Larimer County
Office of the Assessor
May 2025

EXECUTIVE SUMMARY

Four multiplicative regression models were created to establish the market value of residential improved properties as part of the TY2025 reappraisal. There was one model for Economic Area 1 (EA1), another for Economic Area 2 (EA2), a third that addressed both Economic Area 3 (EA3) and Economic Area 4 (EA4), and a fourth which addressed all condos and townhomes countywide. Combined, all Economic areas contain approximately 129.7k residentially classified parcels that must be valued by the market approach. The data set for TY2025 valuation included a 9-year sales sample of 66,085 parcels. Please refer to Table ES-1 for a breakdown of population and sales by economic area. The sales data covered a study period of July 1, 2015, through June 30, 2024. The resulting model values represent the market value as of the appraisal date, which was also June 30, 2024.

Economic Areas 1-3 represent more developed portions of the county with higher population densities and significant commercial development. Economic Area 1 and 2 form a nearly contiguous metropolitan area on the front range, while Economic Area 3 consists of Estes Park, a gateway to Rocky Mountain National Park. Economic Area 4 is largely unpopulated, dominated by public lands, and includes only a modest amount of development relative to its size. Please refer to Figure ES-1.

Each model was a multiplicative regression model and employed similar core variables and variable transformations. Driving factors in the models included location, parcel size, square feet of living area, effective age, and quality. Additional factors include a variety of land and building attributes including, but not limited to, parcel frontage (e.g., lakeside or golf course), garage presence and size, basement area, and finished basement area. The same set of factors was evaluated in each model at the preliminary stage, though not all factors remained in each model's final stage. Model differences reflect location and market variations, as well as sales representation.

TABLE ES-1: POPULATION AND SALES COUNT BY MODEL

	ECONOMIC AREA					
	1	**2**	**3***	**4***	**C/TH**	**TOTAL**
POPULATION	56,124	39,972	4,625	8,420	20,589	129,730
SALES	26,466	21,762	1,583	2,152	14,122	66,085

**EA3 and EA4 were modeled together.*

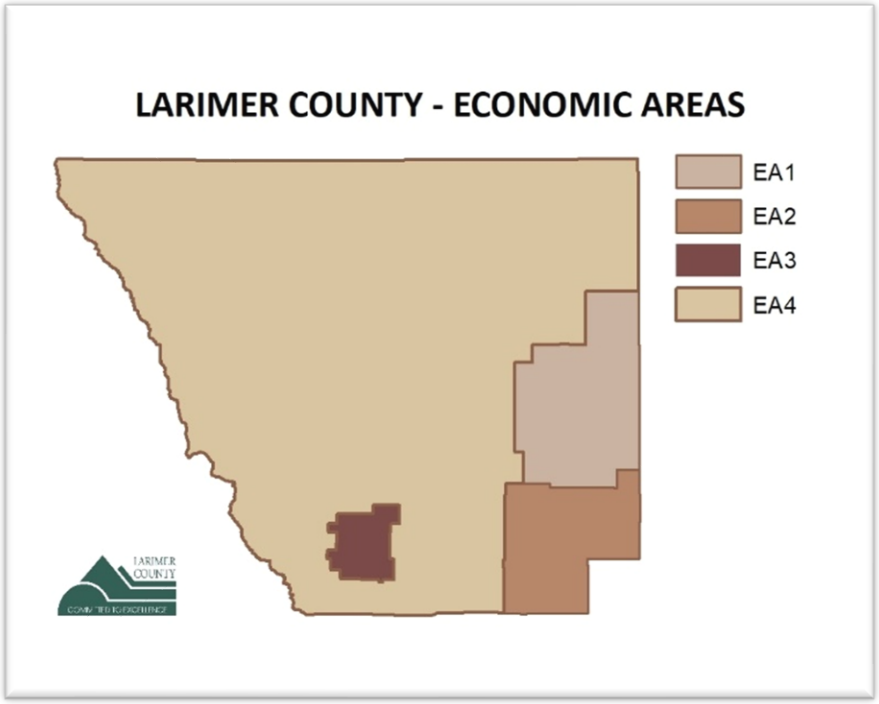

FIGURE ES-1: MAP OF LARIMER COUNTY ECONOMIC AREAS

MARKET TRENDS

Market appreciation during the 9-year study period might be best described as an elongated "S-Curve". Modest appreciation was observed from 2015-2019, followed by unprecedentedly strong appreciation from 2020-2022. In the most recent 18 months prior to the reappraisal date, a relatively flat market was observed. While this broad characterization was generally true for all market areas, more rural areas tended to show modest depreciation in the most recent 18 months prior to the reappraisal date. Using inverse sales ratios (i.e., adjusted sales price divided by the Assessor's TY23 value), Figure ES-2 shows a countywide trend for valid sales in the study period. The increasing trend observed from mid-2020 through mid-2022 indicates rapidly growing sales prices across all property classes. From early 2023 through mid-year 2024, appreciation was muted and variability increased.

