specified.
4. All information in the appraisal documents has been obtained by members of HLL&A's staff or by other reliable sources.
5. The appraisals were prepared exclusively for ad valorem tax purposes.

C. Data Collection and Validation

Data on the subject properties are collected as part of the inspection process and through later submissions by the property owner. Submitted data may be on a rendition form or in other means which require confidentiality. HLL&A receives renditions from either the CAD or directly from the taxpayer. HLL&A is responsible for identifying the accounts that have been properly rendered to the CAD. Subject property data is verified through previously existing records and through published reports. Additional data are obtained and verified through published sources, regulatory reports, and through analysis of comparable properties.

D. Market Data Availability

Market data is collected and maintained for the various types of business personal property appraised. This data includes, but is not limited to, cost indices and tables, depreciation schedules, and value allocation methodologies, applicable to the specific types of properties being appraised. All non-proprietary and non-confidential market data is available to the CAD and to taxpayers upon request.

E. Identification of New Property

Identifying new personal property is the responsibility of HLL&A. The most typical way to do this is through the rendition process mentioned above. Discovery of new property is also accomplished through a variety of other means including, but not limited to obtaining and reviewing building permits and abatement requests; a visual inspection of an area; the input from others in the County who might identify any new properties in the area.

F. Valuation Approach and Analysis

Personal property is appraised using replacement/reproduction cost new less depreciation models. Replacement costs are estimated from published sources, other publicly available information, and comparable properties. Reproduction costs are based on actual investment in the subject or comparable properties. Depreciation is calculated on the age/life method using typical economic lives and depreciation rates based on published sources, market evidence, and the experience of knowledgeable appraisers. Adjustments for functional and economic obsolescence may be made if utilization and income data for the subject property justify such. Income Approach models (direct capitalization and discounted cash flow) are also used when economic and/or subject property income information is available. Capitalization and discount rates are based on published capital costs for the industry of the subject property. A value estimate derived from an income approach model in which the operating income of a business was capitalized must be reduced by the value of any real property in order to arrive at the value of the operating personal property. A market data model based on typical selling prices per item or unit of capacity is also used when appropriate market sales information is available. In the case of some personal property types, such as licensed vehicles, market data from published pricing guides is used to construct a market value model. In other cases, models are based on sales information available through published sources or through private sources.

Because cost information is the most readily available type of data, the cost approach model is always considered and used. If sufficient data is available either of both of the other two models may also be considered and used. The market data and income approach models may need to be reduced by the value of the land in order to arrive at a value of improvements and personal property.

Model calibration in the cost approach involves the selection of the appropriate service life for each type or class of property. Further calibration can occur through the use of utilization or through-put data provided by the owner or agent. Income approach calibration involves the selection of the cost of capital or discount rate appropriate to the type of property being appraised as well as adjusting the projected income stream to reflect the individual characteristics of the subject property. Model calibration in the market data approach involves adjusting sales prices of comparable properties to reflect the individual characteristics of the subject property.

The mathematical form of each model is described below.

Cost Approach

$$RCN - PD - FO - EO = \text{Cost Indicator of Value}$$

Where:

RCN = Replacement or Reproduction Cost New

PD = Physical Depreciation
FO = Function Obsolescence
EO = Economic Obsolescence

Income Approach

$PGR - VCL - FE - VE = NOI$
 $NOI/R = \text{Income Indicator of Value}$

Where:

PGR = Potential Gross Rent
VCL = Vacancy and Collection Loss
FE = Fixed Expenses
VE = Variable Expenses
R = Discount Rate or Cost of Capital

A variation of the income model is:

$NOI \text{ for year } 1 \times DF \text{ for year } 1 = PW \text{ of year } 1 \text{ NOI}$
 $NOI \text{ for year } n \times DF \text{ for year } n = PW \text{ of year } n \text{ NOI}$
 $Net \text{ Reversion} \times DF \text{ for year } n = PW \text{ of Reversion}$
 $Sum \text{ of } PW\text{'s for all years } 1 - n = \text{Income Indicator of Value}$

Where:

NOI = Net Operating Income
DF = Discount Factor
PW = Present Worth
n = Last year of holding period

Market Data Approach

$ASPCP/U = PU$
 $ASPU \times SU = \text{Market Data Indicator of Value}$

Where:

ASPCP = Adjusted Sales Price of Comparable Property
U = Unit of Comparison
PU = Price per Unit of comparison
ASPU = Adjusted Sales Price per Unit of comparison
SU = Subject Property's number of Units of comparison

In reconciling multiple model results for a property the appraiser considers the model results that best address the individual characteristics of the subject property and that are based on the most reliable data while maintaining equalization among like properties. Final results for each property may be found on the appraisal district's appraisal roll.

Highest and best use analysis of personal property is based on the likelihood of the continued use of the personal property in its current and/or intended use. An appraiser's identification of a property's highest and best use is always a statement of opinion, never a statement of fact.

G. Review and Testing

Field review of appraisals is performed through the regular inspection of subject properties. The periodic reassignment of properties among appraisers or the review of appraisals by an experienced appraiser also contributes to the review process. A computer-assisted statistical review of property value changes is also conducted.

Appraisal-to-sales ratios are the preferred method for measuring performance and are used when possible. However sales for some types of personal property are very infrequent. Furthermore, many market transactions occur for multiple sites and include both real and personal property, tangible and intangible, making analysis difficult and subjective. Performance is also measured through comparison with valid single-property appraisals submitted for staff review.

H. Review, Verification & Evaluation by the CAD

Prior to submission of the Appraisal Roll to the ARB, the Chief Appraiser shall request a random sampling of appraisals from HLL&A. HLL&A shall provide the Chief Appraiser with the requested appraisals and all non-privileged and non-proprietary supporting data and review the information with the Chief Appraiser in order for the CAD to evaluate the appraisal results of HLL&A. The HLL&A appraiser responsible for each property sampled will review the appraisal, including but not limited to methodology, technique, data used and final outcome, with the Chief Appraiser or other employee of the CAD designated by the Chief Appraiser to review the contracted work. The Chief Appraiser or designee will verify that all assigned properties were indeed appraised and valued as set out in the contract and here-in and document any failure to do so, noting what if anything is required to fulfill the contract requirements.

Further, a computer-assisted statistical review of property value changes is also conducted at various times throughout the year allowing the CAD to verify that the properties called for in the Contract were appraised and values were entered. Finally, HLL&A will make any non-privileged and non-proprietary market data supporting the values of the properties it appraises, available to the CAD and for inspection by property owners on request.

I. Reappraisal Plan for Business Personal Properties

Business Personal Properties covered by the contract between the CAD and HLL&A shall be reappraised each year. For each year of the contract, the following activities will be undertaken for all business personal properties assigned to HLL&A under its contract with the CAD. Estimates of value are typically provided to the CAD in mid to late May of each Tax Year, but in any event will be available as requested by the Chief Appraiser each year.

1. Identify properties to be appraised through physical inspection or by other reliable means of identification, including deeds or other legal documentation, aerial photographs, land-based photographs, or renditions;
2. Identify and update relevant characteristics of each property in the property records of the CAD;
3. Identify property characteristics that affect property value for each property, including:
 - a. The location and market area of the property;
 - b. Physical attributes of the property such as size, age and condition;

- c. Legal and economic attributes, if any;
 - d. Easements, covenants, leases, reservations, contracts, declarations, special assessments, exemptions or legal restrictions;
4. Develop or update a cost schedule based on SIC codes and market conditions;
 5. Create or refine valuation models using actual cost data to derive the RCN of a particular unit;
 6. Apply these schedules and models to estimate values; and
 7. Review the rendition information in light of the schedules to determine value.

Business personal properties are required to be rendered and will be typically be valued on a cost approach basis.

**VALUATION METHODOLOGY SUMMARY
FOR
MINERAL PROPERTIES
APPRAISED BY HUGH L. LANDRUM & ASSOCIATES, INC.
2019 - 2020**

A. Overview

This type of property consists of operating property, excluding land, owned by any number of working, royalty and overriding interest owners and related personal property. Hugh L. Landrum & Associates, Inc. is contracted to reappraise this type of property annually for the appraisal district. The completed appraisals are all retrospective in nature. The purpose of the appraisals is to estimate market value as of January 1 in accordance with the definition of market value established in the Texas Property Tax Code (Sec. 1.04). "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.

The effective date of the appraisals is January 1 of the year for which this report is submitted.

The client for the mass appraisal is the Texas appraisal district named on the certification page of this report. The intended users of this report are the client and the property owners of the client appraisal district

The appraisal results will be used as the tax base upon which a property tax will be levied. A listing of the mineral properties appraised by Hugh L. Landrum & Associates, Inc. for the appraisal district is available at the appraisal district office. Such mineral properties that are susceptible to inspection are normally re-inspected at least every three years.

HLL&A's mineral appraisal staff includes licensed engineers as well as experienced appraisers who are knowledgeable in all three approaches to value. The appraisal staff stays abreast of current trends affecting mineral properties through review of published materials, attendance at conferences, course work, and continuing education. All appraisers are registered with the Texas Department of Licensing & Regulation.

B. Assumptions and Limiting Conditions

All appraisals are subject to the following assumptions and limiting conditions:

1. Title to the property is assumed to be good and marketable and the legal description correct.
2. No responsibility for legal matters is assumed. All existing liens, mortgages, or other encumbrances have been disregarded and the property is appraised as though free and clear, under responsible ownership and competent management.

3. The appraisers do not necessarily inspect every property every year.
4. All sketches on the appraisal documents are intended to be visual aids and should not be construed as surveys or engineering reports unless otherwise specified.
5. All information in the appraisal documents has been obtained by members of HLL&A's staff or by other reliable sources.
6. The appraisals were prepared exclusively for ad valorem tax purposes.
7. The appraisers have inspected as far as possible, by observation, the improvements being appraised, however, it is not possible to personally observe conditions beneath the soil or hidden structural components within the improvements. Therefore no representations are made as to these matters unless specifically considered in an individual appraisal.

C. Data Collection and Validation

Data on the subject properties is collected as part of the inspection process and through later submissions by the property owner. Production rates for each lease are developed using monthly production reported to the Railroad Commission of Texas. Monthly lease volumes sold and the income received for them, as reported to the Comptroller's Office for severance tax purposes, are used to develop product prices and also to estimate the previous year's income.

Submitted data may be on a rendition form or in other means which require confidentiality. HLL&A receives renditions from either the CAD or directly from the taxpayer. HLL&A is responsible for identifying the accounts that have been properly rendered to the CAD. Subject property data is verified through previously existing records and through published reports. Additional data are obtained and verified through published sources, regulatory reports, and through analysis of comparable properties. Due to the varied nature of mineral properties there is no standard data collection form or manual.

D. Market Data Availability

Market data is collected and maintained for each of the various types of mineral leases appraised. This data includes, but is not limited to, discount rate studies and the supporting evidence, cost of capital information and typical capital structures for the type and area being appraised, lease operating expense data, salvage value data and property and severance tax rate data. All non-proprietary and non-confidential market data is available to the CAD and to taxpayers upon request.

E. Identification of New Property

Identifying new mineral properties is the responsibility of HLL&A. This is accomplished through a variety of means including, but not limited to obtaining and reviewing monthly production updates from the Railroad Commission and comparing the data to the lease information already being appraised; a visual inspection of an area where production is suspected; the polling of operators in the County to see if they can identify any new producing leases or new operators in the area.

F. Valuation Approach and Analysis

The appraisal of mineral properties is based on an income approach to value. This entails estimating the remaining future reserves of the property and the timing of how those reserves will be recovered. This estimation of future production along with the estimation of future pricing generates an estimated yearly income that is discounted to current day dollars. Each succeeding year's income is more heavily discounted than the previous, thus rendering less and less value contribution with each succeeding year. Each mineral lease is valued as a whole. The value of each interest owned within that lease is then determined from this total, based on the type of interest owned and the decimal interest owned in the lease.

The mathematical form of the income model is described below.

Unit Income Approach

NOI for year 1 x DF for year 1 = PW of year 1 NOI

NOI for year n x DF for year n = PW of year n NOI

Net Reversion x DF for year n = PW of Reversion

Sum of PW's for all years 1 - n = Income Indicator of Value

Where:

NOI = Net Operating Income

DF = Discount Factor

PW = Present Worth

n = Last year of holding period

Section 23.175 (a) of the Texas Property Tax Code reads as follows: "If a real property interest in oil or gas in place is appraised by a method that takes into account the future income from the sale of oil or gas to be produced from the interest, the method must use the average price of the oil or gas from the interest for the preceding calendar year multiplied by a market condition factor as the price at which the oil or gas produced from the interest is projected to be sold in the current year of the appraisal."

Section 23.175 also requires that the Comptroller shall calculate the market condition factor, as well as the price escalators/de-escalators that are to be used each year. All prices are determined according to Section 23.175. Further, the Comptroller's methods and procedures for discounting future income from the sale of oil or gas are also used.

In reconciling results for a given property, the appraiser considers the model results that best address the individual characteristics of the subject property while maintaining equalization among like properties. Final results for each property may be found on the appraisal district's appraisal roll.

Land valuation for mineral properties is the responsibility of appraisal district staff. Valuation of the surface estate rarely effects the valuation of the underlying mineral estate.

G. Review and Testing

Appraisal results are tested annually by the Property Tax Assistance Division of the Texas Comptroller's Office. The Comptroller's review as well as comparisons with single-property appraisals indicates the validity of the model and techniques employed.

At various times throughout the year, at the request of the Chief Appraiser, HLL&A provides an updated list from the Railroad Commission in order for the CAD to compare to the list of leases already being appraised by HLL&A for the CAD. In this way, the CAD can verify that HLL&A is indeed discovering all taxable mineral properties in its discovery process.

H. Review, Verification & Evaluation by the CAD

Prior to submission of the Appraisal Roll to the ARB, the Chief Appraiser shall request a random sampling of appraisals from HLL&A. HLL&A shall provide the Chief Appraiser with the requested appraisals and all non-privileged and non-proprietary supporting data and review the information with the Chief Appraiser in order for the CAD to evaluate the appraisal results of HLL&A. The HLL&A appraiser responsible for each property sampled will review the appraisal, including but not limited to methodology, technique, data used and final outcome, with the Chief Appraiser or other employee of the CAD designated by the Chief Appraiser to review the contracted work. The Chief Appraiser or designee will verify that all assigned properties were indeed appraised and valued as set out in the contract and here-in and document any failure to do so, noting what if anything is required to fulfill the contract requirements.

At various times throughout the year, at the request of the Chief Appraiser, HLL&A provides an updated list from the Railroad Commission in order for the CAD to compare to the list of leases already being appraised by HLL&A for the CAD. In this way, the CAD can verify that HLL&A is indeed discovering all taxable mineral properties in its discovery process.

Further, a computer-assisted statistical review of property value changes is also conducted at various times throughout the year allowing the CAD to verify that the properties called for in the Contract were appraised and values were entered. Finally, HLL&A will make any non-privileged and non-proprietary market data supporting the values of the properties it appraises, available to the CAD and for inspection by property owners on request.

I. Reappraisal Plan for Mineral Properties

Mineral Properties covered by the contract between the CAD and HLL&A shall be reappraised each year. For each year of the contract, the following activities will be undertaken for all business personal properties assigned to HLL&A under its contract with the CAD. Estimates of value are typically provided to the CAD in mid to late May of each Tax Year, but in any event will be available as requested by the Chief Appraiser each year.

1. Identify properties to be appraised through physical inspection or by other reliable means of identification, including Railroad Commission filings, deeds or other legal documentation, aerial photographs, land-based photographs, surveys, maps and/or property sketches;
2. Identify and update relevant characteristics of each property in the property records of the CAD;
3. Identify and update all ownership information of each property;
4. Identify property characteristics that affect property value for each property, including:

- a. The location of the property;
 - b. Physical attributes of the property such as production history, age and condition;
 - c. Legal and economic attributes, if any;
 - d. Easements, covenants, leases, reservations, contracts, declarations, special assessments, exemptions or legal restrictions;
5. Identify the preceding year's average price and lease operating expenses;
 6. Calculate the starting rates and price and apply them to the decline curve; and
 7. Review the appraisal results to determine value.

Generally, these types of properties will be valued on an income approach basis, using the Comptroller's and statutory guidelines as to price and discount rate.

Hugh L. Landrum & Associates, Inc.

Reappraisal Plan by Property Type

INTRODUCTION

Hugh L. Landrum & Associates, Inc. is a Registered Professional Engineering Firm in the State of Texas specializing in the mass appraisal of complex properties. In this role HLL&A recommends values to its client appraisal districts.

Pursuant to the Texas Property Tax Code, each Appraisal District is required to implement a biennial reappraisal plan. As a contractor to the Appraisal District, Hugh L. Landrum & Associates, Inc. provides this reappraisal plan in an effort to assist the taxpayers of the county in understanding the methods by which their properties are being valued; and to further aid the CAD in satisfying its requirements under the Code and those of the Comptroller's Property Tax Assistance Division.

***THIS MANUAL IS SUBJECT TO CHANGE WITHOUT NOTICE.
IT IS ROUTINELY UPDATED TO MEET THE REQUIREMENTS OF
THE LEGISLATURE, THE COMPTROLLER AND OUR CLIENTS.***

PLAN FOR PERIODIC REAPPRAISAL

INDUSTRIAL PROPERTIES:

Each year the following activities will be undertaken for all industrial properties assigned to HLL&A under its contract with the CAD. Estimates of value are typically provided to the CAD in mid to late May of each Tax Year.

1. Identify properties to be appraised through physical inspection or by other reliable means of identification, including deeds or other legal documentation, aerial photographs, land-based photographs, surveys, maps and/or property sketches;
2. Identify and update relevant characteristics of each property in the property records of the CAD;
3. Define market areas in the CAD, where applicable;
4. Collect, update, review and analyze market data to be used to support values on properties appraised;
5. Identify property characteristics that affect property value in each market area or for each property, including:
 - a. The location and market area of the property;
 - b. Physical attributes of the property such as size, age and condition;
 - c. Legal and economic attributes, if any;
 - d. Easements, covenants, leases, reservations, contracts, declarations, special assessments, exemptions or legal restrictions;
6. If applicable, develop an appraisal model that reflects the relationship among the property characteristics affecting the value in each market area and determines the contribution of individual property characteristics;
7. Apply conclusions reflected in the model to the characteristics of the property appraised; and

8. Review the appraisal results to determine value.

Generally, industrial properties will be valued on a cost approach basis since these properties have a low frequency of being bought and sold in the open market. In addition, since these properties are owner occupied, the income information is difficult to obtain and rarely applicable to industrial properties.

UTILITY, RAILROAD & PIPELINE PROPERTIES:

Each year the following activities will be undertaken for all utility, railroad and pipeline properties assigned to HLL&A under its contract with the CAD. Estimates of value are typically provided to the CAD in mid to late May of each Tax Year.

1. Identify properties to be appraised through physical inspection or by other reliable means of identification, including deeds or other legal documentation, aerial photographs, land-based photographs, surveys, maps and/or property sketches;
2. Identify and update relevant characteristics of each property in the property records of the CAD;
3. Define market areas in the CAD, where applicable;
4. Collect, update, review and analyze market data to be used to support values on properties appraised;
5. Identify property characteristics that affect property value in each market area or for each property, including:
 - a. The location and market area of the property;
 - b. Physical attributes of the property such as size, age and condition;
 - c. Legal and economic attributes, if any;
 - d. Easements, covenants, leases, reservations, contracts, declarations, special assessments, exemptions or legal restrictions;
6. If applicable, develop an appraisal model that reflects the relationship among the property characteristics affecting the value in each market area and determines the contribution of individual property characteristics;
7. Apply conclusions reflected in the model to the characteristics of the property appraised; and
8. Review the appraisal results to determine value.

Generally, these types of properties will be valued on an income approach basis, being valued as an entire unit and the result apportioned to the pieces in the whole.

SPECIAL PURPOSE PROPERTIES:

Each year the following activities will be undertaken for all special purpose improvements assigned to HLL&A under its contract with the CAD. Estimates of value are typically provided to the CAD in mid to late May of each Tax Year.

1. Identify properties to be appraised through physical inspection or by other reliable means of identification, including deeds or other legal documentation, aerial photographs, land-based photographs, surveys, maps and/or property sketches;
2. Identify and update relevant characteristics of each property in the property records of the CAD;

3. Define market areas in the CAD, where applicable;
4. Collect, update, review and analyze market data to be used to support values on properties appraised;
5. Identify property characteristics that affect property value in each market area or for each property, including:
 - a. The location and market area of the property;
 - b. Physical attributes of the property such as size, age and condition;
 - c. Legal and economic attributes, if any;
 - d. Easements, covenants, leases, reservations, contracts, declarations, special assessments, exemptions or legal restrictions;
6. If applicable, develop an appraisal model that reflects the relationship among the property characteristics affecting the value in each market area and determines the contribution of individual property characteristics;
7. Apply conclusions reflected in the model to the characteristics of the property appraised; and
8. Review the appraisal results to determine value.

Like industrial properties, special purpose properties will be valued on a cost approach basis since these properties have a low frequency of being bought and sold in the open market. In addition, since these properties are owner occupied, the income information is difficult to obtain and rarely applicable.

BUSINESS & INDUSTRIAL TANGIBLE PERSONAL PROPERTIES:

Each year the following activities will be undertaken for all business personal property assigned to HLL&A under its contract with the CAD. Estimates of value are typically provided to the CAD in mid to late May of each Tax Year.

1. Identify properties to be appraised through physical inspection or by other reliable means of identification, including deeds or other legal documentation, aerial photographs, land-based photographs, or renditions;
2. Identify and update relevant characteristics of each property in the property records of the CAD;
3. Collect, update, review and analyze market data to be used to support values on properties appraised;
4. Identify property characteristics that affect property value for each property, including:
 - a. The location and market area of the property;
 - b. Physical attributes of the property such as size, age and condition;
 - c. Legal and economic attributes, if any;
 - d. Easements, covenants, leases, reservations, contracts, declarations, special assessments, exemptions or legal restrictions;
5. Develop or update a cost schedule based on SIC codes and market conditions;
6. Create or refine valuation models using actual cost data to derive the RCN of a particular unit;
7. Apply these schedules and models to estimate values; and
8. Review the rendition information in light of the schedules to determine value.

Business personal properties are required to be rendered and will be typically be valued on a cost approach basis.

MINERAL PROPERTIES:

Each year the following activities will be undertaken for all mineral properties assigned to HLL&A under its contract with the CAD. Estimates of value are typically provided to the CAD in mid to late May of each Tax Year.

1. Identify properties to be appraised through physical inspection or by other reliable means of identification, including deeds or other legal documentation, aerial photographs, land-based photographs, surveys, maps and/or property sketches;
2. Identify and update relevant characteristics of each property in the property records of the CAD;
3. Collect, update, review and analyze market data to be used to support values on properties appraised;
4. Identify and update all ownership information of each property;
5. Identify property characteristics that affect property value for each property, including:
 - a. The location of the property;
 - b. Physical attributes of the property such as production history, age and condition;
 - c. Legal and economic attributes, if any;
 - d. Easements, covenants, leases, reservations, contracts, declarations, special assessments, exemptions or legal restrictions;
6. Identify the preceding year's average price and lease operating expenses;
7. Calculate the starting rates and price and apply them to the decline curve; and
8. Review the appraisal results to determine value.

Generally, these types of properties will be valued on an income approach basis, using the Comptroller's and statutory guidelines as to price and discount rate.

MARKET VALUE

Tax Code Definition of Market Value is as Follows:

"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.

Two Definitions of Market Value Implied by Supreme Court Rulings May be Stated as Follows:

Personal Property Market value is the price that the dealers in the goods are willing to receive and purchasers are willing to pay when goods are bought and sold in the ordinary course of trade.

Real property market value is the amount of money that probably would be arrived at through fair negotiations between a willing seller and a willing buyer, taking into consideration the uses to which the property may be put.

The Appraisal Institute's definition of market value, disposition value and liquidation value are as follows:

Market Value

Market value is based on the concept of an open and competitive market in which transactions are free of duress or forced liquidation. The report clarifies and rearranges the conditions set forth in the definition, as follows:

Market value is the most probable price at which a specified interest in real property is likely to bring under all of the following conditions:

1. Consummation of a sale as of a specified date.
2. Open and competitive market for the property interest appraised.
3. Buyer and seller each acting prudently and knowledgeably.

4. Price not affected by undue stimulus.
5. Buyer and seller typically motivated.
6. Both parties acting in what they consider their best interests.
7. Adequate marketing efforts made and a reasonable time allowed for exposure in the open market.
8. Payment made in cash in U.S. dollars or in terms of financial arrangements comparable thereto.
9. Price represents the normal consideration for the property sold, unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

Disposition Value

Disposition value is the most probably price which a specified interest in real property is likely to bring under all of the following conditions:

1. Consummation of a sale within a severely limited future marketing period specified by the client.
2. Current actual market conditions for the property interest appraised.
3. Buyer acting prudently and knowledgeable.
4. Seller under extreme compulsion to sell.
5. Buyer typically motivated.
6. Buyer acting in what he/she considers his/her best interests.
7. Limited marketing effort made and limited time allowed for completion of sale.
8. Payment made in cash in U.S. dollars or in terms of financial arrangements comparable thereto.
9. Price represents the normal consideration for the property sold, unaffected by special or creative financing or sales concessions granted by anyone associated with this sale.

Liquidation Value

Liquidation value is the most probable price which a specified interest in real property is likely to bring under all of the following conditions:

1. Consummation of sale within a severely limited future marketing period specified by the client.
2. Current actual market conditions for the property interest appraised.
3. Buyer acting prudently and knowledgeable.
4. Seller under extreme compulsion to sell.
5. Buyer typically motivated.
6. Buyer acting in what he/she considers his/her best interests.
7. Limited marketing effort made and limited time allowed for completion of sale.
8. Payment made in cash to U.S. dollars or in terms of financial arrangements comparable thereto.
9. Price represents the normal concessions granted by anyone associated with the sale.

The following types of sales are generally NOT considered arm's-length transaction:

1. Sales involving courts, or in which government agencies or public utilities are principals.
2. Sales in which charitable, religious or educational institutions are principals.
3. Sales in which a financial institution is the buyer and a lienholder or the seller of property taken through foreclosure.
4. Sales between relatives.
5. Sales between corporate affiliates.
6. Sales of convenience.
7. Sales of settling an estate.
8. Forced sales.
9. Sales of a doubtful title.
10. Auctions.

11. Foreclosure sales, condemnation sales or other sales which the price was not representative of market.
12. Sales resulting from divorce proceedings.

Although the following are considered arm's-length, open-market sales, because they involve special circumstances, they should be either excluded from analysis or used with caution:

1. Trades.
2. Transactions involving partial interests.
3. Land Contracts, contracts-for-deed and other installment purchase agreements.
4. Incomplete or un-built property.

Standard on Mass Appraisal of Real Property

Approved July 2017

International Association of Assessing Officers

This standard replaces the January 2012 *Standard on Mass Appraisal of Real Property* and is a complete revision. The 2012 *Standard on Mass Appraisal of Real Property* was a partial revision that replaced the 2002 standard. The 2002 standard combined and replaced the 1983 *Standard on the Application of the Three Approaches to Value in Mass Appraisal*, the 1984 *Standard on Mass Appraisal*, and the 1988 *Standard on Urban Land Valuation*. IAAO assessment standards represent a consensus in the assessing profession and have been adopted by the Executive Board of IAAO. The objective of IAAO standards is to provide a systematic means by which concerned assessing officers can improve and standardize the operation of their offices. IAAO standards are advisory in nature and the use of, or compliance with, such standards is purely voluntary. If any portion of these standards is found to be in conflict with the *Uniform Standards of Professional Appraisal Practice (USPAP)* or state laws, *USPAP* and state laws shall govern.

Published by
International Association of Assessing Officers
314 W 10th St
Kansas City, MO 64105-1616

phone: 816.701.8100
fax: 816.701.8149
toll-free: 800.616.4226
web site: www.iaao.org

ISBN 978-0-88329-2075

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Standard on Mass Appraisal of Real Property

1. Scope

This standard defines requirements for the mass appraisal of real property. The primary focus is on mass appraisal for ad valorem tax purposes. However, the principles defined here should also be relevant to CAMAs (CAMAs) (or automated valuation models) used for other purposes, such as mortgage portfolio management. The standard primarily addresses the needs of the assessor, assessment oversight agencies, and taxpayers.

This standard addresses mass appraisal procedures by which the fee simple interest in property can be appraised at market value, including mass appraisal application of the three traditional approaches to value (cost, sales comparison, and income). Single-property appraisals, partial interest appraisals, and appraisals made on an other-than-market-value basis are outside the scope of this standard. Nor does this standard provide guidance on determining assessed values that differ from market value because of statutory constraints such as use value, classification, or assessment increase limitations.

Mass appraisal requires complete and accurate data, effective valuation models, and proper management of resources. Section 2 introduces mass appraisal. Section 3 focuses on the collection and maintenance of property data. Section 4 summarizes the primary considerations in valuation methods, including the role of the three approaches to value in the mass appraisal of various types of property. Section 5 addresses model testing and quality assurance. Section 6 discusses certain managerial considerations: staff levels, data processing support, contracting for reappraisals, benefit-cost issues, and space requirements. Section 7 discusses reference materials.

2. Introduction

Market value for assessment purposes is generally determined through the application of mass appraisal techniques. Mass appraisal is the process of valuing a group of properties as of a given date and using common data, standardized methods, and statistical testing. To determine a parcel's value, assessing officers must rely upon valuation equations, tables, and schedules developed through mathematical analysis of market data. Values for individual parcels should not be based solely on the sale price of a property; rather, valuation schedules and models should be consistently applied to property data that are correct, complete, and up-to-date.

Properly administered, the development, construction, and use of a CAMA system results in a valuation system characterized by accuracy, uniformity, equity, reliability, and low per-parcel costs. Except for unique properties, individual analyses and appraisals of properties are not practical for ad valorem tax purposes.

3. Collecting and Maintaining Property Data

The accuracy of values depends first and foremost on the completeness and accuracy of property characteristics and market data. Assessors will want to ensure that their CAMA systems provide for the collection and maintenance of relevant land, improvement, and location features. These data must also be accurately and consistently collected. The CAMA system must also provide for the storage and processing of relevant sales, cost, and income and expense data.

3.1 Overview

Uniform and accurate valuation of property requires correct, complete, and up-to-date property data. Assessing offices must establish effective procedures for collecting and maintaining property data (i.e., property ownership, location, size, use, physical characteristics, sales price, rents, costs, and operating expenses). Such data are also used for performance audits, defense of appeals, public relations, and management information. The following sections recommend procedures for collecting these data.

3.2 Geographic Data

Assessors should maintain accurate, up-to-date cadastral maps (also known as assessment maps, tax maps, parcel boundary maps, and property ownership maps) covering the entire jurisdiction with a unique identification number for each parcel. Such cadastral maps allow assessing officers to identify and locate all parcels, both in the field and in the office. Maps become especially valuable in the mass appraisal process when a geographic information system (GIS) is used. A GIS permits graphic displays of sale prices, assessed values, inspection dates, work assignments, land uses, and much more. In addition, a GIS permits high-level analysis of nearby sales, neighborhoods, and market trends; when linked to a CAMA system, the results can be very useful. For additional information on cadastral maps, parcel identification systems, and GIS, see the *Standard on Manual Cadastral Maps and Parcel Identifiers* (IAAO 2016b), *Standard on Digital Cadastral Maps and Parcel Identifiers* (IAAO 2015), *Procedures and Standards for a Multipurpose Cadastre* (National Research Council 1983), and *GIS Guidelines for Assessors* (URISA and IAAO 1999).

3.3 Property Characteristics Data

The assessor should collect and maintain property characteristics data sufficient for classification, valuation, and other purposes. Accurate valuation of real property by any method requires descriptions of land and building characteristics.

