



Harris County Appraisal District



2016
Mass Appraisal Report

Harris County Appraisal District

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Introduction

Scope of Responsibility

The Harris County Appraisal District (HCAD) 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 2016 mass appraisal was prepared under the provisions of the Texas Property Tax Code (hereafter "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 2016 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 the 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 nonconformity 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, 2014; all appraisals are as of January 1, 2016. The date of this report is May 13, 2016.

Definition of Value

Except as otherwise provided by the 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 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;
- 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 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, D and E, 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).

Properties Appraised

This mass appraisal appraised all taxable real and personal property known to the district as of the date of this report, with the exception of certain properties on which valuation was not complete as of the date of this report. These, by law, will be appraised and supplemented to the jurisdictions after equalization. The property rights appraised were fee simple interests, with the exception of leasehold interests in property exempt to the holder of the property's title. The latter are appraised under a statutory formula described in Sec. 25.07, Tax Code. The description and identification of each property appraised is included in the appraisal records submitted to the Harris County Appraisal Review Board (ARB) on May 13, 2016.

Scope of Work Used to Develop the Appraisal

This mass appraisal valued all taxable real and tangible personal property within the boundaries of HCAD, which encompasses all of Harris County, Texas, including the City of Houston. This involves over 1.7 million accounts. The district is the third largest assessment entity by population and the second largest by parcel count in the United States. The district distributes the work of the appraisal among several appraisal divisions. The following sections describe, by division, the scope of work performed and those items addressed in USPAP Standard 6-7 (k) through (p).

The Chief Appraiser, who is the chief executive officer of the appraisal district, manages the district. The district is subdivided into divisions who report directly to either the Chief Appraiser or the Deputy Chief Appraiser. The appraisal divisions are responsible for all appraisal activities. The support services division is responsible for property records maintenance, taxpayer information and assistance and support of the ARB. The administration division is responsible for budget and financial matters. Information technology operates the district's computer facilities. Property tax professionals are required to be registered with the Texas Department of Licensing and Regulation.

The appraisal district staff consists of 628 employees with the following classifications:

- 18 Official/Administrator (Executive Level Administration)
- 93 Professional (Supervisory and Management)
- 223 Technicians (Appraisers, Program Analysts and Network Support)
- 224 Administrative Support (Professional, Customer Service, Clerical and other)
- 8 Protective Services (Security)
- 62 Para-Professionals

While the appraisal district staff conducted most of the appraisal activities, the district received significant assistance from three appraisal contract firms. The appraisal district's boundaries are the same as the county's boundaries. An adjoining appraisal district is involved only in cases where the property is actually split by the county line. If the county line does split your property, you will receive value notices from the appraisal districts for both counties, and must file homestead exemption or agricultural productivity value applications with both. In such cases, if you choose to file a value protest, you must do so with the ARB in both counties.

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 accepted 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, and all available evidence that is specific to the value of the property shall be taken into account in determining the property's market value.

(c) Notwithstanding Section 1.04(7)(C), in determining the market value of a residence homestead, the chief appraiser may not exclude from consideration the value of other residential property that is in the same neighborhood as the residence homestead being appraised and would otherwise be considered in appraising the residence homestead because the other residential property:

- (1) was sold at a foreclosure sale conducted in any of the three years preceding the tax year in which the residence homestead is being appraised and was comparable at the time of sale based on relevant characteristics with other residence homesteads in the same neighborhood; or
- (2) has a market value that has declined because of a declining economy.

(d) The market value of a residence homestead shall be determined solely on the basis of the property's value as a residence homestead, regardless of whether the residential use of the property by the owner is considered to be the highest and best use of the property.

(e) Notwithstanding any provision of this subchapter to the contrary, if the appraised value of property in a tax year is lowered under Subtitle F, the appraised value of the property as finally determined under that subtitle is considered to be the appraised value of the property for that tax year. In the following tax year, the chief appraiser may not increase the appraised value of the property unless the increase by the chief appraiser is reasonably supported by substantial evidence when all of the reliable and probative evidence in the record is considered as a whole. If the appraised value is finally determined in a protest under Section 41.41(a)(2) or an appeal under Section 42.26, the chief appraiser may satisfy the requirement to reasonably support by substantial evidence an increase in the appraised value of the property in the following tax year by presenting evidence showing that the inequality in the appraisal of property has

been corrected with regard to the properties that were considered in determining the value of the subject property. The burden of proof is on the chief appraiser to support an increase in the appraised value of property under the circumstances described by this subsection.

Previous to the addition of 23.01(d) concerning residential homesteads, there was no specific statute defining highest and best use as it applies in appraisals conducted under the Tax Code. However, 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.

With the exception of residence homesteads, this definition of highest and best use still applies to appraisals conducted under the Tax Code.

Appraisal Performance Tests and Performance Measures Attained

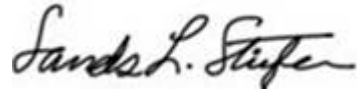
Section 5.102, Tax Code requires the Comptroller of Public Accounts to review county appraisal district governance, taxpayer assistance, operating and appraisal standards, procedures and methodology at least once every two years. School districts located in counties that do not receive the Methods and Assistance Program (MAP) reviews in a year will be subject to property value studies in that year. A MAP review will be completed for 2016.

Government Code Section 403.302 requires the Comptroller to conduct a study at least once every two years to determine the degree of uniformity and the median level of appraisals by the appraisal district with each major category of property, as required by Section 5.10, 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 Assistance Division (PTAD) 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 PTAD certifies the state value, unless the school district is eligible for a grace period, which is a period when local value is used even though it is determined to be invalid. A property value study was conducted for 2015 and the preliminary results were received on February 1, 2016. The PTAD tested twenty-one of the twenty-five school districts that are fully or partially in Harris County. The PTAD reported valid local value for all twenty-one tested school districts. To review the Texas Comptroller's 2015 PVS Report for HCAD, use the following link:

<http://comptroller.texas.gov/propertytax/administration/pvs/findings/2015p/101index.html>

Certification Statement:

"I, Sands Stiefer, Chief Appraiser for the HCAD, 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."



Sands Stiefer

Chief Appraiser

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STAFF PROVIDING SIGNIFICANT
MASS APPRAISAL ASSISTANCE

NAME	TITLE	TDLR #	TYPE OF ASSISTANCE
Roland Altinger	Deputy Chief Appraiser	66214	Oversight of Information & Assistance, ARB Operations, Jurisdiction Communications divisions; Information Systems and Administration departments
Jason Cunningham	Chief of Appraisal	68135	Direct appraisal divisions' activities
April Holcomb	Associate Chief Appraisal, Appraisal Operations	70887	Direct Appraisal Operations activities
Dennis Mabe	Appraisal Operations Specialist	65998	Provide data analysis and assist in appraisal operations
Liz Hernandez	Appraisal Data Analyst	72679	Provide statistical data analysis and training
Scott Christenson	Appraisal Information Specialist	72232	Provide problem resolution, training and data analysis
Kyle Whitener	Appraisal Information Specialist	72583	Provide problem resolution, training and data analysis

Report by Appraisal Divisions

The district allocated the work of the mass appraisal among several divisions, who report to the Chief of Appraisal. The appraisal divisions consist of the Residential Property Division (RPD), which also includes the real property corrections section, the Commercial Property Division (CPD), and the Business/Industrial Property Division (BIPD), which also includes the personal property corrections section. BIPD encompasses business and complex industrial properties, some of which are appraised through mass appraisal models, others of which are directly appraised. Additionally, the division's management coordinates the work of the district's appraisal contractors and a section manager oversees personal property corrections. Each division allocates appraisal staff that is responsible for maintaining property characteristics data and discovering and listing new construction annually and, valuation analysts whose responsibility it is to develop, calibrate, and apply the various mass appraisal models for their respective property types.

Residential Property Division

Scope of Work

RPD is responsible for collecting and maintaining property characteristic data for all residential property, and developing equal and uniform market values for each parcel. There are approximately 1,129,508 residential improved parcels and over 106,338 vacant residential parcels within the appraisal district's jurisdiction.

Field data collection requires organization, planning and supervision of the field staff. Residential appraisers are assigned throughout Harris County to conduct field inspections and record information via a laptop device. Data items required to accurately describe and value property are keyed in the field.

Production standards are set and upheld for the various field activities. It is the supervising appraisers' responsibility to ensure that not only are production standards met, but that the quality of data is reliable. Since data is keyed live to the system, supervisors have the capability to check on appraisers' productivity at any time during the day.

New appraisers are trained in the specifics of data collection set forth in the listing manual and receive hands-on training in the field. Experienced appraisers are routinely retrained in listing procedures prior to each major project, such as new construction or field/office reinspection. The county is segmented into geographic zones for work allocation. A supervising appraiser is designated to a zone, and it is his/her responsibility to coordinate work assignments among the appraisers and provide quality assurance through field and office review of each appraiser's work. During various projects we combine rally points for two zones, thus insuring that at least one supervisor can meet with the group on a daily basis.

The appraisers collect data at each property and key changes directly to their laptop. They update characteristics such as land influences and topography, and improvement data, such as square foot of living area, year built, quality of construction, and condition. The division uses training manuals that establish uniform procedures for listing real property. All properties are coded according to these manuals and the approaches to value are structured and calibrated based on this coding system. The field appraisers use these manuals during their initial training and during field inspections. Manufactured housing is listed as real property if a Statement of Ownership and Location is filed at the county in which the property is located, otherwise, the property receives a state classification of M3 and is listed as personal property.

Projects

New Construction

The field inspection of new construction permits and work file accounts began in December 2015 and was substantially completed by the end of April 2016. Appraisers visit all property where changes to characteristics are identified through building permits and other sources. All changes in characteristics are recorded, including new homes, additions, remodels, pools and other yard improvements, demolitions, and disaster damage and repairs.

Once the new construction work is completed in the field, an appraiser conducts an office review of each property to ensure the value of the property is consistent with the characteristics of the property. More

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than 60,982 permitted or work file items were inspected for 2016. Included in this number were more than 14,991 new home starts added to the tax roll for 2016.

Fieldwork was generated via electronic workflow by geographic area and neighborhood. With the continued use of laptops, work is grouped and assigned electronically by the supervisor. Accounts are worked by an appraiser and routed to their supervisor upon completion. The supervisor then quality checks the accounts and pushes it on to be value reviewed in the office.

Sales Verification

Appraisers and valuation analysts conduct both office and field inspections on properties with recent sales activity to verify the property characteristics, and when able, validated the sales information with the property owner. We verified data on 7,523 properties during this project.

Reinspection

Both field and office reinspection was conducted for tax year 2016. Appraisers are responsible for verifying the characteristics of each property visited. When changes are identified, they are keyed to the 2016 database. The confirmation of sales data and verification of characteristics of sold properties were incorporated with any accounts selected for field inspection. During office reinspection, properties are inspected using current aerial photos provided by our software vendor. Appraisers are able to verify external characteristics, measure walls, and identify economic influences. If the improvements are not visible due to tree cover, or changes in the property are too substantial to fix from the office, a field inspection is performed.

