4.0 DEMOGRAPHICS AND ENROLLMENT PROJECTIONS

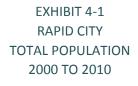
This section presents the demographic analysis and enrollment projections for the master planning period. The demographic analysis and enrollment projections were developed by MGT for the ten-year planning period. Over the next ten years, enrollment is expected to increase modestly across the district. The specific impact of future student enrollment on school building capacities is outlined in **Section 5.0** on Capacity and Utilization.

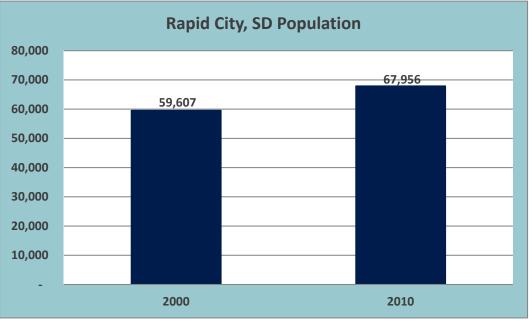
HISTORICAL DATA

An analysis of both quantitative and qualitative data forms the basis for the enrollment projections. Quantitative data comes from the district, the county, and the U.S. Census Bureau ("Census"). Quantitative data provides the basic understanding of trends "by the numbers." Qualitative data is gathered from conversations with district officials familiar with enrollment trends (and county planners), and provides the "why" behind the numbers. Both forms of data are critical to the preparation of enrollment projections for the district's ten-year Facility Master Plan.

RAPID CITY POPULATION TRENDS

It is important to understand the context in which enrollment trends occur within the district. Rapid City, SD had a population of 59,607 in 2000; Census data indicates that number has increased to 67,956 in 2010. **Exhibit 4-1** shows the increase in total population from 2000 to 2010.



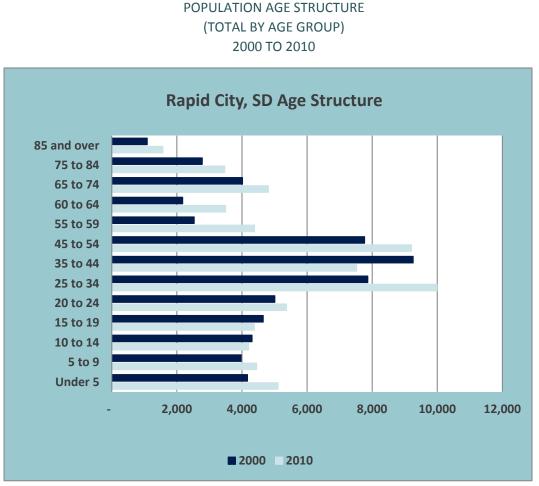


Source: U.S. Census Bureau.



An examination of the age structure of Rapid City reveals that the largest segment of the population is between 25 and 54 years of age. **Exhibits 4-2** and **4-3** illustrate the population age structure of Rapid City in 2000 and in 2010.

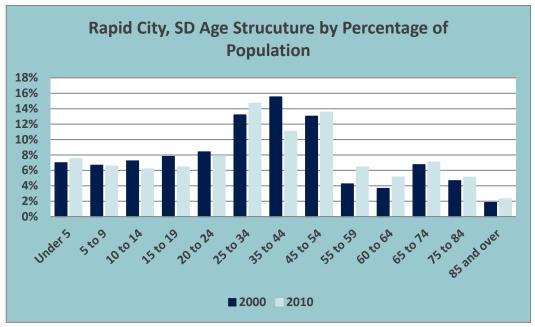
EXHIBIT 4-2 RAPID CITY



Source: U.S. Census Bureau.







Source: U.S. Census Bureau.

Analysis of the age structure does not necessarily lead to any specific conclusions, but it does offer some interesting observations. Note that the population from *Under 5* show a slight increase from 2000 to 2010, while the population segements *5 to 9*, *10 to 14*, and *15 to 19* show a decline from 2000 to 2010, which indicates a decline in the school age population as a percentage of the whole population. There is an increase in the *25 to 34* segment but this increase is offset by a decline in the *35 to 44* segment. Typically these two age groups are considered the child bearing years, but in this case since there gain of one is balanced by the loss from the other we can anticipate a reasonably modest growth of new students enterning the systems. Also note that the segments *45 to 54, 55 to 59, 60 to 64, 65 to 74* and *75 to 84 all* show an increase from 2000 to 2010. This indicates that the older population is growing and the overall demographics of the community are changing.



This is further illustrated by the increase in the median age of the Rapid City population. **Exhibit 4-4** shows the increase in median age from 2000 to 2010.