3.3.1 Selection of Property Characteristics Data

Property characteristics to be collected and maintained should be based on the following:

- Factors that influence the market in the locale in question
- Requirements of the valuation methods that will be employed
- Requirements of classification and property tax policy
- Requirements of other governmental and private users
- Marginal benefits and costs of collecting and maintaining each property characteristic

Determining what data on property characteristics to collect and maintain for a CAMA system is a crucial decision with long-term consequences. A pilot program is one means of evaluating the benefits and costs of collecting and maintaining a particular set of property characteristics (see Gloudemans and Almy 2011, 46–49). In addition, much can be learned from studying the data used in successful CAMAs in other jurisdictions. Data collection and maintenance are usually the costliest aspects of a CAMA. Collecting data that are of little

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auditing firms, or oversight agencies. The inspections should review random samples of finished work for completeness and accuracy and keep tabulations of items coded correctly or incorrectly, so that statistical tests can be used to determine whether accuracy standards have been achieved. Stratification by geographic area, property type, or individual data collector can help detect patterns of data error. Data that fail to meet quality control standards should be recollected.

The accuracy of subjective data should be judged primarily by conformity with written specifications and examples in the data collection manual. The data reviewer should substantiate subjective data corrections with pictures or field notes.

3.3.3 Data Entry

To avoid duplication of effort, the data collection form should be able to serve as the data entry form. Data entry should be routinely audited to ensure accuracy.

Data entry accuracy should be as close to 100 percent as possible and should be supported by a full set of range and consistency edits. These are error or warning messages generated in response to invalid or unusual data items. Examples of data errors include missing data codes and invalid characters. Warning messages should also be generated when data values exceed normal ranges (e.g., more than eight rooms in a 1,200-square-foot residence). The warnings should appear as the data are entered. When feasible, action on the warnings should take place during data entry. Field data entry devices provide the ability to edit data as it is entered and also eliminate data transcription errors.

3.3.4 Maintaining Property Characteristics Data

Property characteristics data should be continually updated in response to changes brought about by new construction, new parcels, remodeling, demolition, and destruction. There are several ways of updating data. The most efficient method involves building permits. Ideally, strictly enforced local ordinances require building permits for all significant construction activity, and the assessor's office receives copies of the permits. This method allows the assessor to identify properties whose characteristics are likely to change, to inspect such parcels on a timely basis (preferably as close to the assessment date as possible), and to update the files accordingly.

Another method is aerial photography, which also can be helpful in identifying new or previously unrecorded construction and land use. Some jurisdictions use self-reporting, in which property owners review the assessor's records and submit additions or corrections. Information derived from multiple listing sources and other third-party vendors can also be used to validate property records.

Periodic field inspections can help ensure that property characteristics data are complete and accurate. Assuming that most new construction activity is identified through building permits or other ongoing procedures, a physical review including an on-site verification of property characteristics should be conducted at least every 4 to 6 years. Reinspections should include partial remeasurement of the two most complex sides of improvements and a walk around the improvement to identify additions and deletions. Photographs taken at previous physical inspections can help identify changes.

3.3.5 Alternative to Periodic On-site Inspections

Provided that initial physical inspections are timely completed and that an effective system of building permits or other methods of routinely identifying physical changes is in place, jurisdictions may employ a set of digital imaging technology tools to supplement field reinspections

with a computer-assisted office review. These imaging tools should include the following:

- Current high-resolution street-view images (at a sub-inch pixel resolution that enables quality grade and physical condition to be verified)
- Orthophoto images (minimum 6-inch pixel resolution in urban/suburban and 12-inch resolution in rural areas, updated every 2 years in rapid-growth areas or 6–10 years in slow-growth areas)
- Low-level oblique images capable of being used for measurement verification (four cardinal directions, minimum 6-inch pixel resolution in urban/suburban and 12-inch pixel resolution in rural areas, updated every 2 years in rapid-growth areas or 6–10 years in slow-growth areas).

These tool sets may incorporate change detection techniques that compare building dimension data (footprints) in the CAMA system to georeferenced imagery or remote sensing data from sources (such as LiDAR [light detection and ranging]) and identify potential CAMA sketch discrepancies for further investigation.

Assessment jurisdictions and oversight agencies must ensure that images meet expected quality standards. Standards required for vendor-supplied images should be spelled out in the Request for Proposal (RFP) and contract for services, and images should be checked for compliance with specified requirements. For general guidance on preparing RFPs and contracting for vendor-supplied services, see the *Standard on Contracting for Assessment Services* [IAAO 2008].

In addition, appraisers should visit assigned areas on an annual basis to observe changes in neighborhood condition, trends, and property characteristics. An on-site physical review is recommended when significant construction changes are detected, a property is sold, or an area is affected by catastrophic damage. Building permits should be regularly monitored and properties that have significant change should be inspected when work is complete.

3.4 Sale Data

States and provinces should seek mandatory disclosure laws to ensure comprehensiveness of sale data files. Regardless of the availability of such statutes, a file of sale data must be maintained, and sales must be properly reviewed and validated. Sale data are required in all applications of the sales comparison approach, in the development of land values and market-based depreciation schedules in the cost approach, and in the derivation of capitalization rates or discount rates in the income approach. Refer to *Mass Appraisal of Real Property* (Gloude-mans 1999, chapter 2) or *Fundamentals of Mass Appraisal* (Gloude-mans and Almy 2011 chapter 2) for guidelines on the acquisition and processing of sale data.

3.5 Income and Expense Data

Income and expense data must be collected for income-producing property and reviewed by qualified appraisers to ensure their accuracy and usability for valuation analysis (see Section 4.4.). Refer to *Mass Appraisal of Real Property* (Gloude-mans 1999, chapter 2) or *Fundamentals of Mass Appraisal* (Gloude-mans and Almy 2011, chapter 2) for guidelines addressing the collection and processing of income and expense data.

3.6 Cost and Depreciation Data

Current cost and depreciation data adjusted to the local market are required for the cost approach (see Section 4.2). Cost and depreciation manuals and schedules can be purchased from commercial services or created in-house. See *Mass Appraisal of Real Property* (Gloude-mans 1999, chapter 4) or *Fundamentals of Mass Appraisal* (Gloude-mans and Almy 2011, 180–193) for guidelines on creating manuals and schedules.

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reported figures can be used as long as they reflect typical figures (or typical figures can be used for all properties).

Alternatively, models for estimating gross or net income and expense ratios can be developed by using actual income and expense data from a sample of properties and calibrated by using multiple regression analysis. For an introduction to income modeling, see *Mass Appraisal of Real Property* (Gloude-mans 1999, chapter 3) or *Fundamentals of Mass Appraisal* (Gloude-mans and Almy 2011, chapter 9). The developed income figures can be capitalized into estimates of value in a number of ways. The most direct method involves the application of gross income multipliers, which express the ratio of market value to gross income. At a more refined level, net income multipliers or their reciprocals, overall capitalization rates, can be developed and applied. Provided there are adequate sales, these multipliers and rates should be extracted from a comparison of actual or estimated incomes with sale prices (older income and sales data should be adjusted to the valuation date as appropriate). Income multipliers and overall rates developed in this manner tend to provide reliable, consistent, and readily supported valuations when good sales and income data are available. When adequate sales are not available, relevant publications and local market participants can be consulted.

4.5 Land Valuation

State or local laws may require the value of an improved parcel to be separated into land and improvement components. When the sales comparison or income approach is used, an independent estimate of land value can be made and subtracted from the total property value to obtain a residual improvement value. Some computerized valuation techniques provide a separation of total value into land and building components.

Land values should be reviewed annually. At least once every 4 to 6 years the properties should be physically inspected and revalued. The sales comparison approach is the primary approach to land valuation and is always preferred when sufficient sales are available. In the absence of adequate sales, other techniques that can be used in land appraisal include allocation, abstraction, anticipated use, capitalization of ground rents, and land residual capitalization. (See *Mass Appraisal of Real Property* [Gloude-mans 1999, chapter 3] or *Fundamentals of Mass Appraisal* [Gloude-mans and Almy 2011, 178–180].)

4.6 Considerations by Property Type

The appropriateness of each valuation approach varies with the type of property under consideration. Table 1 ranks the relative usefulness of the three approaches in the mass appraisal of major types of properties. The table assumes that there are no major statutory barriers to using all three approaches or to obtaining cost, sales, and income data. Although relying only on the single best approach for a given type of property can have advantages in terms of efficiency and consistency, the use of two or more approaches provides helpful cross-checks and flexibility and can thus produce greater accuracy, particularly for less typical properties.

Table 1. Rank of typical usefulness of the three approaches to value in the mass appraisal of major types of property

Type of Property	Cost Approach	Sales Comparison Approach	Income Approach
Single-family residential	2	1	3
Multifamily residential	3	1,2	1,2
Commercial	3	2	1
Industrial	1,2	3	1,2
Nonagricultural land	–	1	2
Agricultural ^a	–	2	1
Special-purpose ^b	1	2,3	2,3

^a Includes farm, ranch, and forest properties.

^b Includes institutional, governmental, and recreation properties.

4.6.1 Single-Family Residential Property

The sales comparison approach is the best approach for single-family residential property, including condominiums. Automated versions of this approach are highly efficient and generally accurate for the majority of these properties. The cost approach is a good supplemental approach and should serve as the primary approach when the sales data available are inadequate. The income approach is usually inappropriate for mass appraisal of single-family residential properties, because most of these properties are not rented.

4.6.2 Manufactured Housing

Manufactured or *mobile* homes can be valued in a number of ways depending on the local market and ownership status. Often mobile homes are purchased separately and situated on a rented space in a mobile home park. In this case the best strategy is to model the mobile homes separately from the land. At other times mobile homes are situated on individual lots and bought and sold similar to stick-built homes. Particularly in rural areas they may be intermixed with stick-built homes. In these cases, they can be modeled in a manner similar to that for other residential properties and included in the same models, as long as the model includes variables to distinguish them and recognize any relevant differences from other homes (e.g., mobile homes may appreciate at a rate different from that for stick-built homes).

4.6.3 Multifamily Residential Property

The sales comparison and income approaches are preferred in valuing multifamily residential property when sufficient sales and income data are available. Multiple regression analysis (MRA) and related techniques have been successfully used in valuing this property type. Where adequate sales are available, direct sales models can be used. MRA also can be used to calibrate different portions of the income approach, including the estimation of market rents and development of income multipliers or capitalization rates. As with other residential property, the cost approach is useful in providing supplemental valuations and can serve as the primary approach when good sales and income data are not available.

4.6.4 Commercial and Industrial Property

The income approach is the most appropriate method in valuing commercial and industrial property if sufficient income data are available. Direct sales comparison models can be equally effective in large jurisdictions with sufficient sales. When a sufficient supply of sales data and income data is not available, the cost approach should be

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Various graphs can also be used for this purpose. The *Standard on Ratio Studies* (IAAO 2013) stipulates that the level of appraisal for each major group of properties should be within 5 percent of the overall level for the jurisdiction and provides criteria for determining whether it can be concluded from ratio data that the standard has not been met.

Another aspect of uniformity relates to the consistency of assessment levels within property groups. There are several such measures, the preeminent of which is the coefficient of dispersion (COD), which represents the average percentage deviation from the median ratio. The lower the COD, the more uniform the ratios within the property group. In addition, uniformity can be viewed spatially by plotting sales ratios on thematic maps.

The *Standard on Ratio Studies* (IAAO 2013) provides the following standards for the COD:

- Single-family homes and condominiums: CODs of 5 to 10 for newer or fairly similar residences and 5 to 15 for older or more heterogeneous areas
- Income-producing properties: CODs of 5 to 15 in larger, urban areas and 5 to 20 in other areas
- Vacant land: CODs of 5 to 20 in urban areas and 5 to 25 in rural or seasonal recreation areas
- Rural residential, seasonal, and manufactured homes: CODs of 5 to 20.

The entire appraisal staff must be aware of and monitor compliance with these standards and take corrective action where necessary. Poor uniformity within a property group is usually indicative of data problems or deficient valuation procedures or tables and cannot be corrected by application of market adjustment factors.

A final aspect of assessment uniformity relates to equity between low- and high-value properties. Although there are statistical subtleties that can bias evaluation of price-related uniformity, the IAAO literature (see particularly *Fundamentals of Mass Appraisal* [Gloude-mans and Almy 2011, 385–392 and Appendix B] and the *Standard on Ratio Studies* [IAAO 2013]) provides guidance and relevant measures, namely, the price-related differential (PRD) and coefficient of price-related bias (PRB).

The PRD provides a simple gauge of price-related bias. The *Standard on Ratio Studies* (IAAO 2013) calls for PRDs of 0.98 to 1.03. PRDs below 0.98 tend to indicate assessment progressivity, the condition in which assessment ratios increase with price. PRDs above 1.03 tend to indicate assessment regressivity, in which assessment ratios decline with price. The PRB indicates the percentage by which assessment ratios change whenever values double or are halved. For example, a PRB of -0.03 would mean that assessment levels fall by 3 percent when value doubles. The *Standard on Ratio Studies* calls for PRBs of -0.05 to $+0.05$ and regards PRBs outside the range of -0.10 to $+0.10$ as unacceptable.

Because price is observable only for sale properties, there is no easy correction for the PRB, which is usually due to problems in valuation models and schedules. Sometimes other ratio study diagnostics will provide clues. For example, high ratios for lower construction classes may indicate that base rates should be reduced for those classes, which should in turn improve assessment ratios for low-value properties.

5.3 Holdout Samples

Holdout samples are validated sales that are not used in valuation but instead are used to test valuation performance. Holdout samples should be randomly selected with a view to obtaining an adequate sample while ensuring that the number of sales available for valuation will provide

reliable results for the range of properties that must be valued (holdout samples of 10 to 20 percent are typical). If too few sales are available, later sales can be validated and used for the same purpose. (For a method of using sales both to develop and test valuation models, see "The Use of Cross-validation in CAMA Modeling to Get the Most Out of Sales" (Jensen 2011).

Since they were not used in valuation, holdout samples can provide more objective measures of valuation performance. This can be particularly important when values are not based on a common algorithm as cost and MRA models are. Manually assigning land values, for example, might produce sales ratio statistics that appear excellent but are not representative of broader performance for both sold and unsold properties. Comparable sales models that value a sold property using the sale of a property as a comparable for itself can produce quite different results when tested on a holdout group.

When a new valuation approach or technique is used for the first time, holdout sales can be helpful in validating use of the new method. In general, however, holdout samples are unnecessary as long as valuation models are based on common algorithms and schedules and the value assigned to a sale property is not a function of its price. Properly validated later sales can provide follow-up performance indicators without compromising the number of sales available for valuation.

5.4 Documentation

Valuation procedures and models should be documented. Appraisal staff should have at least a general understanding of how the models work and the various rates and adjustments made by the models. Cost manuals should be current and contain the rates and adjustments used to value improvements by the cost approach. Similarly, land values should be supported by tables of rates and adjustments for features such as water frontage, traffic, and other relevant influences. MRA models and other sales comparison algorithms should document final equations and should be reproducible, so that rerunning the model produces the same value. Schedules of rental rates, vacancy rates, expense ratios, income multipliers, and capitalization rates should document how values based on the income approach were derived.

It can be particularly helpful to prepare a manual, booklet, or report for each major property type that provides a narrative summary of the valuation approach and methodology and contains at least the more common rates and adjustments. Examples of how values were computed for sample properties can be particularly helpful. The manuals serve as a resource for current staff and can be helpful in training new staff or explaining the valuation process to other interested parties. Once prepared, the documents should be updated when valuation schedules change or methods and calculation procedures are revised.

5.5 Value Defense

The assessment office staff must have confidence in the appraisals and be able to explain and defend them. This confidence begins with application of reliable appraisal techniques, generation of appropriate valuation reports, and review of preliminary values. It may be helpful to have reports that list each parcel, its characteristics, and its calculated value. Parcels with unusual characteristics, extreme values, or extreme changes in values should be identified for subsequent individual review. Equally important, summary reports should show average values, value changes, and ratio study statistics for various strata of properties. These should be reviewed to ensure the overall consistency of values for various types of property and various locations. (See the *Uniform Standards of Professional Appraisal Practice*, Standards Rule 6-7, for reporting requirements for mass appraisals [The Appraisal Foundation 2012–2013].)

The staff should also be prepared to support individual valuations as required, preferably through comparable sales. At a minimum, staff should be able to produce a property record and explain the basic

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templates, files, and documents that can be processed. These are often referred to as commercial off-the-shelf software (COTS) packages.

Generic vertical software usually requires modification to fit a jurisdiction's specific needs. In considering generic software, the assessor should determine

- System requirements
- The extent to which the software meets the agency's needs
- A timetable for implementation
- How modifications will be accomplished
- The level of vendor support
- Whether the source code can be obtained.

(See Standard on Contracting for Assessment Services [IAAO 2008].)

Horizontal generic software is more flexible, permitting the user to define file structures, relational table layout, input and output procedures, including form or format, and reports. Assessment offices with expertise in such software (which does not imply a knowledge of programming) can adapt it for

- Property (data) file maintenance
- Market research and analysis
- Valuation modeling and processing
- Many other aspects of assessment operations.

Horizontal generic software is inexpensive and flexible. However, it requires considerable customization to adapt it to local requirements. Provisions should be made for a sustainable process that is not overly dependent on a single person or resource.

6.4 Contracting for Appraisal Services

Reappraisal contracts can include mapping, data collection, data processing, and other services, as well as valuation. They offer the potential of acquiring professional skills and resources quickly. These skills and resources often are not available internally. Contracting for these services not only can allow the jurisdiction to maintain a modest staff and to budget for reappraisal on a periodic basis, but also makes the assessor less likely to develop in-house expertise. (See the *Standard on Contracting for Assessment Services* [IAAO 2008].)

6.5 Benefit-Cost Considerations

6.5.1 Overview

The object of mass appraisal is to produce equitable valuations at low costs. Improvements in equity often require increased expenditures.

Benefit-cost analysis in mass appraisal involves two major issues: policy and administration.

6.5.2 Policy Issues

An assessment jurisdiction requires a certain expenditure level simply to inventory, list, and value properties. Beyond that point, additional expenditures make possible rapid improvements in equity initially, but marginal improvements in equity diminish as expenditures increase. At a minimum, jurisdictions should budget to meet statutory requirements and the performance standards contained in the *Standard on Ratio Studies* (IAAO 2013) and summarized in Section 5.2.

6.5.3 Administrative Issues

Maximizing equity per dollar of expenditure is the primary responsibility of assessment administration. To maximize productivity, the assessor and managerial staff must effectively plan, budget, organize, and control operations and provide leadership. This must be accomplished within the

office's legal, fiscal, economic, and social environment and constraints (Eckert, Gloude-mans, and Kenyon 1990, chapter 16).

7. Reference Materials

Reference materials are needed in an assessment office to promote compliance with laws and regulations, uniformity in operations and procedures, and adherence to generally accepted assessment principles and practices.

7.1 Standards of Practice

The standards of practice may incorporate or be contained in laws, regulations, policy memoranda, procedural manuals, appraisal manuals and schedules, standard treatises on property appraisal and taxation (see section 6.2). Written standards of practice should address areas such as personal conduct, collection of property data, coding of information for data processing. The amount of detail will vary with the nature of the operation and the size of the office.

7.2 Professional Library

Every assessment office should have access to a comprehensive professional library that contains the information staff needs. A resource library may be digital or physical and should include the following:

- Property tax laws and regulations
- IAAO standards
- Historical resources
- Current periodicals
- Manuals and schedules
- Equipment manuals and software documentation.

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Standard on Ratio Studies

Approved April 2013

INTERNATIONAL ASSOCIATION OF ASSESSING OFFICERS

IAAO assessment standards represent a consensus in the assessing profession and have been adopted by the Executive Board of the International Association of Assessing Officers (IAAO). The objective of the IAAO standards is to provide a systematic means for assessing officers to improve and standardize the operation of their offices. IAAO standards are advisory in nature and the use of, or compliance with, such standards is voluntary. If any portion of these standards is found to be in conflict with national, state, or provincial laws, such laws shall govern. Requirements found in the *Uniform Standards of Professional Appraisal Practice (USPAP)* also have precedence over technical standards.

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Standard on Ratio Studies

Part 1. Guidance for Local Jurisdictions

This standard comprises two major parts. Part 1 focuses on the needs of local assessors. Part 2 presents guidelines for oversight agencies that use ratio studies for equalization and appraisal performance monitoring. The Definitions section explains the terms used in this standard. The appendixes present many technical issues in greater detail. More information on many topics addressed in this standard can be found in *Property Appraisal and Assessment Administration* (IAAO 1990, chapter 20) and in *Gloude-mans* (1999, chapter 5).

1. Scope

This part of the standard provides recommendations on the design, preparation, interpretation, and use of ratio studies for the real property quality assurance operations of an assessor's office. Quality assurance/control measures include data integrity review, assessment level and uniformity analysis, and computer-assisted mass appraisal (CAMA) system performance testing, among others.

Assessors may have the opportunity to utilize ratio study information at a greater depth than oversight agencies. These internal studies can help improve appraisal methods or identify areas within the jurisdiction that need attention. External ratio studies conducted by oversight agencies (Part 2) focus more upon testing the assessor's past performance in a few broad property categories.

2. Overview

For local jurisdictions, *ratio study* is used as a generic term for sales-based studies designed to evaluate appraisal performance. The term is used in preference to the term *assessment ratio study* because use of assessments can mask the true level of appraisal and confuse the measurement of appraisal uniformity when the legal assessment level is other than 100 percent of fair market value.

2.1 The Concepts of Market Value and Appraisal Accuracy

Market value is the major focus of most mass appraisal assignments. The major responsibility of assessing officers is estimating the market value of properties based on legal requirements or accepted appraisal definitions. The viability of the property tax depends largely on the accuracy of such value estimates. The accuracy of appraisals made for assessment purposes is therefore of concern, not only to assessors but also to taxing authorities, property taxpayers, and elected representatives. Appraisal accuracy refers to the degree to which properties are appraised at

market value, as defined by professional standards (see *Glossary for Property Appraisal and Assessment* [IAAO 1997]) and legal requirements. While a single sale may provide an indication of the market value of the property in question, it cannot form the basis for a ratio study, which provides information about the market values of groups of properties. Dividing the appraised value by the sale price forms the ratios. The ratio can be multiplied by 100 and expressed as a percentage.

Market value is a concept in economic theory and cannot be observed directly. However, market values can be represented in ratio studies by sales prices (market prices) that have been confirmed, screened, and adjusted as necessary (see Appendix A, "Sales Validation Guidelines"). Sales prices provide the most objective estimates of market values and under normal circumstances should provide good indicators of market value.

2.2 Aspects of Appraisal Performance

There are two major aspects of appraisal accuracy: level and uniformity. Appraisal level refers to the overall ratio of appraised values to market values. Level measurements provide information about the degree to which goals or certain legal requirements are met. Uniformity refers to the degree to which properties are appraised at equal percentages of market value.

2.3 Uses of Ratio Studies

Key uses of ratio studies are as follows:

- measurement and evaluation of the level and uniformity of mass appraisal models
- internal quality assurance and identification of appraisal priorities
- determination of whether administrative or statutory standards have been met
- determination of time trends
- adjustment of appraised values between reappraisals

Assessors, appeal boards, taxpayers, and taxing authorities can use ratio studies to evaluate the fairness of funding distributions, the merits of class action claims, or the degree of discrimination (see Appendix G). However, ratio study statistics cannot be used to judge the level of appraisal of an *individual* parcel. Such statistics can be used to adjust assessed values on appealed properties to the common level.

- Adjustments to sale prices may be difficult to support or may be subjective.

3.2.2.2 Data Accuracy and Integrity

The findings of a ratio study can only be as accurate as the data used in the study. Personnel involved in collecting, screening, and adjusting sales data or making appraisals should be familiar with real estate conveyance practices in their region. They also should be proficient in the principles and practices of real estate appraisal and understand local market conditions.

Accuracy and integrity of data entered into or transferred through computer systems must be ensured. Design of computer programs should make it easy to verify data accuracy. Query tools should be accessible to users, so that data can be verified easily. Methods for checking the accuracy of assigned strata (such as school district, city, neighborhood, and category) as well as of assessed or appraised value, sale price, parcel identifier, and other fields must be established to reduce these and other nonsampling errors.

3.3 Stratification

Stratification divides all the properties within the scope of the study into two or more groups or strata. Stratification facilitates a more complete and detailed picture of appraisal performance and can enhance sample representativeness.

Each type of property subject to a distinct level of assessment could constitute a stratum. Other property groups, such as neighborhoods and age and size ranges, could constitute additional strata.

When the purpose of the study is to evaluate appraisal quality, flexibility in stratification is essential. The general goal is to identify areas in which the assessment levels are too low or lack uniformity and property groups for which additional reappraisal work may be required. In such cases, it also is highly desirable to stratify on the basis of more than one characteristic simultaneously.

Stratification can help identify differences in level of appraisal between property groups. In large jurisdictions, stratification by geographic areas is generally more appropriate for residential properties, while stratification of commercial properties by either geographic area or property subtypes (e.g., office, retail, and warehouse/industrial) can be more effective.

3.4 Collection and Preparation of Market Data

The reliability of a ratio study depends in part on how well the sales used in the study reflect market values. The underlying principle for review of sales data is to optimize the sample size, but at the same time to exclude sales that provide invalid indicators of market value. A ratio study

sample with fewer than five sales tends to have exceptionally poor reliability and is not very useful.

3.5 Matching of Appraisal and Market Data

The physical and legal characteristics of each property used in the ratio study must be the same as when sold. This implies two essential steps. First, the appraiser must ascertain whether the property descriptions match. If a parcel is split between the appraisal date and the sale date, a sale of any of its parts should not be used in the ratio study.

Second, the appraiser must ascertain whether the property rights transferred, the permitted use, and the physical characteristics of the property on the date of assessment are the same as those on the date of sale. If the physical characteristics of the property have changed since the last appraisal, adjustments may be necessary before including the property in a ratio study. Properties with significant differences in these factors should be excluded from the ratio study.

When statutory constraints are imposed on appraisal methods, the resulting assessment may be less than market value. In such cases a sales ratio study may not provide useful performance information. Constraints typically apply to land that qualifies for agricultural use value, subsidized housing, mineral land, and timberland.

Sales may include property of a type other than the type for which the ratio study analysis is intended. However, sales including more than minimal values of secondary categories are unlikely to be representative, even with adjustment.

For example, a property that is predominantly commercial may include residential components. This sale can be included as representative of the commercial category. In this case, the numerator in the ratio calculation would be the total appraised value including the value of both the commercial and residential components.

In a second example, for a ratio study of vacant land, the numerator in the ratio should reflect only the appraised value of the land. The sale price should be adjusted for the contributory value of the improvements or the sample should be excluded from further analysis.

3.6 Statistical Analysis

After sales have been screened and matched against assessed values, ratios computed, and outliers identified and removed if appropriate, measures of appraisal level, uniformity, and reliability for the entire jurisdiction and each group or stratum should be computed. The sample also could undergo exploratory data analysis to reveal patterns or features of the data (Hoaglin, Mosteller, and Tukey 1983).

4.5 Sample Representativeness

In general, a ratio study is valid to the extent that the sample is sufficiently *representative* of the population.

The distribution of ratios in the population cannot be ascertained directly and appraisal accuracy can vary from property to property. By definition, a ratio study sample would be representative when the distribution of ratios of properties in the sample reflects the distribution of ratios of properties in the population. Representativeness is improved when the sample proportionately reflects major property characteristics present in the population of sold and unsold properties. As long as sold and unsold parcels are appraised in the same manner and the sample is otherwise representative, statistics calculated in a sales ratio study can be used to infer appraisal performance for unsold parcels.

However, if parcels that sell are selectively reappraised based on their sale prices and if such parcels are in the ratio study, uniformity inferences will not be accurate (appraisals appear more uniform than they are). In this situation, measures of appraisal level also will not be supportable unless similar unsold parcels are appraised by a model that produces the same overall percentage of market value (appraisal level) as on the parcels that sold (see Appendix E, "Sales Chasing Detection Techniques"). Assessing officials must incorporate a quality control program; including checks and audits of the data, to ensure that sold and unsold parcels are appraised at the same level.

Operationally, representativeness is improved when the following occur:

1. Appraisal procedures used to value the sample parcels are similar to procedures used to value the corresponding population
2. Accuracy of recorded property characteristics data for sold property does not differ substantially from that of unsold property,
3. Sample properties are not unduly concentrated in certain areas or types of property whose appraisal levels differ from the general level of appraisal in the population
4. Sales have been appropriately screened and validated (see Appendix A).

The first requirement generally is met unless sampled parcels are valued or updated differently from nonsampled parcels, or unless appraisals of sample parcels were done at a different time than appraisals of nonsampled parcels. For example, it is unlikely that the sample is representative of unsold parcels when the sample consists mostly of new construction, first-time sales of improved properties, condominium conversions, or newly platted lots.

The second requirement is met only if value-related property characteristics are updated uniformly for all property in a class as opposed to being updated only upon sale.

The third requirement relates to the extent to which appraisal performance for the sample reflects appraisal performance for the population.

The fourth requirement generally is met when the sales to be used in the sample are properly screened, adjusted if necessary, and validated.

4.6 Acquisition and Validation of Sales Data

Sales data are important in ratio studies and play a crucial role in any credible and efficient mass appraisal system. In some instances, it may be necessary to make adjustments to sales prices so they are more representative of the market. When there is more than one sale of the same property during a study period, only one of the transactions should be used in the ratio study. For guidelines on sales validation see Appendix A.

5. Ratio Study Statistics and Analyses

Once data have been properly collected, reviewed, assembled, and adjusted, outlier handling and statistical analysis can begin. This process involves the following steps.

1. A ratio should be calculated for each observation in the sample by dividing the appraised (or assessed) value by the sale price.
2. Graphs and exhibits can be developed that show the distribution of the ratios.
3. Exploratory data analysis, including outlier identification and screening, and tests of the hypotheses of normality may be conducted.
4. Ratio study statistics of both appraisal level and uniformity should be calculated.
5. Reliability measures should be calculated.

An example of a ratio study statistical analysis report is given in table 1-1.

5.1 Data Displays

Displays or exhibits that provide a profile or picture of ratio study data are useful for illustrating general patterns and trends, particularly to nonstatisticians. The particular form of the displays, as well as the data used (e.g., sales prices, sales ratios, and property characteristics) depends on the purposes of the particular display. Types of displays useful in ratio studies are arrays, frequency distributions, histograms, plots, and maps (Gloude-mans 1999).

Graphic displays can be used to

- indicate whether a sample is sufficiently representative of the properties in a stratum
- indicate the degree of nonnormality in the distribution of ratios
- depict the overall level of appraisal

For guidelines on outlier identification and trimming, see Appendix B, “Outlier Trimming Guidelines.”

5.3 Measures of Appraisal Level

Estimates of appraisal level are based on measures of central tendency. They should be calculated for each stratum and for such aggregations of strata as may be appropriate. Several common measures of appraisal level (central tendency) should be calculated in ratio studies, including the median ratio, mean ratio, and weighted mean ratio. When one of these measures is calculated on the data in a sample, the result is a point estimate, which is accurate for the sample but is only one indicator of the level of appraisal in the population. Confidence intervals around the measures of level provide indicators of the reliability of the sample statistics as predictors of the overall level of appraisal of the population. Note that noncompliance with appraisal level standards cannot be determined without the use of confidence intervals or hypothesis tests.

5.3.1 Median

The median ratio is the middle ratio when the ratios are arrayed in order of magnitude. If there is an even number of ratios, the median is the average of the two middle ratios.

The median always divides the data into two equal parts and is less affected by extreme ratios than the other measures of central tendency. Because of these properties, the median is the generally preferred measure of central tendency for evaluating overall appraisal level, determining reappraisal priorities, or evaluating the need for a reappraisal.

5.3.2 Arithmetic Mean

The arithmetic mean (aka mean or average) ratio is the average of the ratios. It is calculated by summing the ratios and dividing by the number of ratios. In a normal distribution the mean equals the median. In a distribution skewed to the right (typical of ratio study data), the mean is greater than the median. The mean is affected more by extreme ratios than the median.

5.3.3 Weighted Mean

The weighted mean ratio is the value-weighted average of the ratios in which the weights are proportional to the sales prices. The weighted mean also is the ratio of the average assessed value to the average sales price value. The weighted mean gives equal weight to each dollar of value in the sample, whereas the median and mean give equal weight to each parcel. The weighted mean is an important statistic in its own right and also is used in computing the PRD, a measure of uniformity between high- and low-value properties

The weighted mean also can be calculated by (1) summing the appraised values, (2) summing the sales prices, and

(3) dividing the first result by the second. The weighted mean also is called the *aggregate ratio*.