Our goal is to comply with generally recognized guidelines that recommend reinspection of property every four to six years. For tax year 2016, we inspected a total of 162,938 properties; 106,799 accounts were reviewed through reinspection, along with accounts reviewed during new construction and sales verification.

Split-out and Combination of Accounts

At a property owner's request, the district is required to split-out or combine accounts that are under the same ownership and do not have separate mortgages, which requires the coordination of our customer service department and appraisal staff. For tax year 2015, 20,940 accounts were processed with 39 accounts still pending. As of the date of this report, we have completed over 4,385 accounts for tax year 2016 with 15,975 still pending. In many instances, the property owner's request involves not only current year, but also prior year corrections, which increases the workload.

Jurisdiction Estimates of Value

Each year the RPD makes value estimations for taxing jurisdictions on newly developed areas. The purpose of the estimates is to give a total value for all parcels in question so that the taxing jurisdictions can estimate their total tax base as of a specified date. During 2015, we completed 174 estimates of value. As of the date of this report we have completed 54 for 2016 and have received 58. The research coordinator takes an average of over six hours to complete the field and office work associated with each estimate of value.

New Subdivisions

New subdivisions are reviewed and valued based on information gathered in the field and office. Analysts set up base lot sizes, rates for land and estimate the typical grade and characteristics for improvements. Appraisal staff drives the area of the new subdivision, lists the property characteristics and identifies the status of the property as of January 1. For tax year 2015, we processed 854 new subdivisions throughout the county. To date, we have received 165 new subdivisions for 2016.

Sources of Data

The sources of data collection and verification include, but are not limited to, building permits, data mailers, informal meetings and formal hearings, information collected in the field, newspapers, publications, and property owner correspondence by letter and via the internet. Oblique imagery, which allows the appraiser to view a property from multiple angles, is also frequently used for data verification. The appraiser can verify exterior measurements with this software if the tree cover is not too thick. Street-level images are also attached to each account and can assist in the verification of data.

Building permit data attained from the county, City of Houston and surrounding cities, triggers field inspections on property experiencing significant characteristic changes due to new construction or remodeling. Property owners contact our web site to report data inaccuracies that initiate a field inspection or office correction of the data. The use of the internet has enabled us to download mobile home information and upload the data directly to a file in our computer system, which generates a questionnaire that is mailed to the property owner.

Data Maintenance

The residential property support section is responsible for sorting, researching and keying accounts to our permit system, processing new subdivisions, researching and keying mobile home information, and scanning, filing, boxing and warehousing information. This section was also able to provide support to other divisions in need.

Highest and Best Use Analysis

The highest and best use of residential property is normally its existing use. This is due in part to the fact that residential communities through use of deed restrictions, and in some areas zoning, precludes other land uses. The division undertakes the analysis of highest and best use in transition areas and areas of mixed residential and commercial use. In transition areas with ongoing gentrification, the analyst reviews the existing residential property use and makes a determination regarding highest and best use. Once the conclusion is made that the highest and best use remains residential, further highest and best use analysis is done to decide the type of residential use on a neighborhood basis. For example, it may be determined in a transition area that older, non-remodeled homes are economically obsolete, which we refer to as “mis-improvements”, and the highest and best use of such property is the construction of new dwellings. In areas of mixed residential and commercial use, the analyst reviews properties in these areas on a periodic basis to determine if changes in the real estate market require reassessment of the highest and best use of a select population of properties.

The exception to this process is residential homestead property. Section 23.01(d), Tax Code provides that a residence homestead's market value for ad valorem tax purposes is determined solely on the basis of the property's value as a residence homestead, regardless of highest and best use. In mixed-use areas, residential homesteads are valued differently than non-homestead residential property. We use a separate land use code for these properties, which allows us to value the homestead properties separately. Each year we review the status of the exemptions in the mixed-use neighborhoods and change the land use code accordingly. Typical residential neighborhoods are not affected by this tax code because market value estimates are determined based on the residential uses and are not generally affected by the value of other property types.

Model Specification

Area Analysis

Data on regional economic forces such as demographic patterns, regional location factors, employment and income patterns, general trends in real property prices and rents, interest rates trends, availability of vacant land, and construction trends and costs are collected from private vendors and public sources. Information is gleaned from real estate publications and sources such as the Houston Business Journal, the Subdivision and Lot Price Survey by CDS Research, the Houston Metrostudy, UH Center for Public Policy and The Real Estate Center of Texas A&M. Continuing education courses, conference seminars from TAAD and International Association of Assessing Officers (IAAO), real estate seminars from the Urban Land Institute, and UH real estate symposiums, provide the valuation analysts a current economic outlook on Houston's real estate market.

Neighborhood and Market Analysis

Neighborhood analysis involves the examination of how physical, economic, governmental and social forces and other influences affect property values. The effects of these forces are also used to identify, classify, and stratify comparable properties into smaller, manageable subsets of the universe of properties known as neighborhoods. Valuation and neighborhood analysis is conducted on each of the political entities known as Independent School Districts (ISD).

The first step in neighborhood analysis is the identification of a group of properties that share certain common traits. A "neighborhood" for analysis purposes is defined as the largest geographic grouping of properties where the property's physical, economic, governmental and social forces are generally similar and uniform. Geographic stratification accommodates the local supply and demand factors that vary across a jurisdiction. Once a neighborhood has been identified, the next step is to define its boundaries. This process is known as "delineation". Some factors used in neighborhood delineation include location, sales price range, lot size, age of dwelling, quality of construction and condition of dwellings, square footage of living area, and story height. Delineation will be reflected in GIS maps for each neighborhood and it also involves statistical separation or stratification based on attribute analysis.

Part of neighborhood analysis is the consideration of discernible patterns of growth that influence a neighborhood's individual market. Few neighborhoods are fixed in character. Each neighborhood may be characterized as being in a stage of growth, stability or decline. The growth period is a time of development and construction. As new neighborhoods in a community are developed, they compete with existing neighborhoods. An added supply of new homes tends to induce population shift from older homes to newer homes. In the period of stability, or equilibrium, the forces of supply and demand are about equal. Generally, in the stage of equilibrium, older neighborhoods can be more desirable due to

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their stability of residential character and proximity to the workplace and other community facilities. The period of decline reflects diminishing demand or desirability. During decline, general property use may change from residential to a mix of residential and commercial uses. Declining neighborhoods may also experience renewal, reorganization, rebuilding, or restoration, which promotes increased demand and economic desirability.

Neighborhood identification and delineation is the cornerstone of the residential valuation system at the district. All the residential analysis work done in association with the residential valuation process is neighborhood specific. There are in excess of 7,173 residential valuation neighborhoods. Neighborhoods are reviewed in the field and delineated based on observable aspects of homogeneity. Neighborhood boundaries are periodically reviewed to determine if further neighborhood delineation is warranted or, if existing neighborhoods could now be combined because of similar markets. The combined neighborhoods provided a larger sales base for analysis. Whereas neighborhoods involve similar properties in the same location, a neighborhood group is simply defined as similar neighborhoods in similar locations. Each residential neighborhood is assigned to a neighborhood group based on observable aspects of homogeneity between neighborhoods. Neighborhood grouping is highly beneficial in cost-derived areas of limited or no sales, or use in direct sales comparison analysis. Neighborhood groups, or clustered neighborhoods, increase the available market data by linking comparable properties outside a given neighborhood. Sales ratio analysis, discussed later in the report, is performed on a neighborhood basis, and in soft sale areas on a neighborhood group basis.

Market Areas/Time Adjustments

In addition to neighborhood analysis, market areas were analyzed to determine whether time of sale was a factor in establishing market value as of January 1, 2016. Market areas are clusters of neighborhoods with geographic similarities that exhibit parallel market conditions and trends. For 2016, we have 83 residential market areas in Harris County, 53 of which have time adjustments. The adjustment of sales for time is an important component of mass appraisal valuation and ratio studies. The district conducts these studies using guidelines set forth in the International Association of Assessing Officers' (IAAO) *Standard on Ratio Studies* and in compliance with *the Uniform Standards of Professional Appraisal Practice*. In our development of time adjustments, we applied the sales ratio trend analysis method using an industry recognized statistical software package. The sales ratio trend analysis method of deriving time-adjustment factors from market data is the most efficient method, not requiring the analysis of paired sales and related adjustments for differences in physical characteristics.

Trends in the residential market are represented by changes in sales prices over time. However, an analysis that simply tracks changes in sales prices can be misleading. Changes in median or average sales prices may not always indicate market value trends. Those changes may rather be reflective of the particular mix of sold properties. For example, the properties sold in one month may have high numbers of low-end homes. The sales next month may contain a greater number of high-end homes. The difference in the median or average sales prices can be great but may not reflect a true trend in the market.

Changes in sales ratios over time better serve to indicate sales price trends. The sales ratio is the ratio of an appraised value to the sales price of a property. The benefit of sales ratios is that the appraised values reflect a common point in time that allows the effects of changing sales prices to be measured.

Residential time adjustments are analyzed and applied by market area. The district's basic steps for analyzing time adjustments are: collect sales data, screen sales, trim extreme outlier sales ratios and run statistical analysis. We analyze 12 months of sales which allows for a simple linear regression of sales price-appraisal ratios.

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The district's statistical analysis checks that the ratios have a normal distribution and that the time-adjustment results meet statistical tests of significance. A lack of a time adjustment may not mean that market values are unchanged but that those changes may not be statistically significant or consistent over the time period.

For market areas that meet our statistical tests a monthly time-adjustment rate is calculated and applied to sales prices. The monthly time-adjustment rate is non-compounding and the sales adjustment is calculated as:

$$S \times (1 + (r \times t))$$

Where:

S = sales price

r = monthly time-adjustment rate

t = number of months from date of sale to appraisal date.

The time-adjusted sales prices are then used in our sales ratio analysis to produce January 1 values. Per Section 23.01 of the Tax Code the district is required to consider foreclosure sales in determining market value. Foreclosures are considered in determining neighborhood values but for the purposes of calculating time trends they are excluded.

Model Calibration

Cost Schedules

All residential parcels in the district are valued from cost schedules using a comparative unit method. The district's residential cost schedules mimic that of Marshall & Swift (M&S), a nationally recognized cost estimator, but are customized to fit Harris County's local residential building and labor market.

To ensure that our cost program remains current for tax year 2016, a comparison is made between the September 2014 and the September 2015 M&S replacement costs for a sample of improved residential properties. The year-over-year difference indicated less than a 1% change in costs. The 1% change is within the acceptable limits described in Section 23.011(4) of the Texas Property Tax Code. Therefore, the residential base rate was unchanged at \$61.50 for the 2016 tax year.