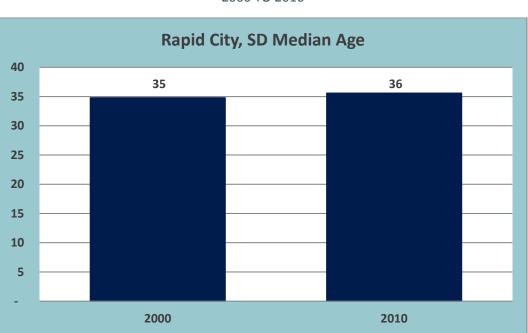


EXHIBIT 4-4 RAPID CITY COUNTY MEDIAN AGE OF POPULATION 2000 TO 2010



Source: U.S. Census Bureau.

The percent change in the percent of population at each age segment further reveals that the population in Rapid City is getting older. **Exhibit 4-5** shows the percent change in population for each age segment. The *Under 5* population increased approximately 7.5% from 2000 to 2010. In addition, the *5 to 9* and *10 to 14* age segments decreased 1.7% and 14.4%, respectively, over that same time period. This data points to the decrease in population of the segments between *15 to 19, 20 to 24* and *35 to 44* as discussed previously and further indicates a slowing of the growth of student populations and those populations which typically produce students either through child birth or relocation.

EXHIBIT 4-5 RAPID CITY, SD CHANGE IN PERCENT OF POPULATION 2000 TO 2010 (BY AGE SEGMENT)

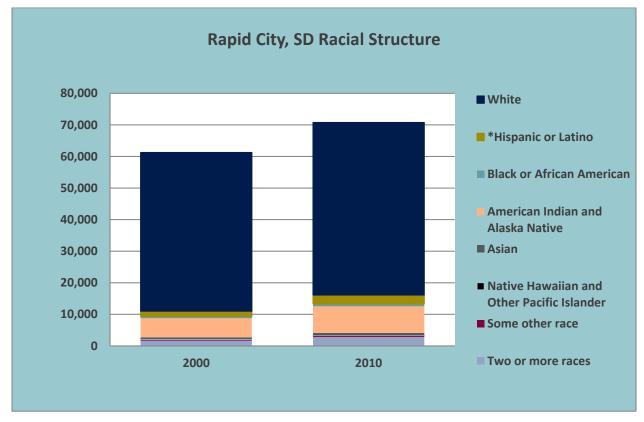
AGE SEGMENT	% OF 2000 POPULATION	% OF 2010 POPULATION	CHANGE IN % OF POPULATION
Under 5	7.0%	7.5%	7.5%
5 to 9	6.7%	6.5%	-1.7%
10 to 14	7.2%	6.2%	-14.4%
15 to 19	7.8%	6.4%	-17.5%
20 to 24	8.4%	7.9%	-6.0%
25 to 34	13.2%	14.7%	11.4%
35 to 44	15.5%	11.1%	-28.7%
45 to 54	13.0%	13.5%	4.0%
55 to 59	4.2%	6.4%	51.8%
60 to 64	3.7%	5.1%	40.7%
65 to 74	6.7%	7.1%	5.1%
75 to 84	4.7%	5.1%	9.4%
85 and over	1.8%	2.3%	26.3%

Source: U.S. Census Bureau.



The racial structure in 2010 for Rapid City consisted of 77% white, 12% American Indian or Alaska Native, and other races accounted for the remaining 11% of the population. The white population increased from 50,226 in 2000 to 54,658 in 2010, however; the white population decreased as a percentage of total population (-4.8%). The Native Indian and Alaska Natives increased from 10% of the population in 2000 to 12% of the population in 2010. **Exhibit 4-6** illustrates the racial structure in Rapid City for 2000 and 2010.

EXHIBIT 4-6 RAPID CITY RACIAL STRUCTURE (TOTAL POPULATION BY RACE) 2000 TO 2010



*Hispanic or Latino (any race) Source: U.S. Census Bureau.

The data presented thus far builds the context for the following discussion regarding future RCAS enrollment.



HISTORICAL ENROLLMENT

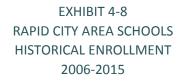
The core body of data used to develop an enrollment projection is historical enrollment. Total enrollment in Rapid City Area Schools stood at 13,102 students in 2006-07. Since then, enrollment has increased to 13,740 in 2015-16. **Exhibit 4-7** details the enrollment history of K-12 students. **Exhibit 4-8** charts the history.

