International Guidance Paper on Mass Appraisal of Real Property
(suggested to be adopted as Guidance note within the International Valuation Standards)

1. Scope
This paper 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 computer-assisted mass appraisals (or automated valuation models) used for other purposes, such as mortgage portfolio management. The paper primarily addresses the needs of assessors, assessment oversight agencies, and taxpayers.

This paper addresses mass appraisal procedures by which property can be appraised at market value, including mass appraisal application of the three traditional approaches to value (cost, sales comparison, and income). Appraisals made on a basis other than market value or on an individual basis are outside the scope of this paper.

Mass appraisal requires complete and accurate data, effective valuation models, and proper management of resources. 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 property types.

2. Introduction
Mass appraisal is the process of valuing a group of properties as of a given date using common data, standardized methods, and statistical testing (IAAO [1990, chapter 5] and Gloudemans [1999, chapter 5]). To determine a parcel’s value, assessing officers must rely upon valuation equations, tables, and schedules developed through mathematical analysis of market data. Unless required by law, 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 is correct, complete, and up-to-date.

Properly administered, the development, construction, and use of a computer-assisted mass appraisal 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

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 prices, rents, costs, and operating expenses).

3.2 Geographic Data
Assessors should maintain accurate, up-to-date cadastral maps covering the entire jurisdiction that include a unique parcel number for each parcel. These maps are especially useful in mass appraisal when they constitute part of a geographic information system (GIS). The GIS permits graphic displays of sale prices, assessed values, inspection dates, land uses, and much more. In addition, the GIS permits
high-level analysis of nearby sales, neighborhoods, and market trends.. For additional information on cadastral maps, parcel identification systems, and GIS, see the Standard on Manual Cadastral Maps and Parcel Identifiers (IAAO 2004), Standard on Digital Cadastral Maps and Parcel Identifiers (IAAO 2003), and Procedures and Standards for a Multipurpose Cadastre (National Research Council 1983), and GIS Guidelines for Assessors (URISA/IAAO 1999).

3.3 Property Characteristics Data
The assessor should collect and maintain sufficient property characteristics data 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 computer-assisted mass appraisal 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 IAAO [1990, chapter 5] and Gloudemans [1999, chapter 2]) In addition, much can be learned from studying the data used in successful computer-assisted mass appraisals in other jurisdictions. Data collection and maintenance are usually the most costly aspects of a computer-assisted mass appraisal. Collecting data that are of little importance in the assessment process should be avoided unless another governmental or private need is clearly demonstrated. The quantity and quality of existing data should be reviewed. If the data are sparse and unreliable, a major recanvass will be necessary. Data that have been confirmed to be reliable should be used whenever possible. New valuation programs or enhancements requiring major recanvass activity or conversions to new coding formats should be viewed with suspicion when the existing database already contains most major property characteristics and is of generally good quality. See Gloudemans (1999, chapter 2) and IAAO (1990, chapter 5) for characteristics of land, location, and improvements usually required for mass appraisal.

3.3.2 Data Collection
A data collection program requires clear and standard coding and careful monitoring through a quality control program. The development and use of a data collection manual is essential in achieving accurate and consistent data collection. The data collection program should result in complete and accurate data.

3.3.2.1 Initial Data Collection
A physical inspection is necessary to obtain initial property characteristics data. This inspection can be performed either by appraisers or by specially trained data collectors. In a joint approach, experienced appraisers would make key subjective decisions, such as the assignment of construction quality class or grade, and data collectors would gather all other details. Depending on the data required, an interior inspection might be necessary. At minimum, a comprehensive exterior inspection should be conducted.

3.3.2.2 Data Collection Format
Data should be collected in a prescribed format designed to facilitate both the collecting of data in the field and entry of the data into the computer system.

The coding of data should be as objective as possible, with measurements, counts, and check-off items used in preference to items requiring subjective evaluations (such as “number of plumbing fixtures” versus “adequacy of plumbing: poor, average, good”). With respect to check-off items, the available codes should be exhaustive and mutually exclusive, so that exactly one code logically pertains to each observable variation of a building feature (such as type of room). The data collection format should promote consistency among data collectors, be clear and easy to use, and be adaptable to virtually all types of construction. Specialized data collection formats may be necessary to collect information on agricultural property, timberland, industrial parcels, and other property types.