While a general countywide trend is apparent, sales data were disaggregated into fourteen mutually exclusive groups representing smaller market areas and different property classes. This segmentation approach enabled individualized time trends to be calculated for each of the 14-time groups, allowing the capture of nuanced data patterns not evident at the countywide level.

Regression analysis was then used to derive rates of appreciation from the sales data. These rates were applied to all sales in the sample to establish time adjusted sales prices reflecting the market as of the appraisal date (6/30/24). The rates and the resulting time adjusted sales prices were incorporated into the four regression models described earlier. Tables of these rates for all time groups and property classes can be found on the Larimer County website (https://www.larimer.gov/assessor/understanding-process).

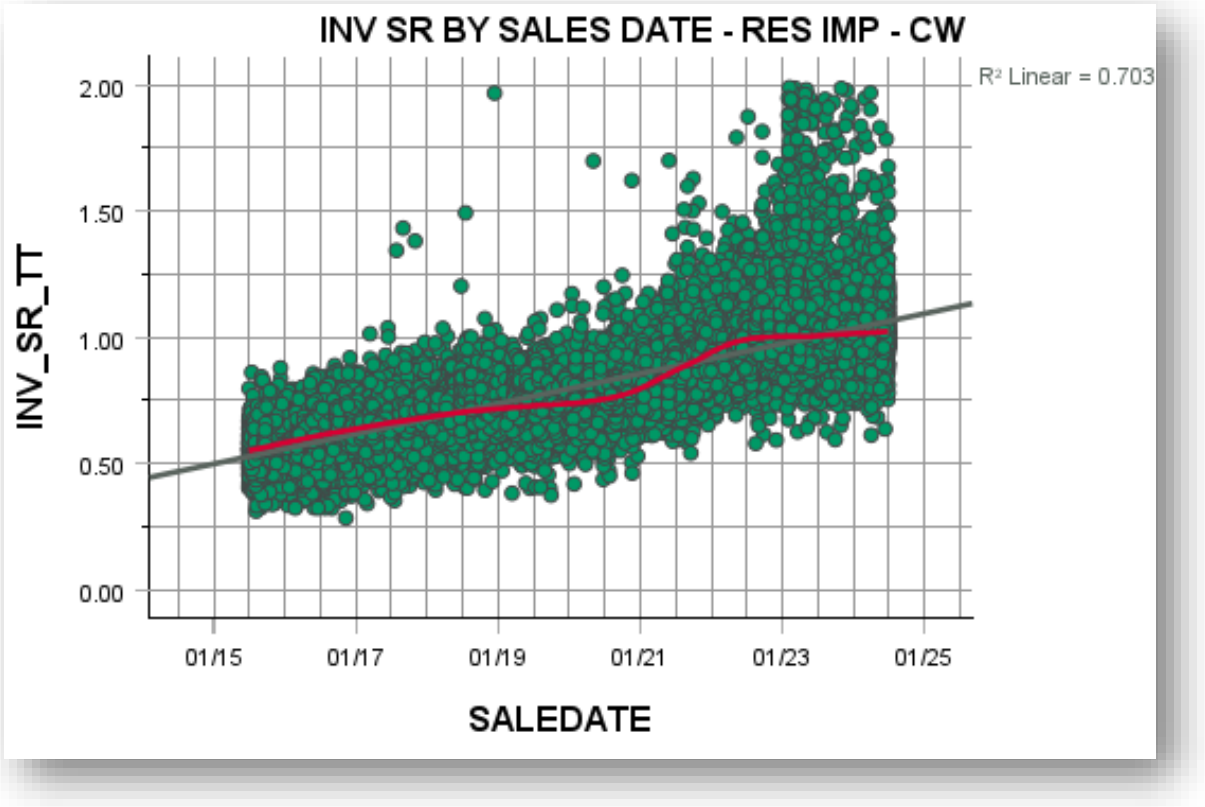

FIGURE ES-2: INVERSE SALES RATIO PLOT DEMONSTRATING MARKET TRENDS COUNTYWIDE

MODEL STRUCTURE

All models utilized the following five continuous variables: age, total basement size, finished basement size, total living area, and total garage size. Additionally, all models except for the Condo/Townhome model used land area. A fireplace/woodstove count was used in the EA2 & EA34 models while the count of bathrooms was used solely in the EA34 model. These eight continuous variables, in order of relative importance (generally speaking), were a) living area b) land area, c) effective age, d) garage size, e) count of bathrooms, f) finished basement area g) total basement area, and h) fireplace count. All continuous variables had units of square feet, except the fireplace and bathroom variable which was expressed as a count, and effective age, which was expressed in years.

All models also evaluated a robust set of qualitative variables, including building attributes, land attributes, and location data. The core building attributes are quality and design style (e.g., ranch, split level, duplex). Over 25 possible land attributes address characteristics such as frontage (e.g., lakeside, golf course), topography, and views. A property's subdivision was the primary location variable in all models, however other variables (NBHD, NBHD_EXT, etc.) were considered as well. The inclusion of specific variables in the final models is dependent on statistical testing, which relies on the prevalence of the features in the sales sample as well as the magnitude of the variable's observed impact. Refer to Table ES-2 for a list of continuous model variables as well as building and land attribute categories.