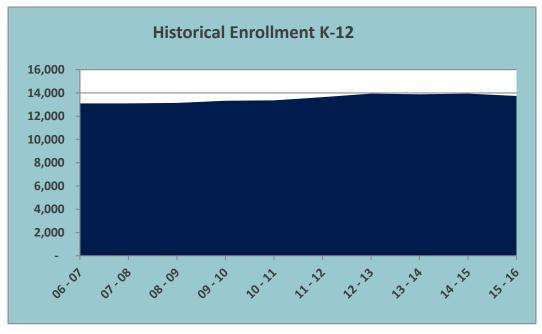
EXHIBIT 4-7 RAPID CITY AREA SCHOOLS ENROLLMENT HISTORY* 2006-2015

Grade	06 - 07	07 - 08	08 - 09	09 - 10	10 - 11	11 - 12	12 - 13	13 - 14	14 - 15	15 - 16
К	1,009	1,091	1,066	1,097	1,121	1,085	1,264	1,162	1,174	1,120
1	996	1,003	1,081	1,083	1,128	1,181	1,141	1,231	1,155	1,123
2	1,034	1,001	996	1,075	1,065	1,132	1,167	1,116	1,224	1,120
3	988	1,016	1,018	974	1,062	1,093	1,147	1,128	1,095	1,188
4	970	1,013	1,030	1,027	962	1,064	1,084	1,127	1,125	1,065
5	996	973	993	1,056	1,009	995	1,075	1,075	1,126	1,104
6	1,000	1,003	974	993	1,036	1,026	990	1,065	1,054	1,098
7	990	979	1,008	964	994	1,039	1,049	998	1,055	1,055
8	1,046	970	965	1,005	979	989	1,063	1,043	999	1,042
9	1,228	1,215	1,239	1,255	1,272	1,231	1,215	1,249	1,213	1,164
10	1,058	1,112	1,080	1,111	1,047	1,148	1,047	1,021	1,032	998
11	877	845	874	866	873	867	872	869	850	849
12	910	881	818	820	814	790	824	800	838	814
К-5	5,993	6,097	6,184	6,312	6,347	6,550	6,878	6,839	6,899	6,720
6-8	3,036	2,952	2,947	2,962	3,009	3,054	3,102	3,106	3,108	3,195
9-12	4,073	4,053	4,011	4,052	4,006	4,036	3,958	3,939	3,933	3,825
K-12	13,102	13,102	13,142	13,326	13,362	13,640	13,938	13,884	13,940	13,740

*Excludes: Early Intervention, Kibben Kuster and 19-21 program Source: Rapid City Area Schools, 2015.





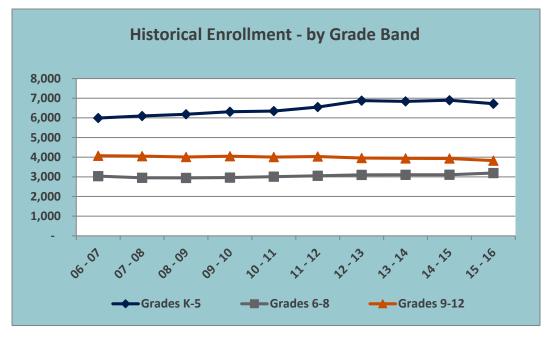


Source: MGT of America, Inc., 2016.

An examination of historical enrollment at the grade-band level reveals that the increase in overall enrollment over the last ten years has been led by an increase in enrollment at the K-5 grade band, which increased 12.13% from 5,993 to 6,720 students. The 6-8 grade band increased in enrollment by 5.24% from 3,036 to 3,195, and the 9-12 grade band decreased by 6.1% from 4,073 to 3,825 in enrollment. **Exhibit 4-9** illustrates the historical enrollment for each grade band.





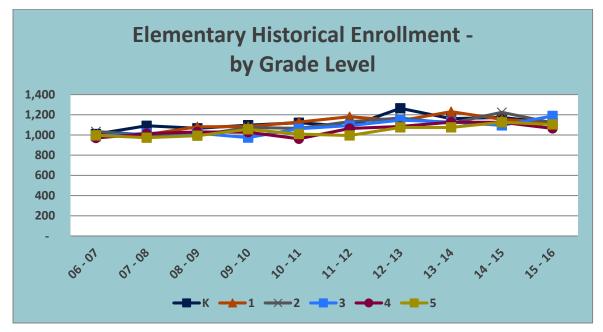


Source: MGT of America, Inc., 2016.



