Metro Forecasting Models

City of Greeley, Colorado – 2015 Forecast Report
Population, Housing and Commercial Demand

Thank you for purchasing this report, which contains forecasts of population growth, housing demand and demand for commercial space for goods and services for the City of Greeley, Colorado.

The analytical methods used to prepare these forecasts have proven to be more accurate than the industry standard of straight-line (linear) forecasts. Our goal is to maintain the most accurate forecasting models, which are based on our history of forecasting:

- In 1982 the City of North Port, Florida, asked Dr. Paul Van Buskirk (author of the Metro Forecasting Model) to forecast the population of their city in 2007, then 25 years into the future. In 1980 North Port had a permanent population of 6,350 people. Dr. Van Buskirk forecasted that in 2007 there would be a permanent population of 57,452; in 2010, the Census counted 57,350 people in North Port. The forecast was 99.7% accurate 25 years into the future.

- In 2002 the City of Cape Coral, Florida, engaged Dr. Van Buskirk to prepare a population forecast for their city to use in planning for future commercial sites, fire stations and schools. His 2010 forecast was 155,179 permanent residents; in 2010, the Census counted 154,305 permanent residents.

The information in this report can be used by businesses, property owners, developers, lenders and planners to help understand the past and future of the City of Greeley and then use accurate forecasts in decision-making:

- ✓ **Businesses:** Metro's growth forecasts help make marketing decisions because growth forecasts can be compared to forecasts of other metropolitan areas.

- ✓ **Property Owners:** Housing and commercial demand forecasts help property owners understand how their land may increase or decrease in value based on the current and future supply versus demand for their respective land uses.

- ✓ **Developers:** Current and forecasted demand versus supply are used in due-diligence reviews and pro forma preparation, as well helping to broadly gauge absorption.

- ✓ **Lenders:** Loan requests for new construction can be compared to the forecasted demand for commercial or residential projects.

- ✓ **Planners:** Population, housing and commercial forecasts are used to evaluate the need for zoning changes desired by their clients.

For more detailed forecasts of population, housing and commercial demand, see our website.

City of Greeley, Colorado
Population, Housing and Commercial Demand Forecast

The City of Greeley, Colorado (this city is part of the Denver-Aurora Combined Statistical Area) is located in northern portion of the state and approximately 50 miles north of Denver.