5.3.4 Contrasting Measures of Appraisal Level

Because it gives equal weight to each ratio and is unaffected by extreme ratios, the median is the preferred measure of central tendency for evaluating appraisal performance. Although the mean ratio is also a parcel-based measure, it can be affected appreciably by extreme ratios and can be relied upon only if the sample is of adequate size and contains few outliers.

5.4 Measures of Variability

Measures of dispersion or variability relate to the uniformity of the ratios and should be calculated for each stratum in the study. In general, the smaller the measure, the better the uniformity, but extremely low measures can signal one of the following:

acceptable causes

- extremely homogeneous properties
- very stable markets

unacceptable causes

- lack of quality control
- calculation errors
- poor sample representativeness
- sales chasing

Note that as market activity changes or as the complexity of properties increases, the measures of variability usually increase, even though appraisal procedures may be equally valid.

5.4.1 Coefficient of Dispersion

The most generally useful measure of variability or uniformity is the COD. The COD measures the average percentage deviation of the ratios from the median ratio and is calculated by the following steps:

1. subtract the median from each ratio
2. take the absolute value of the calculated differences
3. sum the absolute differences
4. divide by the number of ratios to obtain *the average absolute deviation*
5. divide by the median
6. multiply by 100

The COD has the desirable feature that its interpretation does *not* depend on the assumption that the ratios are normally distributed. In general, more than half the ratios

indicates, for example, that assessment ratios fall by 4.5% when values double and increase by 4.5% when values are halved. Like all regression coefficients, the statistical reliability of the PRB can be gauged by noting its *t*-value and related significance level, and by computing confidence intervals. In table 1-4 the PRB is -0.035 and is not statistically significant.

Unacceptable vertical inequities should be addressed through reappraisal or other corrective actions. In some cases, additional stratification can help isolate the problem. Measures of level computed for value strata should not be compared as a way of determining vertical inequity because of a boundary effect that is most pronounced in the highest and lowest strata (Schultz 1996).

5.7 Tests of Hypotheses

An appropriate test should be used whenever the purpose of a ratio study is implicitly or explicitly to test a hypothesis. A hypothesis is essentially a tentative answer to a question, such as, Are residential and commercial properties appraised at equal percentages of market value? A test is a statistical means of deciding whether the answer “yes” to such a question can be rejected at a given level of confidence. In this case, if the test leads to the conclusion that residential and commercial properties are not appraised at equal percentages of market value, some sort of corrective action on the part of assessing officials is clearly indicated.

Tests are available to determine whether the

- level of appraisal of a stratum fails to meet an established standard
- meaningful differences exist in the level of appraisal between two or more strata
- high-value properties are appraised at a different percentage of market value than low-value properties

Appropriate tests are listed in table 1-2 and discussed in Gloudemans (1999), *Property Appraisal and Assessment Administration* (IAAO 1990), and *Improving Real Property Assessment* (IAAO 1978, 137–54).

5.8 The Normal Distribution

Many conventional statistical methods assume the sample data conform to the shape of a bell curve, known as the normal (or Gaussian) distribution. Performance measures based on the mean or standard deviation can be misleading if the study sample does not meet the assumption of normality. As a first step in the analysis, the distribution of sample ratios should be examined to reveal the shape of the data and uncover any unusual features. Although ratio study samples typically do not conform to the normal distribution, graphical techniques and numerical tests can be used to explore the data thoroughly. Traditional choices are the binomial, chi-square, and Lilliefors tests. Newer and more powerful procedures are the Shapiro-Wilk *W*, the D’Agostino-Pearson K^2 , and the Anderson-Darling A^2 tests (D’Agostino and Stephens 1986).

5.9 Parametric and Distribution-Free (Non-parametric) Statistics

For every problem that might be solved by using statistics, there is usually more than one measure or test. These measures and tests can be divided into two broad categories: parametric and distribution-free (nonparametric). Parametric statistics assume the population data conform to a known family of probability distributions (such as the normal distribution). When the mean, weighted mean, and standard deviation are used in this context, they tend to be more meaningful. Distribution-free statistics make less restrictive assumptions and do not require knowledge about the shape of the underlying population distribution. Given similar distribution of ratios in the underlying populations, distribution free tests, such as the Mann-Whitney test, can determine the likelihood that the level of assessment

Table 1-2. Tests of Hypotheses

Null Hypothesis	Nonparametric Test	Parametric Test
1. Ratios are normally distributed.	Shapiro-Wilk <i>W</i> test D’Agostino-Pearson K^2 test Anderson-Darling A^2 test Lilliefors Test	N/A
2. The level of appraisal meets legal requirements.	Binomial test	<i>t</i> -test
3. Two property groups are appraised at equal percentages of market value.	Mann-Whitney test	<i>t</i> -test
4. Three or more property groups are appraised at equal percentages of market value.	Kruskal-Wallis test	Analysis of Variance
5. Low- or high-value properties are appraised at equal percentages of market value.	Spearman Rank test	PRB, correlation or regression analysis
6. Sold and unsold parcels are treated equally.	Mann-Whitney test	<i>t</i> -test

- date and tax year of the appraisals being evaluated
- number of parcels in each stratum
- number of sales
- number of sales trimmed from the study
- measures of central tendency (appraisal level)
- measures of uniformity (variability) and price-related biases
- confidence interval (measures of reliability) about the measures of central tendency
- summary of adjustments made to sales prices

In addition, there should be a description of the steps taken to ensure that sold and unsold properties were valued and described consistently. If the sold and unsold properties were not treated identically, the documentation should characterize the differences discovered between them.

8.3 Analyses and Conclusions

An objective statement of the results of the ratio study should be prepared. If the study is one in a series, a comparison of the results with those of previous studies can be helpful.

8.4 Documentation

Ratio study procedures should be documented thoroughly. This documentation should take three forms. First, a general guideline should explain the design of the study. This guideline should be updated whenever procedures are changed. Second, all software applications should be documented so that the program logic can be reviewed and modified as needed. Third, a user’s manual should explain how to execute the study or run the software.

8.5 Training and Education

The effectiveness of ratio studies can be improved through education and training. Assessment supervisors should conduct seminars or workshops for the appraisal staff to explain how to interpret reports, how ratio studies can be used to improve appraisal performance, and how the results will be used in-house.

9. Ratio Study Standards

Each local jurisdiction should have ratio study performance standards. Local standards should be consistent with state or provincial standards. The standards summarized in table 1-3 are suggested for jurisdictions in which current market value is the legal basis for assessment. In general, when these standards or other local standards are not met, reappraisal or other corrective measures should be taken.

All standards recommended in this section are predicated on the assumption that steps have been taken to maximize representativeness and validity in the underlying ratio study.

9.1 Level of Appraisal

In analyzing appraisal level, ratio studies attempt to measure statistically how close appraisals are to market value (or to a required statutory constraint that can be expressed as a percentage of market value) on an overall basis. While the theoretically desired level of appraisal is 1.00, an appraisal level between 0.90 and 1.10 is considered acceptable for any class of property. However, each class of property must be within 5 percent of the overall level of appraisal of the jurisdiction (see Section 9.2.1 in this part). Both criteria must be met. By themselves, the calculated measures of central tendency provide only an indication, not proof, of whether the level meets the appropriate goal. Confidence intervals and statistical tests should be used

Table 1-3. Ratio Study Uniformity Standards indicating acceptable general quality*

Type of property—General	Type of property—Specific	COD Range**
Single-family residential (including residential condominiums)	Newer or more homogeneous areas	5.0 to 10.0
Single-family residential	Older or more heterogeneous areas	5.0 to 15.0
Other residential	Rural, seasonal, recreational, manufactured housing, 2–4 unit family housing	5.0 to 20.0
Income-producing properties	Larger areas represented by large samples	5.0 to 15.0
Income-producing properties	Smaller areas represented by smaller samples	5.0 to 20.0
Vacant land		5.0 to 25.0
Other real and personal property		Varies with local conditions

These types of property are provided for guidance only and may not represent jurisdictional requirements.

** Appraisal level for each type of property shown should be between 0.90 and 1.10, unless stricter local standards are required.*

PRD’s for each type of property should be between 0.98 and 1.03 to demonstrate vertical equity.

PRD standards are not absolute and may be less meaningful when samples are small or when wide variation in prices exist. In such cases, statistical tests of vertical equity hypotheses should be substituted (see table 1-2).

*** CODs lower than 5.0 may indicate sales chasing or non-representative samples.*

level for residential property is 0.93 and the appraisal level for commercial property is 1.06, the jurisdiction is not in compliance with this requirement. This test should be applied only to strata subject to compliance testing. It can be concluded that this standard has been met if 95 percent (two-tailed) confidence intervals about the chosen measures of central tendency for each of the strata fall within 5 percent of the overall level of appraisal calculated for the jurisdiction. Using the above example, if the upper confidence limit for the level of residential property is 0.97 and the lower confidence limit for commercial property is 1.01, the two strata are within the acceptable range.

9.2.2 Uniformity among Single-Family Residential Properties

The COD for single-family homes and condominiums in older or more heterogeneous areas should be between 5.0 and 15.0. In areas of newer or fairly similar residences, it should be between 5.0 and 10.0.

9.2.3 Uniformity among Income-Producing Properties

The COD should be between 5.0 and 20.0. In larger, urban market areas, it should be between 5.0 and 15.0.

9.2.4 Uniformity among Unimproved Properties

The COD for vacant land should be between 5.0 and 20.0. The upper limit for an acceptable COD for vacant rural residential or seasonal land may be 25.0.

9.2.5 Uniformity among Rural Residential and Seasonal Properties, Manufactured Housing, and Multifamily Dwellings

The COD for heterogeneous rural residential property, recreational or seasonal homes, manufactured housing, and multifamily dwellings (2-4 units) should be between 5.0 and 20.0.

9.2.6 Uniformity among Other Properties

Target CODs for special-purpose real property and personal property should reflect the nature of the properties involved, market conditions, and the availability of reliable market indicators.

9.2.7 Vertical Equity

PRDs should be between 0.98 and 1.03. The reason this range is not centered on 1.00 relates to an inherent upward bias in the arithmetic mean (numerator in the PRD) that does not equally affect the weighted mean (denominator in the PRD). When samples are small, have high disper-

sion, or include properties with extreme values, the PRD may not provide an accurate indication of assessment regressivity or progressivity. When relying on the PRD to measure vertical equity, it is good practice to perform an appropriate statistical test for price-related biases before concluding that they exist (see table 1-2).

The PRB provides a measure of price-related bias that is more meaningful and less sensitive to extreme prices or ratios. As a general matter, the PRB coefficient should fall between -0.05 and 0.05 . PRBs for which 95% confidence intervals fall outside of this range indicate that one can reasonably conclude that assessment levels change by more than 5% when values are halved or doubled. PRBs for which 95% confidence intervals fall outside the range of -0.10 to 0.10 indicate unacceptable vertical inequities.

As an illustration of the above, assume that the PRB is -0.115 with a standard error of 0.02 and corresponding 95% confidence interval of -0.075 to -0.155 (-0.115 ± 0.04 approximately). One can conclude with 95% confidence that assessment levels change by at least 7.5% when values double or are halved but not that assessment levels change by at least 10%. This result would not be out of compliance with the ± 0.10 standard.

9.2.8 Alternative Uniformity Standards

The above standards may not be applicable to properties in unique, depressed, or rapidly changing markets. In such cases, assessment administrators may be able to develop target standards based on an analysis of past performance or results in similar markets elsewhere. Such an analysis can be based on ratio study results for the past five years or more.

9.3 Natural Disasters and Ratio Study Standards

Natural disasters such as earthquakes, floods, and hurricanes can have a substantial impact on the interpretation and use of ratio studies. In particular, they

- increase the difficulty of accurately identifying the physical and economic characteristics of property on the dates of sale and appraisal
- increase the difficulty of producing sufficiently reliable appraised values
- decrease the availability of usable sales and other market data
- disrupt the supply and demand equilibrium in the neighborhood community or region

As a result of these potential problems, a number of unreliable sample properties may need to be excluded and sample sizes may be unavoidably reduced. All these factors should be considered when ratio study standards are being

Standard on Ratio Studies

Part 2. Equalization and Performance Monitoring

1. Scope

This part of the standard provides guidance and supplementary information to oversight agencies that perform ratio studies. Oversight or equalization ratio studies are designed to examine the overall degree of accuracy of assessments within or among categories of property, market areas, assessment jurisdictions or political subdivisions, such as school districts, municipalities, counties, states or provinces.

2. Oversight Ratio Studies

Oversight agencies are often required to monitor appraisal performance and take corrective actions when necessary. Equalization is a common tool used by oversight agencies to address problems associated with appraisal level. Reappraisal orders can be used to correct uniformity problems.

2.1 Monitoring of Appraisal Performance

Oversight agencies usually perform sales ratio studies, which can include independent appraisals, to monitor local assessment performance. The findings can serve as the basis for enforcement actions, such as reappraisal or equalization orders. State/provincial agencies also often perform ratio studies to advise assessors and the public about local appraisal conditions. Many state or provincial oversight agencies have a dual role. One role is to advise and assist local appraisal offices, and the other role is to measure local appraisal performance. These two roles can create a conflict of interest, which should be minimized.

2.2 Equalization

Oversight agencies can use the results of ratio studies to equalize, directly or indirectly, appraisals or assessments in taxing jurisdictions. Direct equalization is accomplished by an oversight agency which alters locally determined assessments by ordering appraisals within jurisdictions or property classes to be adjusted to market value or to the legally required level of assessment. Direct equalization can also involve adjusting appraisals of centrally assessed properties. When indirect equalization is used, appraisals are not adjusted. Instead, indirect equalization involves an oversight agency estimating total taxable value, given the legally required level of assessment or market value. Indirect equalization allows proper distribution of intergovernmental transfer payments between state or provincial and local governments despite different levels of appraisal among

jurisdictions or property classes. Equalization is not an appraisal or a substitute for reappraisal.

When equalization is based on ratio study samples, sampling error must be taken into account. When confidence intervals include an acceptable range, equalization cannot be supported statistically. When confidence intervals *fail* to bracket official requirements, equalization actions are supported (see section 6.5, “Measures of Reliability,” and section 11.1, “Level of Appraisal”).

Legal aspects of ratio studies, many of which relate to equalization, are discussed in Appendix G.

2.2.1 Direct Equalization

Many states and provinces have authority and specific procedures for direct equalization. The advantage of direct equalization is that it can be applied to specified strata, such as property classes, geographic areas, and political subdivisions that fail to meet appraisal level performance standards (Dornfest [Journal of Property Tax Assessment and Administration, 2004]). Direct equalization also produces results that are generally more visible to the taxpayer and more clearly reduces perceived inequities between classes (*Standard on Property Tax Policy* [IAAO 2010]). For example, direct equalization allows proper and equal application of debt and tax rate limits and equitable partial exemptions.

Direct equalization involves use of adjustment factors, which produce effects mathematically identical to those derived through the application of “trending” or “index” factors, which are commonly used for value updating by local assessing jurisdictions. The most significant differences typically are the level of the jurisdiction originating the adjustments and the stratification of property to which the factors are applied. Local jurisdictions with primary assessment responsibility can develop value adjustment factors as an interim step between complete reappraisals. Such factors commonly are applied to properties by property type, location, size, age and other characteristics (see *Property Appraisal and Assessment Administration* [IAAO 1990, p. 310]). It is rare for equalization factors developed by oversight agencies to be applied to strata more specific than property class or broad geographic area. Often such factors are applied jurisdiction-wide.

States and provinces that employ direct equalization techniques should understand that such equalization is not a substitute for appraisal or reappraisal. Direct equalization

3.2.2 Sampling

A ratio study is a form of applied statistics, because the analyst draws conclusions about the appraisal of the universe (the entire jurisdiction) of properties based only on those that have sold during a given time period or appraisals selected for a random sample. The ratios constitute the sample that will be used to draw conclusions or inferences about the population.

To determine the accuracy of appraisals within a jurisdiction with absolute certainty, it would be necessary for all properties in the population to have been sold in arm's-length, open-market transfers near the appraisal date or all properties would need to be appraised independently by the oversight agency. Since this is not possible, ratio studies must use samples and draw inferences or conclusions about the population from these samples.

The number of parcels in the population (the jurisdiction or stratum) is not an important determinant of a statistically valid and reliable sample.

3.2.3 Determining the Composition of Samples

In the design stage, the oversight agency must decide whether the ratio study sample should comprise sales (or asking prices when appropriate), independent appraisals, or a combination of the two. Each sample type has its advantages and disadvantages, as described below.

3.2.3.1 Sale Samples

The advantages of using sale samples include the following:

- Properly validated sales provide more objective indicators of market value than independent appraisals.
- Using sales is much less expensive than producing independent appraisals.

The disadvantages include the following:

- Difficulty in collecting sales data in jurisdictions without disclosure documents
- The oversight authority may not have control over the sales data collection and validation process
- Influence of sales chasing can be difficult to detect or prevent
- Samples of sales may not adequately represent the population of properties
- An adequate sample size may not be achieved if sales data are scarce
- Time adjustments are more critical when supplemental sales are included

3.2.3.2 Independent Appraisal Samples

Independent appraisals also can be used instead of or in addition to sales for ratio study samples. (See section 8, "Appraisal Ratio Studies," in this part.)

3.2.3.3 Samples Combining Sales and Independent Appraisals

The oversight agency can design and conduct ratio studies using samples comprised of sales and independent appraisals. In this approach, the combined advantages of sale samples and appraisal samples are realized. However, the disadvantage of combining sales and independent appraisals is the possible existence of some of the disadvantages of sale samples and/or appraisal samples (see Section 8.7).

3.3 Collection and Preparation of Market Data

The reliability of a ratio study depends in part on how accurately the sales or independent appraisals used in the study reflect market values. For sales-based studies, oversight agencies should conduct an independent sales verification and screening program if resources permit. Alternatively, oversight agencies should develop audit criteria to review data submitted to qualify sales, corroborate representativeness and confirm adequate sample size. Audit decisions should accommodate needs of the agency and resources available. Independent appraisals used in ratio studies must comply with the appropriate sections of the *Uniform Standards of Professional Appraisal Practice* (USPAP; Appraisal Foundation 2010–2011), and reflect market values as of the date being studied. Most oversight agencies use property data collected by the local jurisdiction to develop their independent appraisals. In order to produce credible appraisals, the oversight agency must be certain that the local jurisdiction accurately recorded the appropriate value-related property characteristics for each property it is independently appraising. Steps must be taken to ensure that errors in the database made by the local jurisdiction do not materially or significantly affect the conclusions or opinions of value developed by the oversight agency.

3.4 Stratification

Stratification divides all the properties within the scope of the study into two or more groups or strata. Stratification facilitates a more complete and detailed picture of appraisal performance and can enhance sample representativeness

Each type of property subject to a distinct level of assessment could constitute a stratum. Other property groups, such as market areas, school districts and tax units, could constitute additional strata.

Strata should be chosen to be consistent with factors in the mass appraisal model. When the purpose of the study is to evaluate appraisal quality, flexibility in stratification

The primary level of stratification should ordinarily be by major property type (e.g., residential, commercial, and vacant land). If circumstances permit, a secondary level of stratification also is recommended. When relying on the weighted mean, the secondary level of stratification (substrata) should normally be value range. Higher-value properties can sell with a different frequency than low-value properties, and appraisal levels can vary between high and low-value properties. As a result, high-value properties can be oversampled (or undersampled) and, because of their high value, can exert a disproportionate influence on the weighted mean and resulting estimated value. Value stratification reduces distortion of the weighted mean caused by over or under-representation of value strata with different levels of appraisal. To properly develop and use value strata, the oversight agency needs each individual assessment in the study universe. If detailed value information is not available, the oversight agency should work with local taxing jurisdictions to obtain sufficient information. At a minimum, a questionnaire can be used to request the total value and number of parcels in predetermined value categories or quantiles (each range contains the same amount of value).

In situations in which value stratification information is not available, or where property ratios are not significantly value-influenced, substrata can be created based on property subtype, geographic area, or other appropriate criteria. Stratification by these criteria corrects for differences in level of appraisal between substrata. In large jurisdictions, substratification by geographic areas generally is more appropriate for residential properties while sub-stratification by either geographic area or property subtypes (e.g., office, retail, and warehouse/industrial) can be appropriate for income-producing properties.

When relying on the median and when sample sizes permit, it is appropriate to stratify within property class by whichever property characteristic is most likely to capture differences in appraisal levels. This characteristic can be geographic area, property subtype, or value range. Substratification by value range helps capture value-related differences in assessment levels, which (unlike the weighted mean) are not reflected in the median.

3.6 Statistical Analysis

When ratio studies are conducted for equalization purposes, confidence intervals and statistical tests can be used to determine whether it should be concluded at a given confidence level that appraisal performance or level requirements in a stratum (or jurisdiction) being tested meets or falls outside of mandated standards. Statistical tests can be used for comparisons among strata, provided the sample sizes are large enough that meaningful differences are not missed (see section 6, “Ratio Study Statistics and Analyses”).

3.7 Evaluation and Use of Results

Lack of independence between locally determined values and sale prices (sales chasing) or independent appraisals can subvert attempts to improve equity (direct equalization) and result in incorrect distribution of funds between states or provinces and local jurisdictions (indirect equalization). To guard against these possibilities, oversight agencies should ensure that sold and unsold properties are appraised similarly. Also, appraisals used as substitutes for sales must reflect market value, and the oversight agency must take remedial measures in instances in which they do not (see section 9, “Estimating Performance of Unsold Properties”, and Appendix E, “Sales Chasing Detection Techniques”).

4. Timing and Sample Selection

Ratio studies made by oversight and equalization agencies should be conducted at least annually. Where possible, ratio studies conducted by equalization agencies should use final values established at the local level, inclusive of changes made by local appeal boards up to that time. However, if local appraisers or boards “chase sales” or set values in a manner that is dissimilar to the way other property values have been set, the sample may not be sufficiently representative and should not be used without careful investigation and necessary adjustment.

4.1 Date of Analysis

The date of analysis is a past year when appraisals from past years are being evaluated to avoid the effects of sales chasing. When prior-year assessments are used to gauge current performance (to avoid sales chasing), the results should be adjusted for any reappraisal activity or assessment changes that occurred in the population (net of new construction) between the prior and current years. Sale prices also should be adjusted to the assessment date to account for time trending.

If the purpose of the study is equalization, using sales after the appraisal date (adjusted for time as necessary) helps ensure the independence of appraisals and sales prices. A sales period spanning the appraisal date can be used if measures are taken to ensure the independence of appraisals made after the earlier sales. This approach has the advantage of reducing the importance of time adjustments.

4.2 Representativeness of Samples

The design and conduct of ratio studies requires decisions that maximize representativeness within the constraints of available resources.

In many kinds of statistical studies, samples are selected randomly from the population and from within each stratum to maximize representativeness. Ratio study samples based on independent appraisals can be randomly selected. Because sales are convenience samples and do not repre-

Use of constrained values produces ratio study results that do not provide information on the true level of appraisal in relation to market value. Use of constrained values is appropriate for equalization. However, when the purpose of the ratio study is to determine the overall quality of assessments or the amount of benefit being awarded by a given statutory constraint on appraised value, the unadjusted sale price or independent market value appraisal must be used. Often, procedural audits can be used as adjuncts to more traditional ratio studies. These audits can be particularly effective when the purpose is to judge overall appraisal quality and when precise, quantitative statistical measures are not obtainable.

5.2 Outlier Ratios

Oversight agencies should consider the extent of sales verification when developing guidelines for trimming limits. In practice, this means that if an oversight agency derives sales data from assessing jurisdictions that may have already removed outliers from the sample, additional trimming may not be necessary (see Appendix B, “Outlier Trimming Guidelines”).

5.2.1 Value Outliers

When the weighted mean is used for indirect equalization, a method that identifies high-value *influential* sales is recommended. Since an influential sale may not have an unusually low or high ratio relative to the rest of the sample, the definition of distortion is based on the principle that the point estimate calculated from the sample should not be statistically significantly different whether the suspect observation is in the sample or not.

To test for an influential sale, one approach is to remove it from the sample and compute the weighted mean and associated confidence interval. If the weighted mean of the sample lies outside the confidence interval calculated without the influential sale, then the sale is truly influential and is a candidate for further scrutiny, isolation in a separate stratum, or possible trimming.

This procedure is intended to test the presence of individual influential sales and is not intended to be used successively after deletion of a sale, but can be applied to more than one apparent outlier at a time by leaving all other sales in the comparison group. Note, however, that the presence of multiple influential sales can indicate the start of a trend. Presence of influential sales is often associated with high price-related differential (PRD) values, which could be the result of systematic regressivity or progressivity. In contrast, the coefficient of price-related bias (PRB) is much less influenced by value outliers and should not be relied on to help identify these outliers.

5.2.2 Outlier Trimming

Statistics calculated from trimmed distributions, obviously, cannot be compared to those from untrimmed distributions or interpreted in the same way. This is especially problematic when making interjurisdictional comparisons. For this reason, oversight agencies may wish to promulgate uniform trimming procedures, based on sound statistical principles. Regardless of the chosen procedure, trimming of outliers must not occur more than once for any sample.

6. Ratio Study Statistics and Analyses

Ratio study measures covered in Part 1 are equally applicable to equalization ratio studies based upon sales or independent appraisals. See section 5.3, “Measures of Appraisal Level,” and section 5.4, “Measures of Variability,” in Part 1.

6.1 Measures of Appraisal Level

The median is the generally preferred measure of central tendency for direct equalization, monitoring of appraisal performance, or evaluation of the need for a reappraisal. The mean should not be used for indirect equalization if there are measurable differences in appraisal level of high- and low-value properties (see table 2-2). In data commonly containing outliers, the trimmed mean can be substituted for the mean (Gloude-mans 1999, chapter 3). See Appendix B for outlier-trimming procedures. Because of its dollar-weighting feature, the weighted mean is most appropriately used in indirect equalization, when estimating the total dollar value of the jurisdiction. When relying on the measure, however, outliers should be carefully reviewed (and deleted if appropriate), since they can strongly affect the weighted mean, particularly when they occur for high-value properties and in small samples.

6.2 Overall Ratio for Combined Strata

For purposes of oversight monitoring of overall appraisal performance and direct equalization, the generally preferred approach is to weight the median ratio of each stratum on the basis of the relative number of properties in the stratum. For indirect equalization, the weight assigned to a measure of central tendency of a stratum should be proportional to the share of that stratum’s total estimated market value. Because the number of parcels bears only a loose relationship to dollar value, weighting by number of parcels is not appropriate for indirect equalization.

For indirect equalization, the preferred method of calculating the overall market value of a jurisdiction is as follows:

1. Divide the total appraised (or assessed) value of each stratum by the stratum sample’s measure of

6.5 Measures of Reliability

It is good practice to calculate measures of reliability whenever the results of a ratio study are used for equalization. Measures of reliability will indicate whether there is a desired degree of confidence that a given level of appraisal has not been achieved. The most commonly used measure of ratio study sample reliability is the confidence interval. This interval brackets the unknown population parameter for any sample statistic with a specified (chosen) degree of confidence. When the interval includes a desired assessment level or a performance standard range around the desired level (see section 11 and Table 2-4), equalization adjustments are not warranted. Similarly, when the interval includes a maximum allowable COD (see Table 2-3), reappraisal or other action to correct poor uniformity is not warranted.

6.6 Vertical Inequities

The measures of variability discussed in section 6.4 relate to “horizontal,” or random, dispersion among the ratios in a stratum, regardless of the value of individual parcels. Another form of inequity can be systematic differences in the appraisal of low- and high-value properties, termed “vertical” inequities. 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* is the result. Appraisals made for tax purposes should be neither regressive nor progressive.

An index statistic for measuring vertical equity is the PRD, which is calculated by dividing the mean ratio by the weighted mean ratio. This statistic should be close to 1.00. Measures considerably above 1.00 tend to indicate assessment regressivity; measures below 1.00 suggest assessment progressivity. When samples are small or the weighted mean is heavily influenced by several extreme sales prices, however, the PRD may not be a sufficiently reliable measure of vertical inequities. A scatter plot of ratios versus appraised values or sale prices is a useful diagnostic tool. A downward (or upward) trend to the data indicates systematic regressivity (or progressivity). If not sufficiently representative, extreme sales prices can be excluded in calculation of the PRD. Similarly, when samples are very large, the PRD may be too insensitive to show small pockets in which there is significant vertical inequity. Standards for evaluating the PRD are given in section 9.2.7 in this part. In addition, more powerful statistical tests for vertical inequities are available and should be employed to determine the significance of the indication provided by the PRD (see section 5.7 in this part and Twark, Everly and Downing [1989]).

The coefficient of price-related bias (PRB) provides a more meaningful measure of price-related bias. It is obtained by regressing percentage difference from the median ratio on percentage differences in value (see Appendix D). A PRB of $-.045$ indicates, for example, that assessment ratios fall by 4.5% when values double and increase by 4.5% when values are halved. Like all regression coefficients, the statistical reliability of the PRB can be gauged by noting its *t*-value and related significance level. Like all regression coefficients, the statistical reliability of the PRB can be gauged by noting its *t*-value and related significance level, and by computing confidence intervals. In table 1-4 the PRB is 0.035 and is not statistically significant.

Unacceptable vertical inequities should be addressed through reappraisal or other corrective actions. In some cases, additional stratification can help isolate the problem. Measures of level computed for value strata should not be compared as a way of determining vertical inequity because of a boundary effect that is most pronounced in the highest and lowest strata (Schultz 1996).

6.7 Tests of Hypotheses

An appropriate test should be used whenever the purpose of a ratio study is implicitly or explicitly to test a hypothesis. A hypothesis is essentially a tentative answer to a question, such as, Are residential and commercial properties appraised at equal percentages of market value? A test is a statistical means of deciding whether the answer “yes” to such a question can be rejected at a given level of confidence. In this case, if the test leads to the conclusion that residential and commercial properties are not appraised at equal percentages of market value, some sort of corrective action on the part of assessing officials is clearly indicated. Appropriate tests are listed in table 1-2 and discussed in Gloude-mans (1999), *Property Appraisal and Assessment Administration* (IAAO 1990), and *Improving Real Property Assessment* (IAAO 1978, 137–54)

6.8 The Normal Distribution

Many conventional statistical methods assume the sample data conform to the shape of a bell curve, known as the normal (or Gaussian) distribution. Performance measures based on the mean or standard deviation can be misleading if the study sample does not meet the assumption of normality. As a first step in the analysis, the distribution of sample ratios should be examined to reveal the shape of the data and uncover any unusual features. Although ratio study samples typically do not conform to the normal distribution, graphical techniques and numerical tests can be used to explore the data thoroughly. Traditional choices are the binomial, chi-square, and Lilliefors tests. Newer and more powerful procedures are the Shapiro-Wilk *W*, the D’Agostino-Pearson K^2 , and the Anderson-Darling A^2 tests (D’Agostino and Stephens 1986).

between appraisals of sampled and unsampled properties. In addition, independent appraisals can be used to test for systematic differences between appraisals of sold and unsold properties.

A disadvantage of appraisal ratio studies is the extra time and cost involved with the independent appraisal process. The subject and any comparables should be physically inspected and the appraisals documented according to appropriate standards. Applicable USPAP guidelines should be followed. Applicable USPAP guidelines should be followed. Independent single-property appraisals should be developed in compliance with *Standard 1*, should be reported in compliance with *Standard 2*, and should be reviewed in compliance with *Standard 3* of USPAP. Independent appraisals done with a mass appraisal model should be developed and reported in compliance with *Standard 6* of USPAP. Another disadvantage is that appraisals are an opinion of value. Accordingly, they should be documented and tested against the market. However, this becomes difficult when sales data are scarce. To reduce this disadvantage, appraisal ratio study analysts should ensure that appraisals are carefully reviewed and allow local appraisers to submit appraisal information that may affect the value conclusion (see *Standard on Oversight Agency Responsibilities* [IAAO 2010]). Where adequate sales are available, independent appraisals should be checked for consistency with sales.

8.3 Sample Selection and Resource Requirements

Sample selection and resource planning in appraisal ratio studies require knowledge of statistical sampling, estimation principles, and available resources. Judgment must be used, because the determination of an adequate sample can require more information than is available during the design and planning phase, such as the actual variation within the final ratio data sets (see section 6.2, “Adequacy of a Given Sample Size,” in Part 1). Moreover, the cost of the study increases with the size of the sample. Therefore, the value of more reliable information must be balanced against the costs of obtaining that information.