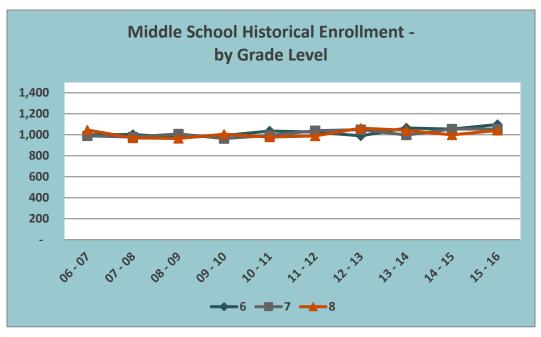
A closer look at historical enrollment at individual grade levels does not reveal any distinct trends at the elementary and middle school grade levels where historical enrollment data has trended upward. However at the high school grade-level enrollment data we do see a three year trend of declining student enrollment at the 9th and 10th grade levels which has a strong correlation to the census data discussed earlier in this chapter. Why this particular segment of the student population is changing and what demographic influencers are causing this change is difficult to determine without a more thorough examination of this population set. The following **Exhibits 4-10, 4-11**, and **4-12** illustrate the historical enrollment for each grade level.

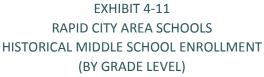




Source: MGT of America, Inc., 2016.

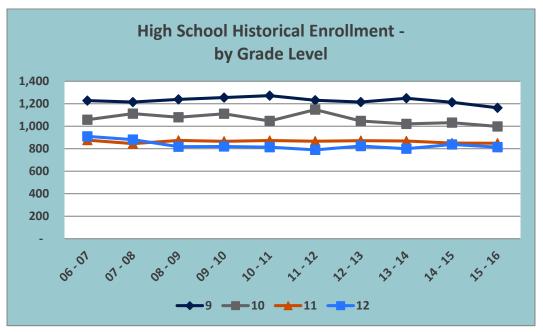






Source: MGT of America, Inc., 2016.



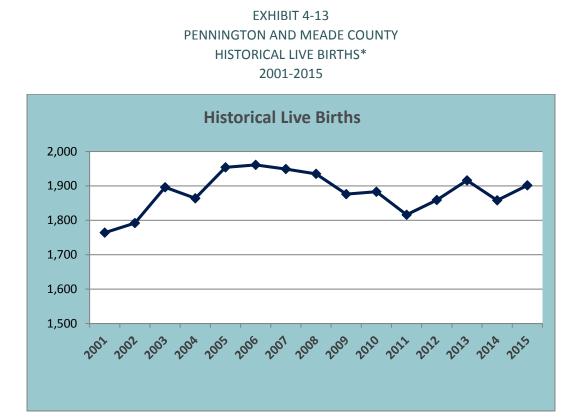




The trends observed in the historical enrollment data will form a key component of the enrollment projections prepared as a part of this master plan.

LIVE BIRTHS AND KINDERGARTEN ENROLLMENT

A second key component to analyzing potential future enrollment is to examine live-birth trends in the area and the live-births-to-kindergarten capture rate. A steady or increasing birth rate could lead to additional students in the district, which would also push future enrollment higher. In Pennington and Meade Counties, live births have overall been increasing. However, the number of live births in Pennington and Meade Counties has been fluctuating between a low of 1,764 in 2001 to a high of 1,961 in 2006. **Exhibit 4-13** shows the trend of historical live births for these counties.



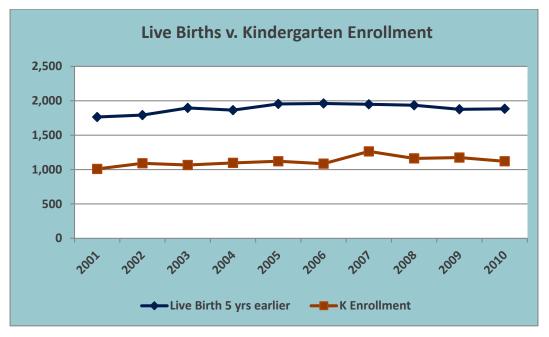
*2015 estimated via linear regression.

Source: South Dakota Department of Health, Office of Health Statistics, 2015.



When examining the ratio of live-births-to-kindergarten enrollment, live-birth data is collected for the past 15 years and kindergarten enrollment for the past ten years. For example, a child born in 1990 would enroll in kindergarten at the age of five. Therefore, in this analysis, we are looking at how many children are enrolled in kindergarten as compared to the number of children born in the counties five years prior to a particular school year. **Exhibit 4-14** compares the district's historical kindergarten enrollment to the live birth data.





Source: MGT of America, Inc., 2016.

Two statistics are critical to understanding the relationship between live births and kindergarten enrollment in the district: the correlation coefficient and the capture rate.

The correlation coefficient calculates the relationship between two series of data. A correlation coefficient of 1 or -1 indicates a strong relationship; a correlation coefficient of 0 indicates a weak relationship. For RCAS, the correlation coefficient for kindergarten enrollment to live births is 0.577 which indicates a mildly strong relationship and therefore the live birth rate may be a good indicator of future kindergarten enrollment.