The Greeley city limits encompass approximately 30 square miles of Weld County which is 4,017 square miles. In 2013 the permanent population was 96,539 according to the US Census, up from 480 in 1870.
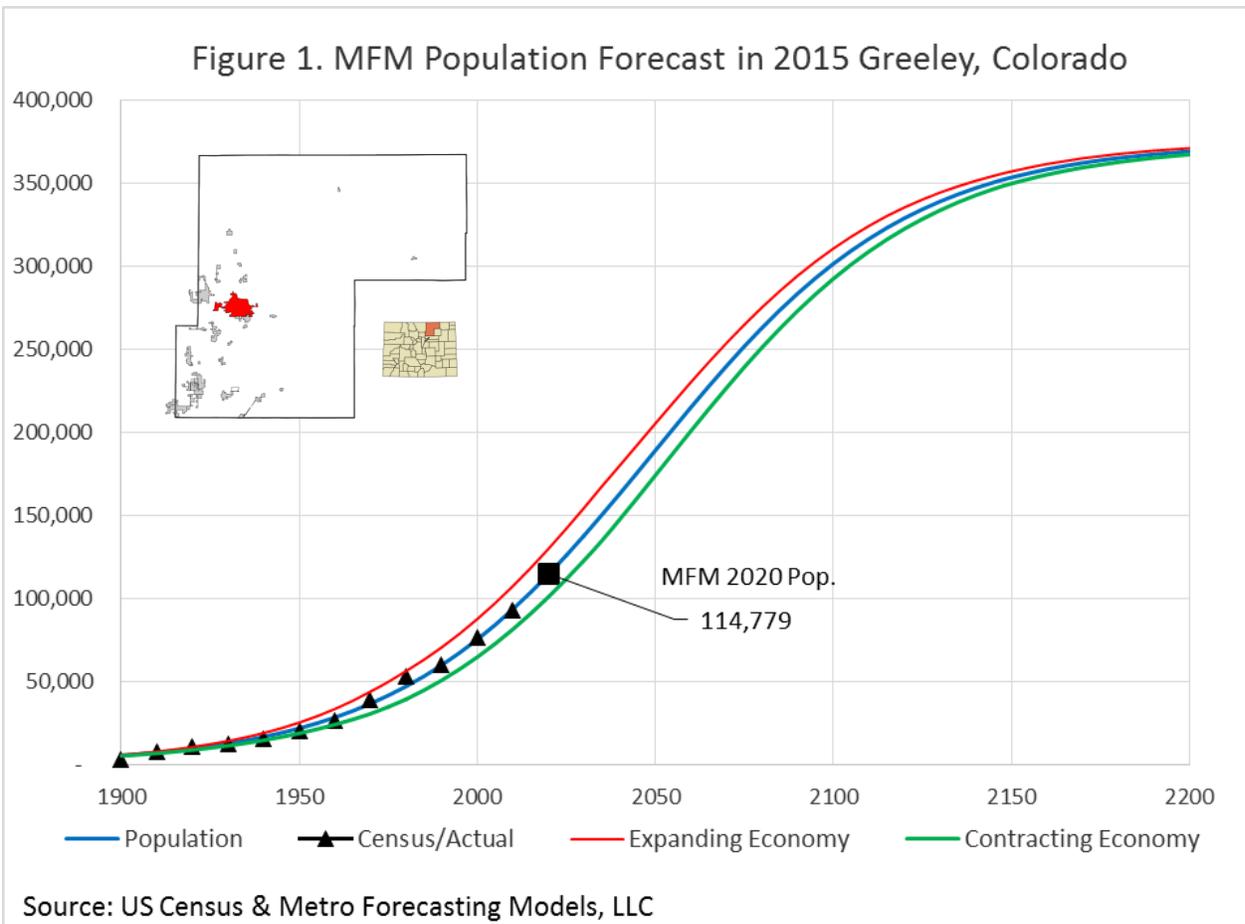
Metro Forecasting Models (MFM) uses proprietary modeling software to forecast the future population of this city in 5-year increments. Whereas forecasters often apply linear extrapolation of past census data, a technique which becomes inaccurate over longer periods, MFM forecasting methodology has been documented to be far more accurate over time.

Figure 1 below is a population graph of Greeley showing actual change in population from 1900 to 2010.

After the MFM Composite Forecast Curve is established (the blue line), similar curves are generated for both an expanding and contracting economy for the entire city. In statistical jargon, these similar curves are each two standard deviations from the mean (composite) curve.

We find that population growth falls within these boundaries 95% of the time, barring catastrophic events (war, natural disaster, etc.) that permanently alter development potential.

Figure 1 presents a summary of our population forecasts for 2020 and beyond for the City of Greeley, Colorado.

Figure 1. MFM Population Forecast in 2015 Greeley, Colorado

MFM 2020 Pop. 114,779

Legend: Population — Census/Actual — Expanding Economy — Contracting Economy

Source: US Census & Metro Forecasting Models, LLC

Population Forecast

Table 1 presents our specific analysis and population growth forecast for the City of Greeley area in 5-year increments for three different economies. The blue column, labeled "Composite," shows how the population will grow over time in a balanced economy.

The orange column, labeled "Expanding," presents a higher forecast for the population growth curve in a "Bull Market" economy. The data presented in this column provides a reliable guide for our clients who need to understand how this city will grow under favorable economic conditions.

The green column, labeled "Contracting," presents a lower forecast for the population growth curve in a "Bear Market" economy. The data presented in this column provides a guide for our clients who need to understand how economic trends, business decisions and government policy (national or local) could affect this city's growth under less favorable economic conditions.

As the economy cycles from bull to bear markets, the day-to-day or year-to-year population growth will revert to the Composite forecast. Depending upon the significance of economic trends and government and business policy, the change in growth can appear to be a never-ending boom-bust cycle.

The general population tends to mentally forecast growth by what has happened over the last year of their lives. If last year showed low or no growth, then next year would be the same or worse under that scenario. If last year was a good year, then next year will be just as good or better. The Composite forecast provides a balanced view of what the future holds for this city.

