

REVIEW AND EVALUATION OF THE
BUILDING & FACILITY ADEQUACY
STANDARDS
OF THE
WYOMING SCHOOL FACILITIES
COMMISSION

June, 2008

In accordance with W.S. §21-15-115(c), the Wyoming School Facilities Commission shall “not less than every four (4) years, review and evaluate [its] building and facility adequacy standards.” This report is intended to summarize the efforts of the Commission during 2007 and 2008 to perform that review and evaluation, and to provide the Commission with several suggested next steps for permanent modifications to its adequacy standards to be adopted in rule and regulation.

I. Executive Summary

With the guidance of school district officials from across the state, the assistance of the School Facilities Commission staff and Commissioners, and with input from experts in the field, in 2007 the Commission began the process of updating its building and facility adequacy standards – particularly focusing on the square-footage guidelines (Guidelines) – adopted by the agency.

The review began by Commission staff examining the existing guidelines and engaging in a critical analysis of the attributes and deficiencies of those guidelines. An extensive outreach effort, using an Interest Based Strategy (IBS) approach, then engaged all stakeholders in the state in developing refinements to the guidelines. Following the IBS sessions, the Commission staff reconvened to incorporate the conclusions of the sessions into a new approach to the guidelines.

Graphs which illustrate allowable square footage per student for every school configuration and enrollment were developed by reviewing the existing guidelines in addition to square-footage guidelines available from other states and school districts. The Commission adopted an initial iteration of the graphs as Commission policy at its February, 2008 meeting.

After adoption of the graphs, Commission staff and consultants worked on creating a tool that would yield more precision in using the guideline graphs adopted by the Commission. Currently, allowable square footage to any facility is determined by visually plotting the student enrollment on the applicable graph. In order to increase reliability, consistency, and transparency of the guidelines, a tool which automatically calculates the allowable square footage was developed. This new tool is a set of graphs which convert the original “square footage per student” graphs into “total square footage” graphs driven by mathematical formulae which allow for precise calculations at any point along a given graph. The effort to develop this tool to operationalize the graphs also identified several unintended anomalies in the graphs. Revisiting the graphs and the underlying data has led to a set of recommendations to the Commission included in this report that address the anomalies. The resulting recommendations are intended to remove perceived barriers embedded in the Guidelines and provide greater flexibility in school design within a given footprint of square footage.

This report presents the recommendations of the staff to convert the guideline graphs to total square footage graphs driven by mathematical formulae, to correct several unintended anomalies in the per-student square footage graphs, and to adopt the graphs in the Permanent Rules and Regulations of the Commission as the updated Facility Design Guidelines. The remainder of the updated adequacy standards will be presented independently to the Commission as a proposed set of rules and regulations.

II. Guidelines Development and Review Process

The Wyoming School Facilities Commission is charged by law with developing a set of facility standards, or guidelines, for the purpose of designing and constructing adequate public school facilities. These standards also guide the funding of major maintenance from the agency to school districts and impact the calculation of routine maintenance funding provided through the Wyoming Department of Education.

A. 2003 Guidelines Development and Adoption

The Wyoming State Legislature established the School Facilities Commission in 2002. Pursuant to W.S. §21-15-115(a), the Commission is required to adopt regulations to establish and maintain uniform statewide standards for the adequacy of school buildings and facilities necessary for providing educational programs prescribed by law for public schools. In 2002, the Commission created a Facility Design Guidelines Steering Committee to develop a set of guidelines consistent with the Legislature's direction. The Commission and the Steering Committee received assistance from MGT of America, Inc., a nationally respected public-sector consulting firm with specialization in education facilities.

The Steering Committee reviewed education facility standards from other states, gathered experiences with school designs in Wyoming and from across the nation, and received insights from education experts on how to effectively deliver curricular programs consistent with the uniform educational content and performance standards (the Wyoming "basket of goods") set forth in W.S. §21-9-101(b). The Commission and Steering Committee worked with Wyoming educators to develop a set of guidelines that would be adequate to house the delivery of educational programs across the state's 48 school districts. The development process included an extensive public engagement campaign soliciting the input of school district officials, educators, parents, students, and the general public.

Through these efforts and with tremendous input from the Wyoming education community, a set of guidelines for various grade levels was developed. These Facility Design Guidelines were to be used for the design and construction of public school facilities across the state. In addition, these guidelines were to be used to calculate the level of funding for major maintenance of education facilities under W.S. §21-15-109.

The Commission adopted the Facility Design Guidelines on July 11, 2003. Tables 1-6 show the adopted guidelines for the different grade levels – elementary school, middle school, high school, as well as K-8, 6-12, and K-12 schools.

Table 1: Elementary School

Number of Students	Square Footage per Student
19	153.42
57	135.44
114	182.63
228	147.98
342	137.73
>=450	121.93

Table 2: Middle School

Number of Students	Square Footage per Student
<=150	300.63
350	195.64
550	160.32
>=650	148.28

Table 3: High School

Number of Students	Square Footage per Student
<=150	358.65
350	236.14
550	196.91
>=750	176.53

Table 4: K-8 School

Number of Students	Square Footage per Student
<=75	380.46
150	300.03
>=350	189.33

Table 5: 6-12 or 7-12 Secondary School

Number of Students	Square Footage per Student
<=75	525.07
100	439.86
150	348.07
250	265.24
>=350	255.76

Table 6: K-12 School

Number of Students	Square Footage per Student
<=75	465.59
100	428.91
150	380.22
250	281.23
>=350	254.43

The guidelines were developed to ensure the maximum amount of local control over the design of schools. Districts and their designers were encouraged to design facilities that meet the needs of their educational programs while achieving the state’s standards for adequacy. According to the rules and regulations adopted by the Commission, guidelines for schools with design capacities that fell between the capacities of the models were determined on a graduated scale. Thus, a school under design with projected enrollment capacity between the identified guideline points would have allowed square footage determined by interpolating between the closest points. The Commission reserved the right to grant exceptions to these guidelines on a case-by-case basis when the exception supported the intent of the guidelines.

B. Guidelines Review and Updating

Pursuant to W.S. §21-15-115(c), the Commission is required to review and evaluate its building and facility adequacy standards not less than once every four years. In 2007, the Commission undertook this effort.

The Commission first instructed its staff to critically review the attributes and deficiencies of the existing guidelines which had been identified through experience over the previous four years. The staff identified a number of strengths and a number of perceived weaknesses in the existing guidelines. Among the strengths identified were a very small number of requests for exceptions to the guidelines – indicating a general sufficiency of allowed space. Among the weaknesses identified was some inconsistency in understanding how the guidelines were to be applied in a given situation – indicating a need for a more standardized approach.

The Commission then began a process of working with the 48 Wyoming public school districts through an interest-based strategy (IBS) process, a public-engagement process that requires the consensus of all participants. The Commission convened an IBS in June, 2007 with all 48 school districts invited to participate to discuss issues related to the facility guidelines. The consensus decision of the participants was to have the Commission staff review the existing guidelines, review the changes to the Wyoming School Funding Block Grant Model, review facility guidelines from other states and school districts, learn from other best-practice designs and make sure that Wyoming’s facility design guidelines are appropriate for the delivery of Wyoming’s “basket of goods.”

C. Guidelines Review and February 2008 Recommendations

Over the course of several months, Commission staff reviewed the appropriateness of the existing guidelines to deliver the Wyoming “basket of goods.” One change to the block grant model that appeared to have an impact on the facility guidelines was the Legislature’s funding of full-day Kindergarten. Other changes had been adopted by the Legislature as well, and were included in the review process.

The Commission undertook a thorough review process that included reviewing the design and construction of school facilities across Wyoming, analyzing school facility guidelines from other states and school districts, and gathering insight from school facility experts and school designs from across the nation. As part of this process, Commission staff reviewed prototypical school model calculations under the original approach which had been updated to include full-day Kindergarten, other block grant changes, and Federal requirements such as Title I programs.

Appendix A includes a listing of the available school facility guidelines from other states and jurisdictions for various grade levels. Appendix B includes the revisited original guidelines that were used to create the trend line graphs adopted by the Commission in February, 2008. Appendix C shows scatter plots of Wyoming’s 2003 guidelines, the guidelines from other states and localities, and the revisited original guidelines used to create the trend line guideline graphs. The scatter plots show the available information reviewed by the Commission staff.

A key conclusion of these efforts was that the facility design guidelines adopted in 2003 remained competitive with those guidelines available from other states and localities. These guidelines, as a whole, also remained adequate to deliver an appropriate Wyoming educational program and to provide school districts and their designers a great deal of flexibility to design schools. Some minor changes were deemed necessary in the elementary school model due almost exclusively to the Wyoming Legislature’s adoption of full-day Kindergarten and were included in the February, 2008 recommendations.

In addition to the recommended changes to the elementary school guidelines, some additions were also recommended to the high school guidelines. The 2003 guidelines for high schools only included guidelines up to 750 students (see Figure 3). Experience taught that there are a number of high schools in Wyoming with enrollments that exceed 750 students. Thus, work was done to estimate the square footage needs of high schools with larger enrollment capacities. Table 7 shows the additional square footage guidelines recommended by staff for these larger high schools. These recommended changes are also consistent with the recommendations in the revisited original guidelines.

Table 7: Recommended Guideline Additions to High Schools

Number of Students	2003 Guidelines	2008 February Recommendations
150	358.65	358.65
350	236.14	236.14
550	196.91	196.91
750	176.53	176.53
950		167.62
1150		163.15
1350		161.31

Using all of this collected data, Commission staff constructed a series of guideline graphs designed to capture the discreet guideline points and craft a trend line between those points. These graphs were presented to the Commission at its February, 2008 meeting and adopted as Commission policy at that time. Figures 1-6 show each of the graphs presented to and subsequently adopted by the Commission.