TABLE ES-2: MODEL VARIABLES	
CONTINUOUS	
DESCRIPTION	**UNITS**
LIVING AREA	SQUARE FEET
PARCEL SIZE	SQUARE FEET
EFFECTIVE AGE	YEARS
BASEMENT AREA	SQUARE FEET
BASEMENT FINISHED AREA	SQUARE FEET
GARAGE AREA	SQUARE FEET
FIREPLACE/WOODSTOVE	COUNT
BATHROOMS	COUNT
BINARY	
DESCRIPTION	**TYPE**
QUALITY	BUILDING
DESIGN STYLE	BUILDING
BASEMENT, WALKOUT	BUILDING
BASEMENT, GARDEN LEVEL	BUILDING
BEDROOM COUNT (0 OR 1)	BUILDING
BATHROOM COUNT (1)	BUILDING
UNIT TYPE (END UNIT)	BUILDING
SWIMMING POOL	BUILDING
ATYPICAL IMPROVEMENT	BUILDING
SHORT-TERM RENTAL	BUILDING
STANDARD LAND LOT	LAND
FRONTAGE: GREENBELT	LAND
FRONTAGE: GOLF	LAND
FRONTAGE: LAKE/RIVER	LAND
FRONTAGE: TRAFFIC	LAND
FRONTAGE: RAILROAD	LAND
TOPO: CORNER LOT	LAND
TOPO: HILLY LOT	LAND
VIEWS	LAND

MODEL QUALITY AND PERFORMANCE

Model quality and performance are evaluated against general statistical measures, the International Association of Assessing Officers (IAAO) standards of statistical measurements, and state statutory requirements.

A primary statistical measure is the adjusted R-squared, a calculation that determines how much of the variance from the mean value is explained by the model. This measure ranges from zero to one, with one indicating a perfect statistical correlation and no variance. The four models averaged an adjusted r-squared of 0.917, which demonstrates a strong model fit.

Industry standards for appraisal and statutory requirements are closely related. They focus on three measures: median sales ratio (the sales ratio is the assessor's valuation divided by the time adjusted sales price), dispersion (the average deviation of the sales ratios as a percentage of the median), and bias (a measure of whether property groups of different value ranges are valued equitably). The latter two measures are known more formally as the Coefficient of Dispersion (COD), and Price Related Differential (PRD), respectively. All four models met these standards for both the five-year study period as well as the latter two years of the study (a state audit requirement). If the same standards are applied to economic areas without reference to specific models or property classification, the standards are also satisfied. Refer to Table ES-3 for specific values.

Another means to evaluate the success of the model is to plot the sales ratio distribution. It is expected that the distribution will be "normal" (i.e., it will resemble the classic bell curve). Refer to Figure ES-3 for the countywide distribution for the two-year audit period, which demonstrates a distribution centered on 1.00 and slight leptokurtic behavior (high concentration around the median).

TABLE ES-3: MODEL QUALITY AND PERFORMANCE					
STATUTORY REQUIREMENTS		MEDIAN	PRD	COD	
		0.95 - 1.05	0.98 - 1.03	<0.1599	
2-YEAR STUDY PERIOD BY MODEL					
MODEL	**MEAN**	**MEDIAN**	**PRD**	**COD**	**SALES**
CONDO/TOWNHOME	0.998	0.995	1.005	0.054	2,770
EA1	0.994	0.991	1.014	0.071	4,196
EA2	0.997	0.994	1.010	0.062	3,691
EA34	1.009	0.992	1.027	0.124	677
5-YEAR STUDY PERIOD BY MODEL					
MODEL	**MEAN**	**MEDIAN**	**PRD**	**COD**	**SALES**
CONDO/TOWNHOME	1.000	0.998	1.005	0.054	8,284
EA1	1.000	0.996	1.010	0.070	14,017
EA2	0.999	0.997	1.008	0.062	12,120
EA34	1.008	0.994	1.020	0.120	2,079
9-YEAR STUDY PERIOD BY MODEL					
MODEL	**MEAN**	**MEDIAN**	**PRD**	**COD**	**SALES**
CONDO/TOWNHOME	1.003	1.000	1.006	0.054	14,122
EA1	1.004	0.999	1.009	0.068	26,466
EA2	1.003	1.000	1.007	0.062	21,762
EA34	1.012	0.998	1.023	0.120	3,735