The population forecasted in Table 1 provides a reliable guide for wise industry leaders who understand the pace of the last few years' growth does not mean that growth will continue in the same pattern. The expanding and contracting economy forecasts provide ranges for strategic planning by governments and the private sector.

Table 1: City of Greeley Population Forecast			
Year	Composite	Expanding	Contracting
1970	36,885	38,399	35,424
1975	41,799	43,489	40,166
1980	47,276	49,155	45,458
1985	53,356	55,436	51,341
1990	60,074	62,365	57,851
1995	67,461	69,971	65,021
2000	75,538	78,273	72,876
2005	84,317	87,277	81,430
2010	93,797	96,979	90,687
2015	103,962	107,357	100,635
2020	114,779	118,372	111,247
2025	126,197	129,969	122,479
2030	138,148	142,073	134,268
2035	150,546	154,593	146,533
2040	163,289	167,424	159,178
2045	176,264	180,447	172,092
2050	189,348	193,539	185,154
2055	202,414	206,573	198,240
2060	215,335	219,422	211,221
2065	227,992	231,970	223,976
2070	240,274	244,110	236,389
2075	252,082	255,749	248,358
2080	263,337	266,812	259,798
2085	273,974	277,241	270,638
2090	283,948	286,996	280,829
2095	293,231	296,055	290,335
2100	301,812	304,411	299,141
Source: Metro Forecasting Models, LLC			

Housing Demand Forecast

Table 2 presents the City of Greeley housing demand forecast in 5-year increments. As explained for Table 1, the blue, orange, and green columns represent three economic conditions. This housing demand forecast provides information for home builders, urban planners, retailers and local governments for their future planning. The blue column, labeled "Composite," shows how the demand for housing will grow over time in a normal economy.

Housing demand drives many other industries such as material suppliers, contractors, professional services, retailers, restaurants and government. A growing population will need these services and many more to meet their day-to-day needs.

The data presented in this table provides information and guidelines for our clients who need to understand how the demand for housing units impacts this city's growth under different economic conditions. The formation of households, trends in household size and vacancy rates play key roles in forecasting housing demand.

As population growth cycles from periods of lower growth to higher growth, housing demand will revert to the Composite forecast. Depending upon the significance of government and private sector policy, the change in growth can appear to be a never ending boom-bust cycle.

The 2010 Census counted 36,323 housing units versus our forecasted demand of 37,355 units. The model accurately identified an undersupply of housing resulting in yearly increases in housing permits since 2010 with 789 permits issued in 2014 (see Figure 4). Our forecast demand of 41,403 units in 2015 compared to our calculated 37,766 housing units in 2014 implies the housing market should remain healthy for the foreseeable future.

Table 2: Greeley, Colorado Housing Units Demand Forecast			
Year	Composite	Expanding	Contracting
1970	14,689	15,293	14,107
1975	16,646	17,319	15,996
1980	18,828	19,576	18,104
1985	21,249	22,077	20,446
1990	23,924	24,837	23,039
1995	26,866	27,866	25,895
2000	30,083	31,172	29,023
2005	33,579	34,758	32,429
2010	37,355	38,622	36,116
2015	41,403	42,755	40,078
2020	45,710	47,141	44,304
2025	50,258	51,760	48,777
2030	55,017	56,580	53,472
2035	59,954	61,566	58,357
2040	65,029	66,676	63,392
2045	70,197	71,863	68,535
2050	75,407	77,077	73,737
2055	80,611	82,267	78,949
2060	85,757	87,384	84,118
2065	90,797	92,382	89,198
2070	95,688	97,216	94,141
2075	100,391	101,852	98,908
2080	104,873	106,257	103,464
2085	109,109	110,411	107,781
2090	113,082	114,296	111,839
2095	116,779	117,903	115,625
2100	120,196	121,231	119,132
Source: Metro Forecasting Models, LLC			

Most home builders forecast growth based on the recent orders for new homes. If last year showed little or no demand for new housing units, will next year be the same or worse? If last year was a good year for housing, will next year be just as good or better? The Composite forecast provides a balanced view of what the future holds for this city.

