



2023

ARAPAHOE COUNTY PROPERTY ASSESSMENT STUDY





September 15, 2023

Ms. Natalie Castle
Director of Research
Colorado Legislative Council
Room 029, State Capitol Building
Denver, Colorado 80203

RE: Final Report for the 2023 Colorado Property Assessment Study

Dear Ms. Castle:

East West Econometrics - Audit Division is pleased to submit the Final Reports for the 2023 Colorado Property Assessment Study.

These reports are the result of two analyses: A procedural audit and a statistical audit.

The procedural audit examines all classes of locally assessed property. It specifically looks at how the assessor develops economic areas, confirms and qualifies sales, develops time adjustments and performs periodic physical property inspections. The audit reviews the procedures for determining subdivision absorption and subdivision discounting. Valuation methodology is examined for residential properties and commercial properties. Procedures are reviewed for producing mines, oil and gas leaseholds and lands producing, producing coal mines, producing earth and stone products, severed mineral interests, and non-producing patented mining claims.

Statistical audits are performed on vacant land, residential properties, commercial/industrial properties and agricultural land. A statistical analysis is performed for personal property compliance on the eleven largest counties: Adams, Arapahoe, Boulder, Denver, Douglas, El Paso, Jefferson, Larimer, Mesa, Pueblo and Weld. The remaining counties receive a personal property procedural study.

East West Econometrics – Audit Division appreciates the opportunity to be of service to the State of Colorado. Please contact us with any questions or concerns.

A handwritten signature in black ink that reads "Harry J. Fuller".

Harry J. Fuller
Project Manager
East West Econometrics – Audit Division

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INTRODUCTION



Colorado

The State Board of Equalization (SBOE) reviews assessments for conformance to the Constitution. The SBOE will order revaluations for counties whose valuations do not reflect the proper valuation period level of value.

The statutory basis for the audit is found in C.R.S. 39-1-104 (16)(a)(b) and (c).

The legislative council sets forth two criteria that are the focus of the audit group:

To determine whether each county assessor is applying correctly the constitutional and statutory provisions, compliance requirements of the State Board of Equalization, and the manuals published by the State Property Tax Administrator to arrive at the actual value of each class of property.

To determine if each assessor is applying correctly the provisions of law to the actual values when arriving at valuations for assessment of all locally valued properties subject to the property tax.

The property assessment audit conducts a two-part analysis: A procedural analysis and a statistical analysis.

The procedural analysis includes all classes of property and specifically looks at how the assessor develops economic areas, confirms and qualifies sales, and develops time adjustments. The audit also examines the procedures for adequately discovering, classifying and valuing agricultural outbuildings, discovering subdivision build-out and subdivision discounting procedures. Valuation methodology for vacant land, improved residential properties and commercial properties is examined. Procedures for producing mines, oil and gas leaseholds and lands producing, producing coal mines, producing earth and stone products, severed mineral interests and non-producing patented mining claims are also reviewed.

Statistical analysis is performed on vacant land, residential properties, commercial industrial properties, agricultural land, and personal property. The statistical study results are compared with State Board of Equalization compliance requirements and the manuals published by the State Property Tax Administrator.

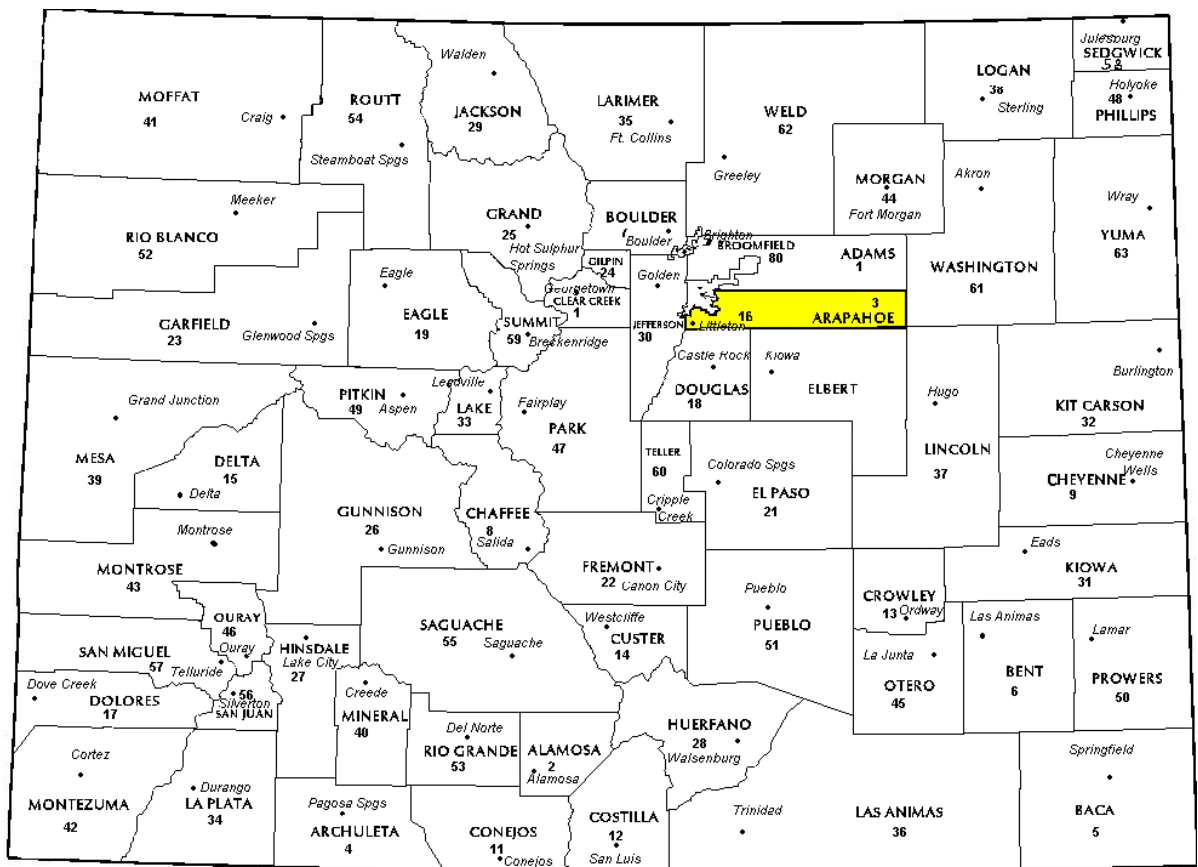
East West Econometrics Audit has completed the Property Assessment Study for 2023 and is pleased to report its findings for Arapahoe County in the following report.

REGIONAL/HISTORICAL SKETCH OF ARAPAHOE COUNTY

Regional Information

Arapahoe County is located in the Front Range region of Colorado. The Colorado Front Range is a colloquial geographic term for the populated areas of the State that are just east of the foothills of the Front Range. It includes

Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, El Paso, Jefferson, Larimer, Pueblo, and Weld counties.



Historical Information

Arapahoe County has approximately 798.1 square miles and an estimated population of approximately 656,590 people with 716.7 people per square mile, according to the U.S. Census Bureau's 2020 estimated census data. This represents a 14.8 percent change from April 1, 2010 to July 1, 2019.

Arapahoe County is the third most populous of the 64 Colorado counties. The county seat is Littleton and the most populous city is Aurora. Arapahoe County is part of the Denver-Aurora Metropolitan Statistical Area and the Denver-Aurora-Boulder Combined Statistical Area. Arapahoe County calls itself "Colorado's First County" since its origins predate the Pike's Peak Gold Rush.

On August 25, 1855, the Kansas Territorial Legislature created a huge Arapahoe County to govern the entire western portion of the Territory of Kansas. The county was named for the Arapaho Nation of Native Americans that lived in the region.

In July 1858, gold was discovered along the South Platte River in Arapahoe County (in present day Englewood). This discovery precipitated the Pike's Peak Gold Rush. Many residents of the mining region felt disconnected from the remote territorial governments of Kansas and Nebraska, so they voted to form their own Territory of Jefferson on October 24, 1859. The following month, the Jefferson Territorial Legislature organized 12 counties for the new territory, including a new

Arapahoe County. Denver City served as the county seat of Arapahoe County.

The Jefferson Territory never received federal sanction, but on February 28, 1861, U.S. President James Buchanan signed an act organizing the Territory of Colorado. On November 1, 1861, the Colorado General Assembly organized the 17 original counties of Colorado including a new Arapahoe County. Arapahoe County originally stretched from the line of present-day Sheridan Boulevard 160 miles east to the Kansas state border, and from the line of present-day County Line Road 30 miles north to the Parallel 40^o North (168th Avenue). Denver City served as the county seat of Arapahoe County until 1902.

In 1901, the Colorado General Assembly voted to split Arapahoe County into three parts: a new consolidated City and County of Denver, a new Adams County, and the remainder of the Arapahoe County to be renamed South Arapahoe County. A ruling by the Colorado Supreme Court, subsequent legislation, and a referendum delayed the reorganization until November 15, 1902. Governor James Bradley Orman designated Littleton as the temporary county seat of South Arapahoe County. On April 11, 1903, the Colorado General Assembly changed the name of South Arapahoe County back to Arapahoe County. On November 8, 1904, Arapahoe County voters chose Littleton over Englewood by a vote of 1310 to 829 to be the permanent county seat.

(Wikipedia.org)

RATIO ANALYSIS

Methodology

All significant classes of property were analyzed. Sales were collected for each property class over the eighteen month period from January 1, 2021 through June 30th, 2022. Property classes with less than thirty sales had the sales period extended in six month increments up to an additional forty-two months. If this extended sales period did not produce the minimum thirty qualified sales, the Audit performed supplemental appraisals to reach the minimum.

Although it was required that we examine the median and coefficient of dispersion for all counties, we also calculated the weighted mean and price-related differential for each class of property. Counties were not passed or failed by these latter measures, but were counseled if there were anomalies noted during our analysis. Qualified sales were based on the qualification code used by each county, which were typically coded as either “Q” or “C.” The ratio analysis included all sales. The data was trimmed for counties with obvious outliers using IAAO standards for data analysis. In

every case, we examined the loss in data from trimming to ensure that only true outliers were excluded. Any county with a significant portion of sales excluded by this trimming method was examined further. No county was allowed to pass the audit if more than 5% of the sales were “lost” because of trimming.

All sixty-four counties were examined for compliance on the economic area level. Where there were sufficient sales data, the neighborhood and subdivision levels were tested for compliance. Although counties are determined to be in or out of compliance at the class level, non-compliant economic areas, neighborhoods and subdivisions (where applicable) were discussed with the Assessor.

Data on the individual economic areas, neighborhoods and subdivisions are found in the STATISTICAL APPENDIX.

Conclusions

For this final analysis report, the minimum acceptable statistical standards allowed by the State Board of Equalization are:

ALLOWABLE STANDARDS RATIO GRID		
Property Class	Unweighted Median Ratio	Coefficient of Dispersion
Commercial/Industrial	Between .95-1.05	Less than 20.99
Residential Condominium	Between .95-1.05	Less than 15.99
Residential	Between .95-1.05	Less than 15.99
Vacant Land	Between .95-1.05	Less than 20.99

The results for Arapahoe County are:

Arapahoe County Ratio Grid					
Property Class	Number of Qualified Sales	Unweighted Median Ratio	Price Related Differential	Coefficient of Dispersion	Time Trend Analysis
Commercial/Industrial	443	0.976	1.041	12.3	Compliant
Residential	29,211	1.000	1.018	2.6	Compliant
Vacant Land	163	1.000	1.030	10	Compliant

After applying the above described methodologies, it is concluded from the sales ratios that Arapahoe County is in compliance

with SBOE, DPT, and Colorado State Statute valuation guidelines.