Figure 1: Elementary School Guidelines Graph Adopted by Commission in February 2008

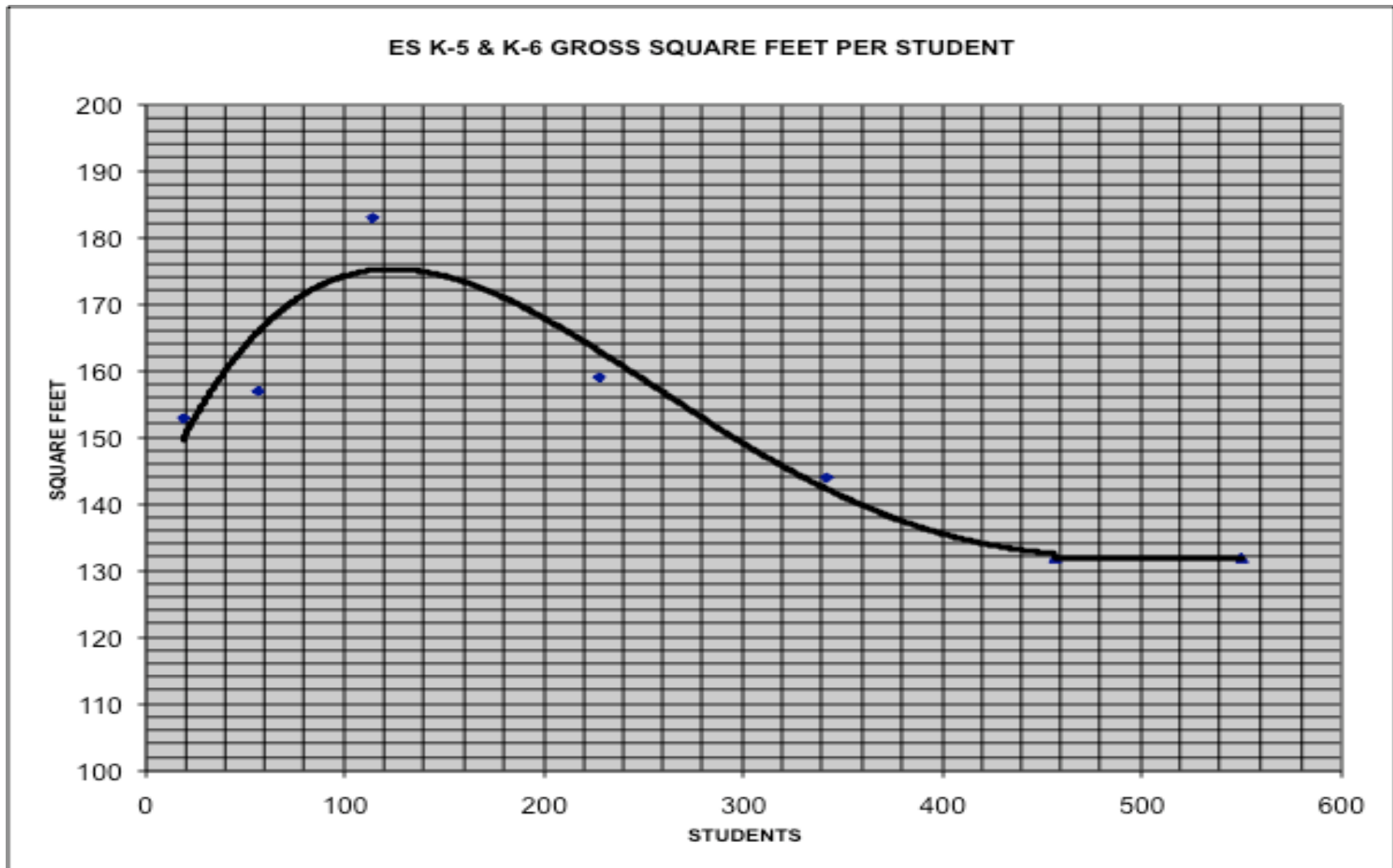


Figure 2: Middle School Guidelines Graph Adopted by Commission in February 2008

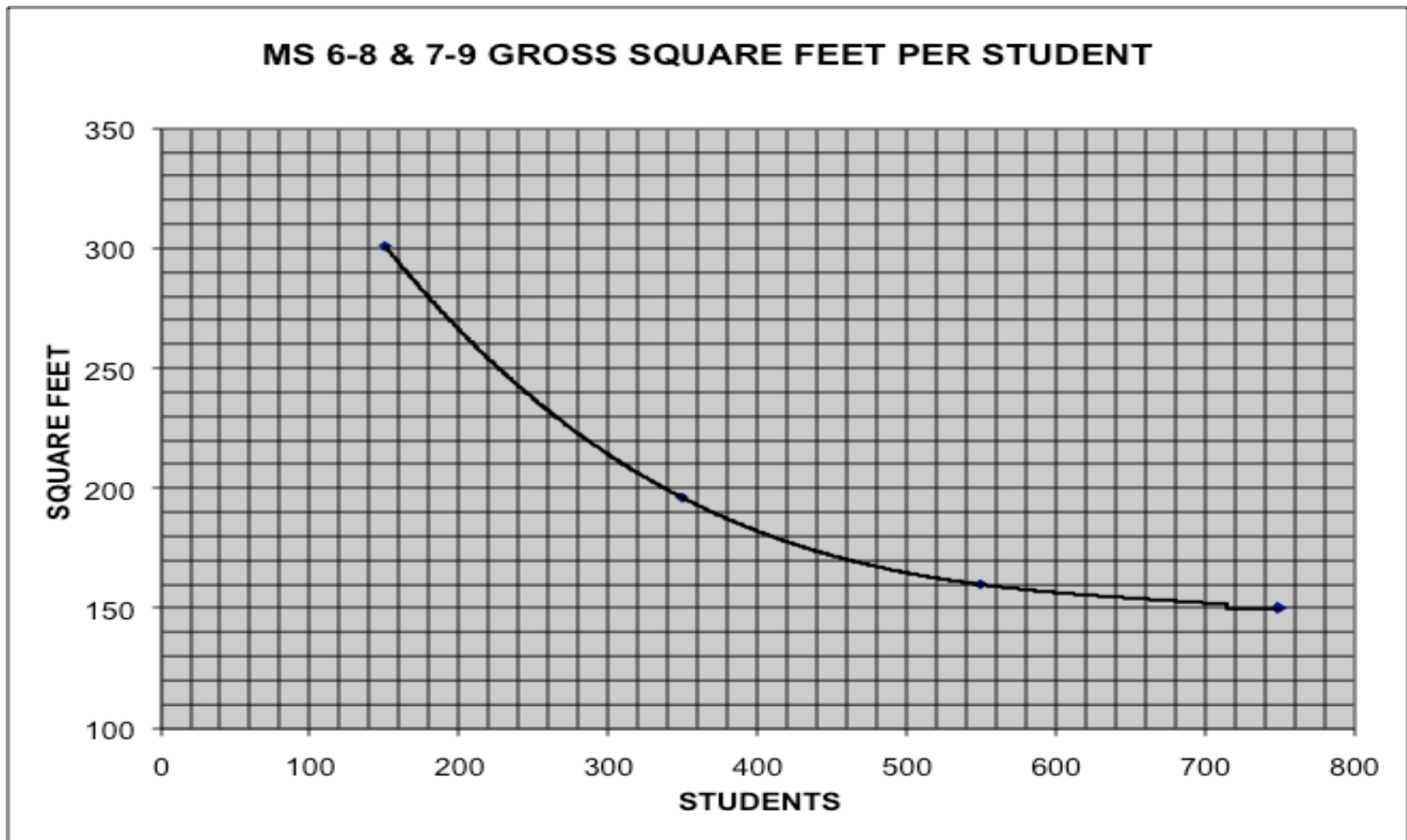


Figure 3: High School Guidelines Graph Adopted by Commission in February 2008

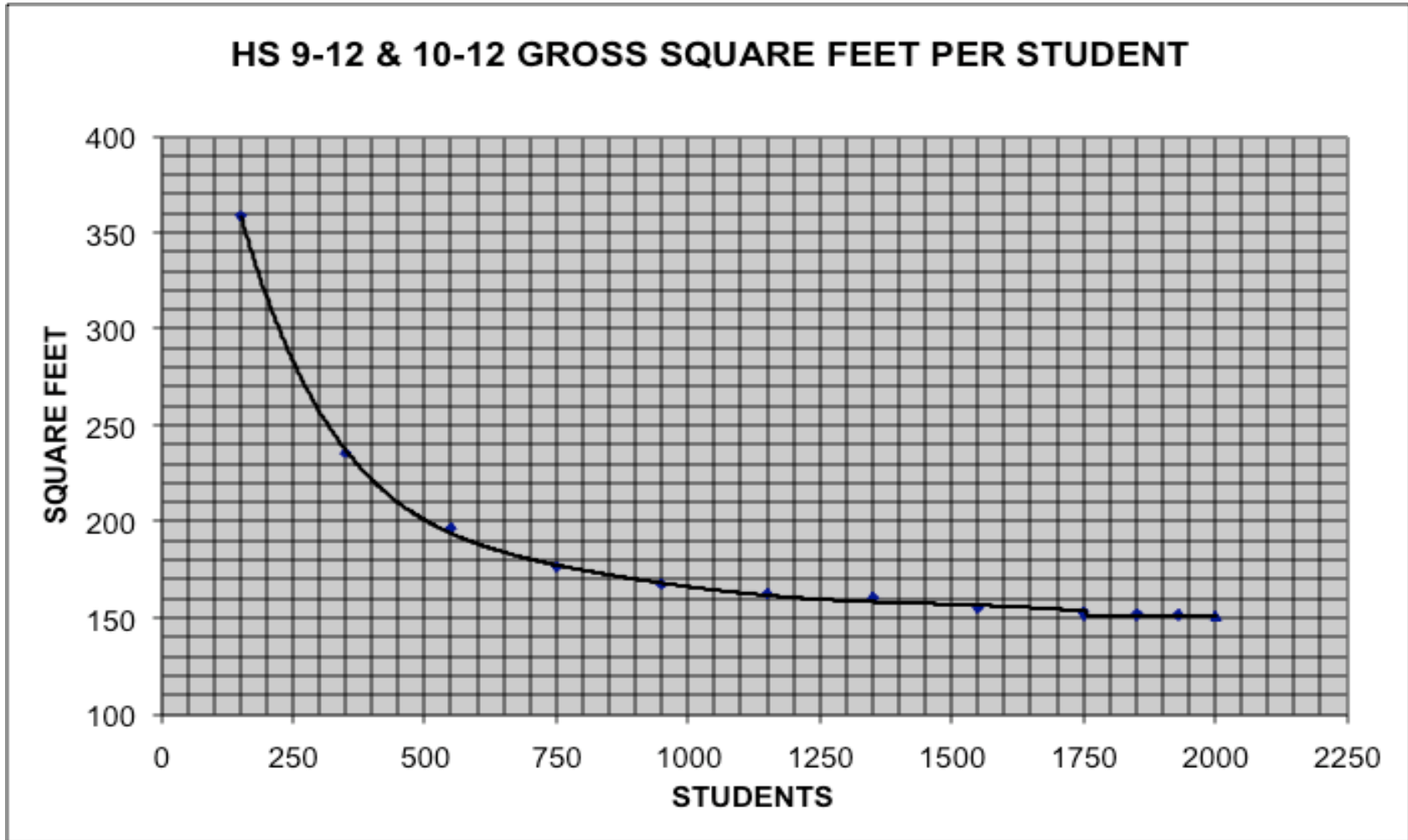


Figure 4: K-8 School Guidelines Graph Adopted by Commission in February 2008

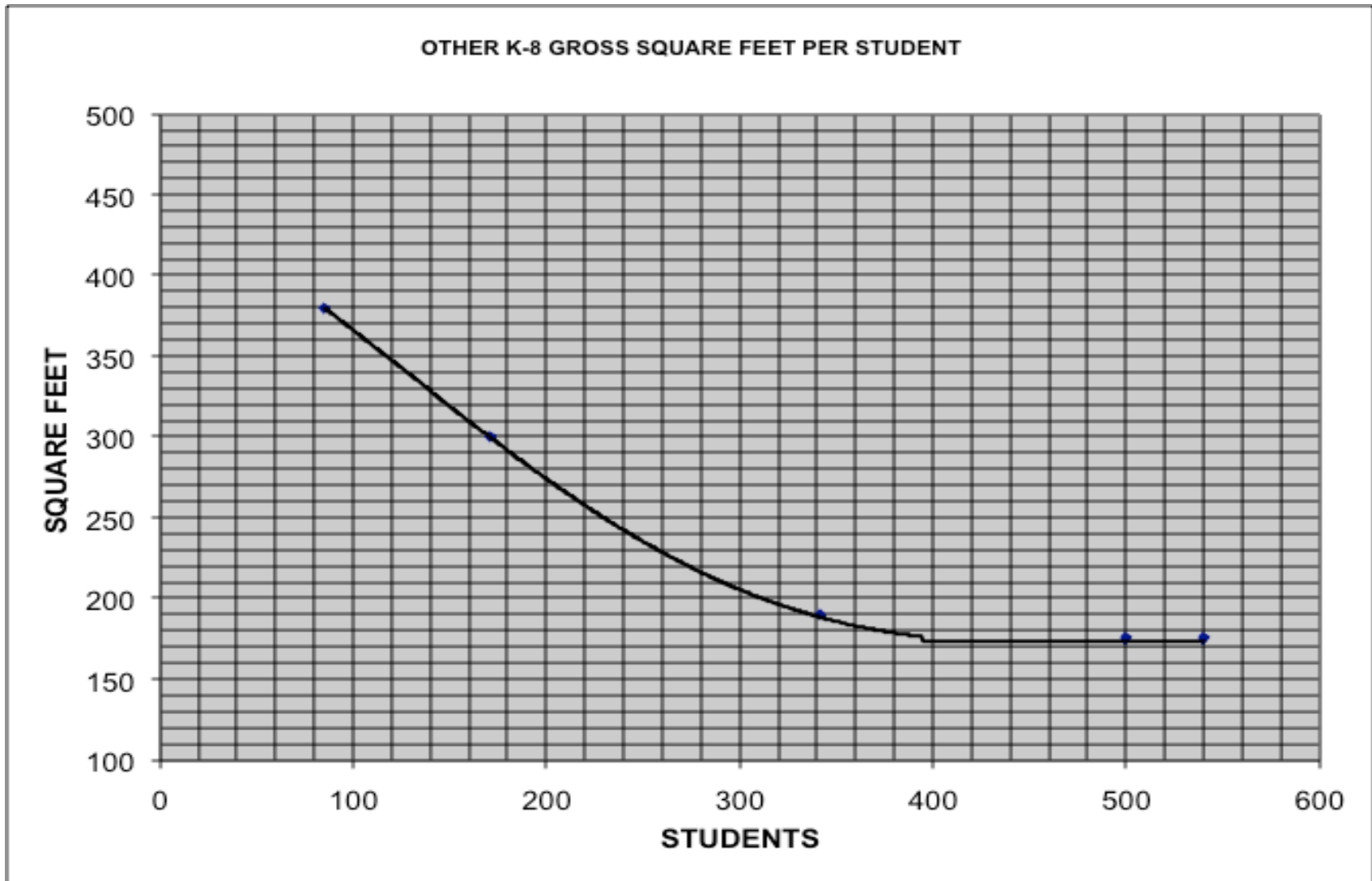


Figure 5: 6-12 Secondary School Guidelines Graph Adopted by Commission in February 2008

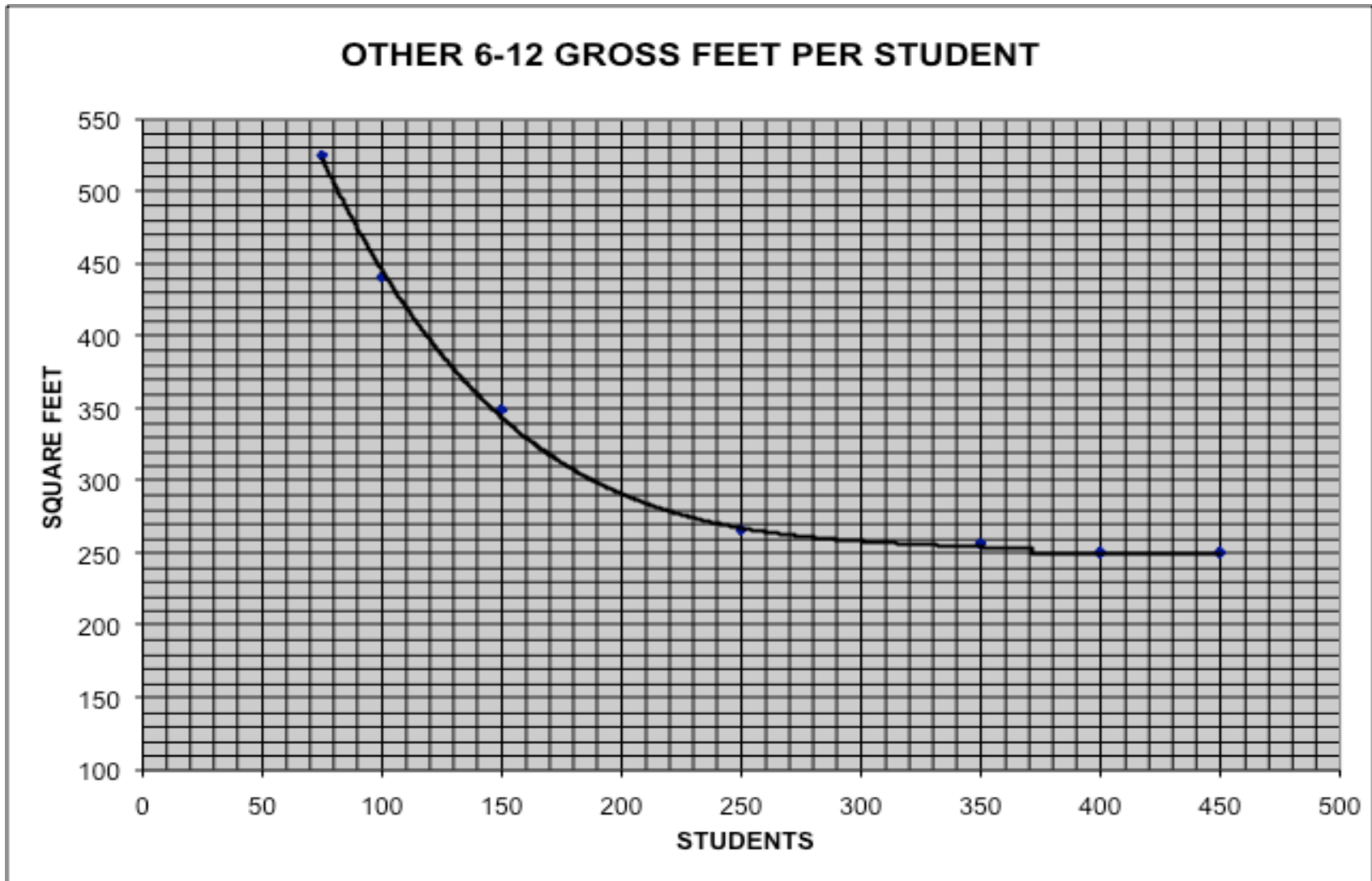