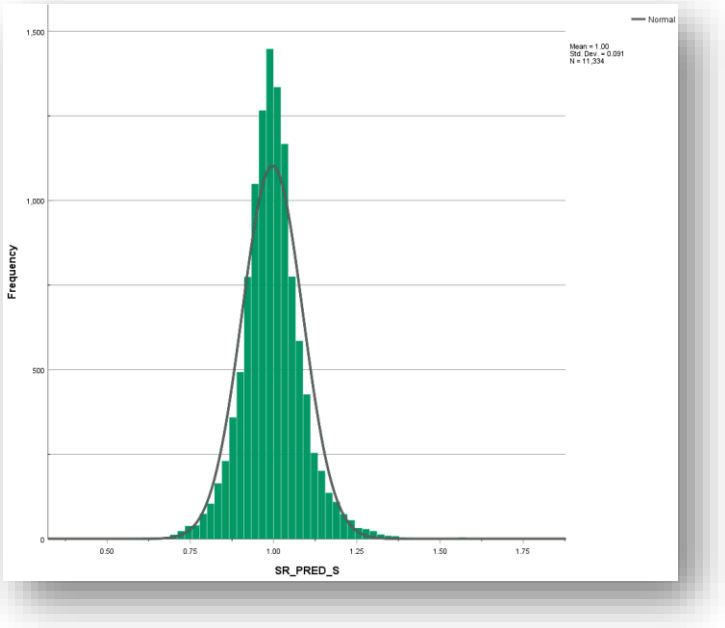

FIGURE ES-3 SALES RATIO DISTRIBUTION
MODEL VALUES – 2 YR STUDY PERIOD

It's important to note that the model performance statistics shared thus far have been based on raw model values. In actuality, parcel values are subject to a variety of adjustments prior to being finalized, including the application of fixed "post regression constraints" as well as "appraisal staff adjustments". In TY2025, post regression constraints included adjustments for the presence of a solar system, certain agricultural occupancies, and deed-restricted properties. The Assessor adjusted the model prediction downward within the state requirements (between 0.95 and 1.05). The median sales ratio target was set at 0.978. Finally, the appraisal staff reviewed numerous parcels applying qualitative analysis to improve the performance of valuations throughout the county. Table ES-4 and Figure ES-4 demonstrate the impact of these adjustments.

TABLE ES-4: MODEL QUALITY AND PERFORMANCE					
STATUTORY REQUIREMENTS		MEDIAN	PRD	COD	
		0.95 - 1.05	0.98 - 1.03	<0.1599	
2-YEAR STUDY PERIOD BY MODEL					
MODEL	**MEAN**	**MEDIAN**	**PRD**	**COD**	**SALES**
CONDO/TOWNHOME	0.985	0.982	1.005	0.054	2,770
EA1	0.983	0.980	1.013	0.071	4,192
EA2	0.986	0.981	1.008	0.061	3,691
EA34	0.997	0.980	1.027	0.122	677
5-YEAR STUDY PERIOD BY MODEL					
MODEL	**MEAN**	**MEDIAN**	**PRD**	**COD**	**SALES**
CONDO/TOWNHOME	0.983	0.980	1.006	0.054	8,284
EA1	0.986	0.981	1.009	0.071	14,013
EA2	0.984	0.980	1.007	0.062	12,120
EA34	0.995	0.983	1.022	0.119	2,073
9-YEAR STUDY PERIOD BY MODEL					
MODEL	**MEAN**	**MEDIAN**	**PRD**	**COD**	**SALES**
CONDO/TOWNHOME	0.982	0.979	1.007	0.055	14,119
EA1	0.987	0.980	1.008	0.070	26,462
EA2	0.985	0.980	1.007	0.063	21,761
EA34	0.994	0.980	1.024	0.123	3,725

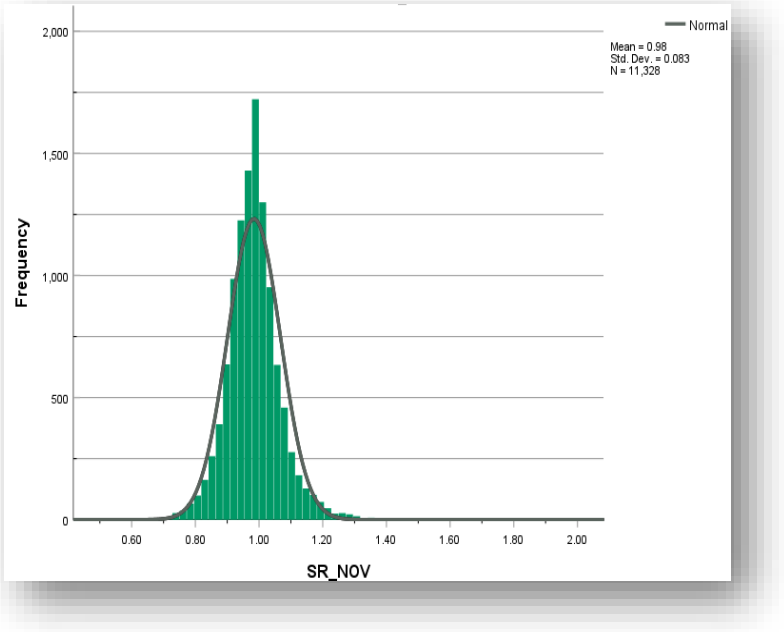

FIGURE ES-4 SALES RATIO DISTRIBUTION
FINAL VALUES - 2YR STUDY PERIOD

The overall model values generated in TY2025 were quite accurate, evidenced by strong performance against both statutory requirements and statistical assessment measures. While no model is perfect, we're confident that the estimates generated in TY2025 assign fair and equitable values across Larimer County residential improved properties.