Recommendations

None

TIME TRENDING VERIFICATION

Methodology

While we recommend that counties use the inverted ratio regression analysis method to account for market (time) trending, some counties have used other IAAO-approved methods, such as the weighted monthly median approach. We are not auditing the methods used, but rather the results of the methods used. Given this range of methodologies used to account for market trending, we concluded that the best validation method was to examine the sale ratios for each class across the appropriate sale period. To be specific, if a county has considered and adjusted correctly for market trending, then the sale ratios should remain stable (i.e. flat) across the sale period. If a residual market trend is detected, then the county may or may not have addressed market trending adequately, and a further examination

is warranted. This validation method also considers the number of sales and the length of the sale period. Counties with few sales across the sale period were carefully examined to determine if the statistical results were valid.

Conclusions

After verification and analysis, it has been determined that Arapahoe County has complied with the statutory requirements to analyze the effects of time on value in their county. Arapahoe County has also satisfactorily applied the results of their time trending analysis to arrive at the time adjusted sales price (TASP).

Recommendations

None

SOLD / UNSOLD ANALYSIS

Methodology

Arapahoe County was tested for the equal treatment of sold and unsold properties to ensure that “sales chasing” has not occurred. The auditors employed a multi-step process to determine if sold and unsold properties were valued in a consistent manner.

We test the hypothesis that the assessor has valued unsold properties consistent with what is observed with the sold properties based on several units of comparison and tests. The units of comparison include the actual value per square foot and the change in value from the previous base year period to the current base year. The first test compares the actual value per square foot between sold and unsold properties by class. The median and mean value per square foot is compared and tested for any significant difference. This is tested using non-parametric methods, such as the Mann-Whitney test for differences in the distributions or medians between sold and unsold groups. It is also examined graphically and from an appraisal perspective. Data can be stratified based on location and subclass. The second test compares the difference in the median change in value from the previous base year to the current base year between sold and unsold properties by class. The same combination of non-parametric and appraisal testing is used as with the first test. A third test employing a valuation model testing a sold/unsold binary variable while controlling for property attributes such as location, size, age and other attributes. The model determines if the sold/unsold variable is statistically and empirically significant. If all three tests indicate a significant difference between sold and unsold properties for a given class, the Auditor may meet with the county to determine if sale chasing is actually occurring,

or if there are other explanations for the observed difference.

If the unsold properties have a higher median value per square foot than the sold properties, or if the median change in value is greater for the unsold properties than the sold properties, the analysis is stopped and the county is concluded to be in compliance with sold and unsold guidelines. All sold and unsold properties in a given class are first tested, although properties with extreme unit values or percent changes can be trimmed to stabilize the analysis. The median is the primary comparison metric, although the mean can also be used as a comparison metric if the distribution supports that type of measure of central tendency.

The first test (unit value method) is applied to both residential and commercial/industrial sold and unsold properties. The second test is applied to sold and unsold vacant land properties. The second test (change in value method) is also applied to residential or commercial sold and unsold properties if the first test results in a significant difference observed and/or tested between sold and unsold properties. The third test (valuation modeling) is used in instances where the results from the first two tests indicate a significant difference between sold and unsold properties. It can also be used when the number of sold and unsold properties is so large that the non-parametric testing is indicating a false rejection of the hypothesis that there is no difference between the sold and unsold property values.

These tests were supported by both tabular and graphics presentations, along with written documentation explaining the methodology used.

Sold/Unsold Results	
Property Class	Results
Commercial/Industrial	Compliant
Residential	Compliant
Vacant Land	Compliant

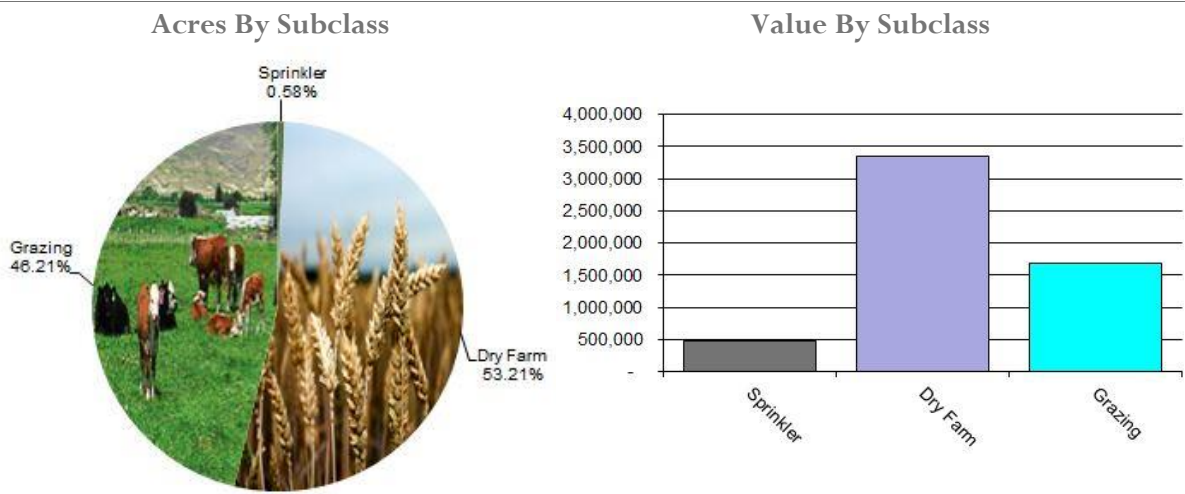
Conclusions

After applying the above described methodologies, it is concluded that Arapahoe County is reasonably treating its sold and unsold properties in the same manner.

Recommendations

None

AGRICULTURAL LAND STUDY



Agricultural Land

County records were reviewed to determine major land categories such as irrigated farm, dry farm, meadow hay, grazing and other lands. In addition, county records were reviewed in order to determine if: Aerial photographs are available and are being used; soil conservation guidelines have been used to classify lands based on productivity; crop rotations have been documented; typical commodities and yields have been determined; orchard lands have been properly classified and valued; expenses reflect a ten year average and are typical landlord expenses; grazing lands have been properly classified and valued; the number of acres in each class and subclass have been determined; the capitalization rate was properly applied. Also, documentation was required for the valuation methods used and any locally developed yields, carrying capacities, and expenses. Records were also checked to ensure that the commodity prices and expenses, furnished by the Property Tax Administrator (PTA), were applied properly.

(See Assessor Reference Library Volume 3 Chapter 5.)

Conclusions

An analysis of the agricultural land data indicates an acceptable appraisal of this property type. Directives, commodity prices and expenses provided by the PTA were properly applied. County yields compared favorably to those published by Colorado Agricultural Statistics. Expenses used by the county were allowable expenses and were in an acceptable range. Grazing lands carrying capacities were in an acceptable range. The data analyzed resulted in the following ratios:

Arapahoe County Agricultural Land Ratio Grid						
Abstract Code	Land Class	Number Of Acres	County Value Per Acre	County Assessed Total Value	WRA Total Value	Ratio
4107	Sprinkler	1,737	277.11	481,275	476,441	1.01
4127	Dry Farm	159,500	21.06	3,358,711	3,432,455	0.98
4147	Grazing	138,534	12.11	1,677,828	1,677,828	1.00
Total/Avg		299,771	18.41	5,517,814	5,586,725	0.99

Recommendations

None

Agricultural Outbuildings

Methodology

Data was collected and reviewed to determine if the guidelines found in the Assessor’s Reference Library (ARL) Volume 3, pages 5.74 through 5.77 were being followed.

of Property Taxation for the valuation of agricultural outbuildings.

Recommendations

None

Conclusions

Arapahoe County has substantially complied with the procedures provided by the Division

Agricultural Land Under Improvements

Methodology

Data was collected and reviewed to determine if the guidelines found in the Assessor's Reference Library (ARL) Volume 3, pages 5.19 and 5.20 were being followed.

Conclusions

Arapahoe County has used the following methods to discover land under a residential improvement on a farm or ranch that is determined to be not integral under 39-1-102, C.R.S.:

- Questionnaires
- Field Inspections
- Phone Interviews
- In-Person Interviews with Owners/Tenants
- Written Correspondence other than Questionnaire
- Personal Knowledge of Occupants at Assessment Date
- Aerial Photography/Pictometry

Arapahoe County has used the following methods to discover the land area under a residential improvement that is determined to be not integral under 39-1-102, C.R.S.:

- Property Record Card Analysis
- Questionnaires
- Field Inspections
- Phone Interviews
- In-Person Interviews with Owners/Tenants
- Written Correspondence other than Questionnaire
- Personal Knowledge of Occupants at Assessment Date
- Aerial Photography/Pictometry

Arapahoe County has substantially complied with the procedures provided by the Division of Property Taxation for the valuation of land under residential improvements that may or may not be integral to an agricultural operation.

Recommendations

None

SALES VERIFICATION

According to Colorado Revised Statutes:

A representative body of sales is required when considering the market approach to appraisal.

(8) In any case in which sales prices of comparable properties within any class or subclass are utilized when considering the market approach to appraisal in the determination of actual value of any taxable property, the following limitations and conditions shall apply:

(a)(I) Use of the market approach shall require a representative body of sales, including sales by a lender or government, sufficient to set a pattern, and appraisals shall reflect due consideration of the degree of comparability of sales, including the extent of similarities and dissimilarities among properties that are compared for assessment purposes. In order to obtain a reasonable sample and to reduce sudden price changes or fluctuations, all sales shall be included in the sample that reasonably reflect a true or typical sales price during the period specified in section 39-1-104 (10.2). Sales of personal property exempt pursuant to the provisions of sections 39-3-102, 39-3-103, and 39-3-119 to 39-3-122 shall not be included in any such sample.

(b) Each such sale included in the sample shall be coded to indicate a typical, negotiated sale, as screened and verified by the assessor. (39-1-103, C.R.S.)

The assessor is required to use sales of real property only in the valuation process.

(8)(f) Such true and typical sales shall include only those sales which have been determined on an individual basis to reflect the selling price of the real property only or which have been adjusted on an individual basis to reflect the selling price of the real property only. (39-1-103, C.R.S.)

Part of the Property Assessment Study is the sales verification analysis. WRA has used the above-cited statutes as a guide in our study of the county's procedures and practices for verifying sales.

EWE reviewed the sales verification procedures in 2023 for Arapahoe County. This study was conducted by checking selected sales from the master sales list for the current valuation period. Specifically EWE selected 83 sales listed as unqualified.

All but 2 of the sales selected in the sample gave reasons that were clear and supportable. Two sales had insufficient reason for disqualification.

For residential, commercial, and vacant land sales with considerations over \$100,000, the contractor has examined and reported the ratio of qualified sales to total sales by class and performed the following analyses of unqualified sales:

The contractor has examined the manner in which sales have been classified as qualified or unqualified, including a listing of each step in the sales verification process, any adjustment procedures, and the county official responsible for making the final decision on qualification.