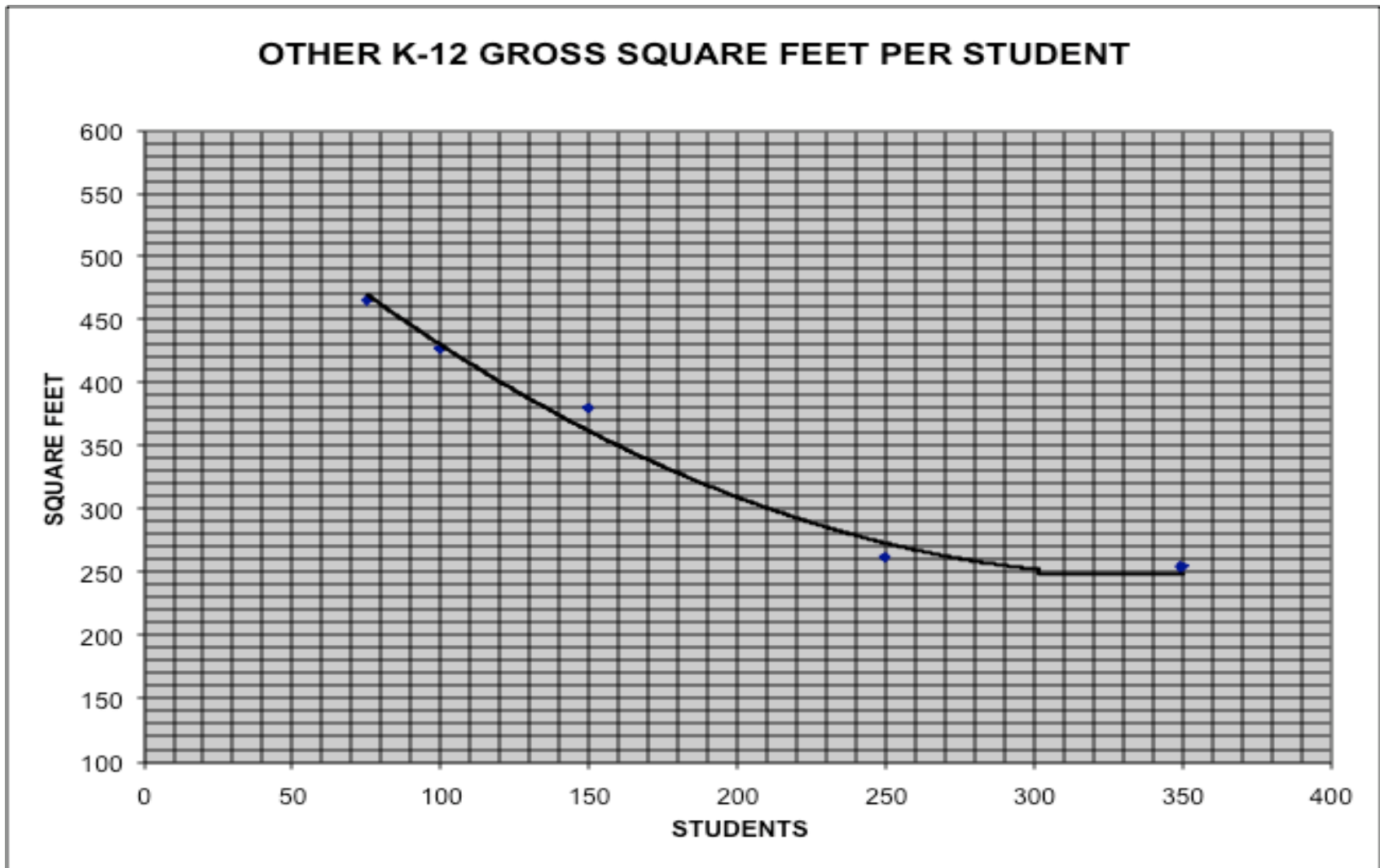


Figure 6: K-12 School Guidelines Graph Adopted by Commission in February 2008



III. The Need to “Operationalize” the Revised Guideline Graphs

A. The Need for Review and Adjustments in a Cycle of Continuous Improvement

After working with the newly adopted graphs for several months, Commission staff determined they were susceptible to some variation in calculation of allowable square footage. Use of the graphs in their original format required a visual plotting of student enrollment. Visual plotting lacked precision and led to some inconsistencies among individuals attempting to calculate allowable space.