3.3.2.3 Data Collection Manuals
A clear, thorough, and precise data collection manual is essential and should be developed, updated, and maintained. Data collection staff should be trained in the use of the manual and related updates to maintain consistency. The manual should present guidelines for personal conduct during field inspections, and, if interior data are required, it should outline procedures to follow when the property owner has denied access or when entry might be risky.

3.3.2.4 Data Accuracy Standards
The following standards of accuracy for data collection are recommended.

- Continuous or area measurement data, such as living area and exterior wall height, should be accurate within 5%. If areas, dimensions, or volumes must be estimated, the property record should note where quantities are estimated.
- For each objective, categorical, or binary data field to be collected or verified, at least 95 percent of the coded entries should be accurate. Objective, categorical, or binary data characteristics include such attributes as exterior wall material, number of full bathrooms, and waterfront view. As an example, if a data collector captures 10 objective, categorical, or binary data items for 100 properties, at least 950 of the 1,000 total entries should be correct.
- For each subjective categorical data field collected or verified, data should be coded correctly at least 90 percent of the time. Subjective categorical data characteristics include data items such as quality grade, physical condition, and architectural style.

3.3.2.5 Data Collection Quality Control
A quality control program is necessary to ensure that data accuracy standards are achieved and maintained. Independent quality control inspections should occur immediately after the data collection phase begins and may be performed by jurisdiction staff, project consultants, auditing firms, or oversight agencies. The inspections should review random samples of completed 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 fails to meet quality control standards should be re-collected.

The accuracy of subjective data should be judged primarily by conformity with written specifications and examples in the data collection manual. Subjective data judgment calls should be substantiated by field notes.

3.3.3 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 doing this. The most efficient involves building permits. However, updating based on building permits is insufficient, because not all alterations require a building permit, sometimes alterations are made without the required permit, and some jurisdictions do not require permits.

(Aerial) photographs also can be helpful in identifying new or previously unrecorded construction and land use.

A system should be developed for making periodic field inspections to identify properties and ensure that property characteristics data are complete and accurate. Properties should be periodically revisited to ascertain that assessment records are accurate and current. Assuming that most new construction activity is identified through building permits or other ongoing procedures, a physical review at least every four to six years should be conducted, including an on-site verification of property characteristics. A reinspection should include partial remeasurement of the two most complex sides of improvements and a walk around the improvement to identify additions and deletions or independent review of the current measurements with specific requirements by an outside auditing firm or oversight agency. Photographs taken at previous physical inspections can help identify changes.

3.3.4 Alternative to Periodic On-Site Inspections

Provided that an initial physical inspection has been completed—and the requirements of a well-maintained data-collection and quality-management program (see Standard on Mass Appraisal of Real Property, sections 3.3.2.1 to 3.3.2.5) have been achieved, jurisdictions may employ a set of digital imaging technology tools to supplement field inspections with a computer-assisted office review. These imaging tools should include:

- Current high-resolution street-view images that enable quality grade and physical condition to be verified
- Orthophoto images updated at least every 2 years in rapid growth areas, or at least every 5 years in slow growth areas to identify new buildings or alterations.
- Images capable of being used for measurement verification, updated at least every 2 years in rapid growth areas or, 5 years in slow growth areas.

Effective tool sets validate CAMA data and incorporate change detection techniques that compare building dimension data (footprints) in the CAMA system to georeferenced imagery or remote sensing data and identify potential CAMA sketch discrepancies for further investigation.

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 affected properties that have significant change should be inspected when work is complete.

3.4 Sales Data

A file of sales data must be maintained. Sales data are required in all applications of the sales comparison approach, in the development of market-based depreciation schedules in the cost approach, and in the derivation of capitalization rates or discount rates. Refer to IAAO (1990, chapter 5) and Gloudemans (1999, chapter 2) for guidelines relating to the acquisition and processing of sales data.