The capture rate measures the percentage of live births that resulted in kindergarten enrollment five years later. Over the last ten years, the district's capture rate has averaged 59.3%, however, the capture rate has been fluctuating in recent years, as **Exhibit 4-15** illustrates. This capture rate indicates that the population segments which typically are associated with the childbearing years are not producing as many children as historically has been the case. This trend was discussed earlier in this chapter as indicated in the census data (**Exhibit 4-5**). The recent overall increase in this capture rate probably indicates the slight growth in the *25 to 34* population segment (also indicated in **Exhibit 4-5**).



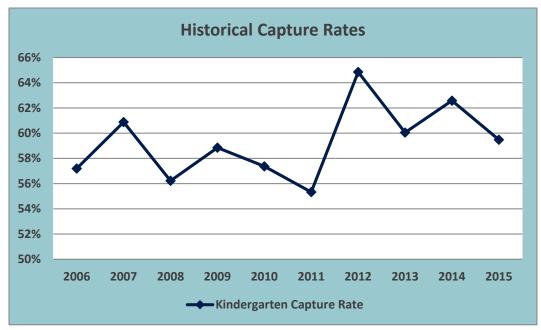
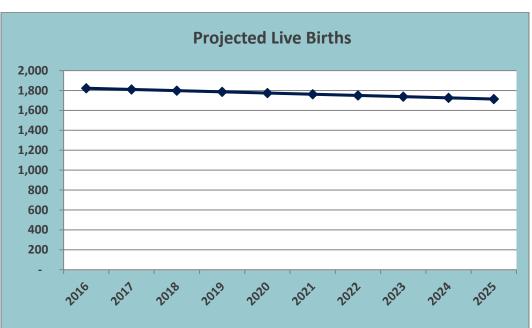




Exhibit 4-16 illustrates the projected live births for the district. Live births are projected using a linear regression model based on historical live births in Pennington and Meade Counties. Given the decline in capture rates from approximately 65% in 2012 to 59% in 2015 there is a strong likelihood that kindergarten enrollments will remain flat or slightly decline in the coming years.





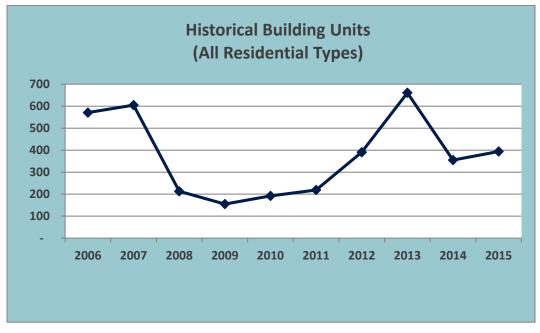


HOUSING UNITS

Another factor used to develop enrollment projections is an analysis of the trends in housing units in the county. The U.S. Census Bureau recorded 25,096 housing units in Rapid City in the 2000 Census and 30,294 housing units in 2010. The census data provides a starting point for this analysis, but building permit data provides additional information upon which to base an assumed number of housing units following the 2000 and 2010 Census.

Since 2006, the number of housing permits issued each year in Rapid City has fluctuated greatly. In an effort to better understand these fluctuations MGT met with the Rapid City and Pennington County planners to further analyze the housing permit information. Although somewhat difficult to predict, a consensus was developed using historical averages, knowledge of the construction environment and an examination of future permitting requests which concluded that overall housing starts would maintain an average of nearly 2% per year for the next ten years. **Exhibit 4-17** illustrates the number of housing permits issued each year since 2006 in Rapid City, which includes both single- and multi-family building permits.

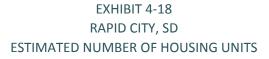


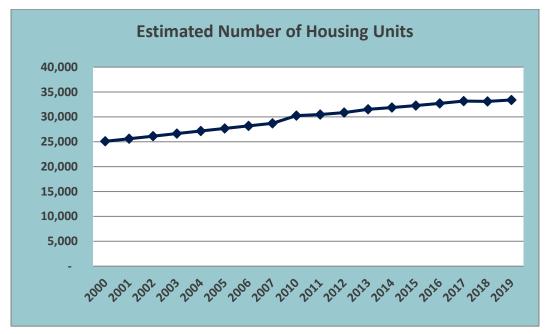


Source: City of Rapid City, Community Planning and Development Services, 2015.



If we combine the historical and average projected building permits, and assume that each permit will result in a built residential unit, we can estimate the number of future housing units in the district. The total estimated number of housing units is generated by using the number of housing units established by the 2010 Census and adding it to the number of historical and projected building permits as illustrated by **Exhibit 4-18** below.