In late April, 2008, Commission staff asked Richard C. Seder, an education policy consultant to the State of Wyoming, to review the guideline graphs adopted by the Commission and determine ways to “operationalize” those guideline graphs to ensure reliable and consistent results from those who use them. Seder’s experience includes having worked with the Wyoming Department of Education and Wyoming Legislative Services Office since 2001 operationalizing different iterations of the Wyoming school funding block grant model, a similar endeavor to that he was asked to undertake here.

B. Review of Guideline Graphs

Seder’s review of the February, 2008 graphs revealed that the graphs were created using the “trend line” function in Microsoft Excel. This Excel function creates a line that best fits the given data points by, in effect, minimizing the distances from the line to the points. This is also known as the “line of best fit.” Given that the underlying data points are not in a straight line, the trend lines that best fit are polynomial trend lines to accommodate the curvilinear nature of the data.

For most of the school-level graphs, these polynomial trend lines appear to fit the data well. For some, though, the polynomial lines did not fit the data well. A weakness of the polynomial trend line approach is that the calculations create anomalous results at the ends of several of the lines where data points become scarce. See the high school graph (Figure 3) and the 6-12 secondary school graph (Figure 5) as examples of these anomalies. In an effort to alleviate this problem, Commission staff added more data points from the available data in an attempt to “smooth” the ends of the trend lines.

In their current form, the guideline graphs are not providing the degree of reliability and predictability which is desired. This lack of precision has the potential of clouding the transparency sought in the design and construction process and the major maintenance funding process assigned to the agency.

C. Review of the Underlying Data

As part of the process of reviewing the graphs presented to the Commission, Seder worked with staff to review the underlying data used to create the graphs. Staff and Seder determined that several adjustments to the guideline points should be considered by the Commission to improve the consistency of the guidelines for several of the school levels.

The elementary school guideline graph adopted by the Commission in February, 2008 included adjustments for the legislative adoption of full-day Kindergarten in the block grant. Given that development, staff determined that the K-8 and K-12 school guidelines would also likely be impacted by this legislative change. To remain consistent with the approach adopted in the elementary school models, some additional square footage was needed to allow the districts to provide full-day Kindergarten in these types of schools. In revisiting the middle school guidelines, no changes were deemed necessary.

Staff also revisited the high school and secondary school (grades 6-12) guidelines in light of their experience designing and building schools with districts across the state. The 2003 high school guidelines divided high school square footage into two separate calculations, one as a base school footprint and a second for auditorium space. This two-stage calculation had the effect of making the guidelines appear rigid. Staff, school districts, and designers often felt that auditoriums had to be of a certain size rather than creating a total square footage footprint within which designers could work. To move away from this two-step calculation for high schools and secondary schools, and to ensure that an appropriate amount of flexibility is provided to designers, changes are recommended to these guidelines that move to a single, all-inclusive set of guidelines for each of these school levels.

Additionally, experience has taught that some changes were needed to the 6-12 secondary school guidelines. Actual construction of schools with this configuration had consistently required slightly more square footage per student than contemplated in the original guidelines.

IV. Suggested Next Steps with Commission-Adopted Graphs

As a result of reviewing the February, 2008 graphs and their underlying data, combined with the desire to operationalize the graphs to improve reliability, transparency, and consistency, staff recommends several adjustments as follows:

- A. Adopt adjusted elementary school guidelines for schools with projected enrollments of less than 114 students;
- B. Adopt adjusted guidelines for K-8 and K-12 schools to reflect adoption of full-day Kindergarten in the block grant;
- C. Adopt adjusted guidelines for schools with secondary grade levels (high schools and 6-12 schools) to include auditorium square footage in the base square footage, and for these secondary models to more accurately reflect experience;
- D. Adopt a new set of guideline graphs based on total square footage rather than per student square footage, and operationalize those new graphs by creating a web-based tool which incorporates the regression equation associated with each graph to calculate the allowable square footage for schools.

Staff and the consultant believe these changes would more accurately capture the intent of the Commission and make operational the adopted guidelines in a reliable, consistent, and transparent manner.

A. Adopting Adjusted Elementary School Guidelines for Small Schools

Nearly 40 Wyoming elementary schools have fewer than 114 students. Of these, 31 elementary schools have 50 or fewer students. In the past, Commission staff would estimate the allowable square footage for new designs and major maintenance payments for these small schools based on one of the three smallest guideline points, either 19 students at 153 square feet per student, 57 students at 157 square feet per student, or 114 students at 183 square feet per student. If the projected enrollment was in between any of these three points, judgment was exercised by Commission staff as to which of the discrete guideline points would be used. This presented the potential for inconsistent calculation of allowable square footage in the smaller elementary schools. For example, for schools with less than 114 students, there were fewer square feet allocated per student than at 114 students, a result inconsistent with the experience of Commission staff and the districts in designing schools in these population ranges.

Therefore, Commission staff determined based upon experience that the square footage for these smallest schools should be increased somewhat to ensure adequacy of space to deliver the educational “basket of goods.” The change recommended by staff is to add discrete guideline points consistent with extrapolating the slope of the line from 228 to 114 students in the elementary schools back to 19 students.

The slope-intercept formula calculates the point at 19 students consistent with the recommended point and is consistent with the square footage footprints of recently designed schools in Wyoming. Addition of a new guideline point of 202.54 square feet per student for 19 students makes the elementary school guideline graph more consistent with experience while still capturing the intent of the Commission. For schools with fewer than 19 students, the square footage associated with a single modular building of 2,915 square feet will be allocated, though the process will remaining open to exception requests consistent with the rules and regulations.

Table 8 shows the differences between the 2003 guidelines and the recommended guidelines of the Commission staff.

Table 8: Recommended Guideline Changes to Elementary Schools

Number of Students	2003 Guidelines	June 2008 Recommendations
19	153.42	202.54
57	135.44	194.58
114	182.63	182.63
228	147.98	158.74
342	137.73	143.53
456	121.93	132.32

The point at 57 students of 194.58 square feet is a calculated point along the line between 19 students and 114 students.

B. Adopting Adjusted Guidelines for K-8 and K-12 schools to Reflect Full-Day Kindergarten in the Block Grant

Consistent with adjusting the elementary school guidelines to reflect the Legislature’s adoption of full-day Kindergarten in the block grant, staff recommends the Commission adopt a set of adjusted guidelines for K-8 and K-12 schools. Table 9 shows the 2003 guidelines and the recommended changes for the K-8 school. Table 10 shows the 2003 guidelines and the recommended changes for the K-12 school.

Table 9: Recommended Guideline Changes to K-8 School

Number of Students	2003 Guidelines	June 2008 Recommendations
75	380.45	
85	335.69*	341.99
150	300.03	
171	263.18*	265.76
342	193.76*	186.46
350	189.33	

The original Rules and Regulations of the School Facilities Commission addressed the 2003 guidelines for K-8 schools with guideline points at 85, 171, and 342 students. Concurrently, the guidelines in Appendix A of the Rules and Regulations show guideline points at 75, 150, and 350 students. In reviewing the work of staff and the guidelines working group, the consistent guideline points being discussed were at 85, 171, and 342 students. The points shown in Table 9 with asterisks are the corrected 2003 guideline points calculated at 85, 171, and 342 students.

Table 10: Recommended Guideline Changes to K-12 School

Number of Students	2003 Guidelines	June 2008 Recommendations
75	465.59	512.71
100	428.91	429.52
150	380.22	383.64
250	281.23	289.04
350	254.43	251.52

As can be seen in both tables, slightly more square footage is allocated per student in the smaller schools as a result of more square footage being devoted to full-day Kindergarten. At 342 students in the K-8 school and 350 students in the K-12 school, slightly less square footage was determined to be needed in the overall footprint than in 2003 even after considering full-day Kindergarten.

C. Adopting Adjusted Guidelines for Schools With Secondary Grade Levels (high schools and 6-12 schools)

The 2003 guidelines for high schools had square footage guidelines apportioned in a two-step process. The first was to provide base square footage guidelines followed by a calculation of additional square footage allocated for auditorium space in schools with secondary school populations of approximately 200 students or more. The auditorium space was provided on a sliding scale.

This two-step process had the potential of inconsistent application across districts over time. To better standardize the square footage allocated for these types of schools, the staff recommends adoption of square footage standards that are all-inclusive and provide an appropriate amount of flexibility to the design of new schools. Table 11 shows the recommended changes to the high school guidelines.

Table 11: Recommended Guideline Changes to High School

Number of Students	February 2008 Guidelines	June 2008 Recommendations
150	358.65	358.65
350	236.14	251.88
550	196.91	209.73
750	176.53	187.23
950	167.62	175.69
1150	163.12	170.36
1350	161.31	167.38

Of particular note and consistent with the way that auditorium space was allocated in the past, there is no suggested change in square footage at 150 students given that a high school of that size was not allocated distinct additional space for an auditorium. School districts designing high schools of that size, then and now, are free to allocate the square footage footprint allotted to them and, therefore, may design an auditorium within that footprint if they so desire.

In reviewing the 2003 secondary school guidelines (grades 6-12), staff determined that additional square footage was needed based on experience designing schools of these configurations across the state.

Table 12: Recommended Guideline Changes to 6-12 Secondary School

Number of Students	2003 Guidelines	June 2008 Recommendations
75	525.07	539.80
100	439.86	456.80
150	348.07	392.17
250	265.24	290.73
350	255.76	260.91

The multi-level secondary school presents unique challenges and staff believes these recommended changes would provide appropriate flexibility for these unique school configurations.

D. Adopting New Guideline Graphs Based On Total Square Footage.

In reviewing the guideline graphs adopted by the Commission in February, 2008, one of the identified weaknesses of the graphing method was that, in some cases, the trend line did not “fit” the guideline points well. In addition, the polynomial trend lines exhibited unintended anomalies in the way they were displayed, particularly at the ends of the lines. Staff and the consultant determined that the additional mathematical operation of dividing the total square footage by the number of students tended to create the lack of fit in the trend line. With a limited number of guideline points, this additional mathematical operation tended to create trend line graphs that did not fit the data as precisely as hoped for in their initial creation.