3.5 Income and Expense Data
Income and expense data must be collected for income-producing property, as these data are required in the application of the income approach to value. (See Standard on Mass Appraisal of Real Property, section 4.4.) Refer to IAAO (1990, chapter 5) and Gloudemans (1999, 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 Standard on Mass Appraisal of Real Property, section 4.2). Cost and depreciation manuals and schedules may be purchased from commercial services or created in-house. See Gloudemans (1999, chapter 4) for guidelines on creating manuals and schedules.

4. Valuation

4.1 Valuation Models
A model is a representation, in words or an equation, of the relationship between value and variables representing factors of supply and demand. Mass appraisal models attempt to represent the market for a specific type of property in a specified area. Mass appraisers must first specify the model, that is, identify the variables (supply and demand factors) that influence value. Then, mass appraisers must calibrate the model, that is, determine the adjustments or coefficients that best represent the value contribution of the variables chosen. Careful and extensive market analysis is required for both specification and calibration of a model that estimates values accurately.

Geographic stratification is appropriate when the value of property attributes varies significantly among areas. It is particularly effective when housing types and styles are relatively uniform within areas. Separate models can be developed for market areas (also known as economic or model areas). Subareas or neighborhoods can serve as variables in modeling and can also be used in land value tables and selection of comparable sales. (See Gloudemans [1999, chapter 3].) Smaller jurisdictions may find it sufficient to develop a single residential model.

Commercial and income-producing properties should be stratified by property type. In general, separate models should be developed for apartment, warehouse/industrial, and retail properties. Large jurisdictions may be able to stratify apartment properties further by type or area or to develop multiple commercial models.

4.2 The Cost Approach
Reliable cost data are imperative in any successful application of the cost approach. The data must be complete, typical, and current. Current construction costs should be based on the cost of replacing a structure with one of equal utility, using current materials, design, and building standards. Costs of individual construction components and building items should also be included in order to adjust for features that differ from the base specifications. These costs should be incorporated into a construction cost manual and related computer software.

Construction cost schedules can be developed internally, based on a systematic study of local construction costs, obtained from firms specializing in such information, or custom generated by a contractor. Cost schedules should be verified for accuracy by applying them to recently constructed improvements of known cost. Construction costs also should be updated before each assessment cycle.

The estimation of accrued depreciation must be based on non-cost data (primarily sales) and can involve considerable subjectivity. Also the land value must be estimated from sales (often from sales of improved
property because sales of vacant land are scarce). Land values used in the cost approach must be current and consistent.

4.3 The Sales Comparison Approach
The sales comparison approach estimates the value of a subject property by statistically analyzing the sale prices of similar properties. This approach is usually the preferred approach for estimating values for residential and other property types with adequate sales.

Applications of the sales comparison approach include direct market models, often based on multiple regression, and comparable sales algorithms. Before being applied, the models or algorithms should be tested using sales ratio analysis or other methods. Users of comparable sales algorithms should take into account that sales ratio statistics will be biased if sales used in the ratio study are used as comparables for themselves in model development. This problem can be avoided by (1) not using sales as comparables for themselves in modeling or (2) using holdout or later sales in ratio studies. (IAAO 2007)

4.4 The Income Approach
In general, for income-producing properties the income approach is the preferred valuation approach when reliable income and expense data are available, along with well-supported income multipliers, overall rates, and required rates of return on investment. Successful application of the income approach requires the collection, maintenance, and careful analysis of income and expense data.

Mass appraisal applications of the income approach begin with collecting and processing income and expense data. The collected data are then analyzed to determine typical figures. 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. These multipliers and rates should always be extracted from actual income and sale price data obtained from properties that have recently been sold.

4.5 Frequency of Reappraisals
The quality of valuation estimates deteriorates over time with annual valuation affording maximum accuracy. If valuation models are not updated annually, adjusting values by property type and location based on sales ratio or related analyses can help maintain accuracy. All values should be updated at least every 5 years.

References