Source: MGT of America, Inc., 2016

CONCLUSIONS AND OBSERVATIONS ABOUT HISTORICAL DATA

Based on the analysis of data presented in this section, we have concluded the following regarding the demographics of Rapid City:

- **4.** Census Bureau population counts show an increase in the overall population but a decrease in population as it relates to the population segments which impact K-12 enrollment.
- 5. The general population and demographics of the RCAS area are changing and getting older, which could lead to fewer students in some areas of the district.
- 6. Housing units will continue to increase but the rate of increase is speculative and dependent on the economy and the growth policies of the county.



ENROLLMENT PROJECTION METHODOLOGY

Enrollment projections are merely an *estimate* of future activity based on the historical data and information provided. As demonstrated by the district calculations over the past ten years, there can be constant variations in growth. These numbers can be highly accurate, but it must be remembered that the numbers are still a projection or estimate. During the implementation of any of the recommendations provided, it is critical that the district reassess these numbers on a regular basis and adjust plans accordingly.

To identify trends and prepare for adequate spaces, teaching staff and materials and supplies, educational leaders use several methods of projecting enrollment. Among the most commonly used models are *Average Percentage Annual Increase, Cohort Survival, Linear Regression*, and *Student-per-Housing Unit* models. Because no one model is foolproof, MGT generates a weighted average of these four "base" models to arrive at its enrollment projection.

A rule of thumb when forecasting enrollment is that the models should use as many years of historical data as there are years in the projection period. In other words, if the model is projecting enrollment for five years from now, then five years of historical data is used. If the model is projecting enrollment for ten years from now, then ten years of historical data is used. Each of the following "base" models draw data in this manner for their calculations.

AVERAGE PERCENTAGE ANNUAL INCREASE MODEL

This model calculates future school enrollment growth based on the historical average growth from year to year for each grade level. This simple model multiplies the historical average percentage increase (or decrease) by the prior year's enrollment to project future enrollment estimates. For example, if enrollment in the first grade decreased five percent from 2000 to 2001 and decreased seven percent from 2001 to 2002, then the average percentage change would be a six percent decrease, and six percent would be the factor used to project future enrollment in this model.

LINEAR REGRESSION MODEL

This model uses a statistical approach to estimating an unknown future value of a variable by performing calculations on known historical values. Once calculated, future values for different future dates can then be plotted to provide a "regression line" or "trend line". MGT has chosen a "straight-line" model to estimate future enrollment values, a model that finds the "best fit" based on the historical data.

COHORT SURVIVAL MODEL

This model calculates the growth or decline between grade levels over a period of ten years based on the ratio of students who attend each of the previous years, or the "survival rate". This ratio is then applied to the incoming class to calculate the trends in that class as it "moves" or graduates through the school system. For example, if history shows that between the first and second grades, the classes for the last ten years have grown by an average of 3.5%, then the size of incoming classes for the next ten years is calculated by multiplying them by 103.5%. If the history shows a declining trend, the multiplying factor would be 100% minus the declining trend number.

The determination of future kindergarten enrollment estimates is critical, especially for projections exceeding more than five years. There are two methods of projecting kindergarten enrollment. The first model is based on the correlation between historical resident birth rates (natality rates) and historical kindergarten enrollment. The second model uses a linear regression line based on the



historical kindergarten enrollment data. The correlation method was used for RCAS due to the mildly strong correlation coefficient between live births and kindergarten enrollment.

STUDENTS-PER-HOUSEHOLD MODEL

This last model utilizes the estimated number of housing units as its base data. Using the housing unit data and historical enrollment data, MGT created a student generation factor for each projected grade level. By taking the total enrollment by grade level and dividing it by the current housing levels, a *student generation factor* (SGF) was calculated for each grade level. This factor indicates the number of students within each grade level that will be generated by each new housing unit.

Once each of these four base models has been calculated, MGT generates a weighted average of each of the models. A weighted average allows the analysis to reflect all of the trends observed in the historical data and the over-arching themes from the qualitative information gathered in this process. The weighted average also works to maximize the strengths of each of the "base" models.

Two models, the Average Percentage Annual Increase Model and the Linear Regression Model, emphasize historical data. These models are quite effective predictors if there is no expectation of unusual community growth or decline and student population rates have minimal fluctuation.

The Cohort Survival Model also uses historical enrollment numbers, but takes into account studentmobility patterns and the effects of the natality rates in prior years. The Cohort Survival Model is perhaps the best-known predictive tool using this type of data. However, like the Annual Percentage Annual Increase Model and the Linear Regression Model, the Cohort Survival Model loses its predictive capabilities in communities that experience, or are expecting to experience, more rapid growth or rapid decline.