To more precisely fit a trend line to the data, staff suggests the Commission adopt a new set of guideline graphs based on the suggested changes to the guidelines (suggestions A-C), but as total square footage rather than per-student square footage. The removal of the mathematical operation converting the data to per-student square footage allows for trend lines that more precisely fit the guidelines data. Tables 13-18 show the suggested total square footage to be used to construct a new set of guideline graphs. The mathematical formulae used to generate the regression equations represented in the graphs will much more closely align with the discrete data points. However, it should be noted that the graph line will not precisely match those data points. Small variations should be anticipated from the actual data points used to generate the graphs and the total square footage actually generated by the graphs. This is the result of creating a regression equation from the discrete points.

Table 13: Suggested Total Square Footage to Generate Elementary School Guideline Graph

Number of Students	June 2008 Per-Student Recommendations*	June 2008 Total Sq. Ft. Recommendations
19	202.54	3,848
57	194.58	11,091
114	182.63	20,820
228	158.74	36,192
342	143.53	49,086
456	132.32	60,340

*Per-student square footage is rounded to two decimal places.

Table 14: Suggested Total Square Footage to Generate Middle School Guideline Graph

Number of Students	June 2008 Per-Student Recommendations*	June 2008 Total Sq. Ft. Recommendations
150	300.63	45,095
350	195.64	68,474
550	160.32	88,174
750	148.28	111,206

*Per-student square footage is rounded to two decimal places.

Table 15: Suggested Total Square Footage to Generate High School Guideline Graph

Number of Students	June 2008 Per-Student Recommendations*	June 2008 Total Sq. Ft. Recommendations
150	358.65	53,798
350	251.88	88,159
550	209.73	115,354
750	187.23	140,425
950	175.69	166,905
1150	170.36	195,913
1350	167.38	225,966

*Per-student square footage is rounded to two decimal places.

Table 16: Suggested Total Square Footage to Generate K-8 School Guideline Graph

Number of Students	June 2008 Per-Student Recommendations*	June 2008 Total Sq. Ft. Recommendations
85	341.99	29,069
171	265.76	45,445
342	186.46	63,769

*Per-student square footage is rounded to two decimal places.

Table 17: Suggested Total Square Footage to Generate 6-12 Secondary School Guideline Graph

Number of Students	June 2008 Per-Student Recommendations*	June 2008 Total Sq. Ft. Recommendations
75	539.80	40,485
100	456.80	45,680
150	392.17	58,826
250	290.73	72,682
350	260.91	91,319

*Per-student square footage is rounded to two decimal places.

Table 18: Suggested Total Square Footage to Generate K-12 School Guideline Graph

Number of Students	June 2008 Per-Student Recommendations*	June 2008 Total Sq. Ft. Recommendations
75	512.71	38,453
100	429.52	42,952
150	383.64	57,546
250	289.04	72,261
350	251.52	88,032

*Per-student square footage is rounded to two decimal places.

The suggested guideline graphs associated with each of these school levels and guideline points are in Appendix D.

E. Operationalize by Adopting the Regression Equation Associated With the Total Square Footage Trend Line Graphs to Calculate the Allowable Square Footage

The trend line function within Microsoft Excel used to create the guideline graphs adopted by the Commission in February, 2008 and the suggested guideline graphs shown in Appendix D allows for a display of the mathematical line equation of the positioned trend line. One of the tasks of the guideline graphs review was to determine ways to operationalize the graphs to improve the reliability, consistency, and transparency of the results of their use. The mathematical equation of the trend line would eliminate the need to visually estimate the amount of square footage allotted for a given school population. Instead, the equations allow for consistent calculations of total square footage across school levels and across prospective enrollments. These equations would also greatly expedite the calculation of allowable square footage for schools for the agency’s calculation of major maintenance payments to districts. Therefore, staff recommends adoption of the guideline graphs in Appendix D and the use of the equations associated with those trend lines to calculate the allowable square footage for both new school designs and for major maintenance calculations.

Table 19: Equations of the Trend Lines of the Proposed Guideline Graphs

Number of Students	Equation of Trend Line
Elementary School	$Y = 0.0002128x^3 - 0.2644484x^2 + 208.6966777x + 16.4242391$
Middle School	$Y = 0.0001460x^3 - 0.1993016x^2 + 187.7071094x + 20929.8632813$
High School	$Y = 0.0000446x^3 - 0.1033081x^2 + 207.0604979x + 25374.3749070$
K-8 School	$Y = -0.3239548x^2 + 273.3488359x + 8175.0727129$
6-12 Secondary School	$Y = 0.0025644x^3 - 1.7519279x^2 + 535.8785137x + 8376.2839819$
K-12 School	$Y = 0.0017301x^3 - 1.3373171x^2 + 484.7783098x + 7940.3304431$

With the exception of elementary schools smaller than 19 students, for schools both larger and smaller than displayed on each graph, per student square footage will remain constant beyond the end of each respective graph. For example, a high school with enrollment of 1,500 students is beyond the description of the graph. Therefore, 167.67 square feet per student is used to calculate the allowable total square footage for that school, a total of 251,505 square feet. The per-student square footage of 167.67 is the equation-generated school at 1,350 students, the last available point described in the high school graph – 226,360 total square feet as calculated by the equation of the line divided by 1,350 students). As noted earlier, very small elementary schools will generate a 2,915 square foot modular with the recognition that exception requests may occur. Table 19 shows these equations for each school level.

V. Summary

This report presents a number of suggested next steps to the Commission for adoption in its rules and regulations. In its further examination of the February, 2008 graphs, staff reviewed both the creation of the graphs and the underlying data. In the process of that review, staff determined that additional adjustments to the guidelines would be recommended for adoption by the Commission to improve consistency among the guidelines based on changes in the block grant and in the use of the guidelines, particularly in secondary schools. The staff also recommends that the Commission adopt a new set of graphs based on total square footage rather than graphs based on per-student square footage. This eliminates the need to mathematically compute the total square footage (the number of most interest) and also addresses some of the graphing anomalies associated with the per-student square footage guideline graphs.

In order to increase reliability, consistency, and transparency of the guidelines, staff recommends the use of equations associated with each of the recommended guideline graphs to operationalize each guideline. These trend line equations allow users to

calculate the total square footage for any given enrollment in any given school type and eliminate the inconsistencies generated by visually plotting points along the graphs.

If adopted by the Commission, the mathematical equations would be posted on the Commission website in a user-friendly format. Any person seeking to identify the allotted square footage of an existing or contemplated school would simply enter the population of that school into the blank space associated with its configuration and the total square footage would be automatically calculated. A similar function would be embedded in the Commission's process for calculation of major maintenance payments.

APPENDIX A: School Facility Guidelines from Other States for Various Grade Levels

Table A-1: Comparative Elementary School Guidelines

State/Locality	"Enrollment"	Square Footage Per Student
Alaska		114
Arizona		80
Arkansas		131
Connecticut		120
Illinois		93
Jefferson County (CO)	576	94
Kentucky		123
Maryland		131
Massachusetts		168
Minnesota	500 or less	125-155
Minnesota	500-999	110-135
New Hampshire		120
New Jersey		125
North Dakota		110
Ohio	400 or less	125
Ohio	400-600	Sliding scale
Ohio	600 or more	116
Oklahoma		88
Rhode Island		168
Vermont		140
Washington		80
West Virginia		110

Table A-2: Comparative Middle School Guidelines

State/Locality	"Enrollment"	Square Footage Per Student
Alaska		165
Arizona		84
Arkansas		128
Connecticut		176
Illinois		115
Jefferson County (CO)	200	405
Jefferson County (CO)	300	300
Jefferson County (CO)	450	230
Jefferson County (CO)	600	180
Jefferson County (CO)	900	135
Kentucky		142
Maryland		145
Massachusetts		177
Minnesota	150	200
Minnesota	350	190
Minnesota	550	180
Minnesota	750	175
Minnesota	1000	160
New Hampshire		140
New Jersey		134
North Dakota		135
Ohio	150	151
Ohio	350	151
Ohio	550	146
Ohio	750	141
Rhode Island		177
Vermont		160
West Virginia		120

Table A-3: Comparative High School Guidelines

State/Locality	"Enrollment"	Square Footage Per Student
Alaska		165
Arizona		120
Arkansas		180
Connecticut		184
Illinois		129
Jefferson County (CO)	1000	174
Jefferson County (CO)	1250	156
Jefferson County (CO)	1500	144
Kentucky		140
Maryland		158
Massachusetts		188
Minnesota	150	320
Minnesota	350	260
Minnesota	550	220
Minnesota	1000	200
Minnesota	1550	190
New Hampshire		160
New Jersey		151
North Dakota		180
Ohio	450	180
Ohio	525	167
Rhode Island		185
Vermont		180
West Virginia		130

Table A-4: Comparative Multi-Grade Guidelines

State/Locality	Grade Configuration	Square Footage Per Student
Ohio	K-8	150
Ohio	6-12	180
Ohio	K-12	190

APPENDIX B: Square Footage Estimates from 2003 Commission Guidelines and as revisited to accommodate Block Grant changes and larger schools to develop guideline graphs.

Table B-1: Elementary School

Number of Students	2003 Guidelines	Revisited Estimates
19	153.42	202.54*
57	135.44	194.58*
114	182.63	182.63
228	147.98	158.74
342	137.73	143.53
456	121.93	132.32

Table B-2: Middle School

Number of Students	2003 Guidelines	Revisited Estimates
150	300.63	300.63
350	195.64	195.64
550	160.32	160.32
750	148.28	148.28

Table B-3: High School

Number of Students	2003 Guidelines	Revisited Estimates
150	358.65	358.65
350	236.14	251.88
550	196.91	209.73
750	176.53	187.23
950		175.69
1150		170.36
1350		167.38

Table B-4: K-8 School

Number of Students	2003 Guidelines	Revisited Estimates
75	380.46	
85		341.99
150	300.03	
171		265.76
342		186.46
350	189.33	

Table B-5: 6-12 Secondary School

Number of Students	2003 Guidelines	Revisited Estimates
75	525.07	539.80
100	439.86	456.80
150	348.07	392.17
250	265.24	290.73
350	255.76	260.91

Table B-6: K-12 School

Number of Students	2003 Guidelines	Revisited Estimates
75	465.59	512.71
100	428.91	429.52
150	380.22	383.64
250	281.23	289.04
350	254.43	251.52

APPENDIX C: Scatter plots of 2003 Wyoming Guidelines, Guideline Points Used to Construct Trend Lines, and Guidelines from Other States and Localities