MEDIAN VALUES AND VALUE CHANGE DATA

The final output of these models are market values for the entire residential population of Larimer County. Biannually property owners are notified of their valuations and property characteristics by the Assessor and can be found online. By aggregating this data, median values and median percent value changes may be tabulated across locations and property classes. Refer to Tables ES-5 and ES-6. Table ES-7 demonstrates what percentage of the population experienced a given range of value change.

TABLE ES-5: RESIDENTIAL IMPROVED VALUES

			COUNT	MEDIAN	MEAN	MINIMUM[2]	MAXIMUM[2]
COUNTY WIDE							
LARIMER COUNTY			127,466	550,600	612,584	28,100	6,020,000
BY ECONOMIC AREA[3]							
EA1	FORT COLLINS		68,172	560,230	612,849	140,500	6,020,000
EA2	LOVELAND		44,800	527,450	602,388	110,770	5,294,100
EA3	ESTES PARK		6,411	669,100	740,006	85,400	4,353,100
EA4	RURAL LC		8,083	515,400	565,805	28,100	3,284,200
BY RESIDENTIAL NEIGHBORHOOD[3]							
EA1	18729	S TIMBERLINE TO STRAUSS CABIN	6,682	607,400	622,931	320,800	4,055,300
	18933	TIMNATH	11,075	594,900	683,077	140,500	6,020,000
	18934	WELLINGTON	4,585	468,800	497,953	191,700	3,072,900
	19601	FRCC & WARREN LAKE	3,344	659,850	701,152	199,900	2,414,400
	19613	BENSON LAKE, FOSSIL CREEK	6,501	617,300	674,855	178,200	4,291,600
	19614	COLINA MARIPOSA	1,966	572,200	578,879	265,600	1,654,700
	19711	DOWNTOWN	3,700	652,550	673,528	159,900	2,535,400
	19715	CSU, CITY PARK	5,607	507,500	529,232	224,000	3,045,700
	19722	W PROSPECT TO W HORSETOOTH	8,978	516,800	520,723	174,300	1,813,600
	19724	E PROSPECT TO E HORSETOOTH	6,137	544,100	539,741	187,100	2,074,700
	19734	W HORSETOOTH TO W HARMONY	3,524	568,300	601,588	248,100	1,559,700
	19829	BELLVUE & HT RESERVOIR	3,103	593,500	671,644	203,600	5,687,700
	19836	NORTH LAKES	2,970	670,300	756,727	281,500	2,918,300
EA2	28506	BOYD LAKE & JOHNSTOWN	6,524	539,100	609,982	274,900	5,294,100
	28623	WINDSOR	3,690	831,100	840,241	354,500	2,561,400
	29414	BERTHOUD	5,982	559,800	599,539	255,500	4,109,000
	29502	W 43RD TO W 29TH	7,276	468,500	495,023	185,600	1,992,700
	29517	DEVIL'S BACKBONE & CARTER	5,852	786,100	851,853	110,770	4,387,300
	29522	LAKE LOVELAND & DOWNTOWN	12,286	459,000	488,912	157,000	4,514,200
	29635	W 57TH TO W 43RD	3,186	531,800	541,061	226,300	1,247,700
EA3	33525	ESTES PARK	6,412	669,100	739,925	85,400	4,353,100
EA4	41428	RURAL LC SW	1,763	623,100	668,162	124,600	3,284,200
	41626	RURAL LC FOOTHILLS	2,308	612,350	669,368	88,600	2,639,700
	42915	RED FEATHER	690	520,050	543,489	132,500	1,866,300
	43028	RURAL LC , N & W	3,322	409,470	444,303	28,100	3,224,390

2. Minimum and maximum values represent extremes in the data set and are rare, but legitimate occurrences. The median and mean are reflective or the norm and represent the bulk of observations.

3. Geographic references are generalizations for convenience and do not represent the exact limits of the economic area, neighborhood, or the associated municipality.