The Students-Per-Household Model allows the planner to take into account projections for housing developments and general growth in the county. This model looks forward and is based on the input from local planners. The planning information is important and the district should continue to monitor this information.

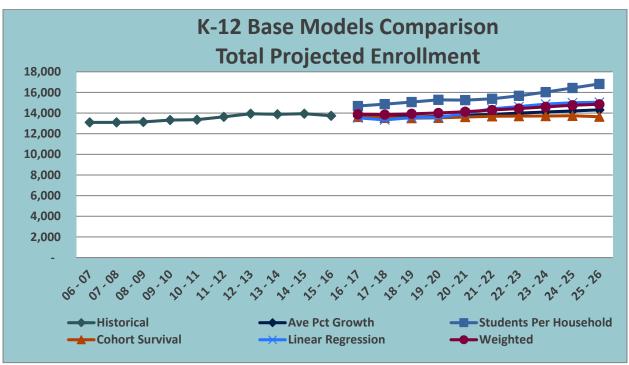
Exhibit 4-19 identifies the weights used in this analysis.

WEIGHTING FACTORS							
MODEL	PROJECTION MODEL WEIGHT						
Average Percentage Annual Increase	20%						
Students-per-Household	25%						
Cohort Survival	35%						
Linear Regression	20%						

EXHIBIT 4-19 WEIGHTS USED TO GENERATE WEIGHTED AVERAGE OF "BASE" MODELS



Exhibit 4-20 illustrates the four enrollment projection models and the one combined weighted model.







Source: MGT of America, Inc., 2016.

ENROLLMENT PROJECTIONS

MGT staff has utilized the methodology described above to forecast enrollment for the district over the next ten years, which are shown in **Exhibit 4-20**. **Exhibit 4-21** on the following page illustrates the historical and projected enrollment for the entire district. The difference in total projected enrollment for the district (**Exhibit 4-20**) and the total of the individual schools (**Exhibit 4-25**) is due to the mathematics of the models and the historical enrollment of a particular school. For example, a school may show significant growth from year-to-year, which would result in a high average annual growth modeling factor and a high overall projection for that particular school. However, the abundance of growth at a particular school will be balanced by the other schools in the district-wide model, which leads to a lower average annual growth modeling factor and a less significant increase in future enrollment. The same is true for grade band projections as compared to the sum of the individual schools within a particular grade band. In the end, the district-wide and grade band totals provide good macro views of potential future trends. The individual school projections appropriate for planning for that particular school, which makes the individual school projections appropriate for planning for that particular building's future.

EXHIBIT 4-20 RAPID CITY AREA SCHOOLS PROJECTED ENROLLMENT

PROJECTED ENROLLMENT										
Grade	16 - 17	17 - 18	18 - 19	19 - 20	20 - 21	21 - 22	22 - 23	23 - 24	24 - 25	25 - 26
К	1,143	1,141	1,160	1,132	1,181	1,178	1,193	1,209	1,219	1,239
1	1,116	1,089	1,079	1,128	1,121	1,148	1,154	1,168	1,192	1,210
2	1,122	1,096	1,132	1,141	1,171	1,185	1,212	1,222	1,237	1,242
3	1,185	1,208	1,181	1,166	1,192	1,232	1,255	1,282	1,279	1,293
4	1,103	1,056	1,060	1,071	1,077	1,118	1,145	1,144	1,167	1,166
5	1,093	1,131	1,125	1,133	1,148	1,144	1,157	1,192	1,200	1,222
6	1,090	1,089	1,128	1,123	1,117	1,109	1,112	1,139	1,166	1,166
7	1,087	1,090	1,098	1,129	1,098	1,109	1,116	1,111	1,135	1,163
8	1,073	1,098	1,074	1,059	1,116	1,098	1,102	1,107	1,105	1,115
9	1,192	1,182	1,194	1,208	1,197	1,242	1,217	1,228	1,227	1,224
10	1,002	1,010	1,024	1,034	1,012	1,016	1,063	1,048	1,055	1,056
11	856	846	853	853	868	871	869	911	901	907
12	825	817	820	832	834	846	850	846	876	851
K-5	6,762	6,721	6,738	6,773	6,889	7,005	7,114	7,216	7,293	7,373
6-8	3,250	3,277	3,300	3,311	3,331	3,316	3,330	3,357	3,406	3,445
9-12	3,875	3,855	3,892	3,926	3,910	3,976	3,999	4,032	4,060	4,039
K-12	13,887	13,853	13,930	14,010	14,130	14,298	14,443	14,605	14,760	14,857