Figure C-1: Elementary School Scatter plot

Figure C-2: Middle School Scatter plot

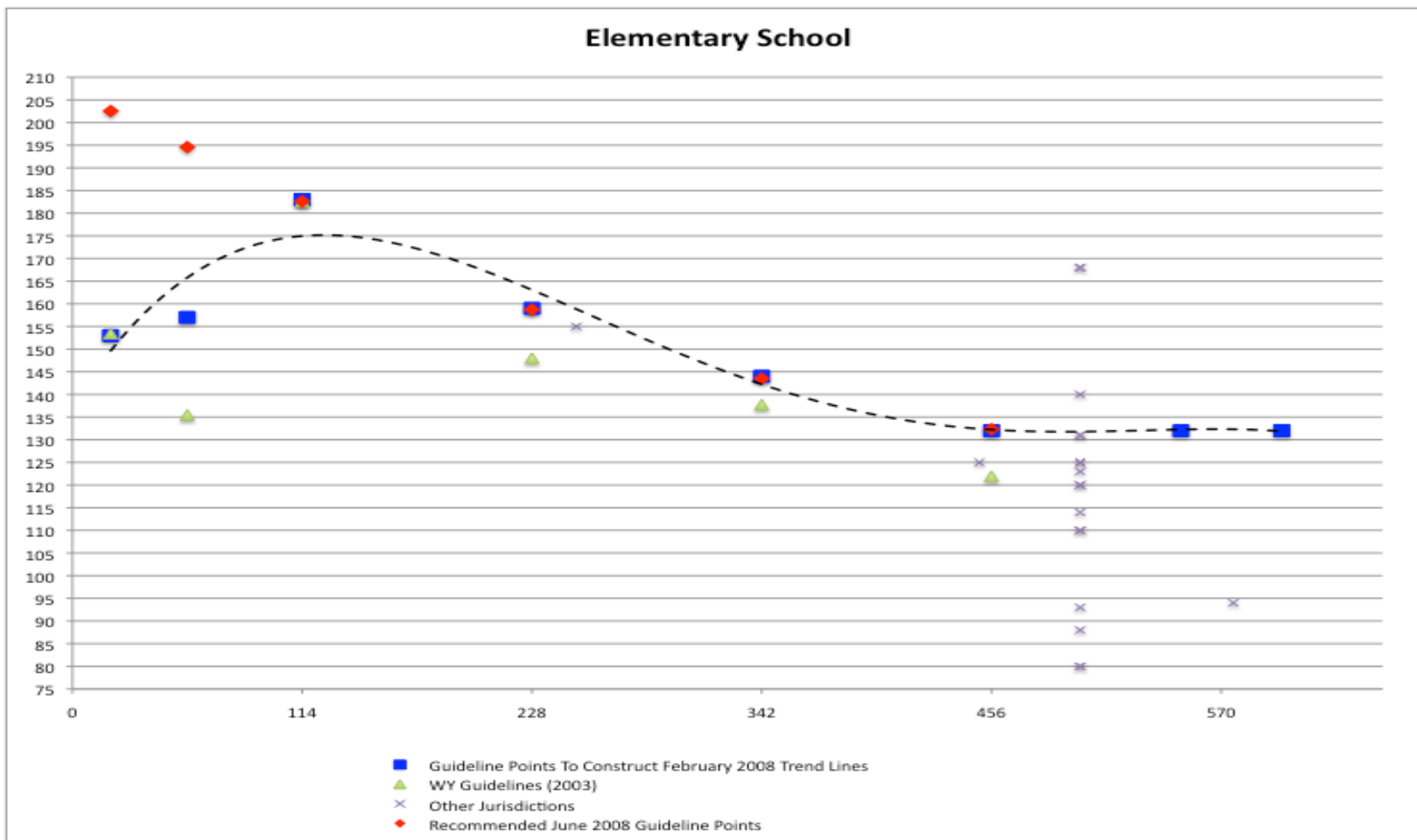
Figure C-3: High School Scatter plot

Figure C-4: K-8 School Scatter plot

Figure C-5: 6-12 Secondary School Scatter plot

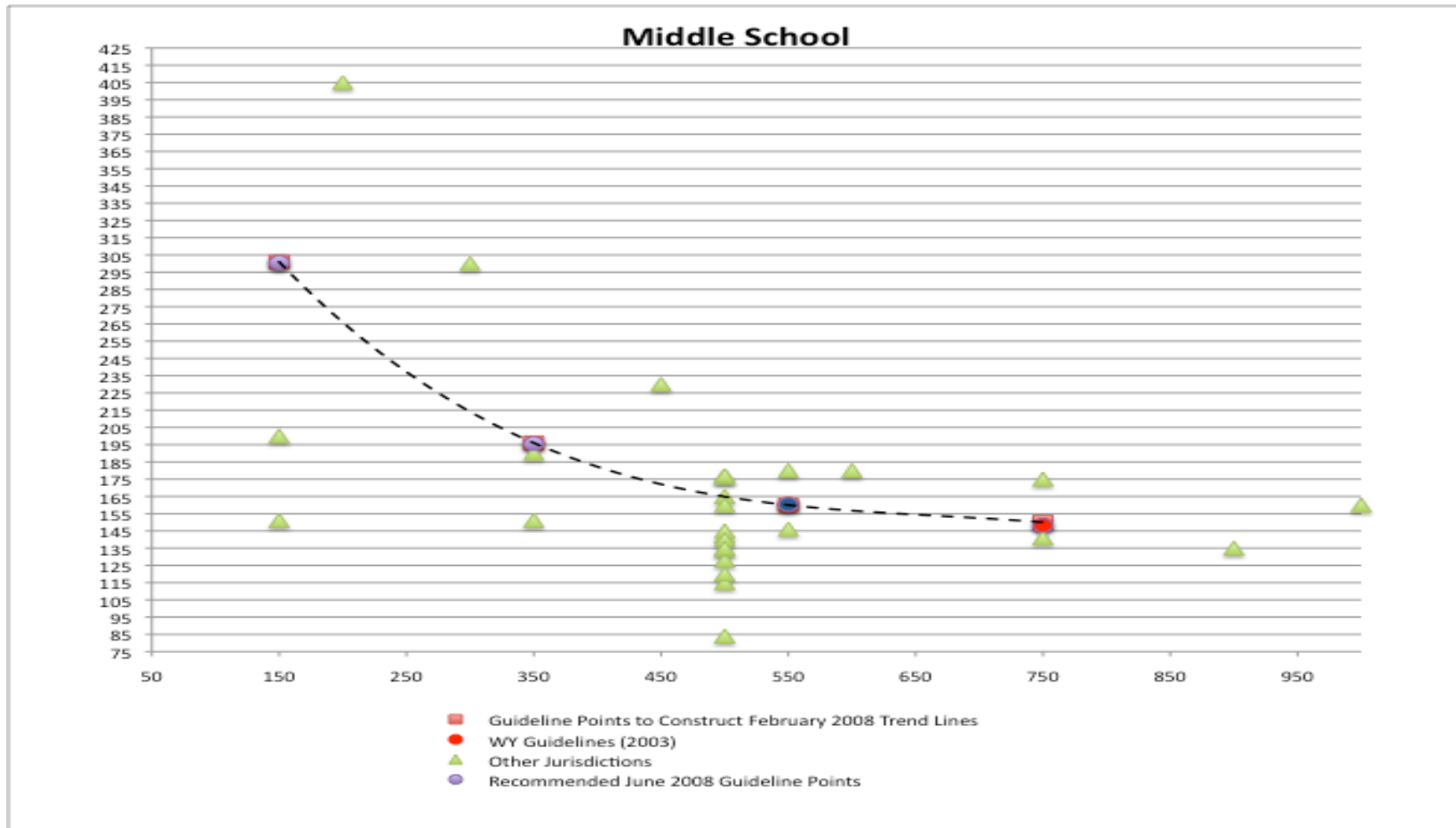
Figure C-6: K-12 School Scatter plot

Figure C-1: Elementary School Guidelines, Final Suggested Guideline Points, Wyoming Guidelines (2003), Guideline Points to Construct Trend Line, and Other States & Localities



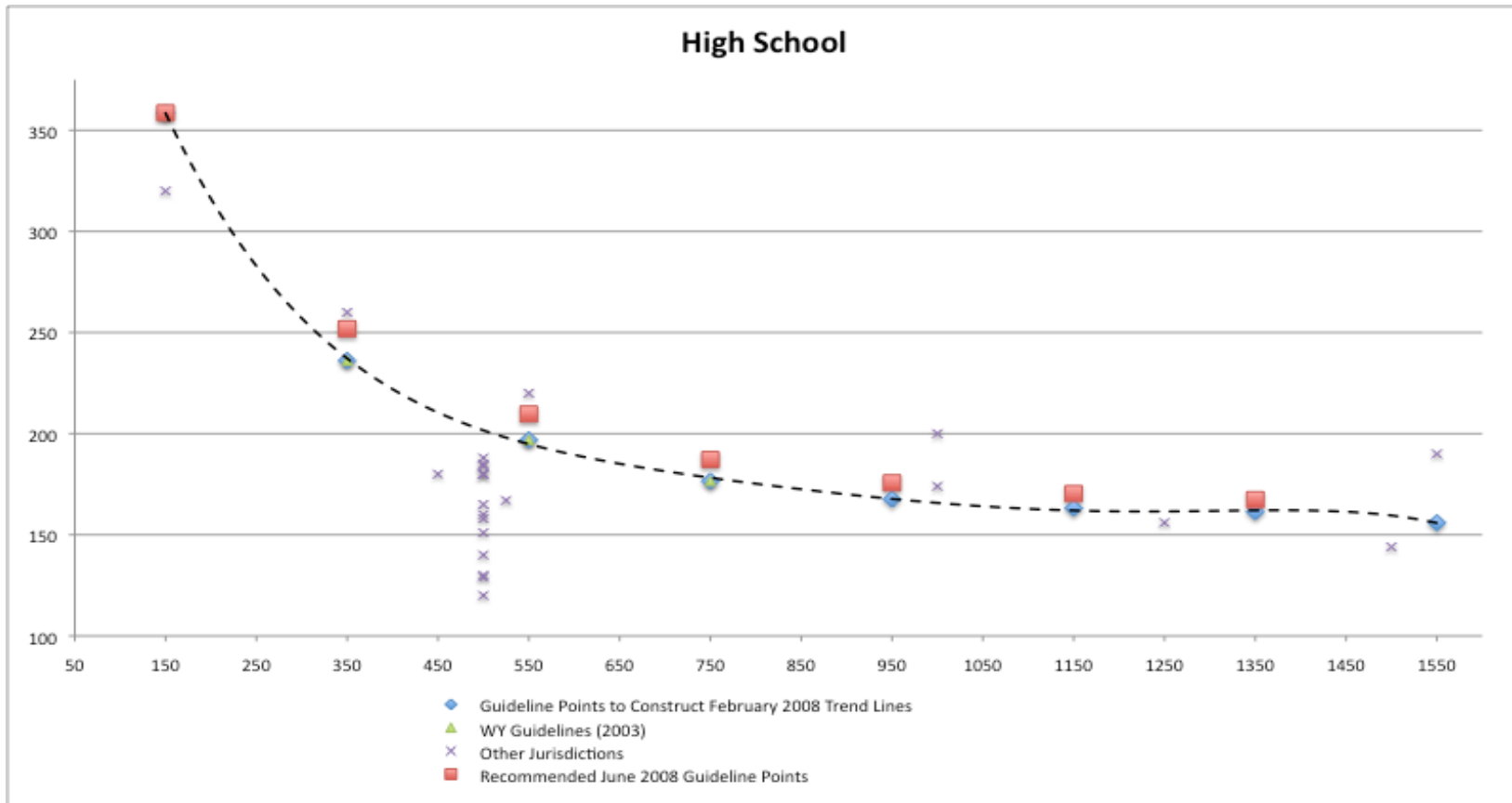
Note: For most other jurisdictions, specific enrollments were not provided for their guidelines. Therefore, an enrollment size of 500 was used for purposes of graphing.