Depreciation Analysis

The residential depreciation analysis for 2016 is conducted in November of 2015 following the steps outlined in the IAAO's *Property Appraisal and Assessment Administration*. Sales are extracted from the CAMA system for the period of January 2015 to September 2015. The results are filtered to return only qualified single family residential sales with no remodel.

IAAO recommends: "If effective ages are not available, use actual ages and exclude improvements in very good or poor condition relative to actual age." *Property Appraisal and Assessment Administration* IAAO, 1990, p.358. For this reason, only accounts with good, average and fair CDU's are selected for analysis while the upper end and low end are filtered out.

Two additional filters are applied to the sales sample. Accounts outside of three standard deviations of the median appraisal/sale ratio are removed to ensure a normal statistical distribution and to avoid

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extreme outliers. Additionally, accounts with a land/sale ratio greater than .90 are removed to avoid using sales near or at land value. The final sample used for analysis includes over 28,800 sales.

For each sale, the residual building value (RBV) is subtracted from the replacement cost new (RCN), then divided by the RCN for a calculation of market-derived depreciation, or

$$\% \text{ Depreciation} = (RCN - RBV) / RCN$$

Percent good is calculated by taking one (1) minus the market-derived depreciation (sales price (S) minus the total of the land value (LV) and other features value (OV) divided by the RCN, or

$$\% \text{ Good} = [S - (LV + OV)] / RCN$$

The resulting percent good for each sale is plotted against the building's actual age using IBM's SPSS 22 statistical software package and a curve was fit to the data. Several curve estimation models are tested with the quadratic model being chosen as the best fit. The curve results are compared to the current depreciation schedule for average CDU. The 2016 analysis shows slight variations from the current schedule but not enough to warrant any significant change. The depreciation schedules for 2016 are unchanged.

Sales Information

Residential improved and vacant sales are collected from a variety of sources; including district questionnaires sent to the grantee, and the grantor when available, field discovery, protest hearings, various vendors, builders, and realtors. A sales coding system is maintained to define salient facts related to a property's purchase or transfer.

In accordance with Government Code Sec. 552.149, the appraisal district must keep confidential any information about properties that an appraisal district obtains from private sources. We cannot publicly disclose (or display on our website) property sales information we obtain from private sources. Sales information is not available for public inspection in the Information & Assistance division or on the HCAD website.

Sales that we used or considered in arriving at a particular value are available to property owners who timely file a value protest, and are included as part of the iFile evidence material. This law in no way prohibits the district's use of confidential sales in the valuation process. A property owner or agent who receives confidential sales information from HCAD in conjunction with the protest evidence is required by Sec. 552.149 of the Government Code to hold that information in confidence. Failure to do so is a criminal violation of the Texas Public Information Act.

Land Analysis

The analysts conduct residential land analysis each year for their respective valuation zones. The analysts develop a base lot, primary rate, and assign each unique neighborhood to one of six square foot land tables. The square foot land table is designed to systematically value the primary and residual land based on a specified percentage of the primary rate. Land information required to consistently value individual parcels within neighborhoods is stored in a computerized land table. Specific land influences are used, where necessary, to adjust parcels outside the neighborhood norm for such factors as view, shape, size, and topography, among others. The preferred method for appraising land is the sales comparison approach. If a sufficient number of sales are not available, the analysts use abstraction or allocation

methods to ensure that the land values best reflect the contributory market value of the land to the overall property value.

Statistical Analysis

The division performs statistical analysis annually to evaluate whether values are equitable and consistent with the market. Ratio studies are conducted on each of the approximately 7,363 residential valuation neighborhoods in the district to judge the two primary aspects of mass appraisal accuracy--level and uniformity of value. Appraisal statistics of central tendency and dispersion generated from sales ratios are available for each stratified neighborhood within a school district and summarized by year. These summary statistics including, but not limited to, the weighted mean, median, standard deviation, coefficient of variation, and coefficient of dispersion provide the analysts a tool by which to determine both the level and uniformity of appraised value on a stratified neighborhood basis. Review of the standard deviation, coefficient of variation, and coefficient of dispersion can discern appraisal uniformity within and between stratified neighborhoods. Our computer-assisted mass appraisal (CAMA) system provides the analyst with an analysis tool that can run statistics and output results.

The analyst, through the sales ratio analysis process, reviews every neighborhood annually. The first phase involves neighborhood ratio studies that compare the recent sales prices of neighborhood properties to the previous year's certified values. The ratio study affords the analyst an excellent means of judging the present level of appraised value and uniformity of the sales. The analyst, based on the sales ratio statistics and designated parameters for valuation update, makes a preliminary decision as to whether the value level in a neighborhood needs to be updated in an upcoming reappraisal, or whether the level of market value in a neighborhood is at an acceptable level.

At the time of this report, 658,895 residential properties had their market values increased from the prior year, 23,703 residential properties had their market values decreased, and 366,689 residential properties remained unchanged.

Final Models: Market Adjustment and Time Consideration

Neighborhood or market adjustment factors are developed from appraisal statistics provided from ratio studies and are used to ensure that estimated values are consistent with the market. The district's primary approach to the valuation of residential properties uses a market trended cost approach. This type of approach accounts for neighborhood market influences not specified in the cost model.

The following equation denotes the model used:

$$MV = MA [RCN - D] + LV$$

The market value (MV) equals the market adjustment factor (MA) multiplied by the replacement cost new (RCN) less depreciation (D), plus the land value (LV). As the cost approach separately estimates both land and building values and uses depreciated replacement costs, which reflect only the supply side of the market, it is expected that adjustments to the cost values are needed to bring the level of appraisal to an acceptable standard. Market or location adjustments are applied uniformly within neighborhoods to account for location variances between market areas or across a jurisdiction.

If a neighborhood is to be updated, the analyst runs a ratio study that compares recent time adjusted sale prices in a neighborhood with the properties' current cost values trended by the previous year's market adjustment factor. The weighted mean of these ratios indicates the neighborhood's level of value. This weighted mean ratio is compared to the target appraisal-to-sale ratio to determine a new market

adjustment factor that will trend the values closer to the market value evidenced by recent sale prices. The sales used reflect the market influences and conditions only for the specified neighborhood, thus producing more representative and supportable values. A market adjustment factor is calculated and applied uniformly by state class to residential properties within a neighborhood. Once the market-trend factors are applied, a second run of the ratio study is generated that compares recent sale prices with the proposed market values for these sold properties. From this set of ratio studies, the analyst judges the appraisal level and uniformity in both update and non-update neighborhoods.

How Estimates are reviewed

Office Review

Homogeneous properties consisting of tract housing, with a low variance in sales ratios, and other properties having a recent field inspection date are value reviewed in the office. Valuation reports comparing previous values against proposed and final values are generated for all residential improved and vacant properties. The dollar amount and percentage of value difference are noted for each property within a delineated neighborhood allowing the analyst to identify, research, and resolve value anomalies before final appraised values are released.

Once the analyst is satisfied with the level and uniformity of value for each neighborhood within his or her area of responsibility, queries are run based on predetermined tolerances to identify accounts that have increased or decreased by a certain percent or dollar amount. Parcels that fail the tolerances are programmatically kept from noticing until the analyst or appraiser can resolve the problem.

Once the proposed value estimates are finalized, the analyst reviews the sales ratios by neighborhood and presents pertinent valuation data, such as, history of hearing protest, sale-to-parcel ratio, and level of appraisal to the Director of Appraisal Administration for final review and approval. The primary objective of this review is to ensure that the proposed values have met acceptable tolerance ranges based on the individual neighborhood's profile.

Appraisal Performance

Sales Ratio Study

The primary analytical tool used by the analysts to measure and improve performance is the ratio study. The division ensures that the appraised values that it produces meet the standards of accuracy in several ways. Overall sales ratios are generated for each school district by quarter to allow the analyst to review general market trends within their area of responsibility and, to provide an indication of market appreciation over a specified period of time. Several sets of neighborhood sales ratios on each of the approximately 7,363 delineated residential neighborhoods are produced prior to the setting of preliminary values and after finalization of appraised values. The neighborhood descriptive statistics are reviewed for each neighborhood being updated for the current tax year.

Texas does not have mandatory sales disclosure; therefore, the district does not have access to all property transactions, which limits sales analysis to only those sales acquired by the district through a commercial vendor or submitted voluntarily by the property owner. Available sales are screened to ensure, to the extent possible, that only valid indicators of market value are included. Sales identified as invalid transactions due to atypical financing, sales between relatives, corporate affiliates and estate sales, and

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sales with partially complete new construction are excluded from the ratio study. It is common to expect residential foreclosure sales in any given real estate market. Although Harris County experienced a significant decline in the number of foreclosure sales in 2014, they continued to impact market values in specific areas. In these neighborhoods foreclosures were analyzed for the purpose of valuation and included in the ratio study.

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RESIDENTIAL PROPERTY STAFF PROVIDING
SIGNIFICANT MASS APPRAISAL ASSISTANCE

NAME	TITLE	TDLR #	TYPE OF ASSISTANCE
Stephen Atchison	Associate Chief Appraiser	68136	Plans and directs field and valuation activities
Sherri Potts	Valuation Manager	68566	Manages valuation group and activities
Patrick Brogan	Assistant Valuation Manager	69419	Supervises valuation group
Joseph Olear	Senior Valuation Analyst	69790	Valuation Activities in ISD 05, 06, 15, 16
Chauncey Majors	Valuation Analyst	73000	Valuation Activities in HISD 1C, 1D
Loren Williams	Valuation Analyst	73716	Valuation Activities in ISD 04
Melissa Soto	Senior Valuation Analyst	69310	Valuation Activities in HISD 1A, 1F Outside Loop
Ed Wolff	Senior Valuation Analyst	70753	Valuation Activities in HISD 1B and River Oaks
Cynthia Gray	Senior Valuation Analyst	63854	Valuation Activities in ISD 09, 24
Ryan Albe	Valuation Analyst	73710	Valuation Activities in HISD 1H
Jamie Stanley	Valuation Analyst	71903	Valuation Activities in ISD 20, 21, 27, 29
LaQuita Flemming	Senior Valuation Analyst	71571	Valuation Activities in HISD 1E, 1J
Roy Beery	Senior Valuation Analyst	72351	Valuation Activities in ISD 05, 07, 18, 23, 28, 30
Shelly Summers	Senior Valuation Analyst	69684	Valuation Activities in ISD 25
Errol Williams	Res Valuation Specialist	69730	Provides statistical analysis & support for valuation
Judy Wood	Senior Valuation Analyst	67718	Valuation Activities in HISD 1F Inside Loop
Joseph Carr	Valuation Analyst	73952	Valuation Activities in ISD 08, 19
Jose Garza	Corrections Manager	61136	Manages Corrections Section
Benita Harvey	Supervising Appraiser	71782	Supervises Split Outs & Combinations, Support
Brenda Budd	Field Manager	70897	Manages field group
Byron Stanley	Assistant Field Manager	71494	Supervises field activities
Spencer Pollard	Supervising Appraiser	70963	Supervises residential data collection for Zone 5
Khari Small	Supervising Appraiser	71665	Supervises residential data collection for Zone 7
Rex Wogan	Supervising Appraiser	70897	Supervises residential data collection for Zone 4
Tai Dinh	Research Coordinator	69403	Researches and compiles all Jurisdiction Estimates
Cynthia Burns	Senior Supervising Appr	70919	Supervises residential field checks and training
Chantelle Harper-Brown	Supervising Appraiser	72085	Supervises residential data collection for Zone 3
Frank Altamuro	Supervising Appraiser	72493	Supervises residential data collection for Zone 2
Sherene Blake	Senior Supervising Appr	69898	Supervises residential data collection for Zone 8
Chet Nimitz	Supervising Appraiser	72999	Supervises residential data collection for Zone 1
Zdravko Sakic	Supervising Appraiser	70923	Supervises residential data collection for Zone 9
Chet Wood	Sr. Supervising Appraiser	73002	Supervises residential special projects and Zone 6

Commercial Property Division

Scope of Work

The scope of this mass appraisal includes all of the commercial real property located within the boundaries of the Harris County taxing jurisdiction that falls under the responsibility of the CPD. All three approaches to value are considered in estimating market value for each property, the most applicable of which is given primary emphasis.