TABLE ES-6: RESIDENTIAL IMPROVED VALUES (CONT.)					
	COUNT	MEDIAN	MEAN	MINIMUM	MAXIMUM
BY PROPERTY TYPE					
CONDO	6,548	336,900	362,839	28,100	2,245,300
DUPLEX	1,783	562,100	595,080	343,300	1,969,200
RESIDENTIAL	105,537	580,800	649,266	64,100	6,020,000
TOWNHOUSE	13,442	427,400	446,799	194,600	1,429,200
TRIPLEX	156	752,300	764,755	444,100	1,330,700
BY SELECTED ACCOUNT TYPES					
AGRICULTURAL	2,246	689,020	762,216	88,820	4,153,470
RESIDENTIAL	125,052	548,900	609,748	28,100	6,020,000
BY PROPERTY CITY					
NONE SPECIFIED	93	412,300	500,658	64,100	2,209,380
ALLENSPARK	11	780,400	854,703	482,800	1,623,710
BELLVUE	1,337	528,400	569,795	81,800	2,495,440
BERTHOUD	6,961	592,200	682,523	162,500	4,109,000
CARR	52	674,900	723,027	236,960	1,495,000
DRAKE	691	411,600	433,286	88,820	2,259,220
ESTES PARK	6,664	672,200	742,159	139,800	4,353,100
FORT COLLINS	59,435	566,500	612,762	140,500	5,687,700
GLEN HAVEN	402	520,850	550,326	124,600	1,743,100
JELM	48	372,250	592,921	118,900	3,224,390
JOHNSTOWN	1,823	539,100	584,677	381,100	4,153,470
LAPORTE	946	537,050	622,434	227,700	2,160,000
LIVERMORE	1,261	524,100	552,582	132,500	2,374,260
LONGMONT	98	802,400	883,693	485,860	2,176,300
LOVELAND	32,881	497,400	562,698	88,600	5,294,100
LYONS	797	703,900	752,468	191,580	2,079,000
RED FEATHER LAKES	1,887	387,300	416,435	28,100	1,866,300
SAND CREEK	143	343,000	355,759	119,200	673,400
TIMNATH	3,797	666,500	806,137	220,600	6,020,000
VIRGINIA DALE	11	417,450	497,668	223,840	1,088,900
WELLINGTON	4,927	471,700	503,942	191,700	3,072,900
WINDSOR	3,201	824,400	823,820	354,500	1,913,600

TABLE ES-6: RESIDENTIAL IMPROVED - PERCENT CHANGE IN VALUES

			COUNT	MEDIAN	MEAN	MINIMUM[2]	MAXIMUM[2]
COUNTY WIDE							
LARIMER COUNTY			121,448	-1.8%	-0.9%	-49.8%	49.9%
BY ECONOMIC AREA[3]							
EA1	FORT COLLINS		64,863	-1.3%	-0.3%	-43.7%	49.7%
EA2	LOVELAND		42,953	-1.9%	-0.9%	-43.0%	49.9%
EA3	ESTES PARK		6,128	-3.8%	-1.9%	-37.9%	48.8%
EA4	RURAL LC		7,504	-7.2%	-5.2%	-49.8%	49.8%
BY RESIDENTIAL NEIGHBORHOOD[3]							
EA1	18729	S TIMBERLINE TO STRAUSS CABIN	6,370	-3.0%	-2.5%	-26.8%	43.1%
	18933	TIMNATH	10,009	-2.7%	-1.2%	-35.2%	49.7%
	18934	WELLINGTON	4,390	-4.0%	-2.6%	-29.2%	49.5%
	19601	FRCC & WARREN LAKE	3,260	-2.0%	-1.2%	-28.9%	46.8%
	19613	BENSON LAKE, FOSSIL CREEK	6,156	-2.8%	-1.7%	-26.1%	47.9%
	19614	COLINA MARIPOSA	1,900	-2.8%	-1.7%	-12.8%	40.8%
	19711	DOWNTOWN	3,558	2.0%	2.5%	-43.7%	49.2%
	19715	CSU, CITY PARK	5,456	-0.3%	0.6%	-37.5%	43.7%
	19722	W PROSPECT TO W HORSETOOTH	8,806	-0.1%	0.3%	-23.6%	45.2%
	19724	E PROSPECT TO E HORSETOOTH	5,931	0.4%	0.6%	-25.8%	48.7%
	19734	W HORSETOOTH TO W HARMONY	3,432	0.7%	1.0%	-41.3%	46.9%
	19829	BELLVUE & HT RESERVOIR	2,908	2.0%	3.8%	-20.5%	49.6%
	19836	NORTH LAKES	2,686	1.0%	1.7%	-26.9%	45.1%
EA2	28506	BOYD LAKE & JOHNSTOWN	6,151	-0.9%	-0.6%	-29.2%	44.9%
	28623	WINDSOR	3,442	0.1%	1.1%	-19.4%	47.1%
	29414	BERTHOUD	5,621	-1.9%	-0.6%	-23.3%	48.4%
	29502	W 43RD TO W 29TH	7,121	-3.1%	-2.3%	-24.7%	45.8%
	29517	DEVIL'S BACKBONE & CARTER LAKE	5,519	-1.0%	0.2%	-30.2%	49.9%
	29522	LAKE LOVELAND & DOWNTOWN	12,010	-2.4%	-1.2%	-43.0%	48.1%
	29635	W 57TH TO W 43RD	3,089	-2.5%	-1.6%	-17.5%	39.4%
EA3	33525	ESTES PARK	6,129	-3.8%	-1.9%	-37.9%	48.8%
EA4	41428	RURAL LC SW	1,668	-8.7%	-7.2%	-39.2%	47.1%
	41626	RURAL LC FOOTHILLS	2,105	-5.0%	-3.2%	-49.8%	49.8%
	42915	RED FEATHER	658	-8.6%	-7.6%	-37.0%	44.7%
	43028	RURAL LC , N & W	3,072	-7.6%	-4.9%	-40.9%	49.6%

2. Minimum and maximum values represent extremes in the data set and are rare, but legitimate occurrences. The median and mean are reflective or the norm and represent the bulk of observations.