In determining the size of the sample for each stratum, the following should be taken into consideration:

1. the required precision (typically measured by the margin of error) of the estimate of the appraisal level, for example, ± 0.05
2. the required confidence level, for example, 95 percent
3. the amount of dispersion expected in the final ratio data set
4. the wastage associated with properties that cannot be efficiently appraised or appraisals that cannot be used for one reason or another (see Gloudemans [1999, chapter 6] for sample size

formulas and required input variables; also see Sherrill and Whorton [1991]).

Once the desired size of an appraisal sample has been determined, the individual properties that will constitute the sample should be selected using a statistically valid sampling plan. Stratified random sampling is preferred.

If value stratification is used, sample properties selected from value groups during resource planning can shift into other value groups before completion of the study, thus reducing the ultimate representativeness of the sample. Some appraisal parcels may need to be removed from the sample when anomalous conditions are discovered such as environmental contamination (sufficiently reliable valuations may be prohibitively difficult or resource intensive) or when the independent appraiser is not allowed access to the property. Any sample parcels that are voided or that shift from a stratum because of value changes should be replaced if possible.

Appraisal ratio studies, as with sales ratio studies, require informed, reasoned judgment to maximize sample representativeness and statistical reliability.

8.4 Data Requirements and Appraisal Techniques

The appraisal techniques selected for an appraisal ratio study should be consistent with accepted appraisal principles and practices. The appraisals should reflect the appraisal date in question and should be well documented. Statistical software should be used as much as possible to expand analytical capabilities and perform calculations.

The appraisals used in appraisal ratio studies can be based on CAMA and automated valuation model (AVM) techniques (see *Standard on Automated Valuation Models*, [IAAO 2003]). The models used must be developed independently from those used for assessment purposes. Adequate market data and property characteristic data are required to develop reliable and defensible model estimates. If available, sales from a later period can be used to expand sample size. However, as in sales-based ratio studies, sales derived from primary assessing jurisdictions should be reviewed to ensure accuracy and validity. CAMA and AVM models have the advantage of reducing costs, permitting the use of larger, more representative samples. CAMA and AVM models developed for equalization must focus on the adequacy of overall, not individual, value or level of assessment estimates.

Because the purpose of the appraisal is to make an *independent* value estimate, not audit the assessor’s work, the appraisals should be made without knowledge of the assessor’s value. Appraisers should *not* be supplied with copies of the assessor’s appraisal work sheets or model information. Supervisors should spot-check and review the work of staff appraisers to ensure that the required independence is maintained. When the purpose of the ratio study is equal-

ner and the data describing them are coded consistently, statistics calculated in a sales ratio study can be used to infer appraisal performance for unsold parcels. However, if parcels that sell are selectively reappraised or recoded, based on their sale prices or some other criterion (such as listing price) and if such parcels are in the ratio study, sales ratio study uniformity inferences will not be accurate (appraisals will appear more uniform than they are). In this situation, measures of appraisal level will also be unsupported unless similar unsold parcels were appraised by a model that produces the same overall percentage of market value (appraisal level) as the parcels that sold.

Oversight agencies must ensure that sold and unsold parcels are appraised at the same level. Several techniques are available for determining whether assessors are selectively appraising sold parcels (see Appendix E, “Sales Chasing Detection Techniques,” or *Property Appraisal and Assessment Administration* [IAAO 1990, Appendix 20-2] and Gloude-mans [1999, chapter 6] for a more detailed discussion).

If unsold properties within a properly specified group are not appraised consistently with sold properties within the same group and according to applicable guidelines, unadjusted sales ratio results cannot be used. The oversight agency will have to adjust calculated results or conduct an alternative study.

Once it is determined that *sales chasing* probably has occurred and probably is reducing the validity of ratio study statistical measures of level or uniformity, it is necessary to redo the ratio study to establish valid measures before any other recommendations, such as reappraisal or equalization action, can be made. If feasible, probably the best approach is to select a sample period that effectively precludes sales chasing. For example, when the lien or appraisal date is January 1, many jurisdictions use sales occurring before that date to make valuation decisions. To test the resulting valuations, it would be appropriate to use sales occurring after January 1 (or after the last date for changing assessments for the year in question), provided such data are time-adjusted (when necessary) backward to match the appraisal date. As a slight variation on this principle, earlier sales could be used, except when sales chasing is detected, in which case it is appropriate to switch to a later, post-appraisal-date sales period.

Legal or practical constraints can prevent use of optimal sample periods in many cases. In these situations, it is important to determine the exact cause of the sales chasing. For example, if a large proportion of selling properties are appealed and if appeal boards typically adjust to sale price, the result is the same as sales chasing by the assessor. One solution is to use appraised values prior to the action of the appeal board, provided that the appeal adjustment is not merely the result of an atypical clerical or other error. Another approach is to use current sales prices and prior-year values, adjusted for reappraisal

activity or assessment value changes in the population. The percentage increase or decrease in the prior-year’s appraised values for the population (net of new construction) should be used to adjust the prior-year’s values for the sample (Gloude-mans 1999).

10. Presentation of Findings, Documentation, and Training

Oversight agencies should produce ratio studies in a manner that is transparent in all stages to all stakeholders.

(See section 8, Part 1.)

11. Ratio Study Standards

Each state and province should have ratio study performance standards. These standards, summarized in table 2-3, are suggested for jurisdictions in which current market value is the legal basis for assessment. In general, when state and provincial standards are not met, reappraisal or other corrective measures should be taken or equalization procedures can be imposed. When an oversight agency orders such actions, the burden of proof should be on the agency to show that the standards have not been achieved.

All standards recommended in this section are predicated on the assumption that all practicable steps necessary to maximize representativeness and validity in the underlying ratio studies have been conducted.

11.1 Level of Appraisal

The calculated measures of central tendency are point estimates and provide only an indication, not proof, of whether the level meets the appropriate goal. Confidence intervals and statistical tests should be used to determine whether the appraisal level differs from the established goal in a particular instance.

A decision by an oversight agency to take some action (direct equalization, indirect equalization, reappraisal) can have profound consequences for taxpayers, taxing jurisdictions, and other affected parties. This decision should not be made without a high degree of certainty that the action is warranted. Conversely, a decision not to take action when action is needed can have equally profound consequences. Oversight agencies should weigh all the options and consider the issues discussed below when developing or revising a level-of-appraisal standard, and when developing equalization or other appraisal oversight procedures.

11.1.1 Purpose of Level-of-Appraisal Standard

Jurisdictions that follow the IAAO recommendation of annual reassessments and comply with USPAP standards should be able to develop mass appraisal models that maintain an overall ratio level of 100 percent (or very near thereto). The local assessor may be required to observe reap-

in the case of direct equalization or measuring appraisal performance. For indirect equalization the chosen interval should overlap the performance standard range of 95 percent to 105 percent. If the confidence interval does not overlap any portion of the appropriate range, equalization is performed or reappraisal orders are issued. See table 2-4 for an example of the direct equalization or appraisal performance decision making process.

11.1.5 Adjustments for High Variability and Small Samples

High variability, small sample size, or a combination of these factors often causes confidence intervals to become quite wide. Wide confidence intervals reflect the imprecision of the underlying statistic and can decrease the usefulness of performance measures. Also, wide confidence intervals can cause an inequitable situation in which jurisdictions with small samples and large variability are never subject to equalization or reappraisal orders, while jurisdictions with larger samples and much less variability are more likely to be subject to such orders even though their appraisal performance may be arguably better.

For these reasons, oversight agencies should consider expanding sample sizes by taking steps to increase the number of sales or by making independent appraisals (see section 7.4 part 2). If the sample size cannot be increased, two options may be considered when the point estimate fails to achieve compliance but the confidence interval overlaps the range of compliance:

- If a particular point estimate does not meet the standard for the current study cycle the oversight agency may reduce the level of confidence by 5% the following year. This may be followed by an annual stepwise reduction of 5%. Such a reduction may continue to a 70 percent level of confidence if the point estimate fails to meet the compliance threshold over this period of time. Corrective action would be imposed when a given year’s confidence interval fails to include the performance standard range.
- The oversight agency may examine statistical point estimates over several study cycles. A jurisdiction that fails to meet a particular point standard for 5 consecutive years has a probability of less than 5% that compliance has been achieved, even if

the confidence interval overlaps the compliance threshold every year. In such cases the oversight agency would impose corrective decisions based upon the point estimate.

11.1.6 Calculating Equalization Adjustments

If noncompliance with either direct or indirect equalization standards is indicated, the appropriate point estimate (statistic) measuring appraisal level should be used to calculate adjustment factors, by dividing it into 100 percent.

11.2 Appraisal Uniformity

Assuming the existence of an adequate and sufficiently representative sample, if the uniformity of appraisal is unacceptable, reappraisal should be undertaken regardless of the level of appraisal. The oversight agency should recognize that the COD is a point estimate and cannot be accepted as proof of assessment uniformity problems without an appropriate degree of statistical confidence. Such proof can be provided by recognized statistical tests, including bootstrap confidence intervals. If the data are normally distributed, the COV and confidence intervals around this measure also can be determined. Then the COV can be mathematically converted into an equivalent COD.

11.2.1 Oversight Uniformity Standards

Oversight agencies should establish uniformity standards for local assessment jurisdictions. Any COD performance standards applied to strata within a particular jurisdiction should be related to the overall size, profile of property characteristics (type, age, condition, and obsolescence) and market activity. In general, tighter uniformity standards can be applied to larger jurisdictions with newer construction and active markets. And generally, less stringent uniformity standards should be applied to older, economically depressed or less densely developed areas with less efficient markets. Standards should also be relaxed in jurisdictions that experience economic instability due to sudden changes in supply or demand factors. In developing uniformity standards, oversight agencies should consider reasonable tolerance ranges in making compliance decisions.

11.2.2 Multi-level Uniformity Standards

The uniformity standards presented in table 2-3 are defined in terms of the COD (point estimate) measure and are

Table 2-4. Ratio Study Standards and Decision Making—Direct Equalization or Appraisal Performance Using Median 90%–110% Standard

Example demonstrating application of standard at a 95% level of confidence

Case	Point Estimate	Confidence Interval (CI) Width (95%)	CI Overlaps Performance Standard Range	Point Estimate in Performance Standard Range	Equalization Action or Reappraisal Order
1	92%	86% to 101%	yes	yes	no
2	88%	81% to 95%	yes	no	no
3	84%	79% to 88%	no	no	yes

duce a sufficiently reliable ratio study, based upon the best information available.

12. Personal Property Studies

Most personal property ratio studies performed by oversight agencies are performed for equalization purposes. Because indirect equalization in particular requires overall estimation of value, it is imperative for these ratio studies to focus on large accounts.

Horizontal equity requires similar levels of appraisal between real and personal property. Sales data for personal property are difficult to obtain and analyze because markets for personal property are generally less visible and more difficult to follow than real property markets. Therefore, performance reviews and appraisal ratio studies should be used in place of sales ratio studies to determine the quality of appraisal of personal property. The performance review does not quantify assessment conditions but can determine general assessment quality. The appraisal ratio study can be used to determine the level and uniformity of assessment for personal property.

12.1. The Performance Review

The performance review is an empirical study that evaluates the assessment method used and the ability of the jurisdiction to meet its legal requirement in the assessment of personal property. This type of study can be used to allocate tax dollars in multijurisdictional funding calculations or equalization by assuming that jurisdictions passing the performance review are assessing personal property at the general level of other classes of property analyzed with ratio studies.

12.1.1. Discovery

The jurisdiction must have the ability to discover the owners or users of taxable personal property within the jurisdiction. This is accomplished using phone books, business/occupational licenses, listings, sales tax rolls, and field reviews (see IAAO Course 500, “The Assessment of Personal Property,” and *Standard on Valuation of Personal Property* [IAAO 2005] for a complete list).

12.1.2. Valuation

Personal property is valued by using acceptable schedules and methods including depreciation schedules published by nationally recognized valuation firms, market data from published valuation guides, and other generally accepted valuation methods and acceptable adjustments (see *Standard on Valuation of Personal Property*).

12.1.3. Verification

Inclusiveness of personal property returns and reports should be verified by an audit program. The audit program should focus on larger and complex accounts; however, it also should include randomly selected accounts. The audit program should provide coverage of the entire tax base regardless of the jurisdiction’s reappraisal cycle.

12.1.4 Forms and Renditions

Comprehensive forms supplied by the assessment authority should allow the taxpayer to disclose fully all assessable personal property. The tax laws should require mandatory compliance, with meaningful penalties for noncompliance.

12.2. Appraisal Ratio Studies for Personal Property

The appraisal ratio study produces an estimate of the level of assessment of personal property by developing a ratio for property that is on the tax roll through the use of appraisals. The level of assessment determined in this way can be adjusted downward to account for property that has not been assessed.

12.2.1 Assessment Ratio for Personal Property

Personal property market values are usually derived from appraisals using a replacement cost new less depreciation (RCNLD) approach (see IAAO Course 500). A comparison of the depreciation schedules in use to nationally accepted schedules would enable the calculation of a ratio for property on the roll. A statistically sound process should be used to select a sample that is representative of personal property on the tax rolls. Such a sample can be parcel- or value-based depending on the intended use of the ratio study in indirect or direct equalization.

12.2.2 Stratification

Proper stratification of personal property accounts should be done for greater statistical accuracy. Strata should be based on the type and value of personal property accounts.

Stratification by type of account should occur first. Personal property accounts can be divided into residential (motor vehicles, boats, aircraft, and the like), agriculture, and business accounts. Further stratification can occur in residential and agricultural accounts but is necessary in business or commercial accounts. Business accounts are usually stratified by size into a minimum of four groups. Value ranges for these groups should be derived from the value ranges in the local market. One example would be small (less than \$250,000), medium (\$250,000 to \$1 million), moderate (\$1–\$5 million), and large (greater than

Standard on Ratio Studies

Definitions

Absolute value. The value of a number (or variable) regardless of its sign. For example, 3 and -3 (minus 3) both have an absolute value of 3. The mathematical symbol for absolute value is one vertical bar on each side of the number in question, for example, $|3|$.

Accuracy. The closeness of a measurement, computation, or estimate to the true, exact, or accepted value. Accuracy also can be expressed as a range about the true value. *See also precision and statistical accuracy.*

Adjusted sale price. The sale price that results from adjustments made to the stated sale price to account for the effects of time, personal property, financing, or the like.

Appraisal. “The act or process of developing an opinion of value; an opinion of value” (USPAP 1999). The act of estimating the money value of property. The money value of property as estimated by an appraiser.

Appraisal date. The date as of which a property’s value is estimated. *See also assessment date.*

Appraisal ratio. (1) The ratio of the appraised value to an indicator of market value. (2) By extension, an estimated fractional relationship between the appraisals and market values of a group of properties. *See also level of appraisal.*

Appraisal ratio study. A ratio study using independent expert appraisals as indicators of market value.

Appraisal-sale price ratio. The ratio of the appraised value to the sale price (or adjusted sale price) of a property; a simple indication of appraisal accuracy.

Appraised value. The estimate of the value of a property before application of any fractional assessment ratio, partial exemption, or other adjustments.

Arithmetic mean. A measure of central tendency. The result of adding all the values of a variable and dividing by the number of values. For example, the arithmetic mean of 3, 5, and 10 is 18 divided by 3 or 6 .

Array. An ordered arrangement of data, such as a listing of sales ratios, in order of magnitude.

Assessed value. (1) A value set on real estate and personal property by a government as a basis for levying taxes. (2) The monetary amount at which a property is put on the assessment roll for purposes of computing the tax levy. Assessed values differ from the assessor’s estimate of actual (market) value for four major reasons: fractional assessment ratios, partial exemptions, preferential assessments, and decisions by assessing officials to override market value.

Assessment. (1) In general, the official acts of determining the amount of the tax base. (2) As applied to property taxes, the official act of discovering, listing, and appraising property, whether performed by an assessor, a board of review, or a court. (3) The value placed on property in the course of such act.

Assessment-appraisal ratio. The ratio of the assessed value of a property to an independent appraisal.

Assessment date. The status date for tax purposes. Appraised values reflect the status of the property and any partially completed construction as of this date.

Assessment progressivity (regressivity). An appraisal bias such that high-value properties are appraised higher (or lower) than low-value properties in relation to market values. *See also price-related differential (PRD) and coefficient of price-related bias (PRB).*

Assessment ratio. (1) The fractional relationship of an assessed value to the market value of the property in question. (2) By extension, the fractional relationship of the total of the assessment roll to the total market value of all taxable property in a jurisdiction. *See also level of assessment.*

Assessment-sale price ratio. The ratio of the assessed value to the sale price (or adjusted sale price) of a property.

Assessor. (1) The head of an assessment jurisdiction. Assessors can be either elected or appointed. In this standard the term is sometimes used collectively to refer to all assessment officials charged with administering the assessment function. (2) The public officer or member of a public body whose duty it is to make the original assessment.

Average deviation. The arithmetic mean of the absolute deviations of a set of numbers from a measure of central tendency such as the median. Taking absolute values is generally understood without being stated. The average deviation of the numbers 4, 6, and 10 about their median (6) is $(2 + 0 + 4) \div 3 = 2$. The average deviation is used in computing the coefficient of dispersion (COD).

Bias. A type of nonsampling error in which a calculated statistic differs systematically from the population parameter. A process is biased if it produces results that vary systematically with some factor that should be irrelevant. In assessment administration, assessment progressivity (regressivity) is one kind of possible bias.

Bootstrap. A computer-intensive method of statistical inference that is based on a repeated resampling of data to provide more information about the population charac-

would result in a loss in value to either the asset or the real estate to which the asset is affixed.

Fractional assessments. Assessments that by law or by practice have assessment ratios different from 1. Usually the assessment ratio is less than 1, and if assessment biases are present, different classes of property may have different fractional ratios.

Frequency distribution. A table or chart showing the number or percentage of observations falling in the boundaries of a given set of classes. Used in ratio studies to summarize the distribution of the individual ratios. *See also class and histogram.*

Histogram. A bar chart or graph of a frequency distribution in which the frequencies of the various classes are indicated by horizontal or vertical bars whose lengths are proportional to the number or percentage of observations in each class.

Hypothesis. A statement in inferential statistics, the truth of which the analyst is interested in determining.

Independent appraisal. An estimate of value using a model different from that used for assessment purposes. Independent appraisals are used to supplement sales in sales ratio studies or in appraisal ratio studies.

Indirect equalization. The process of computing hypothetical values that represent the oversight agency's best estimate of taxable value, given the legally required level of assessment or market value. Indirect equalization allows proper distribution of intergovernmental transfer payments between state or provincial and local governments despite different levels of appraisal between jurisdictions or property classes. *See also equalization and direct equalization.*

Interquartile range (IQR). The result obtained by subtracting the first quartile from the third quartile. By definition 50 percent of the observations fall within the IQR.

Land contract. An executor's contract for the purchase of real property under the terms of which legal title to the property is retained by the vendor until such time as all conditions stated in the contract have been fulfilled; commonly used for installment purchase of real property.

Level of appraisal. The common, or overall, ratio of appraised values to market values. Three concepts are usually of interest: the level required by law, the true or actual level, and the computed level based on a ratio study.

Level of assessment. The common or overall ratio of assessed values to market values. *See also level of appraisal.* *Note:* The two terms are sometimes distinguished, but there is no convention determining their meanings when they are. Three concepts are commonly of interest: what the assessment ratio is legally required to be, what the assessment ratio for the population actually is, and what

the assessment ratio for the population seems to be, on the basis of a sample and application of inferential statistics. When level of assessment is distinguished from assessment ratio, *level of assessment* usually means either the legal requirement or the true ratio, and *assessment ratio* usually means the true ratio or the sample statistic.

Margin of error. A measure of the uncertainty associated with statistical estimates of a parameter. It is typically linked to consumer surveys or political poll questions. A margin of error is a key component of a confidence interval. It reports a "plus or minus" percentage or proportion quantity in a confidence interval at a specified level of probability (typically 95 percent). *See also confidence interval.*

Market value. The major focus of most real property appraisal assignments. Both economic and legal definitions of market value have been developed and refined. A current economic definition agreed upon by agencies that regulate federal financial institutions in the United States is: The most probable price (in terms of money) which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby: The buyer and seller are typically motivated; Both parties are well informed or well advised, and acting in what they consider their best interests; A reasonable time is allowed for exposure in the open market; Payment is made in terms of cash in United States dollars or in terms of financial arrangements comparable thereto; The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale. (See USPAP for additional comments.)

Mass appraisal. The process of valuing a universe of properties as of a given date using standard methodology, employing common data, and allowing for statistical testing (see *USPAP*)

Mean. *See arithmetic mean.*

Median. A measure of central tendency. The value of the middle item in an uneven number of items arranged or arrayed according to size; the arithmetic average of the two central items in an even number of items similarly arranged.

Median absolute deviation. The median of the absolute deviations from the median. In a symmetrical distribution, the measure approximates one-half the IQR.

Median percent deviation. The median of the absolute percent deviations from the median; calculated by dividing the median absolute deviation by one-hundredth of the median.

Quartiles. The values that divide a set of data into four equal parts when the data are arrayed in ascending order. The first quartile includes the lowest quarter of the data, the second quartile, the second lowest quarter, and so forth.

Random sample. A sample of n items selected from a population in such a way that each sample of the same size is equally likely. This also includes the case in which each element in the sample has an equal chance of being selected.

Range. (1) The maximum value of a sample minus the minimum value. (2) The difference between the maximum and minimum values that a variable may assume.

Ratio study. A study of the relationship between appraised or assessed values and market values. Indicators of market values may be either sales (sales ratio study) or independent “expert” appraisals (appraisal ratio study). Of common interest in ratio studies are the level and uniformity of the appraisals or assessments. *See also level of appraisal and level of assessment.*

Real property. *See property.*

Regressivity. *See assessment progressivity (regressivity).*

Regressivity index. *See price-related differential.*

Reliability. In a sampling process, the extent to which the process yields consistent population estimates. Ratio studies typically are based on samples. Statistics derived from these samples may be more or less likely to reflect the true condition in the population depending on the reliability of the sample. Representativeness, sample size, and sample uniformity all contribute to reliability. Formally, reliability is measured by sampling error or the width of the confidence interval at a specific confidence level relative to the central tendency measure.

Representative sample. A sample of observations from a larger population of observations, such that statistics calculated from the sample can be expected to represent the characteristics of the population being studied.

Sale price. (1) The actual amount of money exchanged for a unit of goods or services, whether or not established in a free and open market. An indicator of market value. (2) Loosely used synonymously with “offering” or “asking price.”

Sale ratio. The ratio of an appraisal (or assessed) value to the sale price or adjusted sale price of a property.

Sales chasing. Sales chasing is the practice of using the sale of a property to trigger a reappraisal of that property at or near the selling price. If sales with such appraisal adjustments are used in a ratio study, the practice causes invalid uniformity results and causes invalid appraisal level results, unless similar unsold parcels are reappraised by a method that produces an appraisal level for unsold properties equal

to the appraisal level of sold properties. (2) By extension, any practice that causes the analyzed sample to misrepresent the assessment performance for the entire population as a result of acts by the assessor’s office. A subtle, possibly inadvertent, variety of sales chasing occurs when the recorded property characteristics of sold properties are differentially changed relative to unsold properties. Then the application of a uniform valuation model to all properties results in the recently sold properties being more accurately appraised than the unsold ones.

Sales ratio study. A ratio study that uses sales prices as proxies for market values.

Sample. A set of observations selected from a population. If the sample was randomly selected, basic concepts of probability may be applied.

Sampling error. The error reflected in ratio study statistics that results solely from the fact that a sample of the population is used rather than a census of the population.

Scatter diagram or scatter plot. A graphic means of depicting the relationship or correlation between two variables by plotting one variable on the horizontal axis and one variable on the vertical axis. Often in ratio studies it is informative to determine how ratios are related to other variables. A variable of interest is plotted on the horizontal axis and ratios are plotted on the vertical axis.

Significance. A measure of the probability that an event is attributable to a relationship rather than merely the result of chance.

Skewed. The quality of a frequency distribution that makes it asymmetrical. Distributions with longer tails on the right than on the left are said to be skewed to the right or to be positively skewed. Distributions with longer tails to the left are said to be skewed to the left or to be negatively skewed.

Standard deviation. The statistic calculated from a set of numbers by subtracting the mean from each value and squaring the remainders, adding together all the squares, dividing by the size of the sample less one, and taking the square root of the result. When the data are normally distributed, the percentage of observations can be calculated within any number of standard deviations of the mean from normal probability tables. When the data are not normally distributed, the standard deviation is less meaningful and the analyst should proceed cautiously.

Standard error. A measure of the precision of a measure of central tendency; the smaller the standard error, the more reliable the measure of central tendency. Standard errors are used in calculating a confidence interval about the arithmetic mean and the weighted mean. The standard error of the sample mean is the standard deviation divided by the square root of the sample size.

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Additional Resources

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Appendix A. Sales Validation Guidelines

A.1 Sources of Sales Data

The best sources of sales data are copies of deeds or real estate transfer affidavits containing the full consideration and other particulars of the sale. Assessing officers in jurisdictions without laws mandating full disclosure of sales data to assessing officials work under a severe handicap and should seek legislation that provides for such disclosure.

1. *Real estate transfer documents.* These documents are (1) copies of deeds and land contracts, (2) copies of real estate transfer affidavits, and (3) closing statements.
2. *Buyers and sellers.* Buyers and sellers of real property can be contacted directly to secure or confirm sales data. Means of contact include sales questionnaires, telephone interviews, and personal interviews.
3. *Third-party sources.* Third-party sources include multiple listing agencies, real estate brokers and agencies, government and private fee appraisers, attorneys, appraisal organizations, and others. Of particular value are those individuals or agencies that publish lists of sales or provide sales in an electronic format.

A.2 Information Required

The following data are needed to make any necessary adjustments to sales prices, compute sales ratios, and update ownership information.

1. *Full consideration involved.* This is the total amount paid for the property, including the cash down payment and amounts financed. The sale price is the most essential item of information concerning the sale, and its accuracy must be carefully scrutinized. In many jurisdictions it is common practice in deeds of conveyance to state considerations in such terms as “one dollar plus other due and just consideration.” These amounts are rarely the actual selling price and should be ignored in favor of information from the buyer and seller or other reliable source.
2. *Names of buyer and seller.* This information permits the assessor to maintain a current record of the owners of all property in the jurisdiction. Transfer documents often refer to the buyer as the grantee or transferee and to the seller as the grantor or transferor.
3. *Addresses, phone numbers, and other contact information of buyer and seller or their legal designee.* This information helps to identify more positively the parties to the sale. If the buyer will not reside at the property, the buyer’s address may be needed for future correspondence. If the seller has established a new address, this information will aid the assessor in contacting the seller regarding the sale.
4. *Relationship of buyer and seller.* It is important to know whether the buyer and seller are related individuals or corporate affiliates because such sales often do not reflect market value.
5. *Legal description, address, and parcel identifier.* If each parcel is assigned a unique parcel identifier and if this number is noted on the document at the time it is recorded, then the assessor can locate the parcel in the files directly. If not, the legal description or street address is essential to locate the parcel.
6. *Type of transfer.* It is crucial to identify whether or not a sale is an “arm’s-length” transfer. Therefore, if the sources of sales data do not include copies of deeds, the type of deed should be specifically required.
7. *Time on the market.* Sales that have been exposed to the open market too long, not long enough, or not at all may not represent market value.
8. *Interest transferred.* The appraiser must identify whether or not the entire bundle of rights (fee simple) to the property has transferred. For example, in some transactions, only a life tenancy (“life estate”) may be conveyed, or the seller may retain mineral or other rights to the property. Similarly, the sale price of a property encumbered by a long-term lease may not reflect the market value of the fee simple estate in the property.
9. *Type of financing.* In analyzing the sale, it is helpful to know the amount of down payment; the type, remaining amount, and interest rates of notes secured by mortgages or deeds of trust assumed by the buyer; and the value of any stocks, bonds, notes, or other property passed to the seller. It is also important to know whether the sale conveys title to the property or that it is a land contract, in which title is not conveyed until some time in the future, typically several years.
10. *Personal property.* A sales ratio study requires knowledge of the amount paid for the real

value definition applicable to the jurisdiction. Appraisers must use their judgment, but should not be arbitrary. To help analysts make wise and uniform judgments, screening procedures should be in writing. Each sales analyst should be thoroughly familiar with these procedures as well as with underlying real estate principles (Tomberlin 2001).

A.4.1 Sales Generally Invalid for Ratio Studies

The following types of sales are often found to be invalid for ratio studies and can be automatically excluded unless a larger sample size is needed and further research is conducted to determine that sales are open-market transactions.

1. *Sales involving government agencies and public utilities.* Such sales can involve an element of compulsion and often occur at prices higher than would otherwise be expected.
 2. *Sales involving charitable, religious, or educational institutions.* A sale to such an organization can involve an element of philanthropy, and a sale by such an organization can involve a nominal consideration or restrictive covenants.
 3. *Sales involving financial institutions.* A sale in which the lienholder is the buyer can be in lieu of a foreclosure or a judgment and the sale price can equal the loan balance only.
 4. *Sales between relatives or corporate affiliates.* Sales between relatives are usually non-open-market transactions and tend to occur at prices lower than would otherwise be expected.
 5. *Sales settling an estate.* A conveyance by an executor or trustee under powers granted in a will may not represent fair market value, particularly if the sale takes place soon after the will has been filed and admitted to probate in order to satisfy the decedent's debts or the wishes of an heir.
 6. *Forced sales.* Such sales include those resulting from a judicial order. The seller in such cases is usually a sheriff, receiver, or other court officer.
 7. *Sales of doubtful title.* Sales in which title is in doubt tend to be below market value. When a sale is made on other than a warranty deed, there is a question of whether the title is merchantable. Quit claim deeds and trustees' deeds are examples.
1. *Trades.* In a trade, the buyer gives the seller one or more items of real or personal property as all or part of the full consideration. If the sale is a pure trade with the seller receiving no money or securities, the sale should be excluded from analysis. If the sale involves both money and traded property, it may be possible to include the sale in the analysis if the value of the traded property is stipulated, can be estimated with accuracy, or is small in comparison to the total consideration. However, transactions involving trades should be excluded from the analysis whenever possible, particularly when the value of the traded property appears substantial.
 2. *Partial interests.* A sale involving the conveyance of less than the full interest in a property should be excluded from the analysis unless several sales of partial interests in a single property take place at the same time and the sum of the partial interests equals the fee-simple interest. Then the sum of the sales prices of the partial interests can sometimes be assumed to indicate the sale price of the total property. At other times, however, the purchase of such partial interests is analogous to plottage value in which a premium may have been paid.
 3. *Land contracts.* Land contracts and other installment purchase arrangements in which title is not transferred until the contract is fulfilled require careful analysis. Deeds in fulfillment of a land contract often reflect market conditions several years in the past, and such dated information should be excluded from analysis. Sales data from land contracts also can reflect the value of the financing arrangements. In such instances, if the transaction is recent, the sale price should be adjusted for financing (see section A.5.2).
 4. *Incomplete or unbuilt common property.* Sales of condominium units and of units in planned unit developments or vacation resorts often include an interest in common elements (for example, golf courses, clubhouses, or swimming pools) that may not exist or be usable on the date of sale or on the assessment date. Sales of such properties should be examined to determine whether prices might be influenced by promises to add or complete common elements at some later date. Sales whose prices are influenced by such promises should be excluded from the analysis, or the sales prices should be adjusted to reflect only the value of the improvements or amenities in existence on the assessment date.

A.4.2 Sales with Special Conditions

Sales with special conditions can be open-market sales but must be verified thoroughly and used with caution in ratio studies.

rate is lower than that required by the market for a loan of equal risk. The amount of adjustment can be computed by capitalizing the difference between monthly payments based on the required market interest rate and those based on the actual interest rate. Market analysis using paired sales (sales of similar properties, some with and some without conventional financing) or statistical techniques can correct for such factors.