Figure C-2: Middle School Guidelines, Final Suggested Guideline Points, Wyoming Guidelines (2003), Guideline Points to Construct Trend Line, and Other States & Localities



Note: For most other jurisdictions, specific enrollments were not provided for their guidelines. Therefore, an enrollment size of 500 was used for purposes of graphing.

Figure C-3: High School Guidelines, Final Suggested Guideline Points, Wyoming Guidelines (2003), Guideline Points to Construct Trend Line, and Other States & Localities



Note: For most other jurisdictions, specific enrollments were not provided for their guidelines. Therefore, an enrollment size of 500 was used for purposes of graphing.

Figure C-4: K-8 School Guidelines, Final Suggested Guideline Points, Wyoming Guidelines (2003), Guideline Points to Construct Trend Line, and Other States & Localities

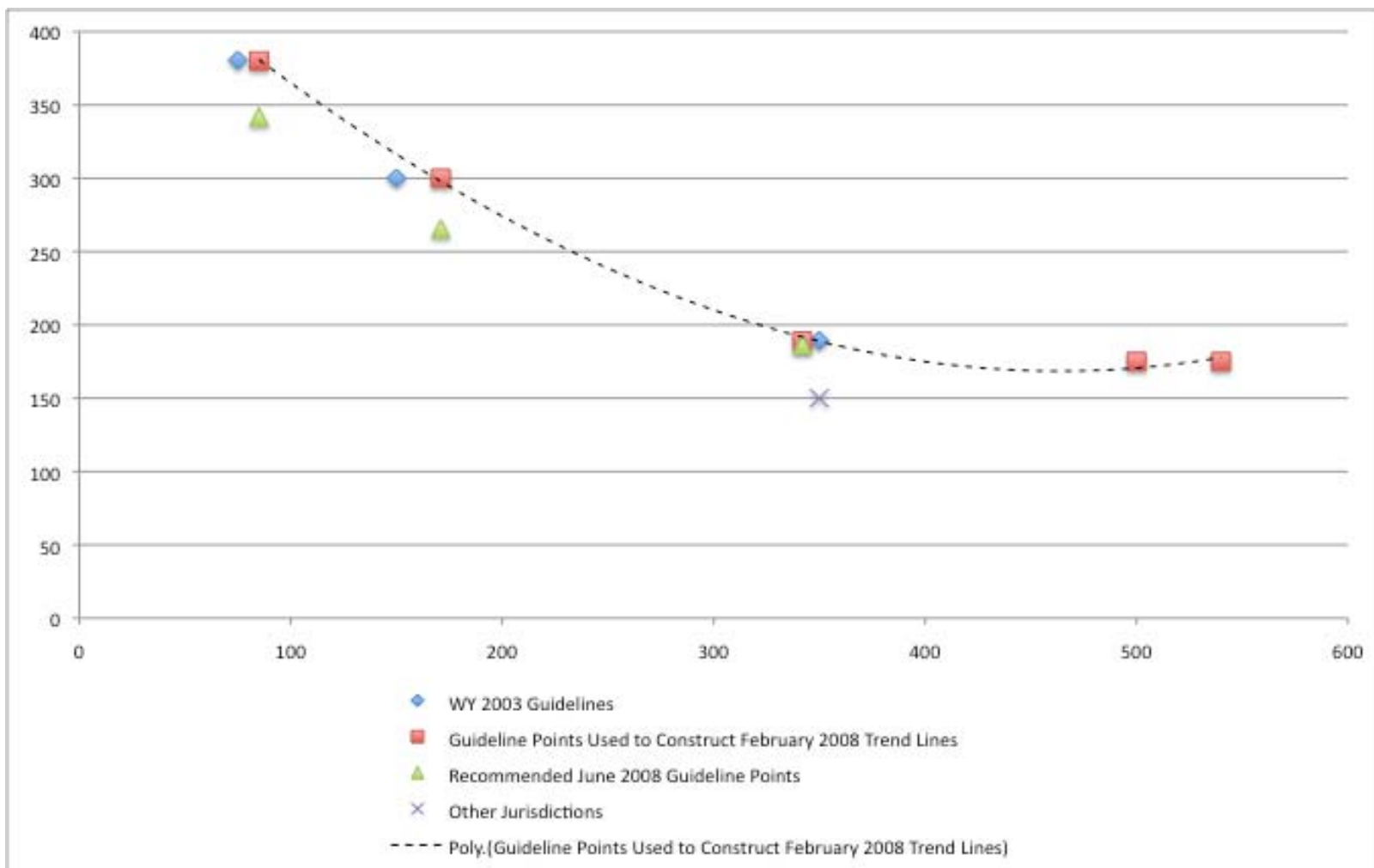


Figure C-5: 6-12 Secondary School Guidelines, Final Suggested Guideline Points, Wyoming Guidelines (2003), Guideline Points to Construct Trend Line, and Other States & Localities

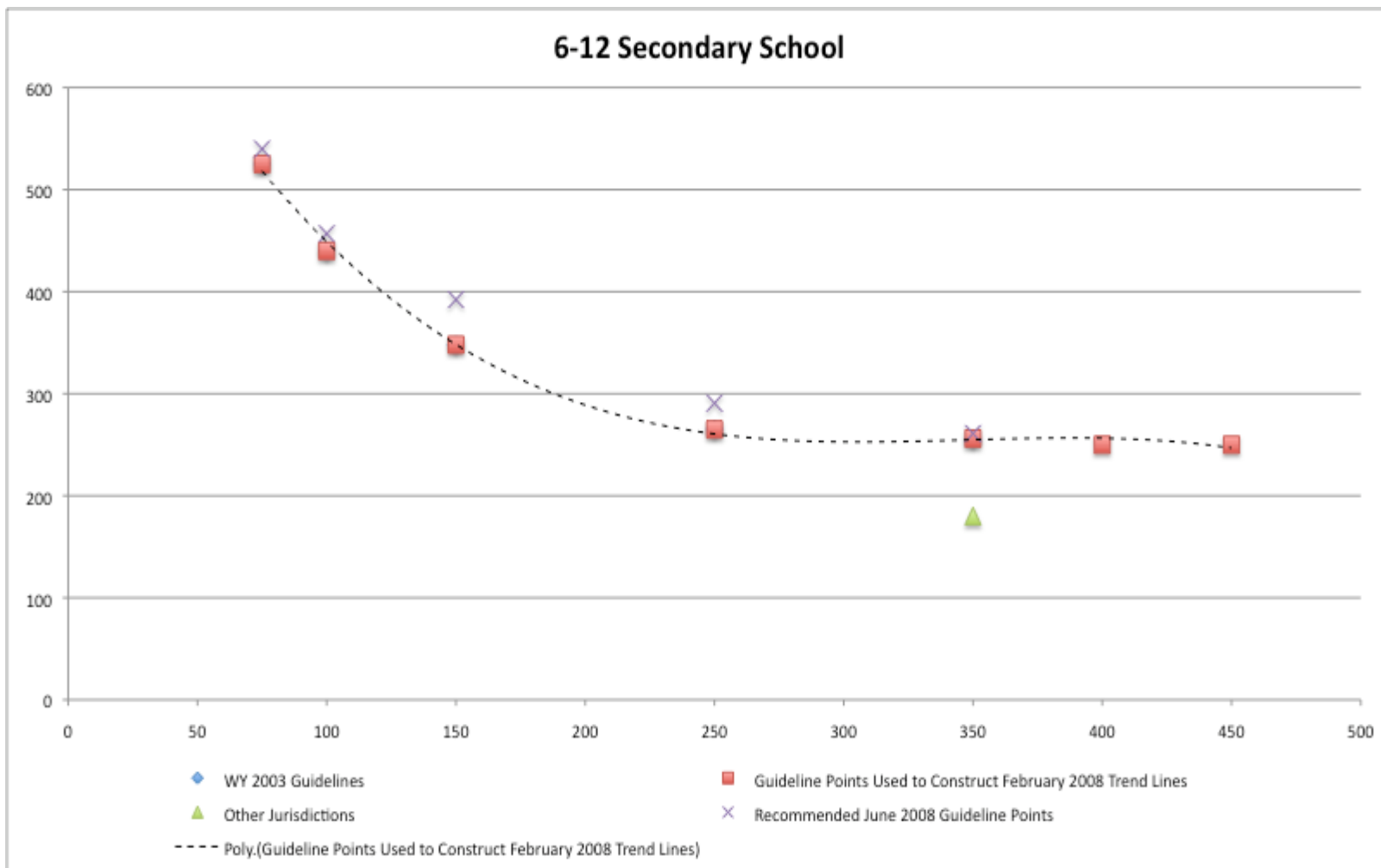
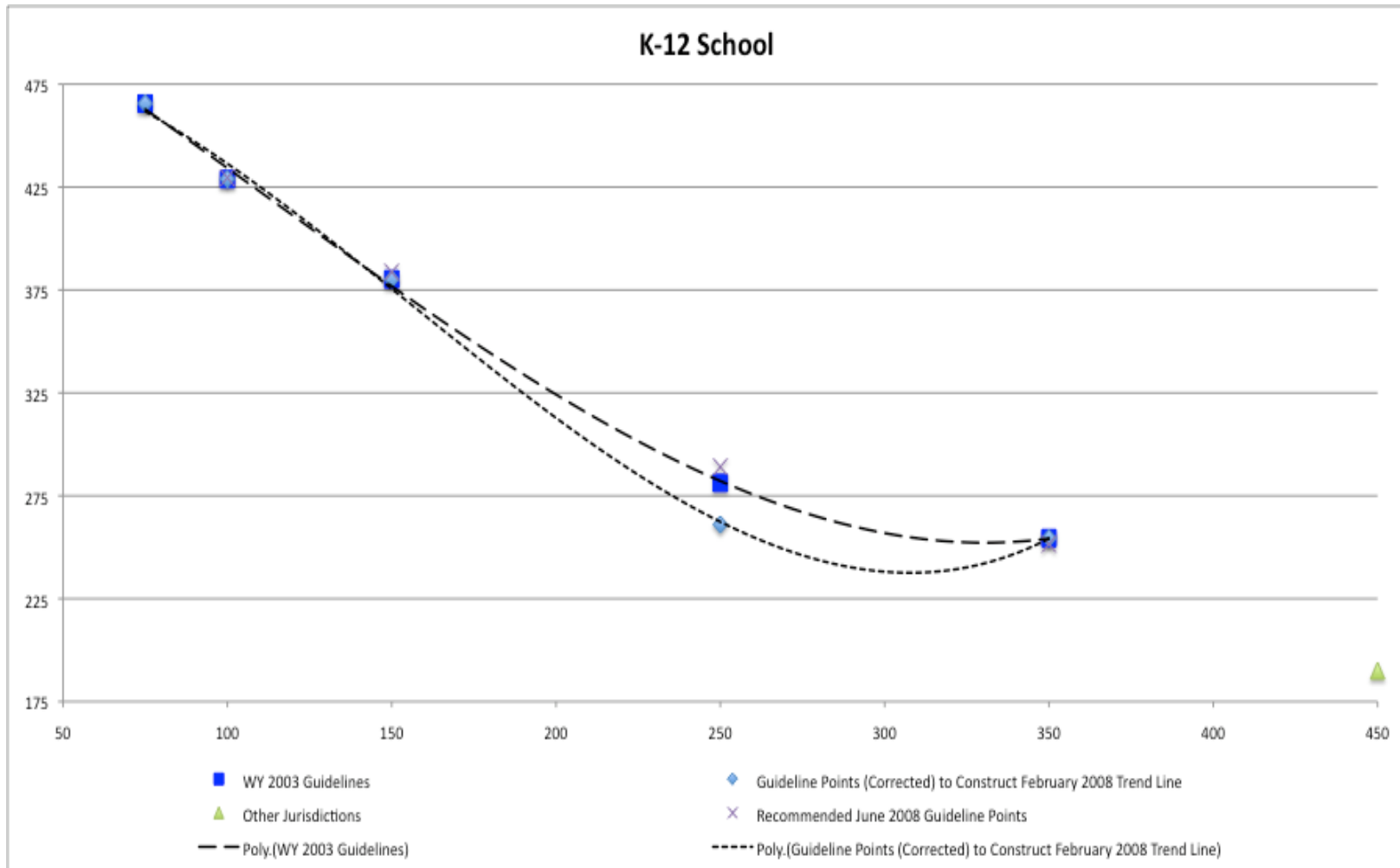