3. Geographic references are generalizations for convenience and do not represent the exact limits of the economic area, neighborhood, or the associated municipality.

TABLE ES-6: RESIDENTIAL IMPROVED - PERCENT CHANGE IN VALUES (CONT.)					
	COUNT	MEDIAN	MEAN	MINIMUM	MAXIMUM
BY PROPERTY TYPE					
CONDO	6,362	-1.7%	-0.6%	-40.7%	48.8%
DUPLEX	1,750	-3.8%	-3.0%	-43.7%	43.0%
RESIDENTIAL	100,491	-1.9%	-1.1%	-49.8%	49.9%
TOWNHOUSE	12,695	-0.9%	0.7%	-33.9%	48.7%
TRIPLEX	150	-1.3%	0.0%	-37.5%	49.2%
BY SELECTED ACCOUNT TYPES					
AGRICULTURAL	2,040	-2.0%	-0.5%	-39.0%	49.2%
RESIDENTIAL	119,367	-1.8%	-0.9%	-49.8%	49.9%
BY PROPERTY CITY					
NONE SPECIFIED	50	1.6%	5.1%	-21.0%	47.1%
ALLENSPARK	9	-9.7%	-1.3%	-16.7%	44.6%
BELLVUE	1,180	-4.5%	-2.6%	-38.1%	49.6%
BERTHOUD	6,482	-1.8%	-0.5%	-30.2%	49.6%
CARR	50	-10.5%	-3.8%	-26.1%	46.3%
DRAKE	605	-4.6%	-4.1%	-49.8%	49.7%
ESTES PARK	6,382	-4.0%	-2.2%	-39.2%	48.8%
FORT COLLINS	56,976	-1.1%	-0.2%	-43.7%	49.7%
GLEN HAVEN	381	-6.0%	-5.6%	-37.2%	46.8%
JELM	43	-11.2%	-5.1%	-21.3%	40.2%
JOHNSTOWN	1,663	-0.9%	-1.0%	-23.2%	41.7%
LAPORTE	906	-0.2%	1.4%	-24.4%	49.8%
LIVERMORE	1,202	-9.6%	-7.4%	-37.0%	44.7%
LONGMONT	93	-0.9%	-1.2%	-14.9%	19.9%
LOVELAND	31,885	-2.3%	-1.2%	-49.6%	49.9%
LYONS	760	-10.3%	-8.8%	-37.9%	45.6%
RED FEATHER LAKES	1,761	-5.3%	-3.2%	-34.1%	49.6%
SAND CREEK	132	-2.2%	0.9%	-40.9%	47.7%
TIMNATH	3,202	-2.1%	0.0%	-35.2%	48.7%
VIRGINIA DALE	10	-13.9%	-10.7%	-21.4%	21.5%
WELLINGTON	4,722	-4.2%	-3.1%	-35.5%	49.5%
WINDSOR	2,954	0.1%	1.0%	-30.7%	47.1%

TABLE ES-7: TY2025 RESIDENTIAL IMPROVED POPULATION WITHIN PERCENT CHANGE RANGES			
% Change Range	Count	Percent	Cumulative Percent
COUNTY WIDE			
< -15%	2,896	2.4%	2.4%
-15% to -12%	2,340	1.9%	4.3%
-12% to -9%	4,520	3.7%	8.0%
-9% to -6%	11,206	9.2%	17.3%
-6% to -3%	26,524	21.8%	39.1%
-3% to 0%	30,441	25.1%	64.2%
0% to 3%	19,123	15.7%	79.9%
3% to 6%	9,570	7.9%	87.8%
6% to 9%	5,444	4.5%	92.3%
9% to 12%	3,004	2.5%	94.7%
12% to 15%	1,824	1.5%	96.2%
> 15%	4,556	3.8%	100.0%
Total	121,448	100.0%	

GLOSSARY OF TERMS[1]

Adjusted R Squared (ADJ R^2) -- a modified version of *Coefficient of Determination* that adjusts for the number of predictors in the model. This adjustment prevents overestimating the impact of adding independent variables to the model. More generally, a measure of the model's ability to accurately predict value. Measured between 0 and 1, an ADJ R^2 above 0.9 is indicative of a very good model.

Coefficient of Dispersion (COD) – Expresses as a percentage the average deviation of sales ratios from the median sales ratio. COD is used throughout the property assessment field as a measure of appraisal uniformity. A lower COD indicates that predicted values from the models, which are based on property characteristics, are close to the time-adjusted sales prices of market sales.