3. The seller pays “points” (a percentage of the loan amount). (*Points paid by the borrower are part of the down payment and do not require adjustment.*) When the seller pays points, the sale price should be adjusted downward by the value of the points.
4. The property is sold under a gift program. Gift programs are a type of creative financing for qualified buyers by certain lending institutions that provide the buyer with additional monies to use as part of a down payment or for property improvements. This program is typically associated with low-value properties and can be difficult to discover without a validation questionnaire and/or telephone interview. The gift amount is added to the actual sale price of the property; however, the seller is never in receipt of the gift amount. This gift amount must be deducted from the actual sale price of the real estate prior to statistical analysis.

Adjustments for financing require data on actual and market interest rates, the amount of the loan, and the term and amortization provisions of the loan. Obtaining and properly analyzing such data, as well as estimating the extent to which the market actually capitalizes non-market financing, are difficult and time-consuming and require specialized skills.

A.5.2 Adjustments for Assumed Leases

The sale price of a property encumbered by a long-term lease of at least three years should be adjusted as follows:

- If the contract rent differs significantly from market rent, then the sales price should be adjusted by the difference between the present worth of the two income streams.
- If the contract rent exceeds market rent, the present worth of the difference in the two income streams should be subtracted from the sale price.
- If the contract rent is less than current market rent, the present worth of the difference in the two income streams should be added to the sale price.

A.5.3 Adjustments for Personal Property

Sales screening includes determining the contributory value of any significant personal property included in the sale. Personal property includes such tangibles as machinery, furniture, and inventories and such intangibles as franchises, licenses, and non-compete agreements. Ordinarily, it is not necessary to consider goodwill, going-concern value, business enterprise value, or the like, unless the value of these intangible assets has been itemized in a sales contract or a formal appraisal has been prepared by either party.

It is necessary to decide whether each item included in the sale should be classified as real or personal property. (See *Standard on Valuation of Personal Property* [IAAO 2005], which provides guidance on classification of property as real or personal.)

Sale prices should be adjusted by subtracting the contributory value of personal property received by the buyer. Ordinary window treatments, outdated models of free-standing appliances, and common-grade used furniture included with residential property do not usually influence the sale price of real property and do not require an adjustment unless the items were specifically broken out in the contract as personal property included in the sale price.

If the value of personal property appears to be substantial (10 percent for residential, 25 percent for commercial), the sale should be excluded as a valid sale in statistical analysis unless the sample size is small.

A.5.4 Adjustments for Time

There should be a program to track changes in price levels over time and adjust sale prices for time as required. This step is an important component of a ratio study. Time adjustments must be based on market analysis and supported with appropriate documentation.

Valid time-adjustment techniques are as follows:

- tracking sales and appraisal ratios over time
- including date-of-sale as a variable in regression or feedback models
- analyzing re-sales
- comparing per-unit values over time in homogeneous strata, such as a subdivision or condominium complex
- isolating the effect of time through paired sales analysis
- statistically supported time trend analysis studies

These techniques are discussed in Gloudemans (1990; 1999), *Property Appraisal and Assessment Administration* (IAAO 1990, Appendix 5-3), and *Improving Real Property Assessment* (IAAO 1978, section 4.6). If sales

Appendix B. Outlier Trimming Guidelines

B.1 Identification of Ratio Outliers

It is first necessary to determine a procedure to identify outliers. Outlier identification based on the interquartile range (IQR) uses order statistics (see table B-1) and has been shown to be robust for a wide variety of distributions (Iglewicz and Hoaglin 1993; Barnett and Lewis 1994). The term outlier is often associated with ratios that fall outside 1.5 multiplied by the IQR. A factor of 3.0 X IQR often is chosen to identify extreme outliers. Other outlier identification procedures are found in statistical literature and can be used. Outlier identification and trimming should follow the sales validation process and precede the calculation of ratio statistics and related tests or analyses.

The example in table B-1 demonstrates the use of the 1.5 X IQR procedure to identify outlier ratios. The distribution of ratios often is skewed to the right; therefore, it may be preferable to apply appropriate transformations to the ratios prior to applying the IQR method. For example, the use of logarithmic transformations tends to identify fewer high and more low ratios as outliers.

B.2 Scrutiny of Identified Outliers

The preferred method of handling an outlier ratio is to subject it to additional scrutiny to determine whether the sale is a non-market transaction or contains an error in fact. If an error can be corrected (for example, data entry), the property should be left in the sample. If the error cannot be corrected or inclusion of the identified outlier would reduce sample representativeness, the sale should be excluded.

B.3 Outlier Trimming

Once outliers have been identified and scrutinized and any errors resolved, the next step is to exclude those that may unduly influence calculated statistical measures. For this reason, it is acceptable to trim outliers identified by recognized procedures (for cautionary notes on trimming small samples, see Tomberlin [2001] and Hoaglin, Mosteller, and Tukey [1983]). An example of such trimming is found in Table B-2. However, trimming of outliers using arbitrary limits, for example, eliminating all ratios less than 50 percent or greater than 150 percent, tends to distort results and should not be employed.

Detected outliers should be reported and can be treated in a variety of ways, including trimming (D'Agostino and Stephens 1986). If outliers are to be considered for removal, the analyst can select a procedure to trim all or just the extreme or influential outliers (see table B-2). If a trimming method has been used to reject ratios from the sample, this fact must be stated in the resulting statistical

Table B-1. A Distribution-Free Method for Locating Outliers
(The following procedure identifies outlier ratios that fall more than 1.5 times beyond the range of the middle 50 percent of the arrayed sample.)

Locating trim boundaries

Data set before trimming

Rank	Ratio (A/S)
1	0.611
2	0.756
3	0.762
4	0.853
5	0.867
6	0.909
7	0.925
8	0.944
9	1.014
10	1.052
11	1.178
12	1.367
13	1.850
14	2.500
Median ratio	0.935
COD	32.271

Steps to locate trim boundaries

1. *Locate the first quartile point*
Formula to locate the first quartile:
 $(0.25 \times \text{number of ratios}) + 0.25$
 $(0.25 \times 14 \text{ ratios}) + 0.25 = 3.75$
3.75 is three-quarters between the third and fourth ranked ratios.
Ratio 3 = 0.762
Ratio 4 = 0.853
Three-quarters between = $(0.853 - 0.762) \times 0.75 = 0.068$
The first quartile point = $0.762 + 0.068 = 0.830$
2. *Locate the third quartile point*
Formula to locate the third quartile
 $(0.75 \times \text{number of ratios}) + 0.75$
 $(0.75 \times 14 \text{ ratios}) + 0.75 = 11.25$
11.25 is one-quarter between the eleventh and twelfth ranked ratios.
Ratio 11 = 1.178
Ratio 12 = 1.367
One-quarter between = $(1.367 - 1.178) \times 0.25 = 0.047$
The third quartile point = $1.178 + 0.047 = 1.225$
3. *Compute the interquartile range*
The distance between the first and third quartile = interquartile range
 $1.225 - 0.830 = 0.395$
4. *Establish the lower boundary*
Lower trim point = first quartile - (interquartile range \times 1.5 or 3.0)
 $0.830 - (0.395 \times 1.5) = 0.238$,
5. *Establish the upper boundary*
Upper trim point = (interquartile range \times 1.5 or 3.0) + third quartile
 $(0.395 \times 1.5) + 1.225 = 1.818$

Outliers identified:

1.850
2.500

Appendix C. Median Confidence Interval Tables for Small Samples

For small samples, tables C-1 and C-2 demonstrate use of a formula based upon the binomial distribution (Clapp 1989) to develop the lower and upper median confidence interval estimates. R_i is the ratio in an array ranked from the lowest ($i = 1$) to the highest (sorted in ascending order). Each confidence interval boundary typically falls between two ratios in the array. The interpolation factor is multiplied by the ratio value and the two are added together to obtain a weighted average. This method should be used for small samples with up to 30 observations (see tables C-1 and C-2). For larger samples the method found in *Property Appraisal and Assessment Administration* (IAAO 1990, p 609) may be used.

Example

Using data from table 1-4 ($n = 17$ ratios) and a 95 percent confidence interval in table C-2:

Lower bound:

$$[0.695 (\text{Ratio}_5) \times 0.9899] + [0.717 (\text{Ratio}_6) \times 0.0101] = \mathbf{0.695}$$

Upper bound:

$$[0.933 (\text{Ratio}_{13}) \times 0.9899] + [0.895 (\text{Ratio}_{12}) \times 0.0101] = \mathbf{0.933}$$

Therefore, the 95% median ratio confidence interval in table 1-4 is from .695 to .933.

Table C-1. 90% Confidence Interval Table

n	Lower Bound	Upper Bound
5	.8800 x R ¹ + .1200 x R ²	.8800 x R ⁵ + .1200 x R ⁴
6	.6333 x R ¹ + .3667 x R ²	.6333 x R ⁶ + .3667 x R ⁵
7	.2286 x R ¹ + .7714 x R ²	.2286 x R ⁷ + .7714 x R ⁶
8	.8643 x R ² + .1357 x R ³	.8643 x R ⁸ + .1357 x R ⁷
9	.5667 x R ² + .4333 x R ³	.5667 x R ⁹ + .4333 x R ⁸
10	.1067 x R ² + .8933 x R ³	.1067 x R ¹⁰ + .8933 x R ⁹
11	.7855 x R ³ + .2145 x R ⁴	.7855 x R ¹¹ + .2145 x R ¹⁰
12	.4282 x R ³ + .5718 x R ⁴	.4282 x R ¹² + .5718 x R ¹¹
13	.9558 x R ⁴ + .0442 x R ⁵	.9558 x R ¹³ + .0442 x R ¹²
14	.6511 x R ⁴ + .3489 x R ⁵	.6511 x R ¹⁴ + .3489 x R ¹³
15	.2217 x R ⁴ + .7783 x R ⁵	.2217 x R ¹⁵ + .7783 x R ¹⁴
16	.8261 x R ⁵ + .1739 x R ⁶	.8261 x R ¹⁶ + .1739 x R ¹⁵
17	.4603 x R ⁵ + .5397 x R ⁶	.4603 x R ¹⁷ + .5397 x R ¹⁶
18	.9735 x R ⁶ + .0265 x R ⁷	.9735 x R ¹⁸ + .0265 x R ¹⁷
19	.6480 x R ⁶ + .3520 x R ⁷	.6480 x R ¹⁹ + .3520 x R ¹⁸
20	.2072 x R ⁶ + .7928 x R ⁷	.2072 x R ²⁰ + .7928 x R ¹⁹
21	.8084 x R ⁷ + .1952 x R ⁸	.8084 x R ²¹ + .1952 x R ²⁰
22	.4156 x R ⁷ + .5844 x R ⁸	.4156 x R ²² + .5844 x R ²¹
23	.9413 x R ⁸ + .0587 x R ⁹	.9413 x R ²³ + .0587 x R ²²
24	.5884 x R ⁸ + .4116 x R ⁹	.5884 x R ²⁴ + .4116 x R ²³
25	.1203 x R ⁸ + .8797 x R ⁹	.1203 x R ²⁵ + .8797 x R ²⁴
26	.7371 x R ⁹ + .2629 x R ¹⁰	.7371 x R ²⁶ + .2629 x R ²⁵
27	.3161 x R ⁹ + .6839 x R ¹⁰	.3161 x R ²⁷ + .6839 x R ²⁶
28	.8687 x R ¹⁰ + .1313 x R ¹¹	.8687 x R ²⁸ + .1313 x R ²⁷
29	.4831 x R ¹⁰ + .5169 x R ¹¹	.4831 x R ²⁹ + .5169 x R ²⁸
30	.9876 x R ¹¹ + .0124 x R ¹²	.9876 x R ³⁰ + .0124 x R ²⁹

Table C-2. 95% Confidence Interval Table

n	Lower Bound	Upper Bound
6	.9000 x R ¹ + .1000 x R ²	.9000 x R ⁶ + .1000 x R ⁵
7	.6857 x R ¹ + .3143 x R ²	.6857 x R ⁷ + .3143 x R ⁶
8	.3250 x R ¹ + .6750 x R ²	.3250 x R ⁸ + .6750 x R ⁷
9	.9222 x R ² + .0778 x R ³	.9222 x R ⁹ + .0778 x R ⁸
10	.6756 x R ² + .3244 x R ³	.6756 x R ¹⁰ + .3244 x R ⁹
11	.2873 x R ² + .7127 x R ³	.2873 x R ¹¹ + .7127 x R ¹⁰
12	.8936 x R ³ + .1064 x R ⁴	.8936 x R ¹² + .1064 x R ¹¹
13	.6056 x R ³ + .3944 x R ⁴	.6056 x R ¹³ + .3944 x R ¹²
14	.1659 x R ³ + .8341 x R ⁴	.1659 x R ¹⁴ + .8341 x R ¹³
15	.8218 x R ⁴ + .1782 x R ⁵	.8218 x R ¹⁵ + .1782 x R ¹⁴
16	.4827 x R ⁴ + .5173 x R ⁵	.4827 x R ¹⁶ + .5173 x R ¹⁵
17	.9899 x R ⁵ + .0101 x R ⁶	.9899 x R ¹⁷ + .0101 x R ¹⁶
18	.7076 x R ⁵ + .2924 x R ⁶	.7076 x R ¹⁸ + .2924 x R ¹⁷
19	.3059 x R ⁵ + .6941 x R ⁶	.3059 x R ¹⁹ + .6941 x R ¹⁸
20	.8835 x R ⁶ + .1165 x R ⁷	.8835 x R ²⁰ + .1165 x R ¹⁹
21	.5479 x R ⁶ + .4521 x R ⁷	.5479 x R ²¹ + .4521 x R ²⁰
22	.0697 x R ⁶ + .9303 x R ⁷	.0697 x R ²² + .9303 x R ²¹
23	.7381 x R ⁷ + .2619 x R ⁸	.7381 x R ²³ + .2619 x R ²²
24	.3373 x R ⁷ + .6627 x R ⁸	.3373 x R ²⁴ + .6627 x R ²³
25	.8958 x R ⁸ + .1042 x R ⁹	.8958 x R ²⁵ + .1042 x R ²⁴
26	.5481 x R ⁸ + .4519 x R ⁹	.5481 x R ²⁶ + .4519 x R ²⁵
27	.0677 x R ⁸ + .9323 x R ⁹	.0677 x R ²⁷ + .9323 x R ²⁶
28	.7221 x R ⁹ + .2779 x R ¹⁰	.7221 x R ²⁸ + .2779 x R ²⁷
29	.3063 x R ⁹ + .6937 x R ¹⁰	.3063 x R ²⁹ + .6937 x R ²⁸
30	.8709 x R ¹⁰ + .1291 x R ¹¹	.8709 x R ³⁰ + .1291 x R ²⁹

From Table 1-4. Demonstration Ratio Study Report

Rank	Parcel #	Appraised value	Sale price*	Ratio
1	9	\$87,200	138,720	0.629
2	10	38,240	59,700	0.641
3	11	96,320	146,400	0.658
4	12	68,610	99,000	0.693
5	13	32,960	47,400	0.695
6	14	50,560	70,500	0.717
7	15	61,360	78,000	0.787
8	16	47,360	60,000	0.789
9	17	56,580	69,000	0.820
10	18	47,040	55,500	0.848
11	19	136,000	154,500	0.880
12	20	98,000	109,500	0.895
13	21	56,000	60,000	0.933
14	22	159,100	168,000	0.947
15	23	128,000	124,500	1.028
16	24	132,000	127,500	1.035
17	25	160,000	150,000	1.067

Date: 0/0/00. No outlier trimming

* or adjusted sale price

$$\text{Pct_Diff} = (\text{ASR} - \text{Median}) / \text{Median}$$

Where:

PCT_Diff = Percentage Difference

ASR = Assessment-Sales Ratio

4. Regress (3) on (2):

$$\text{Pct_Diff} = b_0 + b_1 \times \text{Ln_Value}$$

Because each increment of 1 in the independent variable represents a 100 percent change in value, the regression coefficient, b_1 , represents the corresponding percentage change in assessment ratios.

Figures D-1 and D-2 below contain plots of assessment ratios with assessed values and sales prices, respectively. Similarly, Figure D-3 is a plot of ratios against the value proxy and Figure D-4 plots percentage differences from the median ratio on logarithms of the value proxy divided by 0.693. In this case, all four plots show a regressive relationship. The PRB quantifies the relationship. As shown toward the bottom of table D-1, $\text{PRB} = -0.120$, meaning that ratios

decline by 12.0 percent when values double (and increase by 12.0 percent when values are halved). The relationship is significant at the 99.9 percent confidence level. The 95 percent confidence interval is -0.172 to -0.067 .

To illustrate the relative insensitivity of the PRB to outliers, consider table D-2. Sales prices for the first 15 sales increase by increments of \$50,000: from \$50,000 for sale 1 to \$750,000 for sale 15. The ratios alternate from 0.90, to 1.00, to 1.10. Since the first (lowest sale) has a ratio of 0.90 and the highest sale has a ratio of 1.10, there is minor progressivity. As shown in the upper half of table D-3, the COD is 6.7, the PRD is 0.992, and the PRB is 0.02, all good performance measures.

Now consider sale 16 in table D-2, which is a relative outlier with a sale price of \$2,500,000 and ratio of 0.75. As shown in the lower half of table D-3, the PRD falls well outside of 0.98 to 1.03 and indicates regressivity. The PRB (as denoted in Table D-3 in the column entitled "Coefficients" and "B"), with a benign value of -0.011 , is little affected by the outlier and is not statistically significant.

Figure D-1. Plot of Ratios with Assessed Value

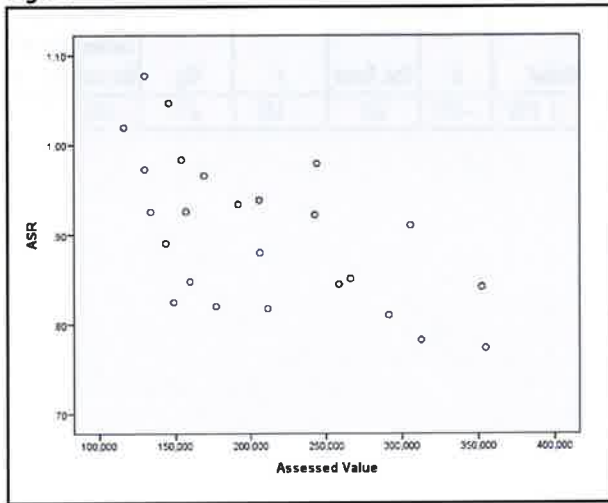


Figure D-3. Plot of Ratios with Value Proxy

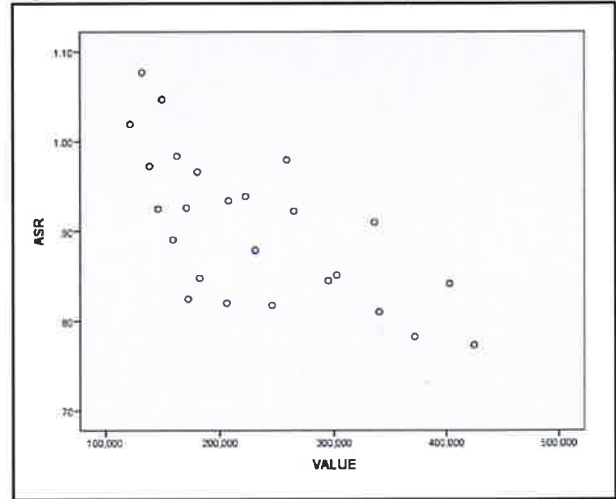


Figure D-2. Plot of Ratios with Sale Price

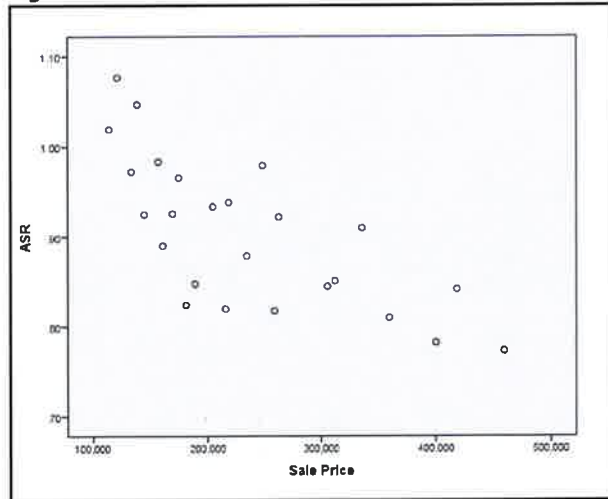
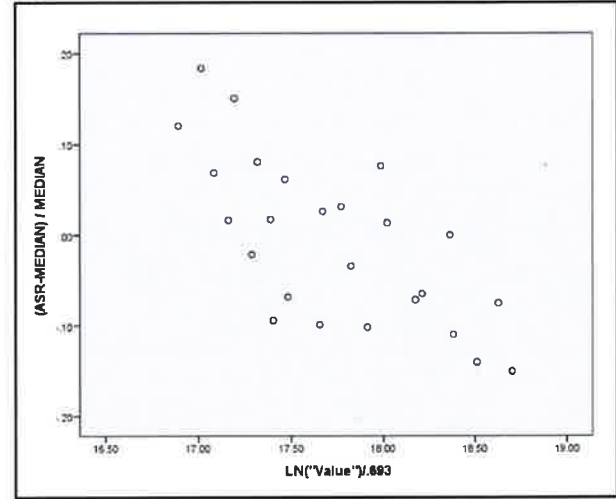


Figure D-4. PRB Plot



Appendix E. Sales Chasing Detection Techniques

As long as sold and unsold parcels are appraised in the same manner and the data describing them are coded consistently, statistics calculated in a sales ratio study can be used to infer appraisal performance for unsold parcels. However, if parcels that sell are selectively reappraised or recoded based on their sale prices or some other criterion (such as listing price) and if such parcels are in the ratio study, sales ratio study uniformity inferences will not be accurate (appraisals will appear more uniform than they are). In this situation, measures of appraisal level also will be unsupportable unless similar unsold parcels were appraised by a model that produces the same overall percentage of market value (appraisal level) as on the parcels that sold based on consistently coded descriptive and locational data.

Assessors and oversight agencies do not need to employ all the detection techniques described in this appendix, but should consider implementing at least one procedure. In some cases, access to assessment information for all properties is necessary to perform the suggested techniques. Agencies that do not have access to these data are at a disadvantage, but should still implement detection techniques, such as those described in sections E.3 and E.4, which do not require such comprehensive assessment information.

E.1 Comparison of Average Value Changes

If sold and unsold properties within a specified group are appraised in the same way, their appraised values should reflect similar average percentage changes from year to year. Accordingly, changes in appraised values for sold and unsold parcels can be compared to determine whether sold parcels have been selectively appraised. Alternatively, the average percent change in value for sample parcels can be compared to that for the population of properties within a specified group or stratum for an indication of selective reappraisal.

For example, if sold parcels are considered representative of a stratum and appraised values increased an average of 10 percent while appraised values for unsold parcels in the same stratum increased an average of only 2 percent, “sales chasing” is a likely conclusion. At a more sophisticated level, the distribution of value changes for sold and unsold parcels can be compared, or statistical tests can be used to determine whether the distributions are different at a given level of confidence.

Statistical significance in the absence of practical significance may be moot. In large samples, small differences

in the magnitude of assessed value changes on sold and unsold parcels can be proven to be statistically significant, yet the actual differences may be slight. Therefore, it is prudent to establish some reasonable tolerance, such as 3 percentage points (e.g., a change of 6 percent for sold properties and 3 percent for unsold properties), before concluding that a meaningful problem exists. Such tolerance applies to other detection techniques discussed below.

E.2 Comparison of Average Unit Values

If sold and unsold parcels are appraised equally, average unit values (for example, value per square foot) should be similar. An appropriate test (Mann Whitney or *t*-test) can be conducted to determine whether differences are significant.

E.3 Split Sample Technique

In this technique, two ratio studies are performed, one using sales that occurred before the appraisal date and one using sales after the appraisal date, both adjusted for date of sale as appropriate. Except for random sampling error and any error in time adjustments, results of the two studies should be similar. Sales chasing is indicated if the results of the first study are consistently better than those from the second. In such a case, the second study is still valid; the first study should be rejected.

E.4 Comparison of Observed versus Expected Distribution of Ratios

Assuming the ratio studies are based on sales that have been properly adjusted for time and other factors, a strong indication of the likelihood of “sales chasing” can be obtained by computing the proportion of ratios that would be expected to fall within a particular narrow range of the mean given the lowest likely standard deviation (although this depends somewhat on the assumption of a normal distribution). For example, with a standard deviation of 5 percent given a normal distribution, about 32 percent of the ratios would be expected to fall within ± 2 percent of the mean (for example, between 98 and 102 percent, given a mean of 100 percent). Except in highly constrained or well-behaved real estate markets, many appraisers consider such a low standard deviation, corresponding approximately to a COD of 4 percent, to be unachievable. Regardless of the distribution of the ratios, the likelihood is extremely low that there would be a sufficiently representative sample with more than this proportion of ratios in such a narrow range. If such is the case, “sales chasing” is a likely conclusion. Sometimes other processes through

Appendix F. Alternative Uses for Ratio Study Statistics

In addition to the use of statistical measures to determine underlying assessment level and uniformity, comparisons between measures can provide useful information about sample representativeness, the distribution of the ratios, and the influence of outliers. For example, by comparing the mean and weighted mean, even without determining the PRD, the analyst should be aware that a large difference between these two measures indicates probable influence of atypical ratios on high-priced properties. This in turn could mean that outliers are still present in the sample and that the sample is not representative. Alternatively, it could indicate systematic appraisal error in the appraisal of properties within a particular price range. The geometric mean-to-mean relationship can provide similar information, especially about the presence of very low ratios, which have a greater influence on the geometric

mean. The relationship between the COD and COV can provide similar additional guidance. This standard chooses the COD as the primary recommended measure of uniformity. This choice reflects the expectation of non-normal distributions of ratios. Despite this consideration, it is useful to recognize that, in a normal distribution, the COV is approximately 1.25 times the COD. When the COV/COD ratio exceeds 1.25, the likely cause is a small number of very high ratios, which may again be non-representative.

It is incumbent on the analyst to review the ratio study sample to attempt to provide a representative sample. Comparisons of statistics, such as those given in this appendix, provide an additional tool to help the analyst in this regard.

Appendix G. Legal Aspects of Ratio Studies

Property taxation is governed by federal, state, and provincial constitutions, statutes, and administrative rules or regulations, many of which require uniform treatment of property taxpayers. Ratio studies play an important role in judging whether uniformity requirements are met. Relevant Canadian Federal statutes based on the Constitution Acts of 1867–1975 provide that municipal councils cannot discriminate between taxpayers of the same class within municipalities.

Relevant United States federal provisions include the Bill of Rights, the commerce clause of the United States Constitution, the Fourteenth Amendment, and the Tax Injunction Act (28 U.S.C. § 1341). Together they guarantee basic protections and due process while still granting states the authority to classify property and grant reasonable exemptions. Many constitutions have clauses that require uniformity in the assessment and taxation of property, although some jurisdictions, either by constitution or statute, permit certain differences between classes. Ratio studies provide a gauge of whether uniformity requirements are being met.

A key U.S. federal statute relating to ratio studies is the U.S. Railroad Revitalization and Regulatory Reform Act (“4-R Act”) of 1976 (49 U.S.C. § 11501). The 4-R Act requires that rail transportation property be assessed for tax purposes at no more than 105 percent of the assessment level of other commercial and industrial property in the same taxing jurisdiction. Similar federal statutes relate to air transportation property, motor carriers, and bus lines (49 U.S.C. §§14502 and 40116).

The 4-R Act provides that ratio studies be used to measure alleged discrimination. In such cases, as in any ratio study, the purpose of the study must be clearly defined and the study must be conducted so that it accurately evaluates the issues at hand. Important issues in ratio studies conducted pursuant to the 4-R Act include the proper definition of “other” commercial and industrial property, screening and adjustments to sales data, proper measures of the level of appraisal, and the combining and weighting of centrally valued and locally assessed properties.



Standard on Professional Development

Approved January 2013

International Association of Assessing Officers

This standard replaces the December 2000 *Standard on Professional Development*. IAAO assessment standards represent a consensus in the assessing profession and have been adopted by the Executive Board of the International Association of Assessing Officers (IAAO). The objective of the IAAO standards is to provide a systematic means for assessing officers to improve and standardize the operation of their offices. IAAO standards are advisory in nature and the use of, or compliance with, such standards is voluntary. If any portion of these standards is found to be in conflict with national, state, or provincial laws, such laws shall govern. Requirements found in the *Uniform Standards of Professional Appraisal Practice (USPAP)* also have precedence over technical standards.

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Standard on Professional Development

1. Scope

This standard recommends basic guidelines for the professional development, education, and certification of assessing officers, including appraisers, assessment managers, tax policy administrators, mappers, and assessors; those who provide professional or technical assistance to assessing officers; those who supervise or review the work of assessing officers; and those who seek employment in assessment administration.

This standard contains broad guidelines that are intended to be applicable to the varied governmental structures under which assessment personnel perform their duties. No attempt is made to specify guidelines that would be more or less appropriate in instances in which property assessment is a function of national, state or provincial, county, township, or municipal government, in which assessors are elected or appointed, or in which assessing officers work full or part time.

The Appendix describes qualifications and recommended courses for various positions in an assessment office, as well as required and recommended continuing education. Educational offerings of the International Association of Assessing Officers (IAAO) can be found at www.iaao.org.

2. Introduction

Assessing officers require detailed knowledge related to their specific responsibilities in the assessment office. In-service training and continuing education of assessment personnel are essential parts of an effective program of assessment administration. Guidelines recommended in this standard are intended to promote satisfaction of basic requirements to ensure qualified personnel.

3. Certification and Licensing of Appraisers

The certification of assessing officers ensures that they possess adequate knowledge of the principles of property appraisal, assessment techniques, and property tax laws and the skills required by their specialties. A major benefit of certification programs is the increased self-respect of assessing officers who attain a level of professional competence and increased public confidence in property tax administration that comes with more accurate assessments and appraisals developed in a professional manner.

3.1 Federal Appraiser Licensing and Certification of Appraisers

The Financial Institutions Reform, Recovery and Enforcement Act established The Appraisal Foundation as an advisory and oversight agency for appraiser licensing and certification. The foundation's Appraiser Qualifications Board promulgates Real Property Appraiser Qualification Criteria to guide state appraisal boards in setting standards for appraiser licensing and certification. Assessing officers may find it advantageous to be licensed or certified in this way.

3.2 State, Provincial, and Local Government Certification of Assessing Officers

Jurisdictions (local, state, or provincial) often establish certification programs. The jurisdiction may set guidelines for the program or grant authority to an agency or board to set guidelines and implement and administer the program. The jurisdiction should establish and fund education programs supporting certification.

Certification programs can be characterized as mandatory, incentive, or voluntary. A mandatory program requires assessing officers to meet specified standards. An incentive program rewards assessing officers with increased pay, bonuses, or specific advancement opportunities for meeting specified standards. A voluntary program offers assessing officers the opportunity to complete requirements without mandate or reward.

The three types of requirements common to governmental certification programs are examination, course or workshop completion, and continuing education. Individuals may be required to pass an examination before assuming a position or within a given period of time thereafter. To attain or maintain their positions or achieve promotions, personnel often must complete a variety of examinations, perhaps given in conjunction with administrators of local civil service or merit systems. Completion of courses and workshops may be required to attain certification or achieve a position. Finally, a specified number of hours of approved continuing education within a specified period of time may be required to retain certification.

4. Professional Designations

Locally conferred professional designations exist in conjunction with mandatory, incentive, or voluntary certification systems administered by a state, provincial,

to the next position by successfully completing the examination for that position.

As specified, each position description should have a clearly delineated set of criteria for advancement to the next position. Although the ultimate criterion for advancement may be examination, such examination must be based on a comprehensive curriculum. Courses on general valuation and administration should be available on a continuing basis, in addition to courses on local law, procedures, and practices.

8. Continuing Education

All assessing officers should attend at least 30 hours of classroom instruction annually. This instruction may be mandatory or may be rewarded by salary incentives authorized and funded by government. Attainment of an IAAO designation should merit additional salary increases for all assessing officers. After earning a designation, designees must complete education requirements, including the IAAO approved course on the Standards of Practice and Professional Ethics, within a 5-year recertification cycle.