The cost approach to value is applied to all real property. This methodology involves using national cost data reporting services as well as actual cost information on comparable properties whenever possible. Cost models are developed based on the M&S cost information, and are modified based on local factors. This approach also employs alternate valuation procedures to value the underlying land value.

The income approach to value was applied to those real properties that are typically viewed by market participants as “income producing” and for which the income methodology is considered a leading value indicator.

The sales comparison (market) approach was used for estimating land value and in comparing sales of similarly improved properties to each parcel on the appraisal roll. Other recognized appraisal methods and techniques are used in the valuation of properties where sales information is not available or is insufficient to produce credible results.

The division appraises the fee simple interest of properties according to statute. However, the effect of easements, restrictions, encumbrances, leases, contracts or special assessments are considered on an individual basis, as is the appraisal of any non-exempt taxable fractional interests in real property (i.e. certain multi-family housing projects). Fractional interests or partial holdings of real property are appraised in fee simple for the whole property and divided programmatically based on their pro-rata interests.

The function of this mass appraisal is to provide an equitable and efficient market valuation of all property in this appraisal district for ad valorem tax purposes in accordance with law.

Procedure for Collecting and Validating Data

The property characteristic data of every property subject to taxation by a jurisdiction within HCAD’s area of responsibility is incorporated into a CAMA system. The commercial appraisers perform maintenance of this inventory of special purpose properties. Building permits trigger field inspections, which capture any alterations to the properties for the pertinent tax year. Appraisers conduct field inspections and collect or update property characteristics via field laptops. For 2016, field appraisers visited over 9,500 accounts. This information serves as the basis for the valuation of property. Also, if any discrepancies are discovered during the hearings process or at any other time, field personnel are sent for a field check prior to the next tax season, and in some cases, during the current tax season.

A new project was started in 2010 and continued through 2016 to digitize existing building sketches. This project will enhance the valuation process for both cost and income properties by allowing for perimeter adjustments along with identification of building sections by use.

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The quality of data used is of paramount importance to accurate valuation of taxable property. While production standards are established and upheld for the various field activities, quality of data is emphasized as the goal and responsibility of each appraiser. New appraisers are trained in the specifics of data collection set forth in the listing manual as “rules” to follow. Experienced appraisers are routinely retrained in listing procedures prior to major field projects such as new construction, sales validation or data review.

The primary manual pertinent to data collection and documentation is the *Commercial Lister’s Manual*. This manual is continually updated, providing a uniform system of itemizing the components comprising improved properties. All properties located in HCAD’s inventory are coded according to this manual and the approaches to value are structured and calibrated based on this coding system. The most recent revision of the listing manual is 2016.

Sources of Data

A vendor provides the district a copy of the deeds recorded in Harris County that convey commercially classed properties. For those properties involved in a transfer of commercial ownership, a sale file is produced which begins the research and verification process. The initial step in sales verification involves a questionnaire, which is mailed to both parties in the transaction (grantor and grantee). If a questionnaire is not returned within thirty days, a second questionnaire is mailed. If a questionnaire is answered and returned, the documented responses are recorded in the sales database system. If no information is provided, verification is then attempted via phone calls to both parties. If the sales information is still not obtained, other sources are contacted such as the brokers involved in the sale, property managers or commercial vendors. In other instances, sales verification is obtained from local appraisers. Finally, closing statements are often provided during the hearings process. The actual closing statement is the most reliable and preferred method of sales verification. After the sales data has been keyed into the database, the data is reviewed to maintain quality control. Additionally, a nationally recognized vendor of market data provides online access to commercial sales information. Other sources of sales data include fee appraisals acquired through the hearings process and local, regional and national real estate and financial publications.

The data used for commercial valuation includes verified sales of vacant land and improved properties and the pertinent data obtained from each (sales price levels, capitalization rates, income multipliers, equity dividend rates, marketing period, etc.). Other data used by the CPD includes actual income and expense data (typically obtained through the hearings process), actual contract rental data, leasing information (commissions, tenant finish, length of terms, etc.), and actual construction cost data. In addition to the actual data obtained from specific properties, market data publications are also reviewed to provide additional support for market trends (such as Apartment Data Service (ADS) for market data on apartments, CoStar Group for office, retail or warehouse data and sales information, State Comptroller Hotel/Motel Report, etc.). Other publications, such as Korpacz, REIS, and IREM, are used for capitalization rates, typical holding periods for real estate investments, interest rates and other pertinent real estate criteria. A variety of real estate data is also available via the internet that is helpful in the establishment of market values. This information is often incorporated into market analysis and includes market trends, labor statistics, sales information, development areas, economic indicators, and financial data to name a few.

Annually, prior to hearings and after the sales have been researched, verified, keyed into the database, and quality control has been completed, the sales data is summarized and produced into an electronic file. This electronic sales file, known as the *Vacant Land Sales* and *Commercial Improved Sales Report*,

categorize the sales by property use type, location and chronological order. These sales are only available to the public once a protest has been filed.

Data Maintenance

Information on building permits is collected from various cities within Harris County, and from unincorporated areas of the county. These permits are matched to the district's existing property records. Accounts that have building permits are electronically placed into virtual work packs. The work packs are sorted by school district and map facet order and are electronically assigned to appraiser work queues. The field appraisers list new construction, note demolition, and record any changes in physical characteristics for properties within their specific work queues. When the packs are completed, they are routed to the supervisor for quality improvement checks. Once the results of the field visit are in the system, the parcels are available to be valued and later noticed.

Highest and Best Use Analysis

The highest and best use is the most reasonable and probable use that generates the highest present value of the real estate as of the assessment date. The highest and best use of any given property must be physically possible, legally permissible, financially feasible, and maximally productive. For improved properties, highest and best use is evaluated as improved and as if the site were still vacant. This assists in determining if the existing improvements have a transitional use, interim use, non-conforming use, multiple uses, speculative use, excess land, or a different optimum use if the site were vacant. For vacant tracts, the highest and best use is considered speculative based on the surrounding land uses. Improved properties reflect a wide variety of highest and best uses which include, but are not limited to, office, retail, apartment, warehouse, light industrial, special purpose, or interim uses. In many instances, the property's current use is the same as its highest and best use. This analysis insures that an accurate estimate of market value (sometimes referred to as value in exchange) is derived.

Conversely, value in use represents the value of a property to a specific user for a specific purpose. This is significantly different than market value, which approximates market price under the following assumptions: 1) no coercion of undue influence over the buyer or seller in an attempt to force the purchase or sale, 2) well-informed buyers and sellers acting in their own best interests, 3) a reasonable time for the transaction to take place, and 4) payment in cash or its equivalent.

Model Specification

Area Analysis

A market analysis relates directly to market forces affecting supply and demand. This study involves the relationships between social, economic, environmental, governmental, and site conditions. Current market activity including sales of commercial properties, new construction, new leases, lease rates, absorption rates, vacancies, allowable expenses (inclusive of replacement reserves), expense ratio trends, and capitalization rate studies are analyzed. Local publications are also reviewed to lend detailed support to the various assumptions utilized in the valuation of real estate.

Neighborhood Analysis

Published market studies such as Apartment Data Service (ADS), REIS and CoStar Group for office, retail and warehouse properties provide current market data by property segment. The neighborhood is comprised of the land area and commercially classed properties located within the boundaries of this taxing jurisdiction. Neighborhood analysis involves the examination of how physical, economic, governmental and social forces and other influences affect property values.

The effect of these forces is also used to identify, classify, and organize comparable properties into smaller, manageable subsets of the universe of properties known as neighborhoods. In the mass appraisal of commercial properties, these subsets are generally referred to as market areas or economic areas.

Economic areas are defined by each of the improved property use types (apartment, office, retail, warehouse and special use) based upon an analysis of similar economic or market forces. These include, but are not limited to, similarities of rental rates, classification of projects (known as building class by area commercial market experts), date of construction, overall market activity or other pertinent influences. Apartments, offices, retail and warehouses have thirty-six, thirty, twenty-four and sixteen delineated economic (market) areas, respectively. Economic area identification and delineation by each major property use type is the benchmark of the commercial valuation system. All income model valuation is economic area specific. Economic areas are periodically reviewed to determine if re-delineation is required. The geographic boundaries, as well as income, occupancy, expense levels, and capitalization rates by age within each economic area for all commercial use types and its corresponding income model may be found in the *Commercial Valuation Manual*.

Model Calibration

Model calibration involves the process of periodically adjusting the mass appraisal formulas, tables and schedules to reflect current local market conditions. Once the models have undergone the specification process, adjustments can be made to reflect new construction procedures, materials and/or costs, and rental concessions, which can vary from year to year.

The basic structure of a mass appraisal model can be valid over an extended period of time, with trending factors utilized for updating the data to the current market conditions. However, at some point, if the adjustment process becomes too involved, the model calibration technique can mandate new model specifications or a revised model structure.

Approaches to Value

Cost Approach

The cost approach to value is applied to all improved real property utilizing the comparative unit method. This methodology involves the utilization of national cost data reporting services, as well as actual cost information on comparable properties whenever possible. Cost models include the derivation of RCN of all improvements. These include comparative base rates, per unit adjustments and lump sum adjustments. This approach also employs other appraisal methods, including the sales comparison approach in the valuation of the underlying land value. Time and location modifiers are necessary to adjust cost data to reflect conditions in a specific market and changes in costs over a period of time. Our base models are developed utilizing actual cost data from the American Institute of Architects' (AIA) documents acquired

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during the hearings process, and with a location modifier applied as necessary. The national cost services provide these modifiers.