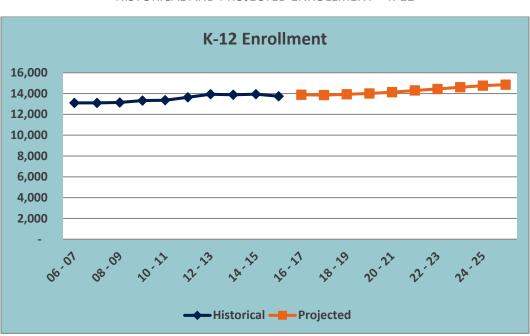


EXHIBIT 4-21 RAPID CITY AREA SCHOOLS HISTORICAL AND PROJECTED ENROLLMENT – K-12



The District is strongly encouraged to continue revisiting these projections on an annual basis and update them to reflect current trends and data. The following **Exhibits 4-22** through **4-24** illustrate the historical and projected enrollment at each grade band.



EXHIBIT 4-22 RAPID CITY AREA SCHOOLS HISTORICAL AND PROJECTED ENROLLMENT – K-5



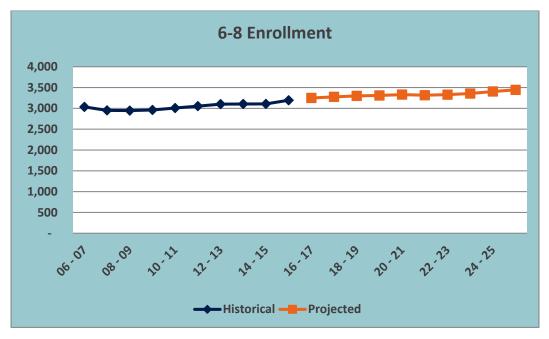
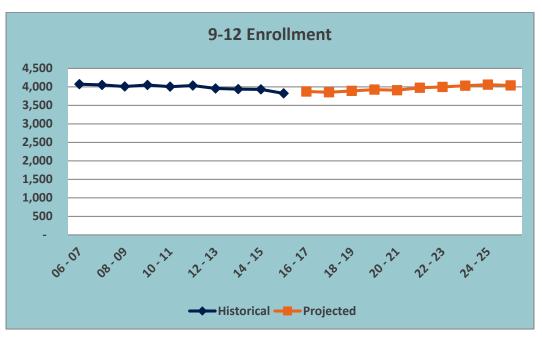


EXHIBIT 4-23 RAPID CITY AREA SCHOOLS HISTORICAL AND PROJECTED ENROLLMENT – 6-8

Source: MGT of America, Inc., 2016

EXHIBIT 4-24 RAPID CITY AREA SCHOOLS HISTORICAL AND PROJECTED ENROLLMENT – 9-12





The methodologies discussed above were used to generate projections for each school. **Exhibit 4-25** provides the 2025 projection by school.

EXHIBIT 4-25 RAPID CITY AREA SCHOOLS PROJECTED ENROLLMENT BY SCHOOL

SCHOOL NAME	PROJECTED (2025) K-12		
Black Hawk ES	554		
Canyon Lake ES\Kibben Kuster	440		
Corral Drive ES	531		
General Beadle ES	610		
Grandview ES	491		
Horace Mann ES	395		
Knollwood ES	572		
Meadowbrook ES	614		
Pinedale ES	482		
Rapid Valley ES	616		
Robbinsdale ES	583		
South Canyon ES	292		
South Park ES	394		
Valley View ES	736		
Wilson ES	435		
Elementary Total	7,745		
East MS	838		
North MS	570		
South MS	679		
Southwest MS	846		
West MS	683		
Middle School Total	3,617		
Central HS	1,913		
Rapid City HS	564		
Stevens HS	1,699		
High School Total	4,176		
District Total	15,538		



FINDINGS

As the foregoing **Exhibit 4-25** shows, enrollment across the district is expected to fluctuate slightly in the next few years, but shows a modest increase by the end of the ten year planning period. While this projection somewhat contradicts birth and age data, it is a reasonable conclusion given the historical enrollments and the current and projected level of development:

- Live births are projected to decrease which will counteract growth in housing.
- While there is a mildly strong correlation between the live birth rate and the kindergarten capture rate, the capture rate has historically been less than 100 percent indicating some level of exodus of students out the district.
- The census data from 2000 to 2010 has shown a decrease in elementary age children.
- While the slowing economy has negatively affected the rate of construction of homes, there is a
 general consensus among stakeholders that the rates of building and migration into the county
 will increase as the economy improves.

In the next section on Capacity and Utilization, we will utilize these enrollment projections to measure the future utilization rates in Rapid City and determine whether there will be excess space or a need for additional space.