9. Administrative Authority and Responsibilities

The assessment profession has the ultimate responsibility for providing in-service training and continuing education. Assessing officers must be included in planning their professional education program. Funding to develop and conduct training programs may be obtained from various sources, and the funder often retains administrative authority. Local jurisdictions, state and provincial authorities, and assessors' associations should make adequate funding of programs a high priority and also provide for proper administration of the training program.

A good model for administering professional assessment education programs includes systems for

- Determining training needs
- Providing adequate funding
- Promoting the programs and encouraging participation
- Scheduling, obtaining, and evaluating courses and instructors.

Specifically, the following actions are required for proper administration of training and continuing education programs:

1. Determining the scope of the entire curriculum and defining specific overall objectives.
2. Defining the subject area and objectives of each part of the curriculum, such as courses, seminars, or workshops.
3. Describing the content and structure of each part and the methods for evaluating its success.
4. Developing instructor qualifications and a list of qualified instructors.
5. Developing or using standardized course or seminar materials, including outlines, texts, case problems, quizzes, laboratory sessions, field demonstrations, visual aids, films and videotapes, and other technological tools such as on-line courses via the Internet, appropriate to the field.
6. Developing or using validated course examinations and methods for evaluating student performance. Examination questions should be continually reviewed and revised.
7. Developing and maintaining a system for keeping records on each student and each course. Results should be reported to students.
8. Developing and maintaining an efficient system to coordinate all aspects of the training program, including provision of acceptable facilities, registration of students, enforcement of prerequisites, evaluation of instructor performance, security of examinations, and evaluation of curriculum.
9. Periodically evaluating programs and course materials. The curriculum should be periodically updated to reflect current appraisal and assessment methods and techniques. Localized materials should also be revised to incorporate changes in state or local statutes, guidelines, and assessment manuals.

Course 112. Income Approach to Valuation II
 Course 201. Appraisal of Land
 Course 300. Fundamentals of Mass Appraisal
 Course 500. Assessment of Personal Property*
 Workshop 150. Mathematics for Assessing Officials
 Workshop 151/191. Uniform Standards of Professional Practice (National)
 Workshop 162. Marshall & Swift Cost Approach (Residential)
 Workshop 157. The Appraisal Uses of Excel® Software
 Workshop 158. Highest and Best Use

Continuing Education Recommended

Course 400. Assessment Administration
 Course 402. Property Tax Policy
 Workshop 171. IAAO Standards of Practice and Professional Ethics Supplement
 Workshop 452. Fundamentals of Assessment Ratio Studies

Chief Assessment Administrator

Education

Bachelor's degree in mathematics, communications, accounting, finance, computer science, business administration, or real estate or combination of college and experience equivalent to a degree.

Experience

Real estate, building construction, GIS/mapping, or mass appraisal.

Skills and Knowledge

Algebra, mathematical ability, computer literacy, complex problem solving, management, administration, public relations, and good written and oral communication skills.

Desirable

Master's degree, professional designation, or IAAO Accredited Member Status

Continuing Education Required

Course 101. Fundamentals of Real Property Appraisal
 Course 102. Income Approach to Valuation
 Course 112. Income Approach to Valuation II
 Course 201. Appraisal of Land
 Course 300. Fundamentals of Mass Appraisal
 Course 400. Assessment Administration
 Course 402. Property Tax Policy
 Course 500. Assessment of Personal Property*
 Workshop 150. Mathematics for Assessing Officials

Workshop 151/191. Uniform Standards of Professional Practice (National)
 Workshop 162. Marshall & Swift Cost Approach (Residential)

Continuing Education Recommended

Workshop 157. The Appraisal Uses of Excel® Software
 Workshop 171. IAAO Standards of Practice and Professional Ethics Supplement
 Workshop 403. Property Tax Policy Alternatives and Modules
 Workshop 452. Fundamentals of Assessment Ratio Studies

Assessment Support Personnel

Assessment support personnel can cover a myriad of disciplines from the most technical to routine clerical support. All these disciplines have their own requirements and areas of specific expertise. Listing all the possibilities throughout the international community is beyond the scope of this document. For example, certain technical appraisal assignments such as utilities and mines may require additional specialized subject matter expertise.

Education

Ranging from a high school diploma or equivalent to a bachelor's degree in mathematics, statistics, communications, accounting, finance, computer science, business administration, geography, or real estate or combination of college and experience equivalent to a degree.

Experience

Real estate, building construction, GIS/mapping, mass appraisal, financial services, or specific areas of expertise relevant to the position.

Skills and Knowledge

Algebra, mathematical ability, computer literacy, and good written and oral communication skills.

Continuing Education Required

Course 101. Fundamentals of Real Property Appraisal
 Course 500. Assessment of Personal Property*
 Workshop 150. Mathematics for Assessing Officials
 Workshop 171. IAAO Standards of Practice and Professional Ethics Supplement

Continuing Education Recommended

Course 300. Fundamentals of Mass Appraisals

* In offices that assess personal property

Standard on Valuation of Personal Property

Approved December 2005

International Association of Assessing Officers

IAAO assessment standards represent a consensus in the assessing profession and have been adopted by the Executive Board of the International Association of Assessing Officers (IAAO). The objective of the IAAO standards is to provide a systematic means for assessing officers to improve and standardize the operation of their offices. IAAO standards are advisory in nature and the use of, or compliance with, such standards is voluntary. If any portion of these standards is found to be in conflict with national, state, or provincial laws, such laws shall govern. Requirements found in the *Uniform Standards of Professional Appraisal Practice (USPAP)* also have precedence over technical standards.

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Standard on Valuation of Personal Property

1. Scope

This standard is intended to provide recommendations for defining, classifying, discovering, reporting, verifying, and valuing personal property for ad valorem tax purposes. It is beyond the scope of this standard to address unique valuation issues that may arise in the appraisal of personal property associated with public utilities, telecommunications, railroads, or similar properties.

2. Introduction

The purpose of this standard is to present methods and techniques that assessing officers can use to achieve uniform and equitable personal property valuations. Effective administration of a personal property assessment system depends, in part, on legislation and regulations that provide clear direction for determining the proper status of personal property for assessment and taxation. Such administration also requires an adequate budget to obtain the resources necessary to assess personal property accurately and equitably.

3. Definition of Personal Property

Property means an aggregate of things or rights to things whose possession is protected by law.

Two broad categories of property are real and personal. “Real property is the rights, interests, and benefits connected with *real estate*. Real estate is the physical parcel of land, improvements to the land (such as clearing and grading), improvements attached to the land (such as paving and buildings), and appurtenances (such as easements that cross the parcel or give access to the parcel). Personal property is defined by exception: property that is not real is personal. The salient characteristic of personal property is its movability without damage either to itself or to the real estate to which it is attached” (International Association of Assessing Officers 1990, 76).

Personal property by its nature is not permanently attached and therefore is movable. Criteria for distinguishing whether an item is real or personal property in a particular situation usually include intent of owner, means of attachment, contribution to highest and best use of the property (real estate), relevant case law including sales and use tax cases if considered relevant, and statutory, regulatory, and legal guidelines.

Personal property is divisible into two classes—tangible and intangible. Examples of tangible personal property are material items such as animals, marine vessels, aircraft, motor vehicles, furniture and fixtures, machinery and equipment, tools, dies, jigs, patterns, and stock in trade (in-

cluding inventories held for resale, supplies, and materials in process). Examples of intangible personal property are representations of rights of ownership to property—cash, shares, annuities, patents, stocks, bonds, notes receivable, insurance policies, accounts receivable, licenses, contracts, franchises, money market certificates, certificates of deposit, and copyrights—as well as goodwill.

An assessment statute should explicitly define the types of personal property subject to and exempt from assessment and taxation. State and provincial agencies should provide supporting rules, regulations, and guidelines as required. Legislation should also explicitly define the situs (location for tax purposes) of personal property and should specify a common assessment date for all taxing authorities.

4. Discovery of Personal Property

The extent to which personal property can be assessed depends upon its discovery. Complete discovery requires adequately trained staff and supporting resources. Taxation agencies should be empowered to issue binding rules and regulations covering the discovery of personal property. Disclosure of personal property is often contingent on identifying the owner of the property. Sources that may be useful in the discovery of personal property and its owners include the following:

- previous assessment records and previous personal property statements or returns
- physical inspection (on-site review)
- personal property listing form, return, rendition, declaration, or statement
- real property field appraiser reports and the property characteristic file
- audits (desk, office, field, or correspondence)
- state, provincial, and local sales tax permits
- federal, state, provincial, municipal, and county business licenses and registrations
- building permits
- chambers of commerce membership lists
- new business listings from news media
- public records (such as trade name records, Uniform Commercial Code [UCC] forms, corporation charters, partnership articles, and assumed name notices)
- property transfer documents, including recorded bill(s) of sale

only additions and deletions to the initial listing, with appropriate details and costs. This system promotes verification and valuation accuracy. Value trending and depreciation factors can be applied to each item individually or to a group of items, such as furniture, fixtures, and equipment (FF&E), acquired in a given year.

The form should contain sufficient instructions to help the taxpayer prepare and file a complete and accurate listing of all taxable personal property. The instructions on the form should also specify the reporting method required and give specific instructions on how to report construction in progress, acquisition costs (including installation, freight, taxes of all types, and fees), and expensed and fully depreciated assets as well as leased assets. The form should contain a statement that all listings are confidential and are subject to audit.

Implementation of an electronic filing process should be considered in order to provide a high level of customer service. The American National Standards Institute (ANSI) has approved electronic data interchange standards through the Accredited Standards Committee (ASC X12 transaction data sets). This standard enables taxpayers with accounts in multiple jurisdictions to efficiently automate the annual filing of personal property returns.

6. Verification and Auditing

6.1 Authority

Statutes should contain enabling language for regulatory compliance and enforcement measures. Such laws should give assessors and their representatives authority to examine the property, books, papers, and accounts of taxpayers. Statutes should also provide appropriate penalties for those who fail to file timely returns, file inaccurate information, or deny the assessor access to property and records. Further, statutes should require property owners to file personal property statements in each jurisdiction in which the owners have personal property.

6.2 Audit Program

The assessor should establish an audit program designed to facilitate the full and proper listing of all taxable personal property in the assessment jurisdiction. In general, emphasis should be placed on the audit of new accounts, major accounts, accounts with significant changes from the previous year, and accounts that are suspected of being inaccurately reported based on objective analysis.

Statistically valid sampling techniques should be employed to ensure that the audit program is equitable. The purpose of an audit is to verify that all taxable personal property items have been reported and that the information given is accurate. A physical inspection may help to verify the completeness of reports.

To ensure fair and equitable treatment, the scope of an

audit program must be clearly defined before the process begins. For example, in establishing audit criteria, it may be useful to identify particular industry segments for examination to maximize resources in a given year or assessment cycle. Audit programs may include one or more of the following activities:

- Review listing changes from one year to the next with taxpayer contact if there are questions.
- Review correctness of data before making changes; contact taxpayers requesting additional information as necessary.
- Request that government revenue agency depreciation schedules be submitted with all listings.
- Obtain copies of government revenue agency depreciation schedules for (specify percentage) of total filings.
- Obtain actual copies of ledger listings from (specify percentage) of total filings.
- For mail audits, request specific documentation from selected accounts or business types.
- Physically inspect and audit records of specifically targeted accounts or business types.
- Physically inspect and audit (specify percentage) of all personal property accounts each year

When conducting a detailed audit with inspection, the appraiser examines a detailed plant fixed-asset ledger or similar record, if available, that provides information on each item such as asset description, serial number, manufacturer, date of purchase, date of installation, location, acquisition cost, depreciation charges, and retirement provisions. The appraiser verifies that assessable items have been completely and accurately reported. Assessable costs may include charges for installation, freight, taxes, and fees (if applicable), unless specifically excluded by law.

Attention should be directed to standby equipment, permanently idled equipment, retired or fully depreciated equipment, and uninstalled equipment. Regardless of book value, such equipment and inventory should be listed and valued unless specifically exempted. Idle, retired, abandoned, or fully depreciated property may not have a value-in-use and may be reported on the company's books as having \$0.00 value, but the property may have a value-in-exchange. The amount of value-in-exchange should be determined based on market research of used machinery and equipment of similar use and condition. The status of personal property as of the assessment date is critical to determining an item's assessability or taxability (ratatability).

The appraiser should compare total reported costs with

the lease payments, an adjustment to the “selling price” may be required.

The assessor should recognize that appraisal and accounting practices for depreciating personal property may differ. Accounting practices provide for recovery of the cost of an asset (the return of the asset), whereas appraisal practices strive to estimate a value related to the current market and should consider both return of the asset and return on the asset. A productive asset may continue to have value at the end of its scheduled life or conversely, an asset may lose its value prior to the end of its scheduled life. Appraisal practice must consider accrued depreciation in the forms of physical deterioration, functional obsolescence, and external (economic) obsolescence. The appraiser/auditor should also be familiar with the purchase accounting methods used by businesses in their jurisdiction. A company’s depreciation schedule should provide life tables for various asset categories.

The restoration or modification of machinery or equipment may be treated differently for assessment and accounting purposes. For accounting purposes, the restoration/modification cost may be entered as a different asset, whereas the appraiser/assessor would add the cost to the original item and adjust the effective age of the asset.

Useful guidelines in the form of depreciation schedules or tables are available from state or provincial assessing authorities, professional valuation companies, and appraisal publishing firms. Because the personalty of a business normally is acquired throughout the year, acceptable depreciation schedules will permit the full year’s depreciation or will consider the average age of six months (half-year convention). Generally, these guides are sufficiently accurate for use in mass appraisal of property. If guides do not exist for specific types of personal property, it is recommended that they be developed. Depreciation schedules can be developed from a study of asset lives and resale prices. The schedules can be asset specific or for general categories such as personal computers or furniture and fixtures. Most schedules base annual depreciation on a percentage of original cost or replacement cost.

However, there can be particular types of property where standard depreciation schedules may not apply and an accurate depreciation estimate can only be made by using an alternate method. One such method is the capitalization of income (rent) loss due to the inefficiency of the property. It is similar to the practice in real estate valuation of calculating the depreciation due to rent loss caused by internal or external forces. An example would be if an existing machine can only run eight hours per day, but a modern replacement can run ten hours per day, the loss in revenue from the two hours of non-production could be capitalized and the amount subtracted from the replacement cost. Whether the obsolescence

was functional or economic would depend on whether the forces reducing the production hours were internal or external. The appraiser/assessor’s experience and judgment should inform their decision of whether to use a standard schedule, develop a new schedule, or apply an alternate method of calculating depreciation.

7.2.2 Sales Comparison Approach

The sales comparison approach may have limited application for appraising machinery and equipment used in business because sales of used items are generally few and are often liquidation sales, which typically are not at market value, or are bulk asset purchases. In such circumstances, list prices including delivery costs and sales taxes, when supported by the marketplace, can be good indicators of value. Used assets acquired in bulk purchases may have been sold in an arm’s-length transaction so market data may be evident. The value of an individual item to the entire sale price (purchase price allocation) may be available in the buyer’s records.

Care must be taken to assure that the property is valued at the proper level of trade. Trade and cash discounts should be subtracted from the list prices, particularly if the equipment sold is still at the wholesale level of trade. If reliable sales data are available, the adjustment process can be applied in the same manner as for real property. If an adjustment for time of sale is made, the adjustment may be negative due to additional accrued depreciation of the property or positive due to inflation.

7.2.3 Income Approach

The income approach produces an estimate of the present worth of income to be received in the future. To apply this approach, the appraiser must estimate the income stream over the remaining economic life of the subject property. This is an important concept; the future income-generating capacity of personal property is typically short-lived compared to real estate. The direct capitalization technique (Income divided by Rate equals Value [$I/R=V$]) can be used if the single-year income applied is indicative of the annual income for the remaining life of the asset and the capitalization rate reflects the recapture period of the asset. Personal property can also be valued using a yield capitalization technique, which values the changing productivity (income) of the asset over its projected remaining life more accurately than $I/R=V$. Many industries use gross income multipliers (GIM) or gross rent multipliers (GRM) to value personal property that has typical and similar operating expenses. When applying the income approach to value personal property, it is important to capitalize income from the rental of an asset not the income of the business that owns the asset.

Typical gross incomes may differ under various leasing

the appraiser should obtain more data from the lessor or compare the equipment in question with similar equipment of known cost.

7.3.4 Inventories

The term inventories includes specific categories of goods held for resale in the course of business, goods in the process of production (termed goods in process), and raw materials.

Whether certain types of goods are classified as inventories or as something else will change depending on the trade level at which the appraisal is being made. Machinery and other equipment that remain classified as inventories at the manufacturing, wholesale, and retail levels become machinery and equipment upon reaching the end user.

Inventory valuation, both for goods in process and for finished goods, should include the value of labor, materials, and overhead expended during production.

There are many methods for estimating the value of inventories. Some of the more common ones are:

- last in, first out (LIFO)
- first in, first out (FIFO)
- weighted average
- lower of cost or market

The most commonly used method for ad valorem purposes is lower of cost or market. First in, first out (FIFO) is also an acceptable measure of inventory replacement costs. Taxpayers often use last in, first out (LIFO) for income tax purposes, but it does not reflect inventory value for property tax purposes. The weighted average method provides for distribution of inventory costs throughout the year.

Caution should be exercised when inventory values are estimated from the owner's accounting records because most accounting systems use an original acquisition cost basis for pricing inventory and this does not necessarily reflect market value as extracted from the marketplace, which may be more or less than original cost.

7.3.5 Supplies

Supplies are stocks of goods that are intended to be consumed during the production process, but are not part of the raw materials inventory that is processed into the finished product. Examples of supplies include chemicals, clothing, pallets, paper, shipping materials, fuels, and repair parts. Unlike inventory, supplies are not held for resale. Supplies should be valued at their acquisition cost.

7.3.6 Consigned Goods

Consigned goods are personal property in the possession of an agent, held for sale by that agent. They should be valued, at the appropriate level of trade, as part of the consignor's inventory.

7.3.7 Imports and Exports

Assessors should be aware of the legal status of import and export merchandise in order to determine its taxable status. If there is no exemption provided by statute, then the techniques for estimating the value of inventories should be used for valuing imports and exports.

7.4 Valuation Guidelines for Intangible Personal Property

The discovery, reporting, verification, and proper valuation of intangible personal property is difficult and can be expensive. The methods for discovering, reporting, verifying, and auditing intangibles are the same as for tangible personal property. Pertinent information includes type of asset, name of issuer, date of acquisition, legal life, expected useful life, face value or par value, market value, and dividends or other income. Individual research can lead to sources that provide information on the selling prices of intangible personal property.

Statutes should provide concise guidance on the assessment of intangible personal property. The benefit/cost ratio of intangible personal property taxation is such that many states have exempted intangible personal property from taxation. For a listing of state and provincial treatment of intangible property, see *Property Tax Policies and Administrative Practices in Canada and the United States* (IAAO 2000).

Those states that continue to assess intangible property primarily do so for public utilities by using a unit valuation method. When centrally assessed property is not held by a public utility, the separation of tangible from intangible value may be required. Recent letter rulings and case law should be researched to provide guidance in this area. Careful review should underscore the purpose, use, and how necessary and integral the identified intangible personal property is to the taxable tangible personal property. This review could entail the examination of the taxpayer's books, records, and filings with regulatory agencies

7.5 Compliance with USPAP

IAAO requires that all appraisal work performed by its members in the United States and Canada be compliant with the *Uniform Standards of Professional Appraisal Practice* (USPAP) of the Appraisal Foundation (2005 [updated annually]) and the *IAAO Code of Ethics and Standards of Professional Conduct* (2005). USPAP Stan-

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Skaff, M.S. 1974. Computerized personal property valuation models. *International Property Assessment Administration* 7:194–201.

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U.S. Department of the Treasury. 2004. *Publication 946: How to depreciate property*. Washington, DC: U.S. Department of the Treasury, Internal Revenue Service.

Glossary of Terms

Acquisition cost. The cost used in accounting to represent the purchase price of an asset. If installation and other associated costs are included, this cost should be referred to as total acquisition cost.

Chattel. An item of tangible movable or immovable property except real estate, freehold, and things (such as buildings) connected with real property.

Consigned goods. A type of inventory in the possession of a selling agent but owned by another party. The seller has no equity, no control of price or sale, and receives none of the profit (as such) from sale of the property (but may receive a sales commission).

Construction in progress. Property that is in a process of change from one state to another, such as the conversion of personal property from inventory to fixed asset by installation or the conversion of personalty to realty by becoming a fixture.

Discovery. The process whereby the assessor identifies all taxable property in the jurisdiction and ensures that it is included on the assessment roll.

Economic life. The period of time over which an asset’s operation is economically feasible. The economic life may or may not be equivalent to the physical life of the asset.

External (economic) obsolescence. The loss in appraisal value (relative to the cost of replacing a property with

property of equal utility) resulting from causes outside the property that suffers the loss. Usually locational in nature in the depreciation of real estate, it is more commonly marketwide in personal property and is generally considered to be economically unfeasible to cure.

Effective age. An age assigned to an asset based on a combination of its actual age and condition.

Finished goods. Inventory at the end stage of a manufacturing process. Finished goods are the result of combining raw materials with labor, capital, machine time, and other components of production.

First in, first out (FIFO). An inventory cost-accounting procedure whereby unsold inventory, including inventory carried over from prior years, is valued at the price most recently paid for inventory purchases.

Fixed assets. Personal property that has been brought to the point of highest and best use, that is, it is fully installed and used to produce income in an economically feasible manner. In a business: permanent assets required for the normal conduct of a business.

Fixture. Generally, an asset that has become part of real estate through attachment in such a manner that its removal would result in a loss in value to either the asset or the real estate to which the asset is affixed.

Goods held for sale or resale. Any inventory held for sale by a wholesaler, distributor, or retailer after having passed through one or more other levels of trade.

Goods in process. Inventory, formerly raw materials, that has begun to undergo the manufacturing process that will result in finished goods.

Historical cost. The cost new to the first owner of personal property.

Intangible property. That class of personal property in which value is based on evidence of ownership rather than physical or tangible characteristics, for example, notes, bonds, insurance, patents, and accounts receivable.

Inventory. The group of personal property items whose value is exhibited by value-in-exchange, that is, ownership is solely for the purpose of sale rather than use.

In-transit goods. Personal property that is in movement from one jurisdiction to another. In-transit goods are not assessable because they lack situs.

Last in, first out (LIFO). An inventory cost-accounting procedure whereby unsold inventory, including inventory carried over from the prior year, is valued at the prices paid for the earliest inventory purchases.

Leasehold improvements. Items of personal property, such as furniture and fixtures associated with a lessee (the tenant), that have been affixed to the real property owned by a lessor.

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Standard on Public Relations

Full revision approved July 2011

INTERNATIONAL ASSOCIATION OF ASSESSING OFFICERS

The assessment standards set forth herein represent a consensus in the assessing profession and have been adopted by the Executive Board of the International Association of Assessing Officers. The objective of these standards is to provide a systematic means by which concerned assessing officers can improve and standardize the operation of their offices. The standards presented here are advisory in nature and the use of or compliance with such standards is purely voluntary. If any portion of these standards is found to be in conflict with the Uniform Standards of Professional Appraisal Practice (USPAP) or state laws, USPAP and state laws shall govern.

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Standard on Public Relations

1. Scope

This standard has been designed to make assessing officers aware of the benefit of good public relations and to promote effective communications between the assessment office and the public. Defining public relations with respect to the assessment profession and using terms specific to the assessment field, this standard discusses the need for a well-planned and well-executed communications program and provides recommendations on how to implement and maintain communication with the public by using proven marketing techniques and tools.

2. Introduction

2.1 Necessity for Public Relations

A public relations program in the assessment profession provides current and useful information on assessment policies and practices, as well as a means of responding to public opinion. A proactive public relations program is essential to public awareness of the assessment process and of the importance of the property tax in funding local government services. A public relations program should be an integral part of every assessment office's work. A public relations program describes what the office does as well as how, why, and for whom its services are provided. An effective public relations program results in more accurate and thorough coverage from the media and a better-informed constituency.

2.2 Core Constituencies

The assessment office needs to be aware of a wide variety of core constituencies, including individuals or groups with special needs that require attention and focused communication. These groups include property owners, civic and professional organizations, lending institutions, developers, attorneys, real estate appraisers and brokers, governmental agencies and policymakers, tax representatives, and the media.

2.3 The Components of a Public Relations Program

A public relations program consists of research, action planning, communication, and evaluation.

- Research should determine how the public perceives the policies, programs, and operations of the assessment office.
- Research is also necessary to provide meaningful data.

- An action plan should be based on research.
- Communications with the public should be positive, courteous, and provide education on the issues.
- The most current and cost-effective means of distributing information should be used.
- All aspects of a public relations program should be tested, evaluated, and improved as required.

3. Developing a Public Relations Program

A written plan is necessary for an effective public relations program. A public relations program should be designed to give special attention to current social, economic, and political conditions. The program should also be tailored to meet the specific needs of core constituencies and address the role of the assessment office.

3.1 Public Relations Officer

The assessment office should have a spokesperson to develop and coordinate its public relations program. Depending on circumstances, assessing officers can appoint a full-time public relations officer, assume the duties themselves, or assign them to another senior staff person. A primary spokesperson should be identified to coordinate interviews, and to write and distribute news releases, newsletters, reports, and correspondence; post information on the Internet; coordinate special events such as open houses and public appearances; edit special publications and annual reports; and coordinate the release of information to media channels.

3.2 Listening

The initial task of public relations is to understand the public's current image of the assessment office. This can be accomplished by listening to what the public is saying and observing its actions and reactions. Listening involves observing the economic, social, and political environments, identifying possible problems or opportunities, interpreting public opinion, and evaluating the program. All issues that affect assessment functions must be clearly defined and given full attention. Assessment offices should consider researching, testing, and implementing a public feedback mechanism. When effectively executed, these systems can provide assessment offices with a wealth of qualitative and quantitative data on operational effectiveness and areas demanding greater public emphasis. Feedback can be ob-

4. Developing a Procedural Manual

Employee demeanor in serving the public is important to maintaining good public relations. Every public contact should be viewed as an opportunity to improve the organization's image. Procedural manuals that include a section detailing how staff should communicate with the public are critical for an effective public relations program. Because assessment offices differ in size, location, and nature, the procedural manual should be designed with the particular office in mind. Procedures should focus on effective communication of content. Information on the following subjects should be included in the section on public relations:

- Professional standards adopted
- Important dates and deadlines
- Rules for disclosure of different types of information and confidentiality of data
- Any established records retention policy
- Identification of who is authorized (and who is not) to communicate as an official spokesperson
- Guidelines for staff interactions with the public
- Guidelines and an authorization process for using intellectual property, logos, trademarks, and copyright
- A privacy statement and policy for public comment mechanisms
- Code of conduct for online behavior
- Protocols and authorization for posting information to online media such as Web sites, social media sites, and community forums
- Identification of media outlets and communication services that staff are authorized to use
- Policy regarding appropriate online use of the assessing jurisdiction's name and identity
- Policy regarding endorsements and political statements
- Suggestions for responding to irate taxpayers
- Guidelines for assessment hearings and appeals
- Staff appearance and attire
- Identification badges, nameplates, and vehicle identification
- Telephone and e-mail etiquette
- Guidelines for the style and structure of letters and e-mail
- Methods for recording actions.

5. Public Records

Public access to assessment records is crucial to good public relations. Measures should be taken to ensure a climate of openness and transparency. Assessment office personnel must understand policies and statutes pertaining to open records, public disclosure, and confidentiality, including an awareness of compliance timelines. The assessing officer should establish guidelines for the dissemination of real estate records or taxpayer information and should be sensitive to privacy concerns. A standard operating procedure for information requests must be developed. A staff member should be assigned the role of custodian of records to ensure a timely response to open records requests. A program for providing information via paper reports or electronic media should be developed. Commonly available file formats for data files should be provided.

6. Printed Information and Correspondence

In preparing printed materials and correspondence for the public, special attention should be paid to form, content, length, and language.

6.1 Correspondence

Written correspondence should follow specific guidelines:

- Answer letters and e-mail promptly and acknowledge those that cannot be responded to immediately
- State information clearly using common words and phrases
- Respond to all relevant questions
- Convey a professional image.
- Add a personal touch whenever appropriate
- Correspond positively
- Retain a copy of all correspondence for future reference
- Be consistent with the office's style.

To avoid contradictory responses, correspondence addressing policy issues must cite controlling rules, statutes, or professional standards and be communicated within the assessment office. Responses to criticisms should be addressed promptly and be resolved in a non-judgmental way.

6.2 Assessment Notices

Assessment notices should contain:

- Name and address of the assessment jurisdiction
- Purpose of the notice
- Tax year

7. Media Contacts

The assessment office should maintain a list of media contacts. The list should be reviewed annually and include contacts in all types of media. Media contacts include news releases, interviews and conferences, and public service announcements.

7.1 News Releases

The news release is a valuable device that should be used to promote activities, communicate policies, and inform the public of assessment issues. The following are recommendations for writing a news release:

- Information should be newsworthy (timely, unique, or significant)
- Public relations industry-recommended format should be followed
- Contact information should be provided
- The length should not exceed two pages
- Online media releases should be as short and concise as possible
- Information should be localized
- The release should be proofread
- The most important facts should appear first
- Deadlines, editing procedures, and other requirements of the media should be accommodated
- All staff should be given copies of the release
- Those mentioned in the release should be notified before it is sent.

7.2 Interviews and Conferences

The assessing officer or spokesperson should be accurate, impartial, and avoid vague answers and comments off the record. If an answer to a particular question is not known, the response should be, “I will get back to you.” An advance review of the questions is advisable whenever possible. Visual aids may be helpful.

7.3 Public Service Announcements

Public service announcements should be sent to local newspapers, radio stations, television stations, and be posted to online media. Broadcast announcements should be brief; a 25-word announcement takes about 10 seconds of airtime. The announcement dates should be specified, and the spokesperson should be identified for follow-up questions.

8. Speaking Engagements

Speaking engagements are an important opportunity for contact between the assessing officer and organized

groups. Engagements can be spur-of-the-moment or scheduled. Material suitable for a variety of impromptu or formal speeches should be developed, independently reviewed, and rehearsed. Opportunities for speaking engagements are usually offered by service organizations, civic groups, neighborhood associations, boards of realtors, industry representatives, regularly scheduled public access stations or radio talk shows, legislators, and other elected officials. An opportune time to meet with groups is just before the mailing of assessment notices or a major reappraisal effort.

9. Contacts with other Public Officials

An assessing officer must deal with other agencies and officials at all levels of government. An effective working relationship with these officials is crucial. To maintain good relations with other public officials, affected policymakers should be notified before public announcements are made. Unreasonable demands and public criticism of other departments should be avoided.

10. Appeals Process

Taxpayers should be made aware of the rules and procedures for appealing assessments. Information on what constitutes a valid appeal should be made available. During this process taxpayers should be treated with courtesy and respect. New information should be evaluated thoroughly and objectively. Adequate space and facilities should be made available for waiting appellants. See the IAAO *Standard on Assessment Appeal* (IAAO 2001) for detailed considerations on appeal procedures.

11. Public Education

The public needs to know the purpose of assessments and what public services are funded by property taxes. The taxpayer should be made aware that the assessment process is designed to establish a tax base and ensure that the tax burden is equitably distributed according to the assessed value of various properties. It should be emphasized that assessments can be made at various levels of government (local, state, or provincial) and are appealable at the same levels. Taxpayers should understand that they have a voice in the local budgetary process—they elect the officials who set the tax rates, can attend public hearings, and can vote on bonding or expenditure referendums. Taxpayers need to know the tax rate, how to apply it to the assessed value, and how to arrive at the tax bill. It is the assessing officer’s responsibility to inform the taxpayer about the appraisal and assessment process, the information available for review, procedures for filing an appeal, and filing deadlines.

12. Internet

In addition to more traditional communication methods, the Internet is an effective way of informing the

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Standard on Contracting for Assessment Services

Approved February 2002
Revised approved December 2008 (Section 6.1 Data Collection)

International Association of Assessing Officers

This standard updates the 2002 *Standard on Contracting for Assessment Services*. IAAO assessment standards represent a consensus in the assessing profession and have been adopted by the Executive Board of the International Association of Assessing Officers (IAAO). The objective of the IAAO standards is to provide a systematic means for assessing officers to improve and standardize the operation of their offices. IAAO standards are advisory in nature and the use of, or compliance with, such standards is voluntary. If any portion of these standards is found to be in conflict with national, state, or provincial laws, such laws shall govern. Requirements found in the *Uniform Standards of Professional Appraisal Practice (USPAP)* also have precedence over technical standards.