The housing demand forecast in **Table 2** provides benchmarks for planners, builders and developers who understand the pace of the last few quarters' growth does not mean that growth will continue at the same rate.
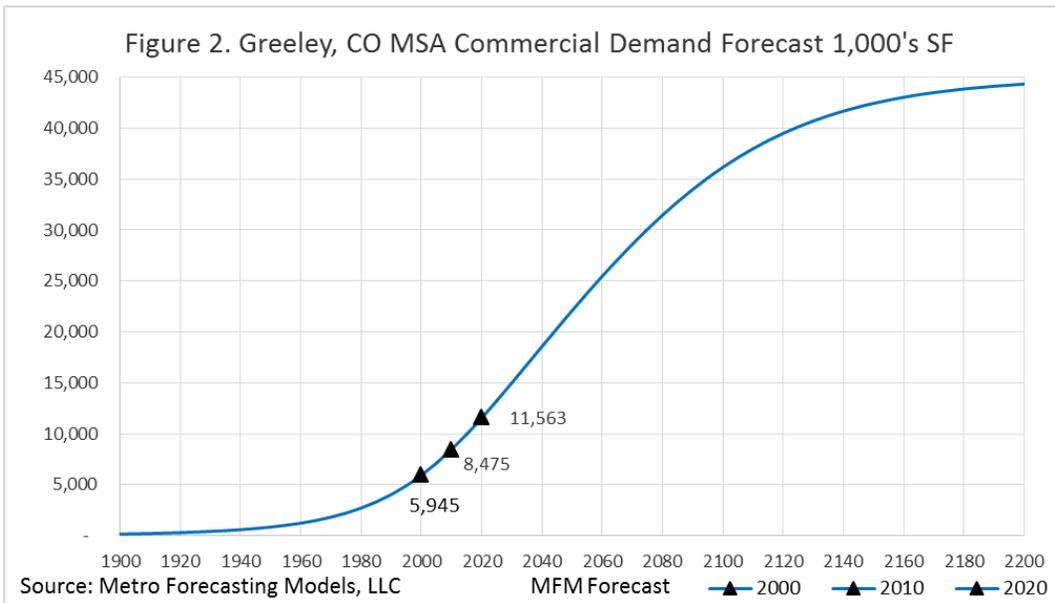
Commercial Demand Forecast

Table 3 presents the City of Greeley commercial retail trade and services demand forecast in 5-year increments. The demand for retail and office space increases as the population grows.

When the increased population meets certain thresholds, the market can support new or expanded stores and services. For example a small population may want a big-box retail store but not have enough people to support the economic investment by the retailer. In those cases, the demand for the big box store is met by neighboring communities that are large enough to meet the minimum investment expectation by the retailer. The City of Greeley provides much of the commercial goods and services supply to serve the demand for the population living in Weld County yet outside the city. There is one Regional Shopping Center and six Neighborhood Shopping Centers. The Neighborhood Shopping Centers range from 30,000-100,000 sf.

The demand forecast shown in **Table 3** is the *total* demand for commercial and office space in this market area. A community can limit the type of commercial development allowed through local zoning codes. Where demand for commercial space exists but supply is not available, the demand is met outside that community. For example, neighborhood shopping centers may require a population of only 8,000–15,000 to be self-sustaining, while community and regional shopping centers may need a threshold population of 30,000 and 150,000 respectively.

Table 3: Greeley, CO Commercial Demand Forecast - Sq. Ft. Bldg.	
Year	1,000's SF
1970	1,830
1975	2,229
1980	2,720
1985	3,320
1990	4,047
1995	4,918
2000	5,945
2005	7,132
2010	8,475
2015	9,960
2020	11,563
2025	13,254
2030	15,005
2035	16,786
2040	18,575
2045	20,352
2050	22,101
2055	23,812
2060	11,563
2065	13,254
2070	15,005
2075	16,786
2080	18,575
2085	20,352
2090	22,101
2095	23,812
2100	25,474

Source: Metro Forecasting Models, LLC

Figure 2. Greeley, CO MSA Commercial Demand Forecast 1,000's SF

Source: Metro Forecasting Models, LLC — MFM Forecast — 2000 — 2010 — 2020

A market, such as Greeley's, may also have more commercial space than the city's population could naturally support. In these cases, demand for certain services from the population of neighboring communities may be met by the local market's supply. This is why Greeley has more commercial supply than a similar population with a market confined to the city limits.