Coefficient of Determination (R^2) – The proportion of the variation in the dependent variable accounted for by the variation in the independent variables. R^2 varies between zero (no linear relationship) and one (perfect linear relationship). See *Adjusted R^2*. More generally, a measure of the model's ability to accurately predict value. Measured between 0 and 1, an R^2 above 0.9 is indicative of a very good model.

Collinearity – when two or more predictor variables are highly correlated, making it difficult to isolate their individual effects on the dependent variable

Decision Tree Model – a predictive tool that estimates property values by splitting data into branches based on key features. Each split helps group similar properties together, making it easier to assign values based on patterns in past sales. It's like a flowchart that guides valuation decisions using simple, step-by-step rules.

Dependent Variable — A variable (such as sales price) whose value will change depending on the value of either one or several independent variables. In property valuation analysis, sale price is analyzed by modeling various property-related variables (i.e., property characteristics) relative to that sales data.

Economic Area - A geographic area, typically encompassing a group of neighborhoods, defined on the basis that the properties within its boundaries are more or less equally subject to a set of one or more economic forces that largely determine the value of the properties in question.

Independent Variable — A variable (such as location, quality, or living area) that is manipulated to test its impact on a *dependent variable*. A change in the independent variable may directly cause or simply be correlated with a change in the dependent variable. Any effect on the dependent variable is typically measured and recorded. In property valuation analysis, independent variables (e.g., land area, living area, location) are typically selected because of the expectation they will influence dependent variables (i.e., sales price).

LOESS— locally weighted scatter plot smoothing; a mathematical means of applying a weighted, non-linear fit line to many discrete measurements without requiring a formulaic relationship for all points in the data set

Multiplicative Regression Model – A mathematical model in which the coefficients of *independent variables* serve as powers (exponents) to which the independent variables are raised or in which independent variables themselves serve as exponents; the results are then multiplied to estimate the value of the *dependent variable*. In other words, each independent variable of the model receives a factor, which is then multiplied by the factors of all other independent variables to arrive at a property value.

Neighborhood – a subset or stratification of an *Economic Area* where the influence of one or more economic forces may vary relative to the parent Economic Area.

Price Related Differential (PRD) – A statistical measure of vertical property tax equity (see *Vertical Equity*). The PRD is calculated by dividing the mean ratio by the weighted mean ratio in a ratio study. If the result exceeds 1.03, assessments are considered regressive. If the result is less than 0.98, assessments are considered progressive.

Qualitative Variable – Non-numeric variable that is subjective in nature. It describes an amenity such as view, quality, or site/location.

Quantitative Variable – Pertaining to the objective nature of some variable of interest, that is, something that can be measured or counted with little ambiguity. For example, the square feet of living area is a quantitative variable.

Regression Analysis — A kind of statistical analysis used to investigate whether a *dependent variable* (such as property value) and a set of one or more *independent variables* share a correlation and, if they do, to predict the value of the dependent variable on the basis of the values of the other variables. Regression analysis of one dependent variable and only one independent variable is called simple linear regression, but it is the word simple (not linear) that distinguishes it from multiple regression analysis with its multiple independent variables.

Residual — The difference between an observed value and a predicted value for a dependent variable.

Sales Ratio – A mathematical relationship between sales prices and assessed value that is used to measure the level of appraisal. The sales ratio is also used to evaluate the effectiveness of assessment practices, reappraisals, or revaluations, and is the basis for *time trends*.

Spline – A line segment representing some number of months within the study period for which regression will determine a slope, the slope being the rate of appreciation/depreciation; splines are a feature of piecewise linear regression

Standardized Residuals – a standardized measure of the variance observed in regression equal to the residual divided by its standard deviation

Time Trends – An analysis of market appreciation or depreciation over time, frequently based on a *sales ratio* study.

Vertical Equity – Distributing tax burdens fairly across differing property values. Equity is achieved when the price-related differential (PRD) falls between 0.98 and 1.03. See *Price Related Differential*.

Understanding Regression Results

B (Unstandardized Coefficient): the slope determined by regression; it indicates how much the dependent variable (e.g., value) will change when the independent variable (e.g., square feet or months) changes by one unit

Standard Error: the precision of B; the smaller the standard error, the more reliable the estimate provided by applying the coefficient

Beta (Standardized coefficient): the slope determined by regression in terms of standard deviation; used to establish the relative importance of a variable; the larger beta is relative to that of other variables, the more important the variable is to the model

t (t-score or t-statistic): a measure of statistical significance; t >= 1.96 indicates that a variable is significant provided that particular conditions are, or are commonly assumed to be, present

Sig. (Significance level or p-value): the probability that the result is due to chance; if Sig. < 0.05, the probability that the result is due to chance is low and the variable is therefore considered to be significant

[1] *Adapted from the IAAO Glossary for Property Appraisal and Assessment, 3rd Edition.*

International Association of Assessing Officers. (2021, September 1). Glossary for property appraisal and assessment. IAAO. https://www.iaao.org/media/pubs/IAAO-Glossary_3rd-Ed_final.pdf