Figure C-6: K-12 School Guidelines, Final Suggested Guideline Points, Wyoming Guidelines (2003), Guideline Points to Construct Trend Line, and Other States & Localities



APPENDIX D: Suggested Guideline Graphs of Total Square Footage by Grade Level

Figure D-1: Elementary School Total Square Footage Guideline Graph

Figure D-2: Middle School Total Square Footage Guideline Graph

Figure D-3: High School Total Square Footage Guideline Graph

Figure D-4: K-8 School Total Square Footage Guideline Graph

Figure D-5: 6-12 Secondary School Total Square Footage Guideline Graph

Figure D-6: K-12 School Total Square Footage Guideline Graph

Figure D-1: Elementary School Total Square Footage Guideline Graph

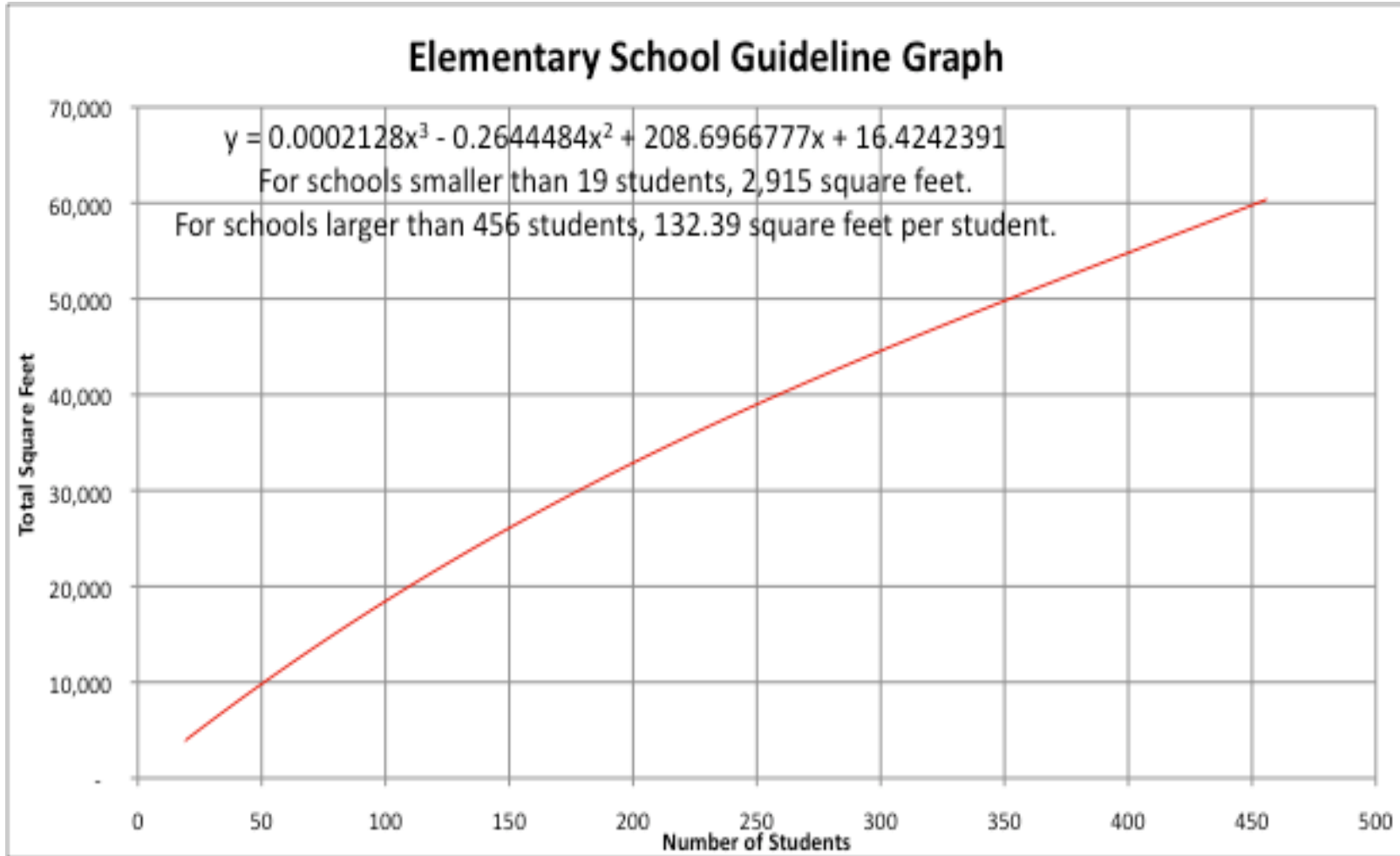


Figure D-2: Middle School Total Square Footage Guideline Graph

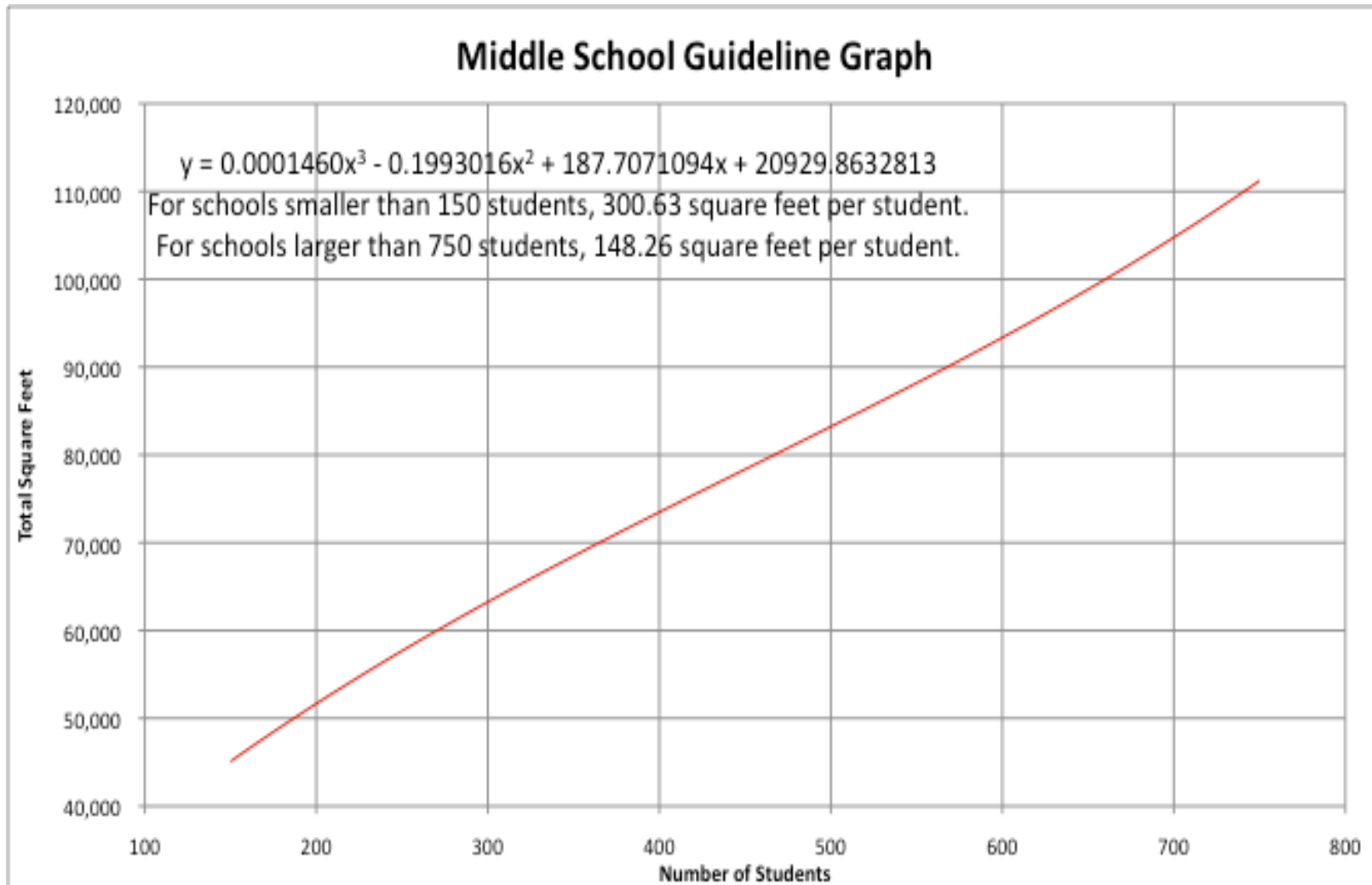


Figure D-3: High School Total Square Footage Guideline Graph