Depreciation schedules are developed based on what is typical for each property type at that specific age. Depreciation schedules have been implemented for what is typical of each major class of commercial property by economic life categories. Schedules have been developed for improvements with 15, 20, 25, 30, 35, 40, 45, 50, 55, and 60 year expected life. These schedules are then tested to ensure they are reflective of current market conditions. For tax year 2016, an analysis was performed based on the guidelines set forth in the *IAAO Assessment and Administration Handbook*, which helps to determine the appropriate age-life for each property segment. The actual and effective ages of improvements are noted in our mass appraisal system. The effective age estimates are based on the utility of the improvement relative to where the improvement lies on the scale of its total economic life and its competitive position in the marketplace. Effective age estimates are based on three levels of renovation and are described in the *Commercial Lister's Manual*. Market adjustment factors such as external and functional obsolescence can be applied if warranted.

A depreciation calculation override can be applied if the condition or effective age of a property varies from the norm by appropriately noting the physical condition and functional utility ratings on the property data characteristics. These adjustments are typically applied to a specific property type or location and can be developed via ratio studies or other market analyses. Accuracy in the development of the cost schedules, condition ratings and depreciation schedules will usually minimize the necessity of this type of an adjustment factor.

Income Approach

The income approach to value was applied to real properties that are typically viewed by market participants as “income producing” and for which the income methodology is considered a leading value indicator.

The first step in the income approach pertains to the estimation of market rent on a per unit basis. This is derived primarily from actual rent data furnished by property owners and from local market study publications. This per unit rental rate multiplied by the number of units results in the estimate of potential gross rent.

A vacancy and collection loss allowance is the next item to consider in the income approach. The projected vacancy and collection loss allowance is established from actual data furnished by property owners and in local market publications. This allowance accounts for periodic fluctuations in occupancy, both above and below an estimated stabilized level. The market derived stabilized vacancy and collection loss allowance is subtracted from the potential gross rent estimate to yield an effective gross rent.

Next, a secondary income or service income is calculated as a percentage of stabilized effective gross rent. Secondary income represents parking income, and other miscellaneous income generated by the operations of real property. The secondary income estimate is derived from actual data collected and available market information and is applied in the model over what is typical for that type of property. In addition to the secondary income, subjects valued on a net basis including office buildings, retail and warehouse properties, a pass through income is added to account for recoveries directly associated with the variable expenses and property taxes. This income is referenced as common area maintenance (CAM). The secondary income and the pass through estimates are added to the effective gross rent to arrive at an effective gross income.

Allowable expenses and expense ratio estimates are based on a study of the local market, with the assumption of prudent management. An allowance for non-recoverable expenses, such as leasing costs

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and tenant improvements, are included in the expenses. A non-recoverable expense represents costs that the owner pays to lease rental space. Different expense ratios are developed for different types of commercial property based on use. For instance, retail properties, medical office buildings, warehouses, and Class "A" office buildings are most frequently leased on a triple-net basis, whereby the tenant is responsible for a pro-rata share of taxes, insurance and common area maintenance. In comparison, other classes of office buildings are most often leased on a base year expense stop. This lease type stipulates that the owner is responsible for all expenses incurred during the first year of the lease. However, any amount in excess of the total per unit expenditure in the first year is the responsibility of the tenant. For example, if the total operating expense in year one equates to \$8.00 per square foot, any increase in expense over \$8.00 per square foot throughout the remainder of the lease term would be the responsibility of the tenant. As a result, expense ratios are implemented based on the type of commercial property being appraised.

Another form of allowable expense is the replacement allowance for short-lived items, such as roof or floor coverings, air conditioning, or mechanical equipment and appliances. When these replacement allowances are analyzed for consistency and adjusted, they may be applied on an annualized basis as stabilized expenses. When performed according to local market practices by commercial property type, these expenses when annualized are known as replacement reserves.

Subtracting the allowable expenses (inclusive of non-recoverable expenses and replacement reserves) from the effective gross income yields an estimate of net operating income. Rates and multipliers are used to convert income into an estimate of market value. These include income multipliers, overall capitalization rates, and discount rates. Each of these is used in specific applications. Rates and multipliers also vary between property types, location, quality, condition, design, age, and other variables. Application of the various rates and multipliers must be based on a thorough analysis of the market. These procedures are documented in the *Commercial Valuation Manual*.

Capitalization analysis is used in the income approach models. This methodology involves the capitalization of net operating income as an indication of market value for a specific property. Capitalization rates, both overall (going-in) cap rates for the direct capitalization method and terminal cap rates for discounted cash flow analyses, can be derived from the market. Sales of improved properties from which actual income and expense data are obtained provide a very good indication of what a specific market participant is requiring from an investment at a specific point in time. In addition, overall capitalization rates can be derived from the built-up method (band-of-investment). This method relates to satisfying the market return requirements of both the debt and equity positions of a real estate investment. This information is obtained from real estate, financial publications and dialogue with local market participants.

Rent loss concessions are made on specific properties with vacancy problems. A rent loss concession accounts for the impact of lost rental income while the building is moving toward stabilized occupancy. The rent loss is calculated by multiplying the rental rate by the percent difference of the property's stabilized occupancy and its actual occupancy. Build-out allowances (for first generation space or retrofit/second generation space, as appropriate) and leasing expenses are added to the rent loss estimate. The total adjusted loss from these real property operations is discounted using an acceptable risk rate. The discounted value, inclusive of rent loss due to extraordinary vacancy, build out allowances and leasing commissions, becomes the rent loss concession and is deducted from the value indication of the property at stabilized occupancy. A variation of this technique allows that for every year that the property's actual occupancy is less than stabilized occupancy a rent loss deduction may be estimated.

Sales Comparison Approach

Although all three of the approaches to value are based on market data, the sales comparison approach is most frequently referred to as the market approach. This approach is utilized not only for estimating land value, but also in comparing sales of similarly improved properties to each parcel on the appraisal roll. As previously discussed in the *Procedures for Collecting and Validating Data* section of this report, pertinent data from actual sales of properties, both vacant and improved, is sought throughout the year in order to obtain relevant information, which can be used in all aspects of valuation.

Sales of similarly improved properties can provide a basis for the depreciation schedules in the cost approach, rates and multipliers used in the income approach, and as a direct comparison in the sales comparison approach. Improved sales are also used in ratio studies, which afford the analyst an excellent means of judging the present level and uniformity of the appraised values.

Review of Estimates of Value

Field Review

The date of last inspection, extent of that inspection, and the HCAD appraiser/analyst responsible are listed in the CAMA system. If a property owner disputes the district's records concerning this data in a protest hearing, the property record may be altered based on the credibility of the evidence provided. Typically, a field review is requested to verify this evidence for next year's reappraisal. In addition, if a building permit is filed for a property indicating a change in characteristics, the property is added to a work file. Although every property cannot be inspected each year, each appraiser designates certain segments of their area of responsibility to conduct field checks. A reinspection program is in effect where each commercial account will be inspected every three years, in the field or in office. In the field, the appraiser will inspect the condition of the structures, and add or remove any structures, where applicable.

Due to time constraints, commercial analysts must prioritize their field review by specific use type. An effort is made to field review economic areas experiencing large numbers of remodels, renovations, or retrofits, changes in occupancy levels or rental rates, new leasing activity, new construction, or areas experiencing wide variations in sale prices. Additionally, the analyst frequently field reviews subjective data items such as building class, quality of construction, condition, and physical, functional and economic obsolescence factors contributing significantly to the market value of the property. In some cases, field reviews are warranted when sharp changes in occupancy or rental rate levels occur between building classes or between economic areas. Once preliminary estimates of value have been generated in these targeted areas, the analyst tests these estimates against their own appraisal judgment. While in the field, the analyst physically inspects sold and unsold properties for comparability and consistency of values.

Office Review

Office reviews are completed on properties not subject to field inspections and are performed in compliance with the guidelines contained in the *Commercial Valuation Manual*. This manual outlines the application of the three approaches to value and Section 4 of the manual details the derivation of final value estimates by property use type. This manual is rigorously maintained and was last updated in 2016.

Office reviews are typically limited by the data presented in valuation reports. Valuation reports summarize the pertinent data of each property as well as comparing the previous values (two year value

history) to the proposed value conclusions of the various approaches to value. These reports show proposed percentage value changes, property characteristics, income model attributes or overrides, economic factor (cost overrides) and special factors affecting the property valuation such as the last inspection date and a three years sales history (USPAP property history requirement for non-residential property). The analyst may review methodology for appropriateness to ascertain that it was completed in accordance with USPAP or more stringent statutory and district policies. This review is performed after preliminary ratio statistics have been applied. If the ratio statistics are generally acceptable overall, the review process is focused primarily on locating skewed results on an individual basis. Previous values resulting from protest hearings are individually reviewed to determine if the value remains appropriate for the current year based on market conditions. Each analyst's review is limited to properties in their area of responsibility by improved property type or geographic area (commercial vacant land).

Once the analyst is satisfied with the level and uniformity of value for each property within their area of responsibility, the estimates of value are designated as ready for noticing. Critical elements of the noticing process are low and high value edits set for each use type by division management. Each parcel is subjected to the value parameters appropriate for its use. If the parcel's total value exceeds the tolerance parameters, it fails the value edits and it is not available for noticing. Therefore, although the value estimates are determined in a computerized mass appraisal environment, value edits flags enable an individual parcel review of value anomalies before the estimate of value is released for noticing.

Statistical and Capitalization Analysis

Statistical analysis of final values is an essential component of quality assurance. This technique represents a comparison of the final value against the standard and provides a concise measurement of the appraisal performance. Statistical comparisons of many different standards are used, including sales of similar properties, the previous year's appraised value, audit trails, value change analysis and sales ratio analysis. Measures of central tendency and dispersion generated from sales ratios are available for each property type by land use code (LUC).

These summary statistics, including but not limited to, the weighted mean, standard deviation and coefficient of variation, provide the analysts an analytical tool by which to determine both the level and uniformity of appraised value of a particular property type. The level of appraised values can be determined by the weighted mean for individual properties within a specific type, and a comparison of weighted means can reflect the general level of appraised value. Review of the standard deviation and the coefficient of variation can discern appraisal uniformity within a specific property type.

An analyst reviews all commercial property types on an annual basis according to LUC and utilizing the sales ratio analysis tool. The first phase involves ratio studies, which compare the recent sales prices of properties to the appraised values of the sold properties. This set of ratio studies affords the analyst an excellent means of judging the present level of appraised value and uniformity of the appraised values. The analyst, based on the sales ratio statistics and designated parameters for valuation update, makes a preliminary decision as to whether the value level of a particular property type needs to be updated in an upcoming reappraisal, or whether the level of market value is acceptable.