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Standard on Contracting for Assessment Services

1. Scope

This standard describes and makes recommendations on the development, awarding, and monitoring of contracts for assessment services.

2. Overview

2.1 Assessment Contracts

Assessment contracts are developed to provide assessment services to government agencies by firms or private individuals. Throughout this standard the government agency awarding the contract will be referred to as the “assessment agency” and the firm or private individual to whom the contract is awarded as the “contractor.”

2.2 Available Services

Assessment service contracts can cover any services relating to the discovery, listing, appraisal, and assessment of property, including data collection, mapping, development of construction cost or valuation manuals, complete or partial revaluations, specialized consulting services, tax policy matters, and system design and implementation, including development of appraisal and assessment software.

2.3 Advantages and Disadvantages

Contracting for assessment services provides assessment agencies the opportunity to obtain a specified product at a known cost in a given period of time, thereby reducing the time and cost associated with internal development and implementation. In many cases the products and services represent years of research and development and have been tested and proven in other assessment agencies. Widespread implementation (or the possibility thereof) allows the contractor to amortize research, development, and other fixed costs among various clients and customers. In addition, most contractors maintain an experienced professional staff, whose skills and knowledge become immediately available to the assessment agency.

At the same time, however, contracting for assessment services may result in a dependence upon the contractor and its products or services. The assessment agency may be less likely to develop internal expertise, and the staff may remain small and not develop a thorough understanding of, or commitment to, the product. In addition, the contractor may not fully understand or be properly concerned with local needs and requirements. As a result, future product

modifications required by statutory changes or procedural enhancements can be cumbersome and costly.

When contracting for assessment services, the assessment agency can minimize potential disadvantages through the development of thoughtful, detailed requests for proposals (RFPs), careful research of potential contractors and their work in other jurisdictions, development of strict quality control procedures, good planning and coordination with the successful bidder, and diligent monitoring and review of project results.

Some assessment services are more suited to contracting than others. In general, services or products that are relatively standardized can be provided most efficiently by contract. Complex tasks requiring specialized expertise not available internally can also be suitable for contracting or consultation services.

The assessment agency can minimize potential disadvantages when contracting for assessment services through

- Detailed and meaningful requests for proposals (RFPs)
- Careful research of potential contractors through in-depth past performance reviews
- Strict quality control procedures through diligent monitoring and reviews of the project
- Improved working relationships with the contractor through good planning and coordination
- Complete, thorough, and precise documentation from the contractor through the use of project management tools

3. Request for Proposal (RFP)

3.1 Purpose of the RFP

The request for proposal (RFP) is the document that sets forth the requirements of the project. It should clearly describe the desired products or services, performance standards, completion dates, and any continuing responsibilities of the successful contractor. It should also explain briefly the background of the project, relevant legal considerations, time and funding constraints, and project objectives. A clear, complete, and detailed RFP is the key to achieving desired project results.

Contractor responsibilities beyond the date of completion should also be specified in the RFP.

3.3.9 Equal Opportunity and Affirmative Action

The RFP should clearly specify if the assessment agency is an equal opportunity and affirmative action employer. If the contractor will be required to provide an affirmative action plan or related reports as proof of nondiscrimination, this should be stated in the RFP. Other jurisdictional provisions should be stated.

3.4 Evaluation Procedures

The RFP should explain the basis on which proposals will be evaluated and selected, including required submission dates, oral presentations, and other review and selection procedures. Some important dates include the date by which letters of intent to file a proposal must be received, the date by which proposals must be received, and the date on which proposals will be opened.

The RFP should also specify the method of packaging and labeling proposals, so that they are not inadvertently opened before the scheduled date.

3.5 Clarifications

The RFP must identify the issuing agency, the contract administrator, and procedures to be followed for receiving clarification or interpretation of the specified requirements. All questions should be directed to and handled by the contract administrator to ensure consistency in responses. It is good practice to prepare a written list of questions and answers concerning the RFP to be disseminated to potential contractors, so that they all have the same information and can respond on the same basis.

3.6 Advisory Committee

It may be helpful to form a project advisory committee, made up of key people involved in the project, to coordinate development of the RFP, the evaluation of bids, and awarding of the contract. The committee might later serve as the project review committee (see section 5.4).

4. Awarding of Contracts

4.1 Selection Criteria

Proposals submitted in response to an RFP should be evaluated on the basis of responsiveness, the bidder's qualifications, and cost. To receive serious consideration, a proposal should address all major points covered in the RFP. Proposals should describe the bidder's experience on similar projects and the qualifications of key personnel to be assigned to the project. Although cost is an important selection criterion, the successful bidder should not be chosen on the basis of cost alone. The assessment agency should expect to negotiate contracts when hiring vendors

of professional, highly technical services and products. The assessment agency must be confident that the selected bidder can implement the program requirements in a timely manner. It is highly desirable that the chosen contractor be one who has successfully completed similar projects.

The evaluation of proposals must be objective. The assessment agency should prepare a checklist of required and desirable features with predetermined evaluation criteria when selecting a contractor. References should be fully verified by the agency.

4.2 Contract Provisions

The contract establishes the legal obligation of all parties with respect to the project. It should incorporate the salient features of the RFP and of the successful proposal.

- Detailed description of the work to be performed
- The time frame, delivery date, and other requirements of the project
- The amount and terms of the contract delineating all expenses (travel and other expenses), including all billable expenses
- Authorized signatures of the assessment agency and other parties
- Performance standards
- Testing standards and procedures
- Performance bonds and other insurance coverage, including indemnification and hold harmless clauses
- Required documentation
- Implementation, installation, and delivery dates
- Responsibility for maintenance and upgrades
- Payment provisions
- Termination rights and compensation or penalty payments to the agency in the event of failure to perform, unavailability of funds, liquidation, or other factors
- Arbitration of contractual and other disputes
- Confidentiality agreements
- Other relevant considerations

With respect to payment provisions, the assessment agency should be careful not to commit to paying fully for a product or service until it has been satisfactorily delivered and tested. Two ways of doing this are through a "holdback" and a "performance bond." In a holdback provision, a specified percentage of the contract amount is withheld until final approval and sign-off on the project. In a performance bond, a third party, in effect, "insures" the contractor's performance. In some cases it may be appropriate to require

then the assessment agency should seek legal advice to resolve the matter.

5.4 Project Review Committee

For projects that affect several departments or that have multiple objectives, a project review committee can provide the agency with an effective mechanism for internal coordination, monitoring, and review. The committee should include representatives from all departments or sections of the agency affected by the project. Ideally, this committee would develop the RFP, review the bids, and coordinate implementation of the project (see section 3.6).

The committee should meet regularly (at least monthly) to discuss the status of the project, review products and results, and coordinate implementation of manuals, procedures, software, or other items provided in the project. The committee should also meet regularly with the contractor to discuss current developments, provide direction and feedback, and discuss upcoming tasks and areas of concern. The committee should actively guide the project and review results to ensure successful completion of the project.

5.5 Contract Monitors

A contract monitor is generally a party hired by the agency to review the services and products provided under the contract (the monitor may also be an independent third party). An effective monitor must be thoroughly familiar with the RFP and successful bid and may also have served as a consultant in the development of the RFP or selection of the successful bidder. The contract monitor must stay in close contact with the project and review major tasks in a timely manner.

A contract monitor can be valuable in providing the assessment agency with specialized expertise that will help ensure the success of the project. The monitor can also bring a useful, independent perspective to evaluation of the project's products and services. The contract monitor must be able to command the respect of the agency and contractor alike.

6. Considerations by Type of Service

6.1 Data Collection

Collection of property characteristics data may be part of a contract for implementation of a mass appraisal system or it may be the subject of a separate contract. Data collection (or reverification) is one of the most critical and typically the most expensive phase of any reappraisal project. The key to a successful data collection project is the establishment of clear and standard coding requirements and the careful monitoring of achievement of such requirements through a quality control program. The development and use of a data collection manual is essential in achieving uniformity in data collection.

The RFP should specify the types and approximate

number of parcels involved in the project, the property characteristics to be examined and codified, standards for data capture and coding accuracy, and procedures for measuring achievement of accuracy standards.

- Property characteristic data collection or reverification should be highly accurate.
- Objective categorical or binary data fields include property characteristics such as exterior wall material, number of full bathrooms, and waterfront view.
- For an objective categorical or binary data field collected or reverified, 95% of the coded entries should be accurate.
- Continuous area, volume or linear measurement data (such as square feet of living area, garage size, and tank capacity and exterior wall height) should be obtained by direct measurement.
- Continuous area or linear measurement data should be accurate within 1 foot (rounded to the nearest foot) of the true dimensions or within 5% of the actual area of the improvement.
- Continuous volume data should be accurate within 5% of the true capacity of the improvement.
- When direct measurements are not possible, calculated areas, dimensions or volumes must be estimated and an exception statement should be provided on the property record.
- Subjective categorical data characteristics include data items such as quality grade, physical condition, architectural style, and effective age.
- For a subjective categorical data field collected or reverified, 90% of the coded entries should be accurate.
- Accuracy of subjective data items can be supported primarily by conformity with written specifications and examples in the data collection manual.
- Subjective data judgment calls may also be substantiated by field notes when the data collection manual does not provide sufficient guidance.
- Data entry accuracy should be as close to 100% as possible and supported by a full set of range and consistency edits.
- Statistical quality assurance tools should be used to measure and verify the attainment of accuracy standards.
- Routine checks of field work should begin immediately after the field data collection phase commences.
- Independent quality inspections may be performed by jurisdiction staff, project consultant, auditing firm, or oversight agency.

definition and scope of the task, statutory requirements, adherence to the *Uniform Standards of Professional Appraisal Practice (USPAP)*, the timeline, confidentiality requirements and agreements, performance standards, contract dispute resolution, ownership of the product, payment schedules, and contract start and termination dates.

6.6 System Design and Implementation

An RFP for system design and implementation will be concerned primarily with software specifications and should set forth performance requirements in reference to existing procedures and desired results. Items that need to be addressed include hardware constraints, report writing capability, legal requirements, program requirements, programming language, transferability, maintenance and updates, program support and documentation, license, copyright, and training. It is also highly important to clarify the ownership of the developed software, including the source code and data generated.

Documentation should be addressed. User documentation relates to manuals and other instructional materials that explain proper use and operation of the system, including such items as completion of forms, classification and grading of buildings, valuation procedures, interpretation of reports, and use of computer terminals. Programmer documentation relates to data processing manuals and instructions that are required by local systems analysts and programmers to understand, maintain, and modify any computer programs provided under the contract. The RFP should specify the type of programmer documentation (such as flow charts, data definitions, and formulas) required by the jurisdiction. The RFP should also require

that the source code (computer programs) either be provided to the assessment agency, while giving appropriate copyright protection to the vendor, or be placed in escrow with a neutral third party in the event of a contract dispute or the inability of the vendor to service the software. The RFP should also describe all service contract obligations on the part of the contractor to maintain and modify the software once installed, including modifications to comply with statutory and legal changes. The contract should establish the criteria for deciding when such modifications are complex enough to warrant additional charges beyond the basic contractual service obligations. The contract should also specify who makes that decision and the timing of such modifications.

References

Note: For sample contracts and sample RFPs, consult the IAAO Web site (www.iaao.org) or the IAAO library.

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Standard on Verification and Adjustment of Sales

Approved November 2010

INTERNATIONAL ASSOCIATION OF ASSESSING OFFICERS

IAAO assessment standards represent a consensus in the assessing profession and have been adopted by the Executive Board of the International Association of Assessing Officers (IAAO). The objective of the IAAO standards is to provide a systematic means for assessing officers to improve and standardize the operation of their offices. IAAO standards are advisory in nature and the use of, or compliance with, such standards is voluntary. If any portion of these standards is found to be in conflict with national, state, or provincial laws, such laws shall govern. Requirements found in the *Uniform Standards of Professional Appraisal Practice (USPAP)* also have precedence over technical standards.

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Standard on Verification and Adjustment of Sales

1. Scope

The primary responsibility of the assessor is estimating the market value of each property within the jurisdiction. The integrity of the property tax is dependent on the accuracy of these estimates of market value. This is accomplished by analyzing market data to determine the price that the property being appraised would probably bring in the marketplace on the date of appraisal. Appraisal accuracy refers to the degree to which properties are appraised at market value, as defined by professional standards (see the IAAO *Glossary for Property Appraisal and Assessment* [IAAO 1997] and the IAAO *Standard on Ratio Studies* [IAAO 2010]). This standard provides guidance to ensure that only sales that meet the definition of market value and that have been adjusted for any monies (including financing) not attributable to the real estate are used in developing these estimates of market value. Accuracy is dependent upon proper verification and adjustment of sales data.

2. Introduction

Sales data should be collected, verified, and adjusted as necessary for model calibration and ratio study purposes. In some cases, sales may be valid for model calibration but should not be considered valid for ratio study purposes. A verified sale is more reliable than an unverified sale.

In jurisdictions that do not have laws mandating full disclosure of sales data, assessing officials work under a severe handicap and should seek legislation that provides for such disclosure (see the results of the 2008 *Survey of Ratio Study Practices* [Technical Standards Committee IAAO 2009]). In addition, jurisdictions that have disclosure but not adequate sale disclosure documents should work toward that goal. The terminology for determining whether or not a sale meets the definition of a valid transaction differs throughout the industry (validation, verification, confirmation, qualification, screening, and so on); however, for purposes of this standard, the term *verification* is used. It is important to remember that all sales should be considered candidates as valid sales unless sufficient information can be documented to show otherwise. While it is imperative that sales be verified uniformly and accurately, it is also important to process and verify sales in a timely manner so they are available for analysis. Sales should be trimmed for outliers during the statistical phase, not during the verification phase of a mass appraisal or sales ratio study program.

3. Sources of Sales Data

The primary sources of sales data include real estate transfer documents, sales verification questionnaires, buyers and sellers, and third-party sources.

3.1 Real Estate Transfer Documents

Real estate transfer documents include deeds, sales contracts, and transfer affidavits (i.e., land contracts, contract for deed) completed at the time of sale. Some jurisdictions require recordation of transfer documents, and some do not (see the results of the 2008 *Survey of Ratio Study Practices* [Technical Standards Committee 2009]).

3.1.1 Deeds and Land Contracts

A deed is a written legal instrument that, when duly executed, conveys an interest in the legal title to a property.

The *general warranty* deed provides the highest level of protection to the buyer and establishes that the seller owns the property and has the legal right to sell it. Unless stated specifically in the deed, the property is free of any liens or encumbrances; the buyer is guaranteed the title will stand against third parties attempting to establish title to the property; and the seller promises, in order to make the title good, he or she will deliver any document or instrument necessary.

A *special warranty* deed is not nearly as protective as the general warranty deed in that the seller warrants he or she has received title and ensures the property was not encumbered during his or her ownership.

Bargain and sale deeds implicitly or explicitly assert the grantor's ownership of the property conveyed, but they make no guarantee to defend the title. They provide the grantee with more protection than a quitclaim deed but less than a special warranty deed. The words of conveyance "bargain and sale" distinguish a bargain and sale deed.

A deed in which the grantor conveys or relinquishes all interests in a property without warrant as to the extent or validity of such interests is known as a *quitclaim* deed. The quitclaim deed is the least protective deed for the buyer and conveys only whatever rights or interests the grantor has in the property. There are no warranties or covenants to the buyer. If the grantor has a good title, it is as good as the warranty deed; however, there are no warranties or guarantees.

Tax deeds (*Sheriff, Marshalls*) are deeds by which title to real property, sold to discharge delinquent taxes, is transferred by a tax collector or other authorized officer of the law to the purchaser at a tax sale.

diction. Transfer documents often refer to the buyer as the grantee or transferee and the seller as the grantor or transferor.

4.3 Addresses, Phone Numbers, and other Contact Information of Buyer and Seller or Their Legal Designee

This information helps to identify more positively the parties to the sale. If the buyer will not reside at the property, the buyer's address may be needed for future correspondence. If the seller has established a new address, this information aids the assessor in contacting the seller regarding the sale.

4.4 Relationship of Buyer and Seller

Any close relationships including marital between individuals (parents, children, aunts, uncles, nephews, nieces, grandparents) or corporate relationships between businesses should be discovered, because sales between related parties may not reflect market value (see section 5.3.5).

4.5 Legal Description, Address, and Parcel Identifier

Each parcel should be assigned a unique parcel identifier (see *Standard on Digital Cadastral Maps and Parcel Identifiers* [IAAO 2009]). If this number is noted on the document at the time it is recorded, the assessor can locate the parcel in the file directly. This information links the sale to the assessor's records and identifies the property's location. Without careful matching of the parcel identifier with the legal description, the wrong appraised or assessed value may be used in a ratio study and the incorrect set of parcel characteristics may be transferred to the sales history file. The legal description also helps identify parcel splits, which are not usable in ratio studies. This information also may be used to prevent sales from being included twice. The situs address can be useful in locating and confirming the physical location of a parcel in the field.

4.6 Type of Transfer

The type of transfer document often helps determine whether the sale is usable. If the source of sales data does not include a copy of the transfer document, the type of transfer document should be specifically required. A warranty deed, for example, is generally associated with a usable sale; sheriff's deeds are not; and quitclaim deeds are questionable while contracts for deed and certain transfer affidavits may require an adjustment for financing (see Section 7.4.4).

4.7 Method of Marketing

Property that is listed with a real estate broker is the most prevalent method of marketing real property. Typi-

cally, when a comprehensive sales verification questionnaire is completed, no further verification is required if no factors exist that would require further verification and/or adjustment. Additional marketing methods are listed below.

- Auctions
- For sale by owner (FSBO)
- Internet marketing
- Newspaper advertisements
- Sealed bids
- Word-of-Mouth.

4.7.1 Auction

An auction is a method of marketing and selling real property, and verification should be made prior to including the sale as a valid transaction (see Section 5.4.5). Auction sales are typically more prevalent in rural areas. The auctioneer is the best contact for verification; then the seller. Rarely is the buyer able to provide all the necessary information.

4.7.2 For Sale by Owner (FSBO)

For sale by owner (FSBO) marketing may be defined as the process of selling *real estate* without the representation of a *real estate broker* or agent. The seller may employ the services of a marketing or online listing company or may actively market their own property. A sale meeting these marketing criteria may be considered as a potentially valid transaction.

4.7.3 Internet

Property that sells on the Internet and meets the criteria of being an open-market, arm's-length transaction should be included as a valid transaction. Brokerage and realty firms are using the Internet as an additional method for advertising and marketing their inventory of properties. All sales require diligent verification. In the case of Internet sales, the primary focus should be whether the parties to the sale are informed buyers and sellers. Indicators of an uninformed buyer could include one or more of the following:

- No knowledge of the market in the area in which the property was purchased
- No broker/realtor involved
- No other similar properties in the area examined
- Bought sight unseen.

4.7.4 Newspaper Advertisements

A newspaper advertisement is a method of marketing real property and requires no further verification if a comprehensive sale's validation questionnaire has been completed and no factors exist that would require further verification and/or adjustment.

- Sales occurred during the time frame being tested or modeled.
- Sales are excluded only when they fail to meet the requirements of an open-market, arm's-length transaction.

All sales meeting the definition of market value should be included as valid transactions unless one of the following two conditions exists:

- Data for the sale are incomplete, unverifiable, or suspect.
- The sale fails to pass one or more specific tests of acceptability.

Although all sales should normally be verified for use in modeling and appraisal analyses, for ratio studies a subset of sales can be selected for verification if the verified sales provide a sufficiently representative sample for purposes of the study (see *Standard on Ratio Studies* [IAAO 2010] for discussion on representative samples).

The position should be taken that all sales are candidates as valid sales unless sufficient information can be documented to show otherwise. If sales are excluded for ratio studies without substantiation, the study may appear to be subjective. Reason codes may be established for valid and invalid sales for both ratio studies and model calibration.

No single set of sales screening rules or recommendations can be universally applicable for all uses of sales data or under all conditions. Sales verification guidelines and procedures should be consistent with the provisions of the value definition applicable to the jurisdiction. Assessors should use their judgment, but they should not be arbitrary. For uniform judgments, verification procedures should be in writing. All personnel should be thoroughly familiar with these procedures as well as with underlying real estate principles (Tomberlin 2001).

5.1 Importance of Sales Verification

Sales data are needed for the valuation process and for sales ratio studies. The reliability of any valuation model or sales ratio study depends on the quality and quantity of its data. Sales data should be collected, edited, and adjusted to obtain valid indicators of market value. Sales data should be verified by contacting a party to the sale (buyer, seller, or other knowledgeable party) when there is a question or an answer is unclear on a sales questionnaire completed prior to the recordation. In general, the fewer the sales, the less common or more complex the property, and the more atypical the sale price, the greater the effort should be to confirm the particulars of the sale.

5.2 Methods of Sales Verification

In general, the completeness and accuracy of sales data are best confirmed by requesting the particulars of a sale

from parties to the sale. Historically, people consent to interviews if they know what is expected of them; understand the importance of the request; and, are treated with respect. When sales data are not available on transfer documents, disclosure documents, are incomplete, or require further verification, parties to the transaction may be contacted using the following methods.

- Sales verification questionnaires (other than the mandatory disclosure questionnaire completed at time of sale)
- Telephone interviews
- Personal interviews.

Comprehensive sales verification questionnaires reduce the number of follow-up verifications required but do not totally eliminate them. Sales information should never be considered absolutely trustworthy. An ideal sales verification system would provide a mechanism for the accurate and timely completion of the sales verification questionnaire. One of the above methods should be used when a question remains unanswered or there are other questions regarding a sale.

For both telephone and personal interviews, it may be necessary to provide verification of the purpose of the interview. The contact person should be ready to supply names and a phone number of a supervisor or human resource contact who can verify their employment and the purpose of the contact.

Preparing a list of basic questions for staff to ask during the interview ensures uniformity and consistency and often leads to discovery of problems regarding the transaction. Specific questions should be prepared and staff trained for sales involving the following (see Appendix B for examples of questions for specific situations):

- Adjoining property owner
- Auctions
- Internet marketing
- Leasebacks
- Personal property
- Property characteristic changes
- Related parties
- Sealed bids
- Uninformed buyers and sellers
- Word-of-mouth
- IRS 1031 Exchanges.

5.2.1 Additional Sales Verification Questionnaires (Other Than Mandatory Disclosure Questionnaires Completed at the Time of Sale)

While mailing sales verification questionnaires may be the least expensive method of obtaining or verifying in-

5.3.4 Sales Involving Financial Institution as Seller

A foreclosure is not a sale but the legal process by which a lien on a property is enforced. The majority of the sales in which the financial institution is the seller are properties that were formerly foreclosed on by the financial institution. Also, they are easily identified because the seller is the financial institution. These sales typically are on the low side of the value range because the financial institution is highly motivated to sell and may be required by banking regulations to remove the property from its books. The longer the property is carried on the books by the financial institution, the lower the asking price is likely to be. If the financial institution was ordered by banking regulators to dispose of the property regardless of the sale price, the sale should not be included as a valid transaction.

Sales in which a financial institution is the seller typically should be considered as potentially valid for model calibration and ratio studies if they comprise more than 20 percent of sales in a specific market area. Care should be taken in validating this type of sale to account for changes in property characteristics (see Section 5.10). Any properties that have been vandalized should be excluded.

5.3.5 Sales between Relatives or Corporate Affiliates

Sales between close relatives (parents, children, aunts, uncles, nephews, nieces, grandparents) or corporate affiliates are usually non-open-market transactions. If the following factors apply during the follow-up verification, the sale may be considered a valid transaction.

- The property was exposed on the open market.
- The asking and selling price was within the range that any party purchasing the property would be expected to pay.
- The sale meets all other criteria of being an open-market, arm's-length transaction.

5.3.6 Sales Settling an Estate

A conveyance by an executor or trustee under powers granted in a will may not represent fair market value, particularly if the sale takes place soon after the will has been filed and admitted to probate in order to satisfy the decedent's debts or the wishes of an heir.

5.3.7 Forced Sales Resulting from a Judicial Order

These sales should never be considered for model calibration or ratio studies. The seller in these sales is usually a sheriff, receiver, or other court officer.

5.3.8 Sales of Doubtful Title

Sales in which title is in doubt tend to be below market value. When a sale is made on other than a warranty

deed, there is a question of whether the title is merchantable. A quitclaim deed is an example.

5.4 Sales with Special Conditions

Sales with special conditions can be open-market transactions; however, they should be verified thoroughly. The following are types of sales with special conditions.

- Trades
- Partial interests
- Land contracts
- Incomplete or unbuilt common property
- Auctions

5.4.1 Trades

In a trade, the buyer gives the seller one or more items of real or personal property as all or part of the full consideration. If the sale is a pure trade with the seller receiving no money or securities, the sale should be excluded from analysis. If the sale involves both money and traded property, it may be possible to include the sale in the analysis if the value of the traded property is stipulated, can be estimated with accuracy, or is small in comparison to the total consideration. However, transactions involving trades should be excluded from the analysis whenever possible, particularly when the value of the traded property is substantial.

5.4.2 Partial Interest

A sale involving a conveyance of less than the full interest in a property should be excluded as a valid transaction. Sometimes all the partial interest owners of a property may agree to syndication and sell their portions of the estate to a buyer (typically on the same day). However, the sum of all the sale prices may not necessarily indicate the market value of the whole property. These transfers should not be used as valid sales without thorough testing, analysis, and documentation.

5.4.3 Land Contracts

Land contracts (also known as contracts for deeds) and other installment purchase agreements in which title is not transferred until the contract is fulfilled require careful analysis. Deeds in fulfillment of a land contract often reflect market conditions several years in the past, and such dated information should not be considered. Sales data from land contracts also can reflect the value of the financing arrangements. In such instances, if the transaction is recent, the sale price should be adjusted for financing, if warranted, and included as a valid transaction (see Section 7.4.4). Because the contract itself often is not recorded, discovery of these sales is difficult until the deed is finally recorded. The sale then is likely to be too old to be used.

Typically, the land and location is purchased, the building erected, and the property sold with a long-term leaseback clause. A major benefit of the leaseback is cash-flow issues.

5.10 Property Characteristic Changes

Sales data files should reflect the physical characteristics of the property when sold. For ratio studies, if significant physical changes have occurred to the property between the date of sale and the appraisal date, the sale should not be included. The sale may still be valid for mass appraisal modeling by matching the sale price to the characteristics that existed on the date of sale. For consistency in application, written guidelines should be provided as to what constitutes significant change. For example, an improvement of \$3,500 may not be significant for a property with a selling price of \$255,000 (1.4 percent), but is significant for a property selling for \$21,000 (16.7 percent).

5.11 Property Change in Use

In conducting ratio studies property in which the use has changed between the date of appraisal and the date of sale should be excluded from further analysis. However, the sale may be used for analytical purposes if it can be matched with its use and physical characteristics at the time of sale.

5.12 Sales with Low and High Ratios

It is a best practice to set parameters for further verification on sales with extreme high or low ratios (e.g., less than 50 percent or greater than 150 percent). Such atypical ratios may be the result of problems that warrant further investigation. However, during sales verification sales should never be excluded from a ratio study solely on the basis of the computed ratio. If no problems are discovered with the sale, it will likely be identified as an outlier and be subject to removal during the statistical trimming process.

5.13 Short Sales

Short sales are difficult to recognize because the parties to the sale are typical buyers and sellers. In a short sale, the lien holder agrees to accept a payoff for less than the outstanding balance of the mortgage or loan. This negotiation is achieved through communication with a bank's loss mitigation or workout department. The homeowner or debtor sells the mortgaged property for less than the outstanding balance of the loan and turns over the proceeds of the sale to the lender. In such instances, the lender would have the right to approve or disapprove a proposed sale. Extenuating circumstances influence whether or not banks will discount a loan balance. These circumstances are usually related to the current real estate market and the borrower's financial situation. A short sale is typically faster and less expensive

than a foreclosure. A short sale is nothing more than negotiating with lien holders a payoff for less than what they are owed, or rather a sale of a debt on a piece of real estate short of the full debt amount. It does not extinguish the remaining balance unless settlement is clearly indicated on the acceptance of offer. As with all foreclosure-related sales, the element of undue stimuli exists. Therefore these sales should be treated like other foreclosure-related sales and considered for model calibration and ratio studies when, in combination with other foreclosure-related sales, they represent more than 20% of all sales in the market area, but only after a thorough verification process of each sale. Again, care should be taken when validating these types of sales to account for changes in property characteristics (see Section 5.10).

6. Documenting the Results of the Verification Process

A documentation form, preferably in electronic format, should be completed for all sales that have had a follow-up verification and the form should become part of the sales file (see Appendix E for an example of a documentation form). Helpful items on the form are listed below.

- Parcel identification number
- Unique sale number
- Contact information
- Conclusions/comments
- Sales source or screening codes
- Validity codes
- Name of person completing the form
- Date the form was completed

Documentation forms should be completed at the time each sale has been verified to limit the loss of valuable information or the possibility of mixing information from different transactions. It is far better to over-document than under-document to eliminate the need for additional follow-up contacts.

6.1 Parcel Identification Number

The parcel identification number is the numeric or alphanumeric description of a parcel that identifies it uniquely.

6.2 Unique Sale Number

Unique sale numbers tie a specific sale to a parcel(s) and eliminate problems caused by parcels with multiple sales.

6.3 Contact Information

Contact information includes the name of the person interviewed, their role in the transaction (buyer, seller,

Example 1: Long-Term Lease Adjustment

Sale price	\$500,000	
Monthly contract rent	\$6,000	
Monthly market rent	\$5,000	<i>Use monthly tables</i>
Years remaining on lease	5	
Discount rate	12%	
The difference between the market and contract rent is \$1,000.		
The present worth of 1 per period for five (5) years @ 12 percent ($\$1,000 \times 44.95504$) = \$44,955		
This is the present worth of monthly savings.		
Adjusted sale price = \$500,000 (sale price) minus \$44,955 (monthly savings) or \$455,045		

When the contract rent is less than current market rent, the present worth of the difference in the two income streams should be added to the sale price.

Example 2: Long-Term Lease Adjustment

Sale price	\$100,000
Monthly contract rent	\$1,000
Monthly market rent	\$1,200
Years remaining on lease	5
Discount rate	11%
The difference between the market and contract rent is \$200 per month for five (5) years capitalized at 11 percent (monthly tables)	
$\$200 \times 45.99303$ (present worth 1/p factor @ 11% or \$9,198.60)	
This is the portion of the present worth of the property that the buyer cannot realize and that consequently should be added to the sale price to determine the full cash value of the property as indicated by the sale.	
The indicated full cash value is $\$100,000 + \$9,199$ or \$109,199.	

7.2 Buyer's Closing Costs (Paid by Seller)

Closing costs are settlement fees and expenses incurred in transferring property ownership that are paid at the real estate closing. Expenses charged commonly include the following (these vary among the various jurisdictions and individual transactions).

- Attorney's fee
- Costs of recording the deed and mortgage
- Survey
- Title insurance
- State transfer taxes (if any).

These costs do not affect the sale price of the property and no adjustment should be made when they are paid by the buyer. However, when paid by the seller, the costs should be deducted from the sale price.

7.3 Delinquent Taxes (Paid by Buyer)

Prepaid property taxes or current tax liabilities are usually prorated to the buyer and the seller and have no bearing on the sale price. However, if the buyer agrees to pay delinquent taxes, this amount should be added to the sale price.

7.4 Financing

The market value of property is its most probable selling price in terms of cash or the equivalent. Sale prices that reflect prevailing market practices and interest rates require no adjustment for financing. Under such conditions, neither the buyer nor the seller gains any advantage as a result of the manner of financing; hence, there is no reason for the sale price to differ significantly from its cash value. Because of different financing arrangements, the sale price of one property may be different from the sale price of another that is virtually identical. If a sale is adjusted for atypical financing, this adjustment should be made before any other adjustments are made. After the sale price has been adjusted for financing, it becomes the appropriate sale price to use as the basis for further adjustments. Adjustments for financing require data on actual and market interest rates, the amount of the loan, and the term and amortization provisions of the loan. Obtaining and properly analyzing such data, as well as estimating the extent to which the market actually capitalizes nonmarket financing, are difficult and time-consuming and require specialized skills.