When less than 50 percent of sales are qualified in any of the three property classes (residential, commercial, and vacant land), the contractor analyzed the reasons for disqualifying sales in any subclass that constitutes at least 20 percent of the class, either by number of properties or by value, from the prior year. The contractor has

reviewed with the assessor any analysis indicating that sales data are inadequate, fail to reflect typical properties, or have been disqualified for insufficient cause. In addition, the contractor has reviewed the disqualified sales by assigned code. If there appears to be any inconsistency in the coding, the contractor has conducted further analysis to determine if the sales included in that code have been assigned appropriately.

If 50 percent or more of the sales are qualified, the contractor has reviewed a

statistically significant sample of unqualified sales, excluding sales that were disqualified for obvious reasons.

Arapahoe County did not qualify for in-depth subclass analysis.

Conclusions

Arapahoe County appears to be doing an adequate job of verifying their sales.

Recommendations

None

ECONOMIC AREA REVIEW AND EVALUATION

Methodology

Arapahoe County has submitted a written narrative describing the economic areas that make up the county's market areas. Arapahoe County has also submitted a map illustrating these areas. Each of these narratives have been read and analyzed for logic and appraisal sensibility. The maps were also compared to the narrative for consistency between the written description and the map.

Conclusions

After review and analysis, it has been determined that Arapahoe County has

adequately identified homogeneous economic areas comprised of smaller neighborhoods. Each economic area defined is equally subject to a set of economic forces that impact the value of the properties within that geographic area and this has been adequately addressed. Each economic area defined adequately delineates an area that will give "similar values for similar properties in similar areas."

Recommendations

None

NATURAL RESOURCES

Earth and Stone Products

Methodology

Under the guidelines of the Assessor's Reference Library (ARL), Volume 3, Natural Resource Valuation Procedures, the income approach was applied to determine value for production of earth and stone products. The number of tons was multiplied by an economic royalty rate determined by the Division of Property Taxation to determine income. The income was multiplied by a recommended Hoskold factor to determine the actual value. The Hoskold factor is determined by the life of the reserves or the lease. Value is based on two variables: life and tonnage. The operator determines these since there is no other means to obtain production data through any state or private agency.

Conclusions

The County has applied the correct formulas and state guidelines to earth and stone production.

Recommendations

None

Producing Oil and Gas

Methodology

Assessors Reference Library (ARL) Volume 3, Chapter 6: Valuation of Natural Resources

STATUTORY REFERENCES

Section § 39-1-103, C.R.S., specifies that producing oil or gas leaseholds and lands are valued according to article 7 of title 39, C.R.S. Actual value determined - when.

(2) The valuation for assessment of leaseholds and lands producing oil or gas shall be determined as provided in article 7 of this title. § 39-1-103, C.R.S.

Article 7 covers the listing, valuation, and assessment of producing oil and gas leaseholds and lands.

Valuation:

Valuation for assessment.

(1) Except as provided in subsection (2) of this section, on the basis of the information contained in such statement, the assessor shall value such oil and gas leaseholds and lands for assessment, as real property, at an amount equal to eighty-seven and one-half percent of:

(a) The selling price of the oil or gas sold there from during the preceding calendar year, after excluding the selling price of all oil or gas delivered to the United States government or any agency thereof, the state of Colorado or any agency thereof, or any political subdivision of the state as royalty during the preceding calendar year;

(b) The selling price of oil or gas sold in the same field area for oil or gas transported from the premises which is not sold during the preceding calendar year, after excluding the selling price of all oil or gas delivered to the United States government or any agency thereof, the state of Colorado or any agency thereof, or any political subdivision of the state as royalty during the preceding calendar year. § 39-7-102, C.R.S.

Conclusions

The county applied approved appraisal procedures in the valuation of oil and gas.

Recommendations

None

VACANT LAND

Subdivision Discounting

Subdivisions were reviewed in 2023 in Arapahoe County. The review showed that subdivisions were discounted pursuant to 39-1-103 (14) C.R.S. Discounting procedures were applied to all subdivisions where less than 80 percent of vacant land parcels were sold. An absorption rate was estimated for each discounted subdivision. An appropriate discount rate was developed using the

Summation Method, following Division of Property Taxation guidelines.

Conclusions

Arapahoe County has implemented proper procedures to adequately estimate absorption periods, discount rates, and lot values for qualifying subdivisions.

Recommendations

None

POSSESSORY INTEREST PROPERTIES

Possessory Interest

Possessory interest property discovery and valuation is described in the Assessor's Reference Library (ARL) Volume 3 section 7 in accordance with the requirements of Chapter 39-1-103 (17)(a) (II) C.R.S. Possessory Interest is defined by the Property Tax Administrator's Publication ARL Volume 3, Chapter 7: A private property interest in government-owned property or the right to the occupancy and use of any benefit in government-owned property that has been granted under lease, permit, license, concession, contract, or other agreement.

Arapahoe County has been reviewed for their procedures and adherence to guidelines when assessing and valuing agricultural and

commercial possessory interest properties. The county has also been queried as to their confidence that the possessory interest properties have been discovered and placed on the tax rolls.

Conclusions

Arapahoe County has implemented a discovery process to place possessory interest properties on the roll. They have also correctly and consistently applied the correct procedures and valuation methods in the valuation of possessory interest properties.

Recommendations

None

PERSONAL PROPERTY AUDIT

Arapahoe County was studied for its procedural compliance with the personal property assessment outlined in the Assessor's Reference Library (ARL) Volume 5, and in the State Board of Equalization (SBOE) requirements for the assessment of personal property. The SBOE requires that counties use ARL Volume 5, including current discovery, classification, documentation procedures, current economic lives table, cost factor tables, depreciation table, and level of value adjustment factor table.

The personal property audit standards narrative must be in place and current. A listing of businesses that have been audited by the assessor within the twelve-month period reflected in the plan is given to the auditor. The audited businesses must be in conformity with those described in the plan.

Aggregate ratio will be determined solely from the personal property accounts that have been physically inspected. The minimum assessment sample is one percent or ten schedules, whichever is greater, and the maximum assessment audit sample is 100 schedules.

For the counties having over 100,000 population, WRA selected a sample of all personal property schedules to determine whether the assessor is correctly applying the provisions of law and manuals of the Property Tax Administrator in arriving at the assessment levels of such property. This sample was selected from the personal property schedules audited by the assessor. In no event was the sample selected by the contractor less than 30 schedules. The counties to be included in this study are Adams, Arapahoe, Boulder, Denver, Douglas, El Paso, Jefferson, Larimer, Mesa, Pueblo, and Weld. All other counties received a procedural study.

Arapahoe County is compliant with the guidelines set forth in ARL Volume 5 regarding discovery procedures, using the following methods to discover personal property accounts in the county:

- Public Record Documents
- Chamber of Commerce/Economic Development Contacts
- Personal Observation, Physical Canvassing or Word of Mouth
- 1/3 businesses physically verified annually

The county uses the Division of Property Taxation (DPT) recommended classification and documentation procedures. The DPT's recommended cost factor tables, depreciation tables and level of value adjustment factor tables are also used.

Arapahoe County submitted their personal property written audit plan and was current for the 2023 valuation period. The number and listing of businesses audited was also submitted and was in conformance with the written audit plan. The following audit triggers were used by the county to select accounts to be audited:

- Accounts with obvious discrepancies
- New businesses filing for the first time
- Incomplete or inconsistent declarations
- Accounts with omitted property
- Businesses with no deletions or additions for 2 or more years
- Non-filing Accounts - Best Information Available
- Accounts close to the \$52,000 actual value exemption status

- Accounts protested with substantial disagreement

Arapahoe County's median ratio is 1.00. This is in compliance with the State Board of Equalization (SBOE) compliance requirements which range from .90 to 1.10 with no COD requirements.

Conclusions

Arapahoe County has employed adequate discovery, classification, documentation, valuation, and auditing procedures for their personal property assessment and is in statistical compliance with SBOE requirements.

Recommendations

None

EAST WEST ECONOMETRICS AUDITOR STAFF

Harry J. Fuller, *Audit Project Manager*

Suzanne Howard, *Audit Administrative Manager*

Steve Kane, *Audit Statistician*

Carl W. Ross, *Agricultural/Natural Resource Analyst*

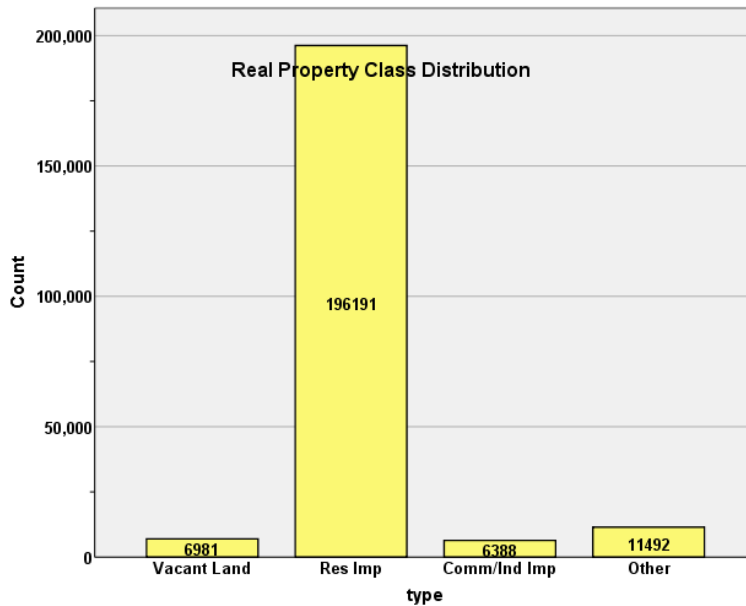
J. Andrew Rodriguez, *Field Analyst*

STATISTICAL APPENDIX

**STATISTICAL COMPLIANCE REPORT
FOR ARAPAHOE COUNTY
2023**

I. OVERVIEW

Arapahoe County is an urban county that is part of the Denver metropolitan area. The county has a total of 221,052 real property parcels, according to data submitted by the county assessor’s office in 2023. The following provides a breakdown of property classes for this county:



The vacant land class of properties was dominated by residential land. Residential and PUD lots (coded 100 and 400) accounted for 81.7% of all vacant land parcels.

For residential improved properties, single family properties accounted 84.6% of all residential properties. The next significant subclass of properties was condominiums (coded 1230), which accounted for 14.3% of all properties.

Commercial and industrial properties represented a much smaller proportion of property classes in comparison. Commercial/industrial sales accounted for 2.9% of all such properties in this county.

II. DATA FILES

The following sales analyses were based on the requirements of the 2023 Colorado Property Assessment Study. Information was provided by the Arapahoe Assessor’s Office in May 2023. The data included all 5 property record files as specified by the Auditor.