Potential gross rent estimates, occupancy levels, secondary income, allowable expenses (inclusive of non-recoverable and replacement reserves), net operating income and capitalization rate and multipliers are continuously reviewed utilizing frequency distribution methods or other statistical procedures or measures. Income model conclusions are compared to actual information obtained on individual commercial properties during the hearings process as well as information from published sources and area vendors.

Appraisal Performance

Comparative Appraisal Analysis

The commercial division performs an average unit value comparison in addition to a traditional ratio study. These studies are performed on commercially-classified properties by property use type (such as apartment, office, retail and warehouse usage or special use). The objective of this evaluation is to determine appraisal performance of sold and unsold properties. The division examines average unit prices of sales and average unit appraised values of the same parcels and the comparison of average value changes of sold and unsold properties. These studies are conducted on substrata such as building class and on properties located within various economic areas. In this way, overall appraisal performance is evaluated geographically, by specific LUC to discern whether sold parcels have been selectively appraised. When sold parcels and unsold parcels are appraised equally, the average unit values are similar. These horizontal equity studies are performed prior to annual noticing.

Sales Ratio Study

The purpose of the district's commercial sales ratio study is to provide a statistical assessment of appraisal performance. The study determines the quality of the commercial property mass appraisal through statistical measures of appraisal level and uniformity. The study was conducted using the guidelines set forth in the IAAO current *Standard on Ratio Studies*. Properties within a school district are considered to be "similarly situated" for the purposes of Sec 41.43 (b) (2), Tax Code.

Texas does not require mandatory sales disclosure; consequently, the district does not have access to all property transactions within Harris County. The study sample is limited to sales information provided by commercial vendors or sales submitted voluntarily by the property owner. A ratio study was developed for each school district using the sales period from January 2013 to February 2016 in order to increase the representativeness of the sample (IAAO, *Fundamentals of Mass Appraisal*, p. 237). Sales prices were adjusted for changes in price levels from the time of the sale to the January 1, 2016 appraisal date. Time adjustments were applied to warehouses, retail, apartments, medical-related properties and offices. To the extent possible, data errors, tieback accounts, characteristic changes and other factors that might produce an erroneous sales ratio were identified and corrected. Sales identified as invalid transactions, such as atypical financing, sales between relatives, corporate affiliates and estate sales, and sales with partially complete new construction were excluded from the ratio study. The data was assumed to represent the distribution of properties within each school district.

The commercial median ratio was used to determine the appraisal level for Harris County and each ISD overall. Additionally, each ISD was stratified and analyzed by property category, including vacant land (state category "C/D"), multifamily (state category "B") and commercial improved (state category "F") to determine assessment levels and uniformity among major property groups. The study used the median value (non-parametric statistics) as a measure of central tendency because it is not influenced by extreme outliers. The coefficient of dispersion (COD), a measure of variability that relates to the distribution of the ratios, was also calculated for each ISD and individual property group.

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COMMERCIAL PROPERTY STAFF PROVIDING
SIGNIFICANT MASS APPRAISAL ASSISTANCE

NAME	TITLE	TDLR #	TYPE OF ASSISTANCE
Erika Nettles	Associate Chief Appraiser	68795	Supervises the Commercial Division. Maintains and updates income models and final valuation
Mike Mateja	Field Manager	70090	Supervises commercial property operations
Danielle Francois	Commercial Valuation Manager	74150	Supervises commercial property valuation
Lonnie Dale	Assistant Commercial Valuation Manager	63746	Supervises valuation of commercial property
Tracy Lensey	Valuation Supervisor	69255	Supervises valuation of vacant land
Doug Starustka	Senior Commercial Valuation Analyst	67019	Supervises valuation of retail properties, hotels, motels, malls & golf courses
Clayton Rogers	Senior Commercial Valuation Analyst	71491	Supervises valuation of warehouses
Van Nguyen	Senior Supervising Appraiser	63572	Supervises field appraisal staff
Charles Monteith	Senior Supervising Appraiser	72956	Supervises field appraisal staff
Gene Kotlyar	Appraisal Support Technician	68628	Maintains and updates income models
Chacko Mathai	Senior Commercial Valuation Analyst	69922	Supervises the sales staff

Agricultural Appraisal Section

Definition of Agricultural Value

Net to land values is the average annual net income that a class of land would be likely to have generated over a five-year period. The average net income is divided by the cap rate to arrive at the productivity value.

Scope of Work

The mass appraisal of agricultural (Ag) property includes all property classified as 1-d-1 and 1-d agricultural uses, which are appraised on the land's ability to produce income from agriculture or timber production. The mass appraisal of agricultural property involves applying similar values within the same agricultural categories and classes. In Harris County, this involves approximately 7,300 accounts. The agricultural appraisal section staff includes a manager, three appraisers and one clerical position.

The section appraises agricultural property according to the Tax Code guidelines. Appraisal values are calculated using the cash lease method. A cash lease (cash rent) is an agreement between landowner and tenant to lease property at a fixed cash payment. Fractional interest (UDI) or partial holdings of real property are appraised for the entire tract and value prorated based on eligibility and prorated interest. The section maintains and qualifies nominal value and special value accounts.

Procedure for Collecting and Validating Data

Approximately one-third of the 1-d-1 agricultural properties are required to reapply each year. Lease data is collected each year and used to calculate productivity values. A modified income approach to valuation is used in calculating these values.

Data Maintenance

The 2016 agricultural appraisal process began on September 1, 2015. Field review of all agricultural accounts required to reapply in 2016 were conducted. Applications were evaluated for approval or denial using field review information.

Appraisal Performance

The PTAD of the State Comptroller's Office regularly reviews all values and procedures used in the calculation of the agricultural values. Staff also routinely evaluates its own valuation procedures. Additionally, the Harris County Agricultural Advisory Board reviews our values and appraisal process.

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AGRICULTURAL APPRAISAL STAFF PROVIDING
SIGNIFICANT MASS APPRAISAL ASSISTANCE

NAME	TITLE	TDLR #	TYPE OF ASSISTANCE
Gary Underwood	Valuation Manager	68628	Supervises special valuation
Ron Stewart	Appraiser IV	62054	Verifies, maintains and conducts hearings on Ag Valuation
Melissa Brodie	Appraiser III	70640	Verifies, maintains and conducts hearings on Ag Valuation
Brian White	Appraiser II	60460	Verifies, maintains and conducts hearings on Ag Valuation

Business/Industrial Property Division

Industrial Valuation Section

Scope of Work

The Industrial Valuation Section (IVS) is responsible for developing fair and uniform market values for all improved industrial real property, general industrial tangible personal property and minerals in Harris County. The IVS appraises 6,024 parcels of industrial real property, 19,648 parcels of tangible personal property and 9,503 mineral and utility parcels.

Procedure for Collecting and Validating Data

The IVS and contract appraisal staff inspect assigned properties to obtain information about buildings, site improvements, equipment, and various items of personal property. They also use information provided by property owners about the cost to purchase, install, and construct items of real and personal property. The individual characteristics of the property are the primary factors that drive the appraised value.

An extended range of variations may exist within the same class of industrial property, and there are a number of property types within each industrial category. The division has adopted the guide for Marshall & Swift / Boeckh's Commercial Building System to standardize data collection for buildings assigned to appraisal staff. The data generated by these forms enables the appraiser to use the software to value industrial buildings.

Industrial personal property also consists of many different classes of assets with a wide range of variation within each class. The division has adopted the convention of listing assets and estimating effective age of assets in the field. The field listing is then compared with information furnished by property owners during the final valuation review.

As new facilities are built, appraisal personnel collect real and personal property data necessary to value the property. This information is updated each time the property is revisited. Building permit information is received from the cities and from the county when a facility is being built outside an incorporated city. Other sources of data include publications such as the Texas Register regarding waste control permits, legal notices published in newspapers, and various refining and chemical industry magazines regarding new construction.

Appraisal personnel periodically visit assigned plants. The frequency of the visit is determined by the nature of the business conducted at each facility. For example, refineries and chemical plants are continually changing or adding to processes to extract greater efficiencies or make new products, but machine shops may not add or remove equipment over a period of two or more years.

When conducting a field visit, the appraisers take with them historical data on the site improvements and previous listing of personal property at the facility. Changes to the existing structures and personal property are noted, and this information is used for value estimation purposes. If cost information for the real or personal property is supplied later, the field data can be compared to that information to judge the accuracy of the information.

The nature of the business and IVS staff resources determines which properties are valued by contract firms instead of district staff. New appraisers receive on-the-job training by accompanying experienced appraisers who have performed field visits and appraisal functions for a number of years. Each appraiser is responsible for the completeness and correctness of their valuation work, but a new appraiser is required to consult experienced appraisal staff regarding their value estimates.

Highest and Best Use Analysis

The current use of the property is generally the highest and best use of that property. Industrial facilities are most commonly located in areas that support industrial use. In areas where mixed use does occur, the appraiser estimates the effect of this factor on highest and best use.

Model Specification

Area Analysis

The scope of market forces affecting industrial products and the capital goods used in the production process tends to extend beyond regional considerations. The effects of information and transportation technology are such that most industrial market forces are measured globally. One exception to this general concept is the market for industrial land. The pricing of land tends to be closely tied to possible alternative uses in the area. For this reason, appraisers assigned to land valuation analyze market forces for specific areas and adjust land value schedules appropriately.

Neighborhood Analysis

Neighborhood analysis is not performed due to the non-homogeneous nature of the property type. Industrial properties do not have the type of generic uniformity that is appropriate for neighborhood models.

Market Analysis

Market analysis is the basis for finalizing value estimates on industrial properties. Even though many industrial properties are unique in nature, the market for this property type is analyzed to see how the value of similar properties are affected by market forces. Industrial properties, such as machine shops, have many similar facilities, and may be compared to the subject property in terms of type and size of equipment, type of property fabricated or serviced at the subject facility, and other factors. Those similarities help the appraiser estimate the value of the subject property. Some facilities, such as specialty chemical plants are so unique in nature that the appraiser must use the closest available plant in terms of output quantity, type of product manufactured, and other factors to estimate the value of the subject property.

Many industrial properties use similar building and type of manufacturing or service equipment. However, the manner in which the entire business operation is put together makes that particular facility unique. Information from similar businesses are used to evaluate the real and personal property values at a particular business, but the individual characteristics of the business determines the value estimation.

Many of the buildings encountered at industrial facilities are generic in construction, such as pre-engineered metal buildings. The cost per square foot to construct these type structures can be used to

estimate values at facilities that have similarly constructed buildings. However, the building as constructed will have differences that must be taken into account when estimating the final value of the property being reviewed.