Typically, new loans from financial institutions are at the prevailing market rates and for seller-financing, rates can be higher (for a lower sale price) or lower (for a higher sale price). Sales prices should be adjusted when the rates are above or below market rates.

Adjustments for financing should be considered if the sale contains any of the following atypical financing:

- Assumed mortgages (nonmarket rates)
- Gift programs
- Points (paid by the seller)
- Seller-financing (nonmarket rates).

The preferred method of making adjustments for financing is the use of compound interest tables. (IAAO 1996, 416–453)

7.4.1 Assumed Mortgages (Nonmarket Rates)

In an assumption of a mortgage, the buyer accepts liability for repayment of an existing debt of the seller. The adjustment process is similar to that of seller-financing except for the assumption fee (lender's processing fee), which is added to the sale price. In order to make an adjustment for loan assumptions that are at nonmarket rates, the following information is needed.

- Loan assumption fee
- Market interest rate
- Actual interest rate
- Amount of the loan
- Term and amortization provisions
- Down payment (if any)

more thorough description of intangible personal property). Ordinarily, it is not necessary to consider goodwill, going-concern value, business enterprises value, or the like, unless the value of these intangible assets has been itemized in a sales contract or a formal appraisal has been prepared for either party.

It is necessary to decide whether each item included in the sale should be classified as real or personal property (see *Standard on Valuation of Personal Property* [IAAO 2005], which provides guidance on classification of property as real or personal).

Sale prices should be adjusted by subtracting the contributory value of personal property received by the buyer. Ordinary window treatments, outdated models of freestanding appliances, and common-grade used furniture included with residential property do not usually influence the sale price of real property and do not require an adjustment unless the items were specifically broken out in the contract as personal property included in the sale price. If the value of personal property appears to be substantial (10 percent for residential – 25 percent for commercial/industrial), the sale should be excluded as a potential valid transaction unless the sample sizes are small.

7.6 Real Estate Commissions

The real estate commission is the fee the seller pays to a real estate broker to obtain a buyer for the property. A knowledgeable seller can avoid the fee by advertising and showing the property, negotiating with potential buyers, and performing the necessary paperwork. The commission then represents the cost of such services, and the sale price cannot be expected to be any more or any less if these services are performed by a real estate broker or by the seller. Therefore, a real estate commission should not be subtracted from the sale price. The sole exception to this rule occurs when the buyer agrees to pay the seller's commission, in which case the amount of the commission is added to the sale price.

7.7 Repair Allowances

Sometimes the seller provides a repair allowance to the buyer to cure defects in the property. In sales ratio studies it is important to match the property assessed with the property sold. Repair allowances should be deducted from the sale price only if the property was in an unrepaired state on the appraisal date but sold at a higher price reflecting the value of the repairs. If the sale occurred before the appraisal date and the repairs were made prior to the appraisal date, no adjustment should be made. For example, if a property sold for \$200,000 with the seller agreeing to credit the buyer \$10,000 for needed repairs at closing and both the sale and repairs were completed before the appraisal date, no adjustment to the sale is required. However, if the repairs are

not made as of the appraisal date, then the sale price should be adjusted to \$190,000 to reflect the value of the unrepaired property on the appraisal date.

7.8 Special Assessments

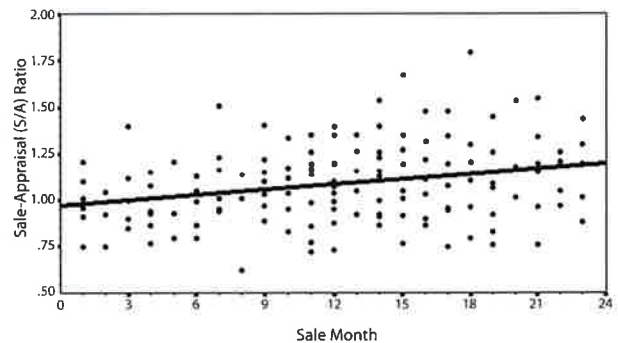
A special assessment is a special tax imposed on property, individual lots, or all property in the immediate area. These taxes are collected for road construction, sidewalks, sewers, and street lights, among other government services. Special assessments are used to finance capital improvements or provide services adjacent to the properties they directly benefit. Typically, the property owner is obligated to make annual payments of principal and interest to a local unit of government over a specified number of years. The sale price of a property encumbered by a special assessment can require adjustment if the current balance of the defrayed amount is significant. The sale price can be adjusted upward to account for this lien. If the effect on market value is significant and can be ascertained, an adjustment should be made.

7.9 Time

There should be a program to track changes in price levels over time and adjust sale prices for time as required. Time adjustments should be based on market analysis and be appropriately supported. Valid time adjustment techniques are as follows:

- Tracking sales-to-appraisal ratios over time
- Including date of sale as a variable in regression or feedback models
- Analyzing resales
- Comparing per-unit values over time in homogeneous strata, such as a subdivision or condominium complex
- Isolating the effect of time through paired sales analysis.

Example: Time Adjustment Plot of Sale/Appraisal Ratios



These techniques are discussed in *Mass Appraisal of Real Property* (Gloude-mans 1999), *Property Appraisal and Assessment Administration* (Eckert, Gloude-mans, and Almy 1990, Appendix 5-3), and *Improving Real Property Assess-*

Definitions

Abstract of Title. An abstract is a complete summary of all recorded documents affecting the title to a property. These documents include all conveyances, such as deeds or wills, and all legal proceedings relating to ownership of the property. Abstracts are arranged to show the history of ownership, describe the land and improvements, and give the name(s) of past and present owners(s).

Absolute Ownership. Ownership of all real property rights and interests in real estate parcel. Also see fee simple.

Accuracy. Accuracy is the closeness of an estimated value (for example, measured or computed) to a standard or accepted value of a particular quantity. Compare to integrity, precision, validity.

Address. (1) A location, expressed in terms of a conventional spatial reference scheme, at which a property or person may be found. (2) In a computer file, a specific juncture of circuits in computer machinery at which information is stored in the form of magnetic polarities. (3) The name a programmer uses to refer to such a juncture.

Note: For a file of human-readable information, one must establish rules about whether and how to record various relevant addresses, including the situs address, owner's address, and mortgagee's address.

Adjusted Sale Price. See Price, Adjusted Sale.

Adjustments. Adjustments are modifications in the reported value of a variable, such as sale price. For example, adjustments can be used to estimate market value in the sales comparison approach by modifications for differences between comparable and subject properties.

Note: Adjustments are applied to the characteristics by the comparable properties in a particular sequence that depends on the method of adjustments selected.

Adverse Possession. The exclusive occupation and continuous possession of (another's) real property under an evident claim of title or right.

Affidavit. A written form of an affirmed or sworn statement.

Agreement. It is a general term describing a common view of two or more people regarding the obligations and rights of each with regard to a specific subject.

Air Rights. The right to use space above real estate.

Alienation. The transfer of title from one person to another.

Alienation Clause. This is a type of acceleration clause that calls for a debt under a deed or mortgage to be due in its entirety upon transfer of ownership from the secured party.

Annuity. An annuity is (1) the right to receive money or its equivalent in (usually) fixed equal amounts or at regular intervals for a definite or indefinite term; (2) a

level, increasing, or decreasing stream of scheduled and predictable income or payment amounts.

Arm's-Length Sale. See sale, Arm's-Length

Assemblage. Assemblage is the assembling of adjacent parcels of land into a single unit. Compare plottage.

Assembly Value. The excess of the value of a large parcel of land formed from a number of smaller parcels over the sum of the values of the unassembled parcels.

Assumption Fee. A lender's fee for processing records when a new buyer assumes an existing loan.

Assumption of Mortgage. An assumption of a mortgage is an agreement in which the buyer accepts liability for repayment of an existing debt. Unless the seller is released, he or she remains liable for the payment of such debt.

Affidavit of Equitable Interest. Affidavits are contracts for the purchase of real property under the terms of which legal title to the property is retained by the seller until such time as all the conditions stated in the contract have been fulfilled. These are commonly used for the installment purchase of real property; however, the deed is not recorded until the terms of the contracts have been fulfilled.

Amortize. The process of repaying a loan or recovering a capital investment by means of a series of scheduled payments, typically includes interest charges and principal repayment in each of the scheduled payments.

Assessment Ratio. (1) The fractional relationship an assessed value bears to the market value of the property in question. (2) By extension, the fractional relationship the total of the assessment roll bears to the total market value of all taxable property in a jurisdiction.

Attachment. Property seizures by a court order.

Attestation Clause. The witness clause in a document that affirms the document is properly executed.

Attribute. Characteristic of a property.

Absolute Auction. This is an auction in which the property is sold to the highest bidder regardless of the amount. No minimum bid clause.

Auction. Auctions are a method of marketing and selling real property. Property that sells by absolute auction should never be included in model calibration and ratio studies.

Bailment. A transaction in which personal property is delivered by its owner (the bailor) to a second party (the bailee) into whose possession it is put for safekeeping or for some other temporary purpose or use with no intention that title shall pass to the second party.

Balloon Mortgage. A mortgage not fully amortized at maturity and requiring a lump sum (or balloon) payment.

Common Area. The total area within a property that is not designed for rental or sale, which is available for common use by all tenants and owners. See also undivided interests.

Comparable sales; Comparables. (1) recently sold properties that are similar in important respects to a property being appraised. The sale price and the physical, functional, and locational characteristics of each of the properties re compared to those of the property being appraised in order to arrive at an estimate of value. (2) By extension, the term “comparables” is sometimes used to refer to properties with rent or income patterns comparable to those of a property being appraised.

Computer-Assisted Mass Appraisal System (CAMA). A system of appraising property, usually only certain types of real property, that incorporates computer-supported statistical analyses such as multiple regression analysis and adaptive estimation procedures to assist the appraiser in estimating value.

Condominium/Condominium Unit. A condominium is a separately owned unit of real property in the same structure with other such units; the unit owners hold an undivided interest in common elements of the property, such as a lobby, swimming pool, and grounds. Also see cooperative.

Consideration. The amount of money and other valuable goods or services on which a buyer and a seller agree, to consummate a sale.

Contract, Land. Also see Land Contract.

Contract for Deed. A contract for sale in which the seller retains title until the buyer completes the contracted payments for the property. The sale is not recorded until title passes to the buyer. See also Land contract.

Contract Rent. The actual amount of rent, per unit of time, which is specified in the contract (lease). For very old contracts, the contract rent may be substantially less than the rent the property would bring today. Compare market rent.

Conveyances. Legal documents that transfer ownership of property. Deeds and wills are examples of conveyances. Compare real estate transfer documents.

Cooperative. A business entity, usually a corporation, that holds title to realty and that grants rights of occupancy to its shareholders by means of proprietary leases or similar devises. A cooperatively owned apartment building is legally different from a building consisting of condominium units. See also condominium and blanket mortgage.

Copyrights. The exclusive right granted by a government for a limited period to an author, composer, designer, or such, or his or heirs, legatees, or assigns, to reproduce, publish, and sell copies of an original literary or artistic work.

Corporation. A legal entity (business organization form) operating under a grant of authority from a state in the form of a charter and articles of incorporation.

Covenant. A covenant is a promise written into a legal agreement (such as a deed) that binds the parties to abide by or refrain from certain acts. A deed restriction is a special kind of covenant.

Date of Sale (date of transfer). The date on which the sale is agreed is the date of sale. This is considered to be the date the deed, or other instrument is signed. The date of recording can be used as a proxy if it is not unduly delayed as in a land contract.

Declaration of Restrictions. A set of recorded restrictions that apply to a specific area or subdivision.

Declaration of Trust. A written acknowledgment by the legal title holder to property specifying the property is held in trust for the benefit of another party.

Deed. A document (or written legal instrument) which, when executed and delivered, conveys an interest in or legal title to a property.

Deed, Bargain and Sale. A bargain and sale deed implicitly or explicitly asserts the grantor’s ownership of the property conveyed, but it makes no guarantees to defend the title. It provides the grantee more protection than a quitclaim deed but less than a special warranty deed. The words of conveyance “bargain and sale” distinguish a bargain and sale deed.

Deed, Quitclaim. A deed in which the grantor conveys or relinquishes all interests that he or she may have in a property, without warrant as to the extent or validity of such interest.

Deed, Special Warranty. A deed in which the grantor only covenants to warrant and defend the title against claims and demands of the grantor and all persons claiming by, through and under him.

Deed, Tax. A deed by which title to real property, sold to discharge delinquent taxes, is transferred by a tax collector or other authorized officer of the law to the purchaser at a tax sale.

Deed, Trust. (1) Broadly, a deed by which title to property is transferred to a trustee to be held in trust. (2) Specifically, a deed by which title to property is transferred, conditionally or unconditionally, to a trustee to be held for the benefit of creditors or obligors of the grantor. (3) Loosely, the agreement made between an issuer of bonds and the holders of such bonds that is deposited with the trustee, whether or not such agreement involves the transfer of property to the trustee. A trust deed is also known as “deed of trust.”

Deed, Warranty. A deed containing a covenant of warranty whereby the grantor of an estate of freehold guarantees that the title that he or she undertakes to transfer is free from defects and that the property is unencumbered except as stated, and whereby the grantor, for him-

Federal Home Loan Mortgage Corp (FHLMC) (Freddie Mac). An organization that facilitates secondary residential mortgages for savings and loan associations, to increase availability of residential mortgage financing.

Federal National Mortgage Assn. (FNMA) (Fannie Mae). A quasi-governmental agency that purchases mortgages from originators; intended to increase liquidity in the home mortgage market.

Fee Simple. Fee simple in ownership is complete interest in a property, subject only to governmental powers such as eminent domain. Fee simple is also known as fee simple absolute. Also see estate in fee simple and absolute ownership.

Fee Simple Condition Subsequent. This gives an owner fee simple title to property so long as a specified event (usually a change in use) does not occur. The person granting fee simple condition subsequent title must file suit to recover ownership if the condition is not met.

Fee Simple Determinable. Fee Simple Determinable is identical to fee simple condition subsequent except that the grantor (the original owner) does not need to file suit to regain title.

Fee Simple Title. Fee simple title indicates ownership that is absolute and subject to no limitation other than eminent domain, police power, escheat; and taxation.

Fiduciary. A fiduciary is any person who occupies a position of special trust in certain of his or her relationships to another person or persons, for example, an administrator, executor, guardian, receiver or trustee.

Foreclosure. Foreclosure is the legal process by which a lien on a property is enforced.

Foreclosure-Related Sale. These sales were formerly foreclosed on by the financial institution. The seller will be the financial institution. These sales typically are on the low side of the value range because the financial institution is highly motivated to sell and may be required by banking regulations to remove the property from its books.

Franchise. A privilege or right that is conferred by grant of government or an individual or a group of individuals; usually an exclusive right to furnish public services or to sell a particular product in a certain geographical area.

Freddie Mac. Defined under Federal Home Loan Mortgage Corporation.

Free and Clear. Free and clear is property unencumbered by any liens or mortgages.

Freehold. Defined under estate of freehold.

Future Worth of 1. (The future worth of 1 is also called the compound amount of 1 or the amount of 1 at compound interest.) It is the amount to which one dollar will grow at compound interest over a specified number of years and at a specified interest rate.

Future Worth of 1 per Period. (The future worth of 1 per period is also called the compound amount or accumulation of 1 per period.) It is the amount to which a series of equal periodic payments will accumulate at compound interest for a specified number of years and at a specified interest rate.

General Warranty Deed. The general Warranty deed is the most common type of deed. This deed implicitly promises that (1) the grantor owns the property and may convey title; (2) there are no hidden liens against the property; (3) no one else has better title to the property; (4) the grantor will obtain and deliver any documents needed to make good the transfer; and (5) the grantor will be liable for damages if future competing claims to the property prove valid.

Going Concern Value. Going concern value is the enhanced or synergistic value of assets due to their existence within, or assemblage into, an operating and economically viable business that is expected to continue its operation in the future with no intention or necessity of liquidation or the material alteration of the scale of operation.

Goodwill. Goodwill is the economic advantage over competitors that a business has acquired by virtue of habitual patronage of customers.

Government National Mortgage Assn (GNMA) (Ginnie Mae). A government-owned and government-financed agency that subsidizes mortgages through its secondary mortgage market and issues federally insured mortgage-backed securities. This agency falls within the Department of Housing and Urban Development.

Grantee Index. Lists alphabetically the name of every grantee whose name appears on a deed recorded for the year the index covers.

Grantee. A grantee is one who acquires property by voluntary conveyance.

Grantor. A grantor is one who voluntarily conveys property, whether by sale, gift, lease, or otherwise.

Grantor Index. Lists alphabetically the name of every grantor whose name appears on a deed recorded for the year the index covers.

Industrial Property. Industrial property is generally any property used in a manufacturing activity, including a factory, wholesale bakery, dairy plant, food processing plant, mill, mine, quarry, all locally assessed utility property, and the like.

Installment Contract. An installment contract is a purchase contract in which payment is made in prescribed installments that are usually forfeited if default occurs.

Instrument. An instrument is a formal legal document such as a deed, contract, will, or lease.

Intangible Personal Property. Intangible personal property is property that has no physical existence beyond neither merely representational, nor any extrinsic value:

Market Analysis. Market analysis is a study of real estate market conditions for a specific type of property.

Market Area. A geographic area, typically encompassing a group of neighborhoods, defined on the basis that the properties within its boundaries are more or less equally subject to a set of one or more economic forces that largely determine the value of the properties in question.

Market Analysis. A study of real estate market conditions for a specific type of property.

Market Modeling. See model.

Market-Related Adjustment. These adjustments account for changes in market conditions between the time a comparable sold and the effective date of the appraisal. See market adjustment factors.

Market Adjustment Factors. Market adjustment factors, reflecting supply and demand preferences, are often required to adjust values obtained from the cost approach to the market. These adjustments should be applied by type of property and area and are based on sales ratio studies and other market analyses. Accurate cost schedules, condition ratings, and depreciation schedules will minimize the need for market adjustment factors.

Market Approach. A valuation term with several meanings. In its broadest use, it might denote any valuation procedure intended to produce an estimate of market value, or any valuation procedure that incorporates market-derived data, such as the stock and debt technique, gross rent multiplier method, and allocation by ratio. In its narrowest use, it might denote the sales comparison approach.

Market Rent. The rent current prevailing in the market for properties comparable to the subject property. Market rent is capitalized into an estimate of value in the income approach.

Market Value. Market value is the major focus of most real property appraisal assignments. Both economic and legal definitions of market value have been developed and refined. A current economic definition agreed upon by agencies that regulate federal financial institutions in the United States is:

The most probable price (in terms of money) which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeable, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

The buyer and seller are typically motivated;

Both parties are well informed or well advised, and acting in what they consider their best interest;

A reasonable time is allowed for exposure in the open market;

Payment is made in terms of cash in United States dollars or in terms of financial arrangements comparable thereto;

The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

Model. (1) a representation of how something works. (2) For purposes of appraisal, a representation (in words or an equation) that explains the relationship between value or estimated sale price and variables representing factors of supply and demand.

Mortgage. A mortgage is a contract under the terms of which the legal, but not the equitable, title to a specific property of one person (the mortgagor) is conditionally conveyed to a second person (the mortgagee) as security for the payment of a debt or performance of some other act.

Note: In some states, legal title to mortgaged property passes to the mortgagee on execution of the mortgage; in others, legal title passes when the debt secured by the mortgage is in default; in still others, the mortgage is simply a lien, and the legal title does not pass until foreclosure proceedings have been completed.

Multiple Listing Service (MLS). This is a local or regional service that compiles available real estate for sale by member brokers. Detailed information about properties is provided to brokers, agents and the public, generally online. Local MLS organizations have their own rules and systems for providing listing information.

Neighborhood. A neighborhood is (1) the environment of a subject property that has a direct and immediate effect on value; (2) a geographic area (in which there are typically fewer than several thousand properties) defined for some useful purposes, such as to ensure for later multiple regression modeling that the properties are homogeneous and share important locational characteristics.

Objective. Objective is the quality of being definable by specific criteria without the need for judgment. Quantitative variables are objective.

Open Market. A freely competitive market in which any buyer or seller may trade and in which prices are determined by competition.

Origination Fee. Origination fee is a fee charged by a lender (called the loan "originator" for making a real estate loan.

Outliers. Observations that have unusual values, that is, they differ markedly from a measure of central tendency. Some outliers occur naturally; others are due to data errors.

Owner, Equitable. An equitable owner is one who, under rules of equity, has rights to some or all of the benefits deriving from property, although legal ownership and actual possession may be vested in another person.

\$1 receivable at the end of a specified number of years and discounted at a specified rate.

Present Worth of 1 per Period. (Also called the annuity factor or Inwood Coefficient.) The present worth of 1 per period is the present worth of a series of payments of \$1, receivable at the end of each year, for a specified number of years and at a specified interest rate.

Price, Adjusted Sale. The sale price that results from adjustments made to the stated sale price to account for the effects of time, personal property, atypical financing, and the like.

Price, Market. The value of a unit of goods or service, expressed in terms of money, as established in a free and open market.

Note: This term is sometimes distinguished from “market value” on the ground that the latter term assumes that buyers and sellers are informed, but this presumption is also implied by the phrase “free and open market.” Compare to price, sale.

Price, Sale. The sale price is (1) the actual amount of money exchanged for a unit of goods or services, whether or not established in a free and open market (an indicator of market value); (2) loosely used synonymously with “offering” or “asking price”.

Note: The sale price is the “selling price” to the vendor and the “cost price” to the vendee.

Private Encumbrance’s. Private hindrances that affect value and sale price such as easements, condominium controls, and deed or subdivision restrictions.

Private Restrictions. Private parties, such as a group of homeowners, may establish private restrictions on ownership rights. Deed restrictions are a common form of private restriction.

Property. (1) Property is an aggregate of things or rights to things. Property rights are protected by law. There are two basic types of property: real and personal. (2) The legal interest of an owner in a parcel or thing. See bundle of rights.

Property Split. A property split is the result of the sale of property held by a single owner such that different pieces of the property are owned by different owners. Splits may or may not occur along plat lines. Assessors need to monitor splits not only to ensure the correctness of the property listing, but also to monitor the land and its adequacy as a lien against past and present tax liabilities.

Quitclaim Deed. See deed.

Ratio, Assessment. See assessment ratio.

Ratio Study. A study of the relationship between appraised or assessed values and market values. Indicators of market values may be either sales (sales ratio study) or independent “expert” appraisals (appraisal ratio study). Of common interest in ratio studies are the level and uniformity of appraisals or assessments.

Real Estate. The physical parcel of land and all improvements permanently attached. Compare to real property.

Real Estate Transfer Documents. The various kinds of deeds whereby real property is conveyed. Compare to conveyances.

Real Estate Transfer Affidavits. In written or electronic format, these documents are an affirmed or sworn statement regarding particulars to a sale of real property, such as personal property, financing, etc. Typically, these forms are required in states and provinces where sales disclosure statutes have been enacted and are filed prior to recording the deed. Comprehensive affidavits may limit the number of follow-up verifications required during the sales verification process. These questionnaires are also known as sales verification questionnaire.

Real Property. Real property consists of the interests, benefits, and rights inherent in the ownership of land plus anything permanently attached to the land or legally defined as immovable; the bundle of rights with which ownership of real estate is endowed. To the extent that “real estate” commonly includes land and any improvements; the two terms can be understood to have the same meaning. Real property is also called “realty.”

Realty. (1) Any tangible thing whose fee ownership constitutes real property, that is, land or improvements. (2) A synonym for real property.

Receiver. One who is appointed by a court of equity as its representative to manage property owned by an insolvent debtor until the claims of creditors have been met or to manage property that is the subject of a law suit pending its outcome.

Recordation/Recording. Recordation/recording is the filing of documents affecting real property for public record, which usually requires the witnessing and notarizing of the document.

Redemption. The process by which the owner of real property sold at a tax sale buys back the property from the purchaser at an enhanced price within a specified redemption period.

Reject Code. A flag applied to a record (such as a sale) indicating that it should not be used for certain purposes.

Representative Sample. A sample of observations from a larger population of observations, such that statistics calculated from the sample can be expected to represent the characteristics of the population being studied.

Residential (Nonfarm) Single-Family. Single-family residential include each detached, semidetached, or attached house. If separately assessed and not on a farm, that is a residence for one family only. For detached houses, this would include one-family rural properties or suburban estates not used primarily for farming and mobile homes assessed as real property. This category includes each condominium unit in a multiunit dwell-

Split. See property split.

Stratify. To divide, for purposes of analysis, a sample of observations into two or more subsets according to some criterion or set of criteria.

Tangible Personal Property. Tangible personal property is personal property that has a substantial physical presence beyond merely representational. It differs from real property in its capacity to be relocated. Common examples of tangible personal property are automobiles, boats, and jewelry.

Tax Sale. A sale of a taxpayer's property by a public authority so that delinquent taxes may be collected from the proceeds; usually preceded by a period during which the taxpayer can pay delinquent taxes, and followed by a period during which the taxpayer can redeem the property from the purchaser. Also see certificate of redemption; redemption.

Tenancy. The act of using or occupying property, especially real property whose fee title is vested in someone other than the occupant.

Tenancy, Joint. A state of tenancy involving two or more persons owing undivided possessory interests which have arisen out of a single conveyance, no one of the tenants being free to create interests in the estate without the consent of the others, and the surviving tenants acquiring the interests of any tenant who may die. Compare to tenancy in common.

Tenancy in Common. A state of tenancy involving two or more persons owning undivided possessory interests that have arisen out of separate and distinct conveyances, any one of the tenants being free to create interest in his or her portion of the estate and the heirs or devisees acquiring the interest of any tenant who may die. Compare to tenancy.

Tenancy in Severalty. A tenancy in severalty is a state of tenancy involving one person who owns a divided possessory interest.

Tenant. One who holds or possesses a property.

Tenement. Tenement is (1) Real property and the rights to ownership, especially those of a permanent nature that relates to and pass with the land. (2) A building intended for rental residence.

Time-Adjusted Sale Price. The price at which a property sold, adjusted for the effects of price changes reflected in the market between the date of sale and the date of analysis.

Title. The union of all elements constitution proof of property ownership and the instrument that is evidence of ownership.

Title Search. An examination of public records to ensure the quality of the seller's title to a property. Preparation of an abstract of title requires a complete title search, and also for preparation to foreclose on a property in a delinquent tax suit.

Trust. An agreement whereby the owner of property (the settlor) transfers legal title to a second party (the trustee), such property to be held, managed, or disposed of for the benefit of a third party (the beneficiary) or the settlor, or both, as set forth in the trust agreement.

Trustee. A trustee is one who holds legal title on property under a trust agreement. Compare settlor; beneficiary

Undivided Interest. An interest in a property that is not distinct from the interest or interests of one or more other persons as to the time during which the interest is possessory or as to the portion of the property to which the interest attaches, for example, the interest of a joint tenant or a tenant in common.

Unit. The property being appraised and everything used or useful to the ongoing economic operation of the business (property). Tangible and intangible personal property is included.

Validity. The quality of a data element or procedure being what it should be in terms of some ultimate purpose or use. Also see integrity. Compare to accuracy, precision.

Value. (1) Value is the relationship between an object desired and a potential owner; the characteristics of scarcity, utility, desirability, and transferability must be present for value to exist. (2) Value may also be described as the present worth of future benefits arising from the ownership of real or personal property. (3) Value is the estimate sought in a valuation. (4) Any number between positive infinity and negative infinity. Also see market value.

Verify. To check the accuracy of something. For example, sales data may be verified by interviewing the seller or purchaser of the property, and data entries may be verified by check digits.

Word-of-Mouth. A method of marketing property without a realtor and/or broker involved. Typically, used for selling real property by "for sale by owner" and is more prevalent in rural areas.

Zoning. Zoning is the exercise of the police power to restrict land owners as to the use of their land and/or the type size, and location of structures to be erected thereon.

Appendix B. Questions for Specific Situations

Basic questions—for all follow-up verifications made

- How was the property marketed (realtor [name of realtor], word-of-mouth, newspaper ad, for sale by owner, Internet, etc.)?
- How long was the property exposed to the open market?
- What was the asking price?
- What was the selling price (or verify the amount on the sales verification questionnaire)?
- What was the condition of the property at the time of sale?
- Was there a change in use of the property?
- Was a “fee appraisal” made on the property (if so, in what amount)?
- Was any personal property included in the sale price (if so, was the amount specified in the purchase or contract agreement)?
- What is your estimate of the amount of personal property included in the sale price (if the personal property is not specified in the contract)?
- Are you aware of any changes to property characteristics that have recently occurred (if so, when)?
- Was there any undue compulsion to buy or sell?
- Were there any circumstances that might cause the sale to be considered a non-arm’s-length transaction?

The following questions should be asked in addition to the basic questions listed above for the various situations.

Adjoining property owners

- Was the seller aware of the buyer’s interest in the property or need for business expansion (commercial/industrial use)?

Auction sales

(Auctioneer and seller are the best source of information)

- Was the auction well-advertised?
- Was the auction well-attended?
- Did the seller have the right-of-refusal (a low bid clause or bid with reserve)?
- How many parties were bidding on the property?

1031 Exchange

- Was the reinvestment time nearing an end (possible duress)?

Internet marketing

(See questions relating to uninformed buyers and sellers)

- Were both parties an informed, buyer and seller?

Leaseback (commercial/industrial properties)

- Was a leaseback involved in the sale transaction?
- If so, did the leaseback influence the sale price?

Personal property

All the questions are answered in the set of basic questions.

Property characteristic changes

- What types of changes were made (repair, remodeling, addition or demolition)?
- How much cost was involved (labor and materials)?
- Was the work performed by a professional?

Related party sales

- What is the specific nature of the relationship?
- Was the sale price influenced by the relationship?

Uninformed buyers

- Did you look at other property in the area?
- How long did you search for property in the area?
- Did you talk to local realtors?

Uninformed sellers

- How did you arrive at the sale price?
- Were there any local offers?

Appendix D. Multiple Parcel Form

MULTIPLE PARCEL FORM

JURISDICTION: _____

SALE NO.: _____

SALE DATE: _____

CLASS: _____

TYPE: _____

SALE PRICE: _____

SOURCE: _____

VALIDITY: _____

Type = Improved or Unimproved SC = Source Code VC = Validity Code

Parcel ID Number	Class	Type	SC	VC	Appraised Value
Total Appraised Value					

COMMENTS: _____

RESEARCH ANALYST: _____ APPRAISER: _____

Appendix F. Intangible Personal Property in Operating Properties

An operating business is often referred to as going concern. These properties may include a component of intangible personal property in the form of business enterprise value or goodwill.

Going-concern value is derived from a proven business operation. It implies that the total enterprise value that may be greater than the sum of its real and tangible personal property parts but does not imply that the business must be profitable. Typically, going-concern value will fall into one of two groups.

Goodwill is the intangible value of a business enterprise that can be measured by some excess profit by virtue of some advantageous position in the marketplace with little or no competition. Income beyond that required, providing an economic return on the assets of the business, is a component of goodwill.

Business enterprise value in general, is can be a product of any endeavor where the primary motive is profit and not mere employment for oneself and others. It may also include the capitalized value of above market rents for malls and super-regional shopping centers (Appraisal Institute, 2001).

Intangible personal property can fall into three general groups (Desmond, 1988).

Nonseverable enterprise assets

- Assemblage of land, building, tangible personal property into a productive operation
- Image and reputation of the business (service, value, quality, dependability)
- Established customer base, customer acceptance, and public patronage
- Trained staff of employees
- Operating procedures, control methods, and socio-technical systems
- Corporate or business values
- Credit rating and investor confidence

Nonseverable personnel assets

- Reputation of owner/manager and staff with customers, suppliers, and the public
- Skill of support staff (technical know-how, sales ability, specialized talent)
- General leadership, administration, customer relations, and skills of management

Assets severable from the enterprise

- Trademarks, trade names, brand names, trade secrets (formulas, recipes, methods, etc.)
- Copyrights, patents, and technical libraries
- Licenses, franchises, and rights (film, recording, publishing, air, water, etc.)
- Covenants not to compete and operating agreements
- Contracts (purchase, advertising, employment, sales)
- Favorable leases below market rent
- Mailing lists, subscription lists, prescription accounts, customer lists