III. RESIDENTIAL SALES RESULTS

There were 29,211 qualified residential sales for the 24-month sale period ending June 30, 2022. The sales ratio analysis was as follows:

Ratio Statistics

Median	1.000
Price Related Differential	1.018
Coefficient of Dispersion	2.6

We next stratified the sales ratio analysis by economic area and by neighborhoods, the latter with at least 50 sales:

Case Processing Summary

ECONAREA	Count	Percent
1.00	60	0.2%
2.00	112	0.4%
3.00	798	2.7%
4.00	741	2.5%
5.00	1189	4.1%
6.00	542	1.9%
7.00	1231	4.2%
8.00	6584	22.6%
9.00	423	1.5%
10.00	2765	9.5%
11.00	2482	8.5%
12.00	432	1.5%
13.00	851	2.9%
14.00	1435	4.9%
15.00	163	0.6%
16.00	956	3.3%
17.00	2180	7.5%
18.00	3201	11.0%
19.00	292	1.0%
20.00	1652	5.7%
21.00	928	3.2%

Ratio Statistics for CurrTot / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion
1.00	1.000	1.001	.026
2.00	1.000	1.002	.019
3.00	1.000	1.002	.027
4.00	1.001	1.003	.029
5.00	1.000	1.001	.024
6.00	1.002	1.003	.033
7.00	1.000	1.002	.028
8.00	1.001	1.002	.027
9.00	1.003	1.003	.040
10.00	1.000	1.002	.022
11.00	1.001	1.002	.032

12.00	1.002	1.002	.032
13.00	1.000	1.001	.025
14.00	1.000	1.002	.022
15.00	1.001	1.002	.028
16.00	1.000	1.009	.029
17.00	1.000	1.001	.022
18.00	1.001	1.002	.025
19.00	.999	.999	.026
20.00	1.000	1.008	.023
21.00	1.000	1.004	.024

For the 21 economic areas with at least 30 sales, the median sales ratio and coefficient of dispersion metrics were all in compliance. We next stratified residential sales by neighborhoods with at least 50 sales, as follows:

Ratio Statistics for CurrTot / TASP

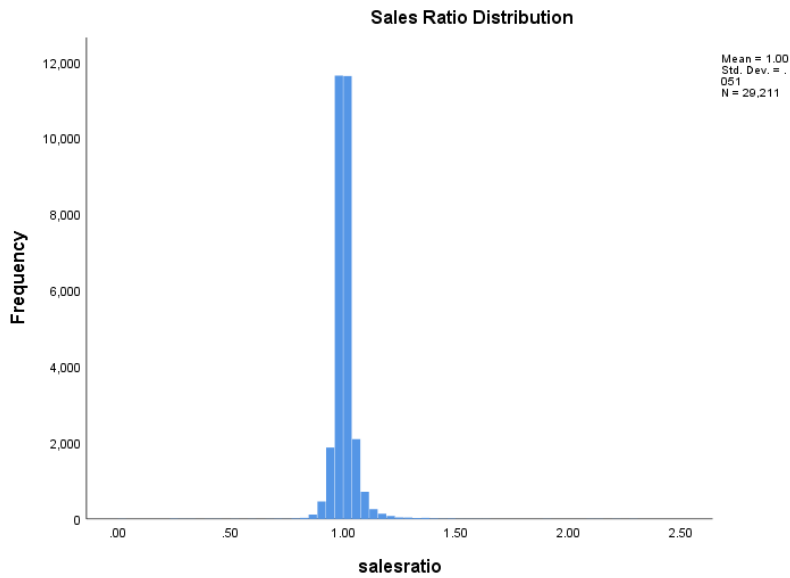
Group	Median	Price Related Differential	Coefficient of Dispersion
2	1.003	1.002	.031
8	1.011	1.005	.034
11	1.001	1.001	.024
22	.999	1.002	.028
28	1.014	1.005	.047
32	1.005	1.003	.041
36	.999	1.001	.017
45	1.011	1.008	.054
102	1.000	1.002	.025
111	1.000	1.001	.017
112	1.003	1.002	.021
149	1.001	1.002	.018
164	1.001	1.001	.025
174	.999	1.005	.060
183	.998	1.001	.021
218	1.001	1.007	.049
226	1.004	1.002	.022
231	.996	1.005	.046
235	1.000	1.005	.049
247	.999	1.002	.022
248	1.001	1.002	.021
271	1.001	1.001	.016
273	1.000	1.004	.033
304	1.000	1.002	.025
324	1.000	1.005	.036
349	.997	1.000	.017
366	1.001	1.000	.022
374	.999	1.001	.020
380	1.001	1.001	.015
387	1.000	1.001	.012
391	1.001	1.001	.022
423	1.006	1.004	.036
458	1.000	1.002	.024
479	1.015	1.008	.055
481	1.040	1.003	.038
509	1.000	1.004	.030
564	.998	1.003	.049

570	1.001	1.001	.018
593	.993	1.004	.043
596	1.001	1.001	.016
601	1.002	1.001	.018
604	1.001	1.003	.049
606	1.019	1.002	.036
613	1.002	1.001	.016
616	.991	1.002	.041
626	1.002	1.000	.015
628	1.004	1.001	.033
629	1.006	1.000	.019
631	.995	1.002	.036
648	.998	1.001	.018
654	1.002	1.001	.018
655	.997	1.004	.048
682	.987	1.002	.040
683	.995	1.001	.031
704	.998	1.001	.017
718	1.001	1.003	.030
732	.993	1.001	.028
757	1.007	1.002	.039
758	.999	1.001	.027
761	.999	1.002	.024
763	1.000	1.002	.017
844	1.006	1.000	.036
847	1.000	1.001	.015
916	1.006	1.002	.034
917	.986	1.001	.024
1018	1.000	1.001	.014
1021	1.000	1.001	.011
1090	1.004	1.001	.035
1097	1.003	1.002	.032
1172	1.002	1.002	.037
1210	.998	1.001	.023
1291	1.000	1.001	.011
1324	1.001	1.001	.013
1386	1.000	1.001	.014
1480	1.018	1.004	.049
1482	1.000	1.001	.019
1526	1.002	1.001	.014
1564	1.000	1.001	.022
1565	1.000	1.000	.019
1566	1.000	1.000	.012
1588	1.000	1.002	.026
1589	.995	1.001	.020
1590	1.002	1.001	.015
1591	1.002	1.001	.018
1659	1.000	1.000	.043
1725	1.000	1.003	.031
1751	1.000	1.000	.009
1763	.999	1.003	.025
1766	1.001	1.002	.025
1780	1.001	1.002	.036
1783	1.008	1.009	.043
1808	1.000	1.002	.018
1819	1.010	1.003	.038
1834	1.003	1.001	.055

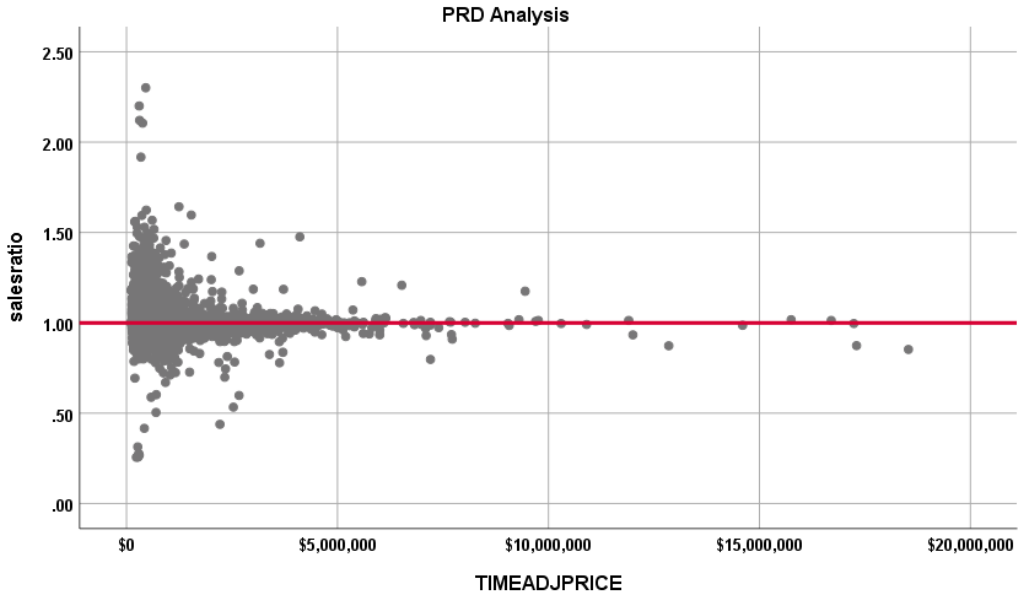
1860	1.001	1.001	.017
1866	1.000	1.002	.021
1876	1.000	1.001	.030
1903	1.004	1.002	.038
1913	1.001	1.001	.017
1918	1.005	1.003	.065
1923	.999	1.001	.023
1936	1.000	1.002	.023
1937	1.028	1.004	.044
1940	1.000	1.001	.019
1947	.992	1.006	.054
1978	.985	1.002	.023
1982	1.023	1.004	.045
1983	1.005	1.002	.030
1984	1.003	1.002	.039
1987	1.059	1.000	.039
2000	1.002	1.001	.019
2017	1.001	1.000	.010
2022	1.002	1.003	.038
2025	1.014	1.004	.061
2052	1.001	1.001	.024
2060	1.000	1.002	.020
2074	1.000	1.002	.021
2082	.998	1.004	.051
2083	.999	1.001	.025
2085	1.002	1.003	.049
2088	1.006	1.005	.056
2094	.994	1.003	.041
2101	1.000	1.002	.020
2107	1.001	1.001	.015
2110	.994	1.001	.039
2126	1.001	1.001	.017
2131	1.000	1.001	.022
2161	.997	1.001	.025
2162	1.003	1.002	.023
2172	.998	1.001	.020
2181	1.014	1.002	.035
2250	1.002	1.003	.026
2270	1.001	1.001	.023
2276	.999	1.001	.022
2300	1.002	1.003	.027
2313	1.000	1.001	.017
2316	1.000	1.002	.025
2317	.999	1.000	.007
2327	.999	1.000	.016
2332	1.003	1.001	.028
2334	.992	1.001	.027
2405	1.000	1.001	.016
2414	1.008	1.003	.037
2448	.989	1.005	.041
2465	1.006	1.002	.027
2473	.997	1.004	.036
2490	.999	1.002	.034
2500	.999	1.002	.020
2516	1.001	1.001	.016
2549	1.000	1.002	.019
2613	1.001	1.001	.022

2688	1.002	1.001	.027
2752	.997	1.002	.025
2764	1.000	1.000	.014
2766	1.000	1.002	.024
2779	1.006	1.001	.035
2798	1.001	1.004	.033
2801	1.014	.999	.044
2905	1.000	1.002	.017
2906	1.003	1.001	.017
2939	1.000	1.001	.018
Overall	1.001	1.002	.030

The above ratio statistics, stratified by neighborhoods, were in compliance with the standards set forth by the Colorado State Board of Equalization (SBOE) for the overall residential sales. The following graphs describe further the sales ratio distribution for all of these properties:

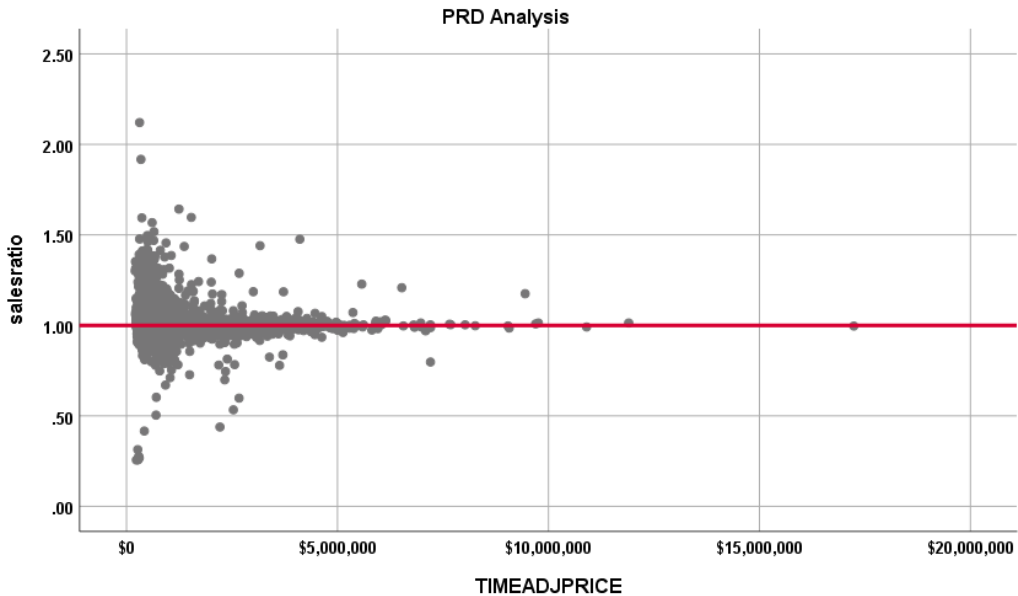


SALES LESS THAN \$20,000,000



Subclass 1212 PRD Analysis

We next analyzed residential properties identified as 1212 using the state abstract code system. These include single family residences, town homes and purged manufactured homes. The following indicates the distribution of sales ratios across the sale price spectrum:



The Price-Related Differential (PRD) for 1212 sales is 1.002. This is within the IAAO standards for the PRD. We also performed a regression analysis between the sales ratio and the assessor's current value to further test for regressivity or progressivity in the residential sales valuation, as follows:

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	1.003	.001	1966.019	.000	
	CurrTot	.0000000013	.000	.015	2.223	.026

a. Dependent Variable: salesratio

At 0.0000000013, the slope of the line is not significant, which indicates that sales ratios are similar across the entire sale price array. We also stratified the sales ratio analysis by the sale price range, as follows:

Case Processing Summary

		Count	Percent
SPRec	LT \$300K	289	1.2%
	\$300K to \$400K	1136	4.9%
	\$400K to \$500K	3595	15.4%
	\$500K to \$600K	7202	30.9%
	\$600K to \$750K	5981	25.7%
	\$750K to \$1000K	3192	13.7%
	\$1000K to \$2000K	1373	5.9%
	Over \$2000K	526	2.3%
Overall		23294	100.0%
Excluded		0	
Total		23294	

Ratio Statistics for CurrTot / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
LT \$300K	1.007	1.001	.057	12.9%
\$300K to \$400K	1.004	1.000	.037	7.6%
\$400K to \$500K	1.003	1.000	.027	5.0%
\$500K to \$600K	1.001	1.000	.020	3.6%
\$600K to \$750K	1.000	1.000	.020	3.8%
\$750K to \$1000K	.999	1.000	.023	4.1%
\$1000K to \$2000K	.996	1.000	.024	5.0%
Over \$2000K	.996	.997	.033	6.9%
Overall	1.000	1.002	.024	4.6%

This analysis indicates that the sales ratio distribution was more or less consistent across the sale price range for Arapahoe County.

Residential Market Trend Analysis

We next analyzed the residential dataset using the 24-month sale period, with the following results:

Coefficients^a

ECONAREA	Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
.	1	(Constant)	1.071	.031		35.012	.000
		SalePeriod	-.004	.002	-.191	-1.653	.103
1.00	1	(Constant)	1.007	.014		71.893	.000
		SalePeriod	-.001	.001	-.346	-.640	.568
2.00	1	(Constant)	1.014	.006		158.336	.000
		SalePeriod	-.001	.001	-.171	-1.820	.072
3.00	1	(Constant)	1.006	.004		268.110	.000
		SalePeriod	.000	.000	-.066	-1.209	.227
4.00	1	(Constant)	1.014	.004		271.378	.000
		SalePeriod	-.001	.000	-.099	-2.636	.009
5.00	1	(Constant)	1.001	.003		301.968	.000
		SalePeriod	.000	.000	.014	.435	.664
6.00	1	(Constant)	.997	.006		181.002	.000
		SalePeriod	5.954E-5	.000	.008	.145	.885
7.00	1	(Constant)	1.008	.003		301.524	.000
		SalePeriod	-.001	.000	-.099	-2.804	.005
8.00	1	(Constant)	1.004	.001		812.605	.000
		SalePeriod	-1.551E-5	.000	-.002	-.172	.863
10.00	1	(Constant)	1.009	.002		542.194	.000
		SalePeriod	.000	.000	-.035	-1.687	.092
11.00	1	(Constant)	1.008	.002		482.484	.000
		SalePeriod	.000	.000	-.025	-1.186	.236
12.00	1	(Constant)	.986	.007		142.640	.000
		SalePeriod	.002	.000	.209	4.422	.000
13.00	1	(Constant)	1.011	.004		242.943	.000
		SalePeriod	.000	.000	-.061	-1.351	.177
14.00	1	(Constant)	1.002	.002		590.551	.000
		SalePeriod	-2.298E-5	.000	-.005	-.186	.852
15.00	1	(Constant)	.991	.006		167.354	.000
		SalePeriod	.001	.000	.255	3.126	.002
16.00	1	(Constant)	1.000	.004		273.601	.000
		SalePeriod	.000	.000	-.015	-.417	.677
17.00	1	(Constant)	1.004	.002		575.276	.000
		SalePeriod	-8.726E-5	.000	-.016	-.669	.503
18.00	1	(Constant)	1.006	.001		684.623	.000
		SalePeriod	-7.794E-5	.000	-.014	-.729	.466
19.00	1	(Constant)	.998	.005		190.934	.000
		SalePeriod	.000	.000	-.034	-.576	.565
20.00	1	(Constant)	1.000	.002		501.167	.000
		SalePeriod	.000	.000	.031	1.167	.243
21.00	1	(Constant)	1.003	.003		323.014	.000
		SalePeriod	3.446E-5	.000	.006	.154	.878

a. Dependent Variable: salesratio



The above analysis indicated that no significant residential market trend was present in the sale data within each economic area. We concluded that the assessor has adequately adjusted for market trending for residential properties.

Sold/Unsold Analysis

In terms of the valuation consistency between sold and unsold residential properties, we compared the median actual value per square foot for 2023 between each group. The following results present the overall results, as well as by economic area, for sold and unsold properties:

Report

VALSF			
sold	N	Median	Mean
UNSOLD	166985	\$335	\$365
SOLD	29201	\$336	\$367

Report

VALSF				
ECONAREA	sold	N	Median	Mean
1.00	UNSOLD	270	\$467	\$441
	SOLD	60	\$476	\$463
2.00	UNSOLD	944	\$446	\$448
	SOLD	112	\$505	\$496
3.00	UNSOLD	4612	\$323	\$335
	SOLD	798	\$325	\$333
4.00	UNSOLD	4903	\$379	\$380
	SOLD	741	\$399	\$409
5.00	UNSOLD	7628	\$310	\$332
	SOLD	1186	\$323	\$346
6.00	UNSOLD	3157	\$289	\$307
	SOLD	542	\$289	\$306
7.00	UNSOLD	7108	\$289	\$295
	SOLD	1231	\$303	\$305
8.00	UNSOLD	27706	\$306	\$321
	SOLD	6582	\$310	\$322
9.00	UNSOLD	2003	\$257	\$264
	SOLD	423	\$262	\$269
10.00	UNSOLD	22682	\$358	\$376
	SOLD	2765	\$382	\$403
11.00	UNSOLD	9543	\$314	\$321
	SOLD	2482	\$312	\$320
12.00	UNSOLD	3375	\$637	\$668
	SOLD	429	\$676	\$718
13.00	UNSOLD	5910	\$435	\$443
	SOLD	851	\$442	\$464
14.00	UNSOLD	8217	\$504	\$577
	SOLD	1435	\$535	\$587
15.00	UNSOLD	1452	\$445	\$440
	SOLD	163	\$483	\$468
16.00	UNSOLD	6622	\$378	\$415
	SOLD	955	\$400	\$424
17.00	UNSOLD	13192	\$332	\$349
	SOLD	2180	\$343	\$359
18.00	UNSOLD	16260	\$323	\$335
	SOLD	3201	\$331	\$341



19.00	UNSOLD	1364	\$336	\$344
	SOLD	292	\$294	\$310
20.00	UNSOLD	11764	\$297	\$311
	SOLD	1652	\$310	\$322
21.00	UNSOLD	6495	\$396	\$408
	SOLD	928	\$407	\$420

All economic areas had less than a 10+/- percent difference in the median value per square foot between sold and unsold properties. We also compared the median change in taxable years 2020 and 2022 between sold and unsold properties for these 21 economic areas. This test indicated differences of less than 5 percent. Based on these results, we concluded that there was no significant gap in value between residential sold and unsold properties by economic area for Arapahoe County.

We next compared residential sold and unsold properties for neighborhood with at least 50 sales using the median value per square foot method. Neighborhoods with more than a 10 percent difference in the median or mean value per square foot test were identified in red, as follows:

VALSF					DIFF					
NRHD	N	Median	Mean		NRHD	N	Median	Mean		
218	0	848	270.29	277.33		218	0	848	1.41	1.42
	1	143	319.20	313.18			1	143	1.54	1.54
	Total	991	273.38	282.50	18%	13%	Total	991	1.42	1.44
226	0	787	421.25	430.89		226	0	787	1.38	1.39
	1	83	461.54	469.51			1	83	1.42	1.44
	Total	870	423.46	434.57	10%	9%	Total	870	1.39	1.39
248	0	765	471.29	470.38		248	0	765	1.39	1.39
	1	83	527.55	509.39			1	83	1.42	1.44
	Total	848	474.01	474.20	12%	8%	Total	848	1.39	1.40
304	0	757	419.20	418.60		304	0	757	1.42	1.43
	1	140	473.81	461.64			1	140	1.49	1.50
	Total	897	425.95	425.32	13%	10%	Total	897	1.42	1.44
349	0	445	426.97	426.80		349	0	445	1.35	1.35
	1	53	484.68	477.51			1	53	1.40	1.43
	Total	498	431.02	432.20	14%	12%	Total	498	1.35	1.36
458	0	455	356.06	366.02		458	0	455	1.28	1.28
	1	64	412.53	416.09			1	64	1.39	1.40
	Total	519	366.63	372.20	16%	14%	Total	519	1.28	1.30
564	0	254	246.17	242.71		564	0	254	1.17	1.16
	1	75	270.50	269.74			1	75	1.27	1.26
	Total	329	246.17	248.87	10%	11%	Total	329	1.17	1.18
570	0	438	405.84	410.99		570	0	438	1.52	1.53
	1	67	445.69	456.72			1	67	1.57	1.58
	Total	505	408.59	417.05	10%	11%	Total	505	1.52	1.53
626	0	236	751.02	785.31		626	0	235	1.42	1.45
	1	51	834.16	865.40			1	51	1.34	1.40
	Total	287	762.32	799.54	11%	10%	Total	286	1.40	1.44
718	0	582	476.59	482.71		718	0	582	1.49	1.52
	1	63	529.82	524.60			1	63	1.49	1.52
	Total	645	480.27	486.80	11%	9%	Total	645	1.39	1.40
1018	0	540	514.47	432.15		1018	0	540	1.41	1.41
	1	96	564.20	561.93			1	96	1.37	1.40
	Total	636	521.92	4300.80	10%	-61%	Total	636	1.40	1.41
1659	0	367	295.71	307.52		1659	0	367	1.34	1.35
	1	91	324.49	334.65			1	93	1.40	1.41
	Total	458	300.26	312.91	10%	9%	Total	460	1.35	1.36
1783	0	348	638.49	654.69		1783	0	348	1.50	1.55
	1	51	699.53	680.98			1	51	1.52	1.53
	Total	399	645.45	658.05	10%	4%	Total	399	1.50	1.55
1834	0	206	204.58	218.18		1834	0	206	1.22	1.30
	1	66	249.73	242.82			1	66	1.43	1.43
	Total	272	211.52	224.16	22%	11%	Total	272	1.24	1.33
1866	0	583	362.00	382.88		1866	0	583	1.38	1.39
	1	65	417.27	423.99			1	65	1.38	1.41
	Total	648	367.93	387.00	15%	11%	Total	648	1.38	1.39
1937	0	94	297.75	312.39		1937	0	94	1.46	1.46
	1	82	337.22	327.71			1	82	1.50	1.61
	Total	176	314.69	319.53	13%	5%	Total	176	1.47	1.53
1982	0	126	253.26	242.46		1982	0	63	1.42	1.62
	1	113	309.72	308.73			1	107	1.44	1.50
	Total	239	282.40	273.79	22%	27%	Total	170	1.44	1.54
2017	0	399	514.41	514.18		2017	0	399	1.40	1.40
	1	62	589.86	597.35			1	62	1.39	1.39
	Total	461	522.17	525.37	15%	16%	Total	461	1.40	1.40
2082	0	171	244.16	221.45		2082	0	18	1.39	1.49
	1	128	299.11	308.27			1	117	1.32	1.42
	Total	299	267.58	258.61	23%	39%	Total	135	1.33	1.43
2465	0	699	345.84	348.95		2465	0	699	1.40	1.40
	1	52	394.03	396.37			1	52	1.59	1.55
	Total	741	348.41	352.27	14%	14%	Total	741	1.40	1.41
2473	0	522	297.27	328.85		2473	0	522	1.47	1.47
	1	74	330.83	357.57			1	74	1.53	1.53
	Total	596	301.87	332.41	11%	9%	Total	596	1.48	1.48
2549	0	584	422.16	437.93		2549	0	584	1.52	1.53
	1	74	467.24	475.69			1	74	1.55	1.56
	Total	658	426.88	442.18	11%	9%	Total	658	1.52	1.53

Please note that the above 22 neighborhoods with a difference of over 10 percent using the median or mean value per square foot test were also tested using the median and mean percent change in value method. Only two neighborhoods were identified out of a total of 160 residential neighborhoods with more than 50 sales, or 0.6 percent of these larger neighborhoods.

Based on the above overall results, we concluded that the assessor has valued sold and unsold residential properties in a similar manner.

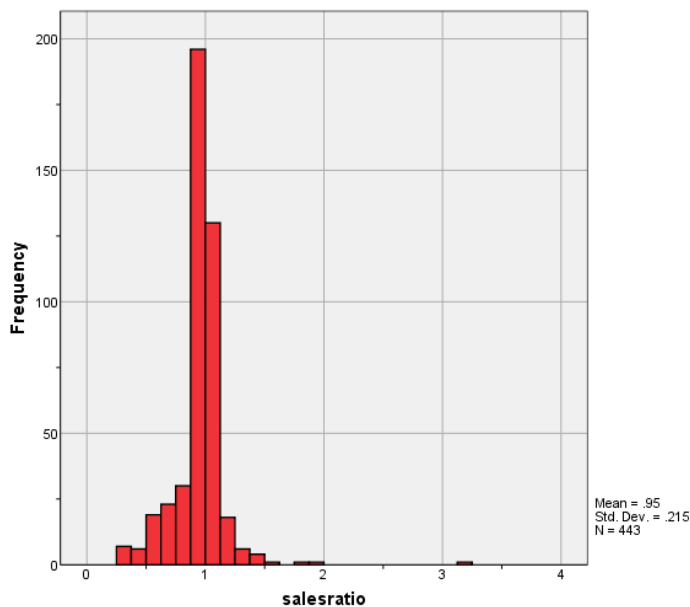
IV. COMMERCIAL/INDUSTRIAL SALE RESULTS

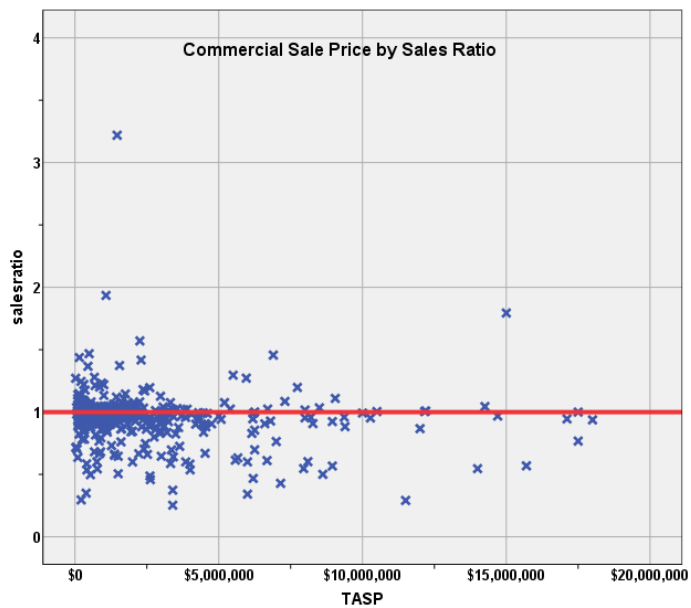
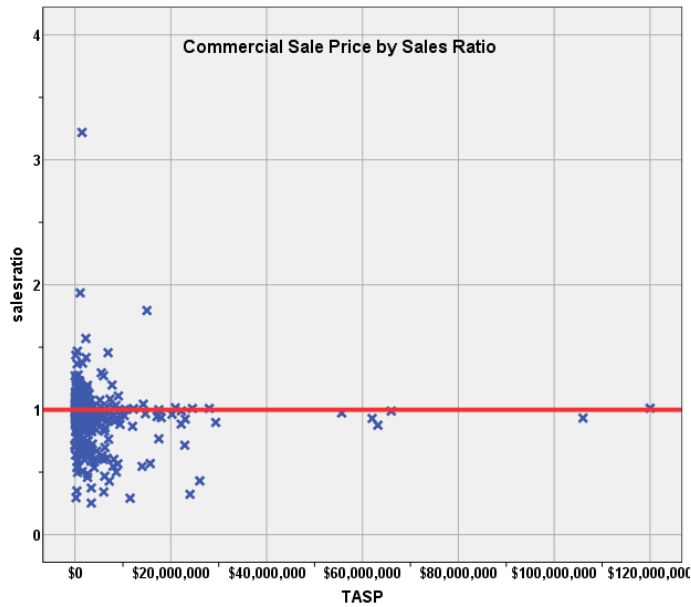
There were 443 qualified commercial/industrial sales for the 24-month sale period ending June 30, 2022. The sales ratio analysis was as follows:

Ratio Statistics

Median	0.976
Price Related Differential	1.041
Coefficient of Dispersion	12.3

The above ratio statistics were in compliance overall with the standards set forth by the Colorado State Board of Equalization (SBOE) for the overall commercial sales. The following histogram describes further the sales ratio distribution for these properties:





SALES LESS THAN \$20,000,000

The above histogram indicates that the distribution of the sale ratios was within state mandated limits. No sales were trimmed.

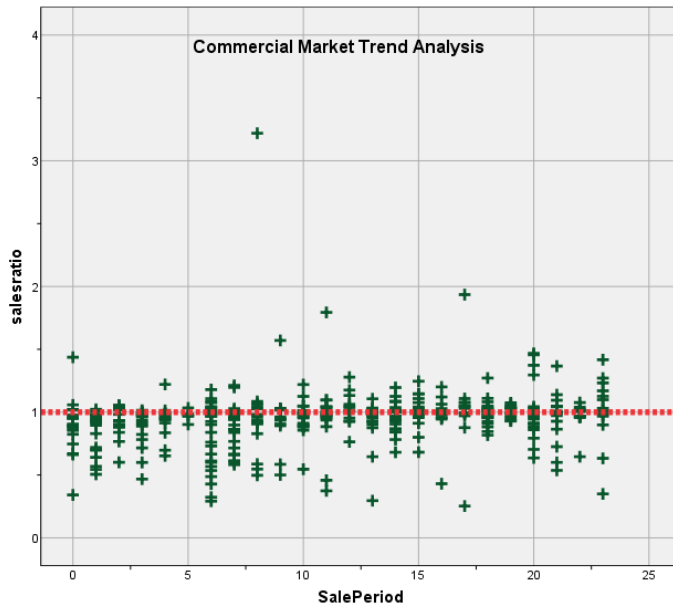
Commercial Market Trend Analysis

We next analyzed the commercial dataset using the 24-month sale period, with the following results:

Coefficients^a

Model	Unstandardized Coefficients		Standardized	t	Sig.	
	B	Std. Error	Coefficients Beta			
1	(Constant)	.884	.019		46.408	.000
	SalePeriod	.006	.001	.188	4.030	.000

a. Dependent Variable: salesratio



While the class level market trend analysis indicated a significant residual trend in the sales ratio data, when stratified by subclass, there were no significant market trends. Based on these results, we concluded that the assessor has adequately dealt with market trending for commercial properties.

Sold/Unsold Analysis

In terms of the valuation consistency between sold and unsold commercial properties, we first compared the 2023 median value per square foot between sold and unsold commercial properties, as follows:

Report			
VALSF			
	N	Median	Mean
UNSOLD	5928	\$175	\$223
SOLD	442	\$189	\$222

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of VALSF is the same across categories of sold.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .01.

Report

VALSF	ABSTRIMPMAJOR	sold	N	Median	Mean
2212	UNSOLD		898	\$173	\$200
	SOLD		38	\$246	\$250
2215	UNSOLD		75	\$135	\$153
	SOLD		7	\$128	\$128
2220	UNSOLD		615	\$129	\$153
	SOLD		57	\$140	\$168
2230	UNSOLD		1470	\$250	\$342
	SOLD		106	\$250	\$315
2235	UNSOLD		1115	\$150	\$176
	SOLD		86	\$162	\$172
2245	UNSOLD		1611	\$185	\$195
	SOLD		141	\$195	\$203

We also compared the median change in actual value for taxable years 2020 and 2022 between each group by subclass. The following were the results:

Report

DIFF	ABSTRIMPMAJOR	sold	N	Median	Mean
2212	UNSOLD		891	1.14	1.16
	SOLD		38	1.29	1.35
2215	UNSOLD		74	1.21	1.25
	SOLD		7	1.28	1.36
2220	UNSOLD		608	1.07	1.11
	SOLD		57	1.17	1.29
2230	UNSOLD		1450	1.17	1.30
	SOLD		106	1.44	1.49
2235	UNSOLD		1089	1.31	1.38
	SOLD		86	1.41	1.49
2245	UNSOLD		1611	1.21	1.21
	SOLD		141	1.21	1.23
2250	UNSOLD		45	1.19	1.31
	SOLD		1	1.22	1.22
3215	UNSOLD		15	1.36	1.43
	SOLD		2	1.43	1.43

Based on the above differences for Subclasses 2212 and 2230, we advised the assessment staff to track valuations of sold and unsold properties carefully moving forward.