A similar analysis is used for personal property. Many personal property items, such as furniture and fixtures, computers, and even machinery and equipment are generic in construction, but individual characteristics that affect value, such as useage, environment where used, and level of care will have an effect on the final value estimation. When cost data for this property type is available and considered reliable, it is used for value estimation purposes at other plant facilities. However, on-site inspection and information provided by the property owner will affect the final value.

Model Calibration

The schedules used are an integration of Marshall & Swift/Boeckh Commercial Building Valuation System for real property improvements. The real property valuation schedules and the IVS Tank Farm Database are updated annually through data supplied by Marshall & Swift/Boeckh. The valuation schedule incorporated into the IVS Industrial Plant Database is updated annually using a calculated index factor compiled from data in Chemical Engineering Magazine.

HCAD develops schedules based on indexed M&S depreciation factors for use in the valuation of all business and industrial personal property. These schedules are updated annually by the appraisal staff. The contract appraisal firms use similar schedules and methodology based on their experience in valuing real and personal property.

Review of Estimates of Value

Field Review

The appraisal staff review their assigned real and personal property accounts annually where there is evidence of change. Where there is no change, these accounts are revisited on a two to three year cycle. Certain properties are always reviewed annually because past experience shows that changes are occurring continually in the real or personal property at that facility. Properties assigned to contract appraisal firms are reviewed annually because changes also occur regularly at these facilities.

The results of prior year hearings and the existence of building permits frequently trigger a field visit. Evidence is frequently presented during a protest hearing that supports a value adjustment. The issues presented in the hearing are subsequently field checked to determine if the influences will be on-going and warrant permanent value adjustment or are transitory and permanent adjustment is not warranted. This information is recorded to assist appraisers during valuation. Building permits must be field checked to determine effects on existing structures. New construction is noted and the information necessary to value the structure is recorded. Additionally, any structure demolition is noted and the improvement value adjusted accordingly. Part of the field review includes noting any land characteristics that would affect the land value. The district appraisal staff values all land for the properties over which it has responsibility, including those properties assigned to contract appraisal firms. The contract appraisal firms advise the IVS of any characteristics that would affect the value of the land associated with that assigned facility. The land values used for industrial properties are coordinated with the CPD to maintain continuity of land values.

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Results of 2016 Field Review

Field review of real and personal property is generally conducted on a two to three year cycle. The accounts assigned to contract appraisal firms are field reviewed annually. The district and contract appraisal staff field visited 1,241 real property accounts for 2016. The accounts inspected were those with building permits, tax abatements, and issues raised during 2015 hearings. Tax abatement-related accounts have a yearly field visit requirement regardless of construction at the facility. Mineral and utility properties are not field reviewed because it is not practical or feasible to physically visit every electric substation or mineral lease, or follow every pipeline through the county. These properties are office reviewed as stated in office review results below.

Field review also included the inspection of personal property, which occurs when visiting the real property accounts, or as independent visits when the real property is not valued by the industrial section, such as a warehouse or pipe yard. As of the date of this report, the district and contract appraisal staff field have visited 1,229 personal property accounts for 2016.

Office Review

All properties not subject to field review are reviewed in the office by the appraisers assigned to specific real or personal properties. The office review relies on historical information in the real or personal property file as the basis for estimating the value to be placed on the property for the current tax year.

When valuing real property, the characteristics of the property being reviewed were the driving force in value estimation. Experience in valuing other real property, such as a similar building elsewhere, helps the appraiser decide the estimated value to be placed on the subject improvements.

When valuing personal property, the type of furniture, equipment, and computers will be used along with any cost data provided by the property owner to estimate the value. Experience in valuing similar property at other facilities helps the appraiser estimate the value of the subject facility. Individual characteristics of the property, such as usage and maintenance will have a bearing on the value calculated by use of district schedules.

Results of 2016 Office Review

The district and contract appraisal staff conduct office review on both field-inspected and non-field-inspected real property. The office review consists of determination of the proper value for land, any new construction, and the depreciation to apply to non-field visited accounts using age of construction, building condition or facility usage. As of the date of this report, there are 6,024 industrial real property parcels that will be reviewed by district or contract appraisal staff.

The district and contract appraisal staff conduct office review on both field-inspected and non-field-inspected industrial personal property. The office review consists of determining the active status of the account and estimating the value using field collected information and information from the property owner. As of the date of this report, there are 15,204 industrial personal property accounts in state category L2 and 9 commercial aircraft accounts in state category L1 that will be reviewed by district or contract appraisal staff. These L2 accounts include, warehouse inventories, tank farm inventories, pipe yard inventories, industrial facilities, and communication properties.

There are an additional 9,503 mineral (state category G) and utility (state category J) accounts that will be reviewed by contract appraisal staff. Active status for the account was determined and the property value estimate was determined using information from the property owner and state agencies for mineral and utility properties.

Appraisal Performance

Sales Ratio Study

Typically, there are not enough sales of industrial properties to show representativeness of that class of property in a ratio study. Ratio studies of industrial properties usually have to rely on independent appraisals as an indicator of market values.

Comparative Appraisal Analysis

This type of analysis is usually not done on industrial properties due to the unique nature of the property, and also, because of time and budget constraints regarding available appraisal staff. A jurisdiction challenge filed with the ARB is generally the only reason for an analysis of this nature. If a jurisdiction challenge is received on a category of property, the appraisers assigned to those accounts will research the appraisal roll to see what other similar properties exist. The real property values can be compared on an average value per square foot of structure basis, but the differences from one facility to another must be carefully compared because it is unlikely that two different facilities are going to build like improvements and use them in similar ways. Similarly, the personal property values can be compared per category, such as furniture and fixtures, machinery and equipment, but the same comparison of the type and use of the property must be examined to ensure property comparability.

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INDUSTRIAL PROPERTY STAFF PROVIDING
SIGNIFICANT MASS APPRAISAL ASSISTANCE

NAME	TITLE	TDLR #	TYPE OF ASSISTANCE
Charles E. Stone, Jr.	Associate Chief Appraiser	64530	Managing and coordinating appraisals in the IVS
Adam Bogard	Industrial Manager	71162	Manager of IVS appraisals
Paul Wright	Valuation Supervisor	69925	Supervisor of IVS appraisals
Hal Long	Project Specialist	67823	Research and development
Hartley Chevalier	Engineer	68785	Appraises industrial plants and personal property
Iqbal Dadabhoy	Engineer	71781	Appraises industrial plants and communications equipment
Robbie Moore	Senior Valuation Analyst	72815	Appraises industrial plants and personal property
Mike Smith	Senior Valuation Analyst	16580	Appraises industrial plants and land
Mary Jo Kieschnick	Senior Valuation Analyst	70602	Appraises stored products and personal property
Richard Miranda	Valuation Analyst	72684	Appraises industrial plants and personal property
Phebbie Nguyen	Valuation Analyst	73044	Appraises industrial plants and personal property
Hollie Dunlap	Valuation Analyst	72808	Appraises industrial plants and personal property
Sangeeta Dargan	Valuation Analyst	72494	Appraises industrial plants and personal property
Tonya Nguyen	Valuation Analyst	72685	Appraises industrial plants and personal property
Dalia Bernal	Valuation Analyst	72802	Appraises industrial plants and personal property
Suzanne Shell	Valuation Analyst	72816	Appraises industrial plants and personal property
Errol Daniels	Valuation Analyst	73611	Appraises industrial plants and personal property
Diane Malone	Part-Time Employee	66175	Administer Tax Abatements / COH Industrial District Accts

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INDUSTRIAL CONTRACTORS PROVIDING
SIGNIFICANT MASS APPRAISAL ASSISTANCE

Pritchard & Abbott

NAME	TITLE	TDLR #	TYPE OF ASSISTANCE
Shannon Stary	Pritchard & Abbott, Houston District Mgr.	68599	Minerals, industrial, utility and personal property appraiser
Jason S. Driskell	Pritchard & Abbott, Asst. District Mgr.	70598	Minerals, industrial, utility and personal property appraiser
Cindy Fox	Pritchard & Abbott, Appraiser	65426	Mineral appraiser
Sandra Villarreal	Pritchard & Abbott, Appraiser	71839	Mineral appraiser
Dianna Miller	Pritchard & Abbott, Appraiser	69719	Mineral appraiser
Joel Fischer	Pritchard & Abbott, Appraiser	72810	Industrial, utility and personal property appraiser
Wesley Gilbert	Pritchard & Abbott, Appraiser	72486	Industrial, utility and personal property appraiser
Coleman Chism	Pritchard & Abbott, Appraiser	74628	Industrial, utility and personal property appraiser
David Peletz	Pritchard & Abbott, Appraiser	74710	Industrial, utility and personal property appraiser
Andrew Mize	Pritchard & Abbott, Appraiser	72992	Industrial, utility and personal property appraiser
Janet Doyle	Pritchard & Abbott, Appraiser	72297	Industrial, utility and personal property appraiser
Shannon Evans	Pritchard & Abbott, Appraiser	74490	Mineral appraiser
Christopher Palermo	Pritchard & Abbott, Appraiser	71361	Industrial, utility and personal property appraiser
Melodee Arrendell	Pritchard & Abbott, Appraiser	68409	Industrial, utility and personal property appraiser
Rodney Kret	Pritchard & Abbott, Appraiser	63468	Minerals, industrial, utility and personal property appraiser
Wayne Frazell	Pritchard & Abbott, Appraiser	71278	Industrial, utility and personal property appraiser
Victor Henderson	Pritchard & Abbott, Appraiser	645	Minerals, industrial, utility and personal property appraiser
Alvin Allison	Pritchard & Abbott, Appraiser	64220	Minerals, industrial, utility and personal property appraiser

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Capitol Appraisal

NAME	TITLE	TDLR #	TYPE OF ASSISTANCE
Jon Neely	Capitol Appraisal, President	16216	Appraises all property types
Gregg Davis	Capitol Appraisal, Appraiser	71552	Appraises industrial properties
Sandra Fain	Capitol Appraisal, Appraiser	74641	Appraises industrial properties
Dave Popelar	Capitol Appraisal, Appraiser	71614	Appraises refineries & chemical plants
Noel Wilcoxson	Capitol Appraisal, Appraiser	71581	Appraises refineries, chemical plants, olefins and co-generation
Alfonso Porras	Capitol Appraisal, Appraiser	72391	Appraises utility properties
Kenneth Hitt	Capitol Appraisal, Appraiser	71452	Appraises underground storage properties

Landrum & Associates

NAME	TITLE	TDLR #	TYPE OF ASSISTANCE
Hugh L. Landrum, Jr.	Landrum & Associates, President	67041	Appraises chemical plants & personal property
Tracey Foster	Landrum & Associates, Vice President/General Counsel	68689	Appraises mineral properties
Doug Warren	Landrum & Associates, Appraiser	66961	Appraises industrial plants & personal property
Max Yu	Landrum & Associates, Appraiser	74084	Appraises industrial plants & personal property
Kirk Slaughter	Landrum & Associates, Appraiser	74083	Appraises industrial plants & personal property
Erik Ontiveros	Landrum & Associates, Appraiser	74753	Appraises industrial plants & personal property

Business/Industrial Property Division

Business Personal Property Section

Scope of Work

The Personal Property Section (PPS) is responsible for developing fair and uniform market values for business personal property located within Harris County. The eight (8) different property groups appraised by the section are as follows.