The forecasted commercial demand in Table 3, combined with the knowledge of the existing commercial supply and vacancy rates, is useful in determining how much new space will be needed in 5-year steps. Note the demand is not linear; one 5-year step may forecast a demand rate that is greater or less than the previous 5-year period. **Figure 2** helps illustrate the changing demand for commercial space over time.

City of Greeley, Colorado Overview

Greeley is the 12th largest city in Colorado according to the 2010 US Census. This MSA had a population of 92,889 in 2010 and an estimated Census population of 96,539 in 2013. The University of Northern Colorado is located in Greeley and has a student enrollment of more than 12,000.

The major economic drivers for this MSA include education, manufacturing and healthcare. The largest employers in this MSA are JBS Swift & Company (food process and packaging), North Colorado Medical Center, Vestas Wind Systems (wind turbine manufacturing), State Farm Insurance and Halliburton Energy Services.

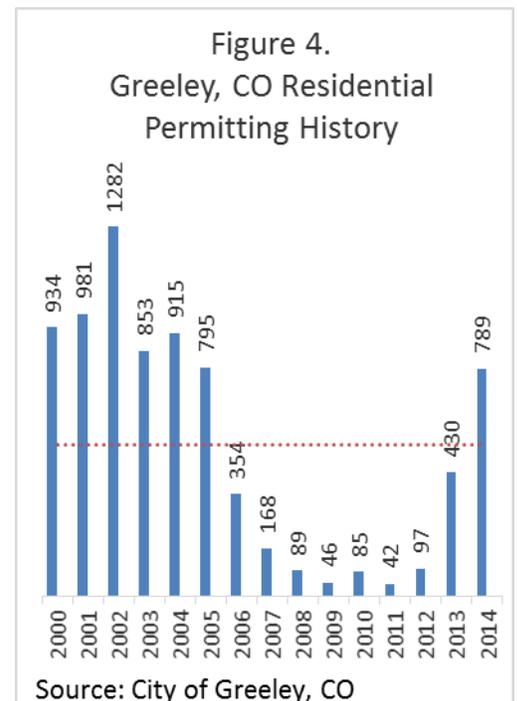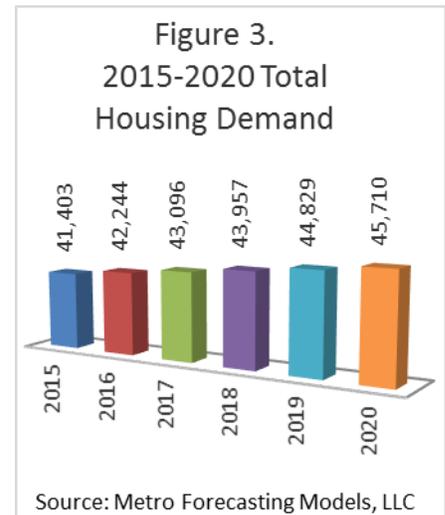### Historic Residential Building Permitting

The City of Greeley has a wide range of annual building permitting from a high of 1,282 permits in 2002 to a low of 42 in 2009. In 2014 the city issued 789 residential permits. Over the last 14-years (2000-2014), on average, Greeley has issued 524 permits per year as indicated in Figure 4 by the dashed red line. The data seems to indicate future building permitting will be above the historic average.

5-year Forecast (2015-2020)

The permanent population of Greeley is forecasted to grow by 10.4% from 2015 through 2020, increasing by 10,817 residents during this period. Housing demand resulting from the forecasted 5-year population growth is 4,307 new units from 2015–2020, as shown in Figure 3. Due to the weak economy, new housing construction has been anemic from 2006-2013 as demonstrated in Figure 4. We are careful to suggest the reduced building activity is based on the weak economy rather than overbuilding. Our observation of a stable vacancy rate confirms housing construction did not exceed housing demand. The permitting data indicates there is a rebound in housing construction compared to the historic annual permits issued (see Figure 5). The demand for commercial space for goods and services to support the growing population of the Greeley market area will increase by 1.603 million square feet from 2015 through 2020.