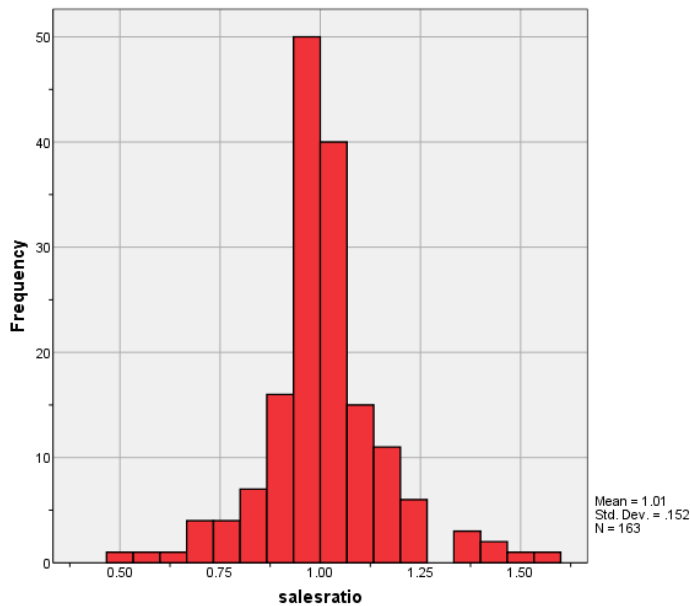
V. VACANT LAND SALE RESULTS

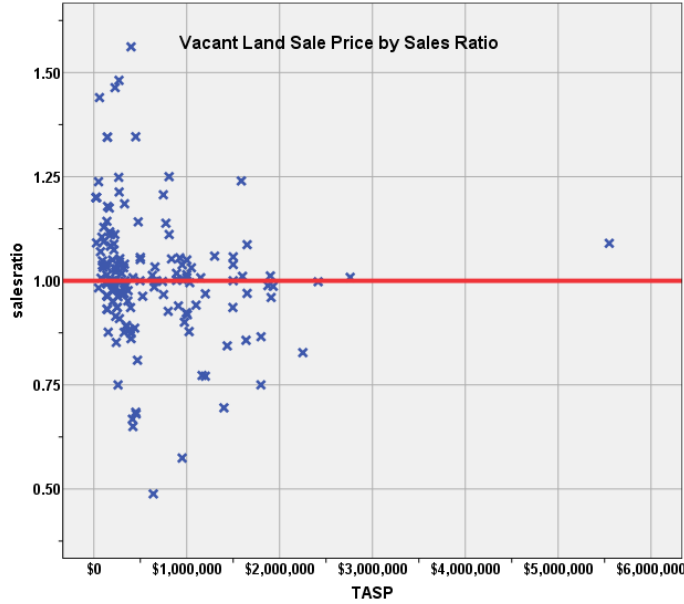
There were 165 qualified vacant land sales for the 24-month sale period ending June 30, 2022. Two sales were excluded using IAAO standards, resulting in a final count of 163 sales for this analysis. The sales ratio analysis results were as follows:

Ratio Statistics

Median	1.000
Price Related Differential	1.030
Coefficient of Dispersion	10.0

The above ratio statistics were in compliance overall with the standards set forth by the Colorado State Board of Equalization (SBOE) for the overall vacant land sales. The following graphs describe further the sales ratio distribution for all of these properties:





The above histogram indicates that the distribution of the vacant land sale ratios was within state mandated limits, while the above scatter plot indicated that there was no price related differential issues. No sales were trimmed.

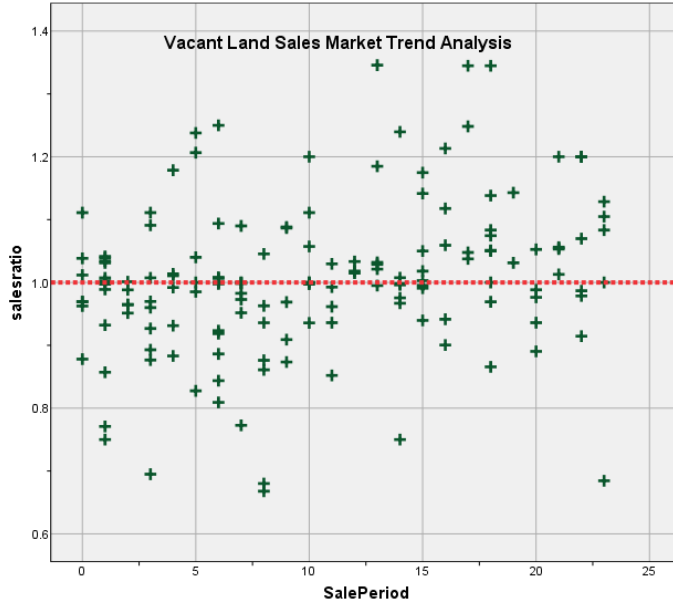
Vacant Land Market Trend Analysis

We next analyzed the vacant land dataset using the 24-month sale period, with the following results:

Coefficients^a

Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Coefficients Beta		
1	(Constant)	.957	.017		57.805	.000
	SalePeriod	.005	.001	.278	3.590	.000

a. Dependent Variable: salesratio



The above analysis indicated that a residual market trend was present in the vacant land sale data, although the magnitude as marginal. We will consult with the assessor regarding this result.

Sold/Unsold Analysis

In terms of the valuation consistency between sold and unsold vacant land properties, we compared the median change in actual value for taxable years 2020 and 2022 between each group. The following were the results:

Report

DIFF	N	Median	Mean
UNSOLD	4498	1.22	1.32
SOLD	140	1.32	1.40

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of DIFF is the same across categories of sold.	Independent-Samples Mann-Whitney U Test	.007	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .00.

We next examined the change in value for subdivisions with at least 3 sales:

Report

DIFF

SUBDIVNO	sold	N	Median	Mean
001315	UNSOLD	39	.96	1.00
	SOLD	8	1.01	1.14
007830	UNSOLD	1	1.00	1.00
	SOLD	4	1.00	1.06
008250	UNSOLD	23	1.00	1.10
	SOLD	5	1.00	1.00
017508	UNSOLD	2	1.00	1.00
	SOLD	3	1.89	1.90
022235	UNSOLD	1	1.00	1.00
	SOLD	10	1.53	1.47
033223	UNSOLD	3	1.25	1.22
	SOLD	6	1.27	1.07

Based on the comparison between sold and unsold properties both overall and at the subdivision level, we concluded that the county assessor valued sold and unsold vacant land properties consistently.

VI. CONCLUSIONS

Based on this statistical analysis, there were no significant compliance issues concluded for Arapahoe County as of the date of this report.

STATISTICAL ABSTRACT

Residential

Ratio Statistics for CurrTot / TASP													
ECONAREA	Mean	95% Confidence Interval for Mean		Median	95% Confidence Interval for Median			Weighted Mean	95% Confidence Interval for Weighted Mean		Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Mean Centered
		Lower Bound	Upper Bound		Lower Bound	Upper Bound	Actual Coverage		Lower Bound	Upper Bound			
.00	.827	.582	1.072	.930	.807	1.014	96.1%	.683	.209	1.156	1.211	.169	38.5%
1.00	.999	.989	1.009	1.000	.989	1.008	97.3%	.998	.990	1.007	1.001	.026	3.7%
2.00	1.005	.998	1.012	1.000	.998	1.002	95.3%	1.003	.997	1.009	1.002	.019	3.7%
3.00	.999	.996	1.002	1.000	.999	1.001	95.6%	.996	.994	.999	1.002	.027	4.4%
4.00	1.009	1.005	1.013	1.001	1.000	1.002	95.3%	1.006	1.002	1.009	1.003	.029	5.6%
5.00	1.003	1.000	1.007	1.000	1.000	1.001	95.1%	1.003	1.000	1.006	1.001	.024	6.4%
6.00	1.009	1.004	1.013	1.002	1.000	1.004	95.7%	1.006	1.002	1.009	1.003	.033	5.8%
7.00	1.001	.998	1.004	1.000	.999	1.000	95.4%	.999	.997	1.002	1.002	.028	5.2%
8.00	1.005	1.003	1.006	1.001	1.000	1.001	95.3%	1.002	1.001	1.003	1.002	.027	4.7%
9.00	1.010	1.004	1.016	1.003	1.000	1.007	95.9%	1.007	1.001	1.012	1.003	.040	6.2%
10.00	1.006	1.004	1.008	1.000	1.000	1.001	95.2%	1.004	1.002	1.006	1.002	.022	4.7%
11.00	1.006	1.004	1.008	1.001	1.000	1.002	95.3%	1.003	1.001	1.006	1.002	.032	5.1%
12.00	1.012	1.005	1.019	1.002	1.000	1.005	95.2%	1.010	1.004	1.016	1.002	.032	7.3%
13.00	1.010	1.006	1.014	1.000	1.000	1.001	95.3%	1.009	1.005	1.013	1.001	.025	6.0%
14.00	1.007	1.004	1.010	1.000	1.000	1.001	95.5%	1.005	1.002	1.008	1.002	.022	6.6%
15.00	1.021	1.008	1.033	1.001	1.000	1.001	95.9%	1.019	1.007	1.030	1.002	.028	7.8%
16.00	1.002	.998	1.005	1.000	.999	1.001	95.2%	.992	.986	.998	1.009	.029	5.4%
17.00	1.003	1.001	1.005	1.000	1.000	1.000	95.4%	1.002	1.000	1.003	1.001	.022	4.1%
18.00	1.005	1.004	1.006	1.001	1.000	1.001	95.2%	1.003	1.002	1.004	1.002	.025	4.2%
19.00	.995	.990	1.001	.999	.998	1.000	96.0%	.996	.990	1.002	.999	.026	4.9%
20.00	1.004	1.002	1.006	1.000	.999	1.000	95.4%	.996	.988	1.003	1.008	.023	3.8%
21.00	1.005	1.002	1.007	1.000	.999	1.001	95.5%	1.001	.998	1.004	1.004	.024	4.2%

The confidence interval for the median is constructed without any distribution assumptions. The actual coverage level may be greater than the specified level. Other confidence intervals are constructed by assuming a Normal distribution for the ratios.

Commercial/Industrial

Ratio Statistics for CurrTot / TASP												
Mean	95% Confidence Interval for Mean		Median	95% Confidence Interval for Median			Weighted Mean	95% Confidence Interval for Weighted Mean		Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Mean Centered
	Lower Bound	Upper Bound		Lower Bound	Upper Bound	Actual Coverage		Lower Bound	Upper Bound			
.952	.932	.973	.977	.968	.983	95.3%	.913	.869	.956	1.043	.123	22.6%

The confidence interval for the median is constructed without any distribution assumptions. The actual coverage level may be greater than the specified level. Other confidence intervals are constructed by assuming a Normal distribution for the ratios.