Property Name	Property Group	State Class	Units
Business Personal Property	A	L1	117,447
Vessels	F	L1	130
Private Aircraft	H	L1	322
Leased Equipment	I	L1	772
Dealer Inventory	Q	S1	3,231
Billboards	S	L1	20
Vehicles	T	L1	49,628
Multi-Locations	Z	L1	192

Leased assets and multi-location items combined have 181,210 distinct locations with 1,059,151 line items in Harris County. Vehicle accounts have 319,983 line items, vessel accounts have 1,841 line items and business aircraft accounts have 990 line items in Harris County.

Procedure for Collecting and Validating Data

A common set of data characteristics for each personal property account in Harris County is collected in the field and data entered to the HCAD tangible computer system. The property characteristic data drives the system. The field staff, consisting of seventeen appraisers and a supervising appraiser, collects the field data.

Personal property data collection procedures are published and distributed to all appraisers involved in the appraisal and valuation of personal property. The appraisal procedures are reviewed and revised to meet the changing requirements of field data collection. The most recent revision of the personal property data collection procedures was for 2015.

Sources of Data

Business Personal Property

In addition to data collected and verified by the field appraisers, state sales tax listings and the assumed names database from the county clerk's office are also researched to discover personal property. Tax assessors, city and local newspapers, business journals, and the public often provide the district information regarding new personal property and other relevant facts related to property valuation.

Transportation (Vehicles, Vessels, and Business Aircraft)

An outside vendor provides HCAD with a list of business vehicles within Harris County. The vendor develops this listing from the Texas Department of Motor Vehicles (TxDMV) Title and Registration Division records. Vessel information is obtained from US Coast Guard registration information for all registered vessels. Vessels with a hailing port in Harris County are identified. Aircraft information is downloaded from the Federal Aviation Administration (FAA) website, with those hangared in Harris County identified.

HCAD also uses national and regional publications to research value benchmarks. Other sources of data include property owner renditions and field inspections.

Leased and Multi-Location Assets

The primary source of leased and multi-location assets is property owner renditions. Data may also be provided in reports of field inspections.

Highest and Best Use Analysis

The highest and best use of property is the reasonable and probable use that supports the highest present value as of the date of the appraisal. The highest and best use must be physically possible, legal, financially feasible, and productive to its maximum. The highest and best use of personal property is normally its current use.

Model Specification

SIC Code Analysis

Four digit numeric codes, called Standard Industrial Classification (SIC) codes, were developed by the federal government to identify business entities having common attributes. These classifications are used by HCAD as a way to delineate personal property by business type. HCAD has further stratified these codes by adding alpha suffixes to SIC codes in order to group business types that have similar personal property characteristics.

SIC code identification and delineation is the cornerstone of the personal property valuation system at the district. All of the personal property analysis work done in association with the personal property valuation process is SIC code specific. There are 1,083 personal property SIC codes. SIC codes are delineated based on observable aspects of homogeneity and are periodically reviewed to determine if further stratification is warranted.

Model Calibration

Cost Schedules

Analysts build cost schedules based on SIC codes. Cost data from property owner renditions, hearings, state schedules, and published cost guides are utilized to develop these cost schedules. The cost schedules

are reviewed as necessary to conform to changing market conditions. The schedules are typically in a price per square foot format, but some SIC codes are in a price per unit format, such as per room for hotels.

Statistical Analysis

Summary statistics, including the median and mean, provide an analytical tool by which to determine the level of appraised value by SIC code. Review of the standard deviation or coefficient of dispersion can discern appraisal uniformity within SIC codes.

Final Models: Depreciation Schedule and Trending Factors

Business Personal Property

The primary approach to the valuation of business personal property is the cost approach. The replacement cost new (RCN) is developed either from property owner reported historical cost or from existing valuation models. The trending factors used to develop RCN are based on the national average for equipment as published in the October report of the *Marshall Valuation Service* by Marshall & Swift, L. P. The percent good depreciation factors are based on the depreciation schedules for furniture, fixtures, and equipment as published in the *Marshall Valuation Service* for October of each year. RCN is calculated as follows:

$$RCN = HISTORICAL\ COST \times INDEX\ FACTOR$$

RCN and percent good depreciation factors are used to develop replacement cost new less depreciation (RCNLD) value estimates as follows:

$$MARKET\ VALUE\ ESTIMATE = RCN \times PERCENT\ GOOD\ FACTOR$$

This mass appraisal percent good depreciation schedule is used to ensure that estimated values are uniform and consistent within the market.

Computer Assisted Personal Property Appraisal (CAPP)

The CAPP valuation process has two main objectives: 1) analyze and adjust existing SIC models; and 2) develop new models for business classifications not previously integrated into CAPP. The delineated sample is reviewed for accuracy of SIC code, units (typically square foot), field data, and original cost information. Models are created and/or refined using actual original cost data to derive a typical RCN per unit for a specific category of assets. The RCN per unit is depreciated by the estimated age using factors that have been averaged and trended from the fixtures and equipment depreciation tables of the *Marshall Valuation Service*.

The data sampling process is conducted in the following order: 1) prioritize SIC codes for model analysis; 2) compile data and develop reports; and 3) field check selected samples. The models are built and adjusted using developed software (TG_MVAT). The models are then tested against the previous year's data. The typical RCN per unit is determined by a statistical analysis of the available data.

The CAPP environment includes 267 models for business groups identified by most common SIC codes in the business population. CAPP model values are used in the general business personal property valuation program to estimate the value of new accounts for which no property owner's rendition is filed.

Model values are also used to establish tolerance parameters for testing valuation of property for which prior year data exist or for which current year rendered information is available. The calculated current or prior year value is compared to the indicated model value by a valuation program. If the value tested is within an established tolerance range of the model value, the account passes that range check and moves to the next valuation step. If the account fails the tolerance range check, it is flagged for individual review. Allowable tolerance ranges may be adjusted from year to year depending on the analysis of the results from the prior year.

Transportation (Vehicles, Vessels and Business Aircraft)

Value estimates for vehicles are provided by an outside vendor and are based on data furnished by National Market Reports. Vehicle valuation is conducted by a valuation program which selects the value of each vehicle based on an identified hierarchy of values which includes depreciated cost, vendor value, and rendered value among the selections.

Vehicles, vessels, and business aircraft are manually valued using depreciated cost or nationally recognized valuation guides such as: NADA, National Auto Research, Aircraft blue book, etc. to develop the estimate of market value.

Leased and Multi-Location Assets

Leased and multi-location assets are valued using the index factor and percent good depreciation schedules mentioned above. If the asset to be valued in this category is a vehicle, then published book values or similar values provided by a vehicle data vendor are adjusted according to current economic criteria.

Review of Estimates of Value

Business Personal Property

A valuation computer program identifies accounts in need of review based on a variety of conditions. Property owner renditions, accounts with field or other data changes, accounts with prior hearings, new accounts, and SIC cost table changes are all considered. The accounts are processed by a valuation program and pass or fail preset tolerance parameters by comparing appraised values to prior year and model values. Analysts individually review accounts that fail the tolerance parameters.

Transportation (Vehicles, Vessels and Business Aircraft)

Vehicle, vessel and aircraft master files are loaded into the system and items are programmatically matched to existing accounts. The items remaining after the matching process are sorted by owner name, prioritized by the number of items owned, and a report is created for each type. Many of these items are manually matched to existing accounts or new accounts are created as needed. A pre-populated “discovery” rendition is sent to owners of items not matched to existing accounts. Accounts are created, as necessary, from responses to these “discovery” renditions.

Leased and Multi-Location Accounts

Leasing and multi-location accounts, reported by the property owner electronically with a large volume of assets are loaded programmatically. Accounts that render by hard copy are keyed manually. After matching and data entry, reports are generated and reviewed by an appraiser.

Field Review

The appraisal staff reviews personal property accounts in an effort to review all accounts within a three-year cycle. In addition to the annual field review, field checks are conducted on accounts identified as a result of discovery through hearings, business publications, and various correspondence.

Results of 2016 Field Review

The field staff plan to inspect 58,150 personal property accounts for 2016. As of April 5, 2016, 41,033 accounts have been inspected. A total of 4,734 new accounts have been set up from the field effort to date with preliminary field values placed on these accounts.

Appraisal Performance

The Personal Property Ratio Study will be conducted in June once the majority of renditions have been filed. The results will be available as a supplement to the Mass Appraisal Report.

Harris County Appraisal District
2016 Mass Appraisal Report

PERSONAL PROPERTY STAFF AND CONTRACTORS
PROVIDING SIGNIFICANT MASS APPRAISAL ASSISTANCE

NAME	TITLE	TDLR #	TYPE OF ASSISTANCE
Charles E. Stone, Jr.	Associate Chief Appraiser	64530	Managing and coordinating appraisals in the personal property section
Susanne Alaman	Personal Property Manager	65922	Manager of Personal Property Valuation
Hal Long	Project Specialist	67823	Research and development
Lauren Tulsa	Valuation Analyst	73502	Develop and refine models, update depreciation schedules and value accounts
Pauline Yu	Senior Valuation Analyst	72833	Develop and refine models, update depreciation schedules, and value accounts
Owen Mauzy	Senior Valuation Analyst	71439	Develop and refine models, update depreciation schedules, and value accounts
Jennifer Contreras	Valuation Analyst	73167	Develop and refine models, update depreciation schedules, and value accounts
Kenyetta Blocker	Valuation Analyst	71838	Develop and refine models, update depreciation schedules, and value accounts
Maria Garza	Valuation Analyst	73259	Develop and refine models, update depreciation schedules, and value accounts
Marycella Hernandez	Valuation Analyst	73202	Develop and refine models, update depreciation schedules, and value accounts
Laurie Gillespie	Valuation Analyst	72182	Develop and refine models, update depreciation schedules, and value accounts
Thien Tran	Valuation Analyst	74449	Develop and refine models, update depreciation schedules, and value accounts
Osaretin Osague	Valuation Analyst	74500	Develop and refine models, update depreciation schedules, and value accounts
Claude B. Hale	Valuation Supervisor	73736	Supervised Valuation Analyst Group
Barbara O'Neal	Senior Supervising Appraiser	69897	Supervised multi-location valuation and vehicle valuation
Claudia Mendoza	Field Supervisor	72499	Supervised field discovery group
Stephen McDowell	Contractor	N/A	Provided current vehicle valuation data