10-year Forecast (2015-2025)

The permanent population of Greeley is forecasted to grow by 21.4% from 2015 through 2025, increasing by 22,235 during this period to a total of 126,197 residents in 2025. Our 10-year forecast for new housing to serve the additional population is 8,855 units from 2015–2025. The market area's growing population will increase demand for commercial space for goods and services by an additional 3.29 million square feet from 2015 through 2025.

Figure 3.
2015-2020 Total Housing Demand

2015	2016	2017	2018	2019	2020
41,403	42,244	43,096	43,957	44,829	45,710

Source: Metro Forecasting Models, LLC

Figure 4.
Greeley, CO Residential Permitting History

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
934	981	1282	853	915	795	354	168	89	46	85	42	97	430	789

Source: City of Greeley, CO

Figure 5.
2015-2020 Permits For New Housing Forecast By Year

2015	2016	2017	2018	2019	2020
831	841	852	862	872	881

Source: Metro Forecasting Models, LLC

MFM Back-Cast Analysis Description

Our proprietary population growth forecast model is capable of running different growth scenarios using historic population and housing data. Over time, the city's year-to-year population growth may be above or below our forecasted population if the economy is expanding or contracting, as demonstrated in **Figure 6**.

MFM uses the divergence of actual population from our growth curve forecast to measure where a specific MSA is within the growth cycle. When the measured or actual population is slightly above or below our forecast, we use statistical analysis to determine the significance of the divergence. Figure 6 shows the population growth from 2000 to 2010 exceeded our forecast (housing boom) and then from 2010 to 2013 fell below the forecast (housing bust).
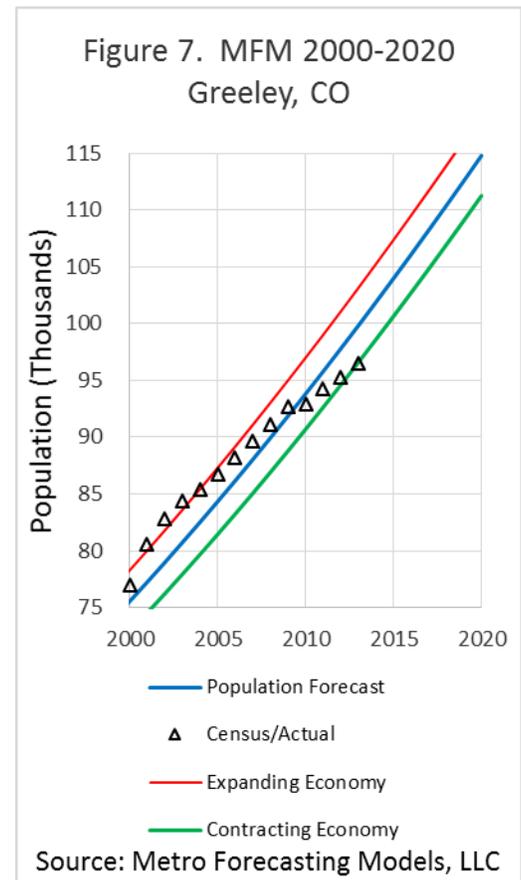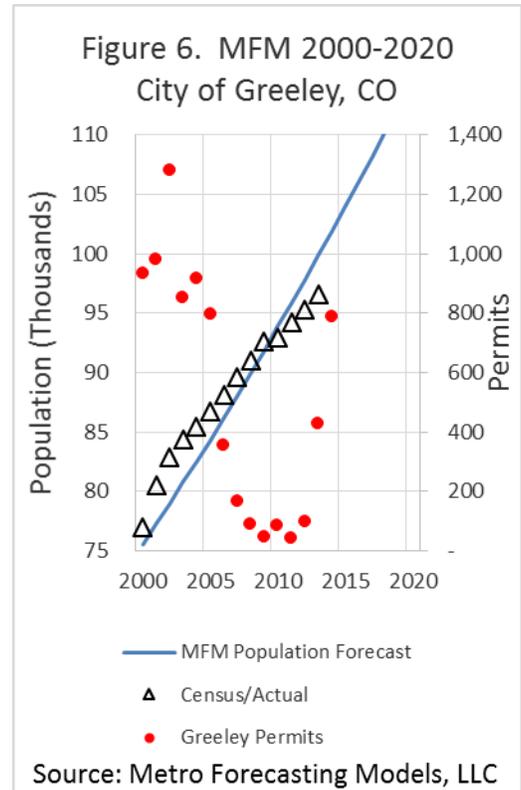
For a city that shows slower than forecasted growth for a period of years, we can demonstrate a growing potential **pent-up demand** for future housing, government services and commercial uses. For a city that shows a more rapid growth for a period of years, our forecast can indicate a potential **future oversupply** of housing and commercial space.