Vacant Land

Ratio Statistics for CurrLnd / TASP												
Mean	95% Confidence Interval for Mean		Median	95% Confidence Interval for Median			Weighted Mean	95% Confidence Interval for Weighted Mean		Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Mean Centered
	Lower Bound	Upper Bound		Lower Bound	Upper Bound	Actual Coverage		Lower Bound	Upper Bound			
1.010	.987	1.034	1.000	.996	1.012	95.9%	.981	.953	1.009	1.030	.100	15.1%

The confidence interval for the median is constructed without any distribution assumptions. The actual coverage level may be greater than the specified level. Other confidence intervals are constructed by assuming a Normal distribution for the ratios.

Residential Median Ratio Stratification

Subclass

Case Processing Summary

		Count	Percent
ABSTRIMP	0	10	0.0%
	1212	23283	79.7%
	1215	137	0.5%
	1220	49	0.2%
	1225	75	0.3%
	1230	5655	19.4%
	9250	1	0.0%
	9270	1	0.0%
Overall		29211	100.0%
Excluded		0	
Total		29211	

Ratio Statistics for CurrTot / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
0	.295	8.194	.630	101.6%
1212	1.000	1.002	.023	4.5%
1215	1.111	1.017	.122	20.0%
1220	.955	1.009	.049	6.4%
1225	.956	1.042	.053	10.1%
1230	1.001	1.002	.034	5.3%
9250	1.001	1.000	.000	.
9270	.981	1.000	.000	.
Overall	1.000	1.018	.026	5.2%

Improvement Age

Case Processing Summary

		Count	Percent
AgeRec	0	10	0.0%
	Over 100	145	0.5%
	75 to 100	322	1.1%
	50 to 75	3468	11.9%
	25 to 50	13152	45.0%
	5 to 25	7172	24.6%
	5 or Newer	4942	16.9%
Overall		29211	100.0%
Excluded		0	
Total		29211	

Ratio Statistics for CurrTot / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
0	.295	8.194	.630	101.6%
Over 100	1.000	1.009	.038	16.2%
75 to 100	1.001	1.003	.017	4.0%
50 to 75	1.000	1.004	.024	6.0%
25 to 50	1.000	1.015	.025	4.9%
5 to 25	1.000	1.011	.023	4.0%
5 or Newer	1.001	1.011	.036	5.2%
Overall	1.000	1.018	.026	5.2%

Improved Area

Case Processing Summary

	Count	Percent
ImpSFRec	0	0.0%
LE 500 sf	44	0.2%
500 to 1,000 sf	3863	13.2%
1,000 to 1,500 sf	9244	31.6%
1,500 to 2,000 sf	7540	25.8%
2,000 to 3,000 sf	6328	21.7%
3,000 sf or Higher	2182	7.5%
Overall	29211	100.0%
Excluded	0	
Total	29211	

Ratio Statistics for CurrTot / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
0	.295	8.194	.630	101.6%
LE 500 sf	1.000	1.004	.032	6.0%
500 to 1,000 sf	1.000	1.002	.030	5.2%
1,000 to 1,500 sf	1.000	1.002	.026	5.0%
1,500 to 2,000 sf	1.000	1.002	.025	5.1%
2,000 to 3,000 sf	1.001	1.002	.024	4.6%
3,000 sf or Higher	.998	1.036	.032	5.8%
Overall	1.000	1.018	.026	5.2%

Improvement Quality

Case Processing Summary

	Count	Percent
QUALITY	10	0.0%
A	1158	4.0%
B	10013	34.3%
C	17698	60.6%
D	98	0.3%
R	17	0.1%
X	217	0.7%
Overall	29211	100.0%
Excluded	0	
Total	29211	

Ratio Statistics for CurrTot / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
	.295	8.194	.630	101.6%
A	.998	1.002	.026	5.2%
B	1.001	1.013	.024	4.1%
C	1.000	1.012	.027	5.4%
D	.998	1.039	.031	6.4%
R	1.003	1.003	.030	6.7%
X	.997	1.001	.030	4.8%
Overall	1.000	1.018	.026	5.2%

Commercial Median Ratio Stratification

Sale Price

Case Processing Summary

	Count	Percent
SPRec		
LT \$25K	2	0.5%
\$25K to \$50K	1	0.2%
\$50K to \$100K	11	2.6%
\$100K to \$150K	21	4.9%
\$150K to \$200K	17	4.0%
\$200K to \$300K	31	7.3%
\$300K to \$500K	48	11.3%
\$500K to \$750K	31	7.3%
\$750K to \$1,000K	33	7.7%
Over \$1,000K	231	54.2%
Overall	426	100.0%
Excluded	0	
Total	426	

Ratio Statistics for CurrTot / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
LT \$25K	.993	1.032	.280	39.6%
\$25K to \$50K	.719	1.000	.000	.
\$50K to \$100K	1.008	.999	.107	16.7%
\$100K to \$150K	.983	.995	.090	13.6%
\$150K to \$200K	.988	.999	.043	5.8%
\$200K to \$300K	.993	.997	.075	15.1%
\$300K to \$500K	.986	.997	.105	17.7%
\$500K to \$750K	.970	.998	.085	14.0%
\$750K to \$1,000K	.983	.995	.114	16.8%
Over \$1,000K	.967	1.030	.145	26.7%
Overall	.977	1.043	.123	22.2%

Subclass

Case Processing Summary

	Count	Percent
ABSTRIMP 0	1	0.2%
2212	38	8.9%
2215	6	1.4%
2220	46	10.8%
2225	2	0.5%
2230	103	24.2%
2233	1	0.2%
2235	82	19.2%
2245	141	33.1%
2250	1	0.2%
2888	1	0.2%
3215	1	0.2%
5725	1	0.2%
9259	2	0.5%
Overall	426	100.0%
Excluded	0	
Total	426	

Ratio Statistics for CurrTot / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
0	.342	1.000	.000	.
2212	.979	1.099	.111	38.9%
2215	.930	.983	.175	24.6%
2220	1.008	1.009	.096	14.8%
2225	.830	1.169	.228	32.2%
2230	.829	1.115	.241	28.9%
2233	.937	1.000	.000	.
2235	.992	.975	.083	16.9%
2245	.986	1.008	.069	10.0%
2250	1.009	1.000	.000	.
2888	.881	1.000	.000	.
3215	.882	1.000	.000	.

5725	1.023	1.000	.000	.
9259	1.104	1.044	.104	14.7%
Overall	.977	1.043	.123	22.2%

Improvement Age

Case Processing Summary

		Count	Percent
AgeRec	0	1	0.2%
	Over 100	2	0.5%
	75 to 100	4	0.9%
	50 to 75	55	12.9%
	25 to 50	183	43.0%
	5 to 25	150	35.2%
	5 or Newer	31	7.3%
Overall		426	100.0%
Excluded		0	
Total		426	

Ratio Statistics for CurrTot / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
0	.342	1.000	.000	.
Over 100	.931	1.012	.036	5.1%
75 to 100	.989	1.071	.067	14.1%
50 to 75	.970	1.023	.129	22.1%
25 to 50	.987	1.027	.105	17.3%
5 to 25	.976	1.053	.135	27.3%
5 or Newer	.919	1.059	.133	19.0%
Overall	.977	1.043	.123	22.2%

Improved Area

Case Processing Summary

		Count	Percent
ImpSFRec	0	1	0.2%
	LE 500 sf	5	1.2%
	500 to 1,000 sf	47	11.0%
	1,000 to 1,500 sf	47	11.0%
	1,500 to 2,000 sf	32	7.5%
	2,000 to 3,000 sf	42	9.9%
	3,000 sf or Higher	252	59.2%
Overall		426	100.0%
Excluded		0	
Total		426	

Ratio Statistics for CurrTot / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
0	.342	1.000	.000	.
LE 500 sf	.719	1.047	.206	40.2%
500 to 1,000 sf	.988	1.007	.058	7.7%
1,000 to 1,500 sf	.982	1.013	.096	16.4%
1,500 to 2,000 sf	.982	1.048	.080	13.9%
2,000 to 3,000 sf	.971	1.058	.146	22.8%
3,000 sf or Higher	.969	1.040	.137	25.3%
Overall	.977	1.043	.123	22.2%

Improvement Quality

Case Processing Summary

	Count	Percent
QUALITY	1	0.2%
A	2	0.5%
B	40	9.4%
C	324	76.1%
D	59	13.8%
Overall	426	100.0%
Excluded	0	
Total	426	

Ratio Statistics for CurrTot / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
	.342	1.000	.000	.
A	.930	.993	.098	13.8%
B	.962	.997	.154	24.3%
C	.977	1.057	.116	21.9%
D	.984	.995	.127	21.4%
Overall	.977	1.043	.123	22.2%

Vacant Land Median Ratio Stratification

Sale Price

Case Processing Summary

		Count	Percent
SPRec	LT \$25K	5	3.1%
	\$25K to \$50K	3	1.8%
	\$50K to \$100K	7	4.3%
	\$100K to \$150K	17	10.4%
	\$150K to \$200K	10	6.1%
	\$200K to \$300K	31	19.0%
	\$300K to \$500K	31	19.0%
	\$500K to \$750K	10	6.1%
	\$750K to \$1,000K	18	11.0%
	Over \$1,000K	31	19.0%
Overall		163	100.0%
Excluded		0	
Total		163	

Ratio Statistics for CurrLnd / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
LT \$25K	1.200	1.000	.000	0.0%
\$25K to \$50K	1.091	.998	.078	11.8%
\$50K to \$100K	1.048	1.014	.073	15.6%
\$100K to \$150K	1.014	1.000	.091	13.6%
\$150K to \$200K	1.067	1.000	.063	8.3%
\$200K to \$300K	1.000	.999	.089	15.3%
\$300K to \$500K	.969	1.002	.128	19.2%
\$500K to \$750K	.998	.995	.085	18.5%
\$750K to \$1,000K	1.011	1.004	.080	13.4%
Over \$1,000K	.987	.987	.087	12.2%
Overall	1.000	1.030	.100	15.2%

Subclass

Case Processing Summary

		Count	Percent
ABSTRLND	0	13	8.0%
	100	67	41.1%
	200	12	7.4%
	300	5	3.1%
	400	49	30.1%
	1112	1	0.6%
	2120	1	0.6%
	2130	11	6.7%
	2135	3	1.8%
	9149	1	0.6%
	Overall		163
Excluded		0	
Total		163	

Ratio Statistics for CurrLnd / TASP

Group	Median	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
0	1.007	.972	.052	7.6%
100	1.000	1.028	.091	13.5%
200	.976	1.025	.165	27.6%
300	.979	1.023	.094	16.0%
400	1.003	1.032	.112	16.7%
1112	1.006	1.000	.000	.
2120	1.000	1.000	.000	.
2130	1.013	1.016	.076	11.0%
2135	.919	1.034	.146	22.5%
9149	1.129	1.000	.000	.
Overall	1.000	1.030	.100	15.2%