City of Greeley Back-Cast Analysis

The City of Greeley MSA has shown lagging growth compared to our forecast since the 2010 Census. The forecasted population for 2015 using a back-cast analysis is 103,961 versus the 2013 Census *estimated* population of 96,539, as illustrated in **Figure 7**.

While the local economy is in a recovery mode broadly speaking, Greeley's housing demand and supply have reached equilibrium. Looking ahead, Greeley will have consistent positive growth for the next ten years. As we do our updates, we will monitor Greeley's growth to see if the population trends back toward the blue line shown in Figure 7.

The growth from 2000-2003 was a clear indicator that population was greatly accelerated compared to the forecast. Since the City of Greeley is still recovering from the recession, we anticipate the rental market to remain tight and housing construction to accelerate to satisfy the housing needs of new residents through 2020.

Figure 6. MFM 2000-2020 City of Greeley, CO

Source: Metro Forecasting Models, LLC

Figure 7. MFM 2000-2020 Greeley, CO

Source: Metro Forecasting Models, LLC

Metro Forecasting Models
Detailed Metro Analysis

The information presented in this report is for the city as a whole. Metro Forecasting Models consist of two basic models. The first is the Metro Forecasting aggregate model that forecasts for the entire metro area; the second is the Metro Forecasting disaggregate model that divides the metro are into hundreds or thousands of zones and forecasts the distribution and timing of growth for each zone.

Historically, and unfortunately, population forecasts have underestimated growth for fast growing areas. Accurate population forecasting is necessary to optimize the return on both public and private investment. For example, underestimating growth results in physical improvements that become obsolete (buildings are too small, roads too narrow, pipes too small). Overestimating growth can result in premature financial investment and under-utilization of capital improvements, resulting in a negative return on capital investment. Other negative impacts can result such as low economic activity, lower property values, and poor quality of life from inappropriate apportionment of land to support the future population.

Data Collection
and Input Process

For the MFM disaggregate forecast, we collect many thousands of data points from each city/MSA including specific attributes for *every* parcel within the study area. We then group the collected data in hundreds or thousands of discrete areas known in the planning industry as Traffic Analysis Zones (TAZ for short). For example, our model disaggregates the Lee County Florida into 1,434 discrete zones (see the TAZ map for Lee County, FL on the next page) and forecasts population growth for each of these zones. A TAZ is a specific geographic area that contains many lots/parcels/tracts with a combined population typically less than 3,000 people. We apply this methodology to other metro areas

Our algorithms analyze each TAZ's development potential on an individual basis. The model then groups the zones by order from most likely to be developed to least likely. This same analysis is then repeated in 5-year increments until theoretical build-out is determined. From the forecasted data we can identify those zones that are built out, those that are experiencing rapid growth and those that demonstrate slow growth.

Figure 9. Typical Sigmoid Curve

Additional Model Outputs

The disaggregate model can provide many different reports to satisfy the needs of our varied clients. The following demand forecasts, indicating where and when development is anticipated to take place, are available for MSAs disaggregated by TAZ or other defined communities or neighborhoods in 5-year increments to build out:

- Population growth
- Multifamily and single family demand
- Multifamily and single family household size and vacancy rates
- Commercial demand for space
- Shopping center demand by type
- K-12 students for each school type
- Fire station demand

- Public parks differentiated by type
- Agricultural lands

Our disaggregate model has been used by governments and developers to determine where specific needs and markets exist or will exist and when. Government agencies have purchased property for future uses at lower prices, saving public funds. Developers and planners have used the model to demonstrate the need for a zoning change to local governments based on the model's demand forecasts. Call us or email today to discuss the MSAs you are interested in learning more about and what additional data we may have to assist you with making good planning and spending decisions.

Figure 10. Lee County, Florida, with 1434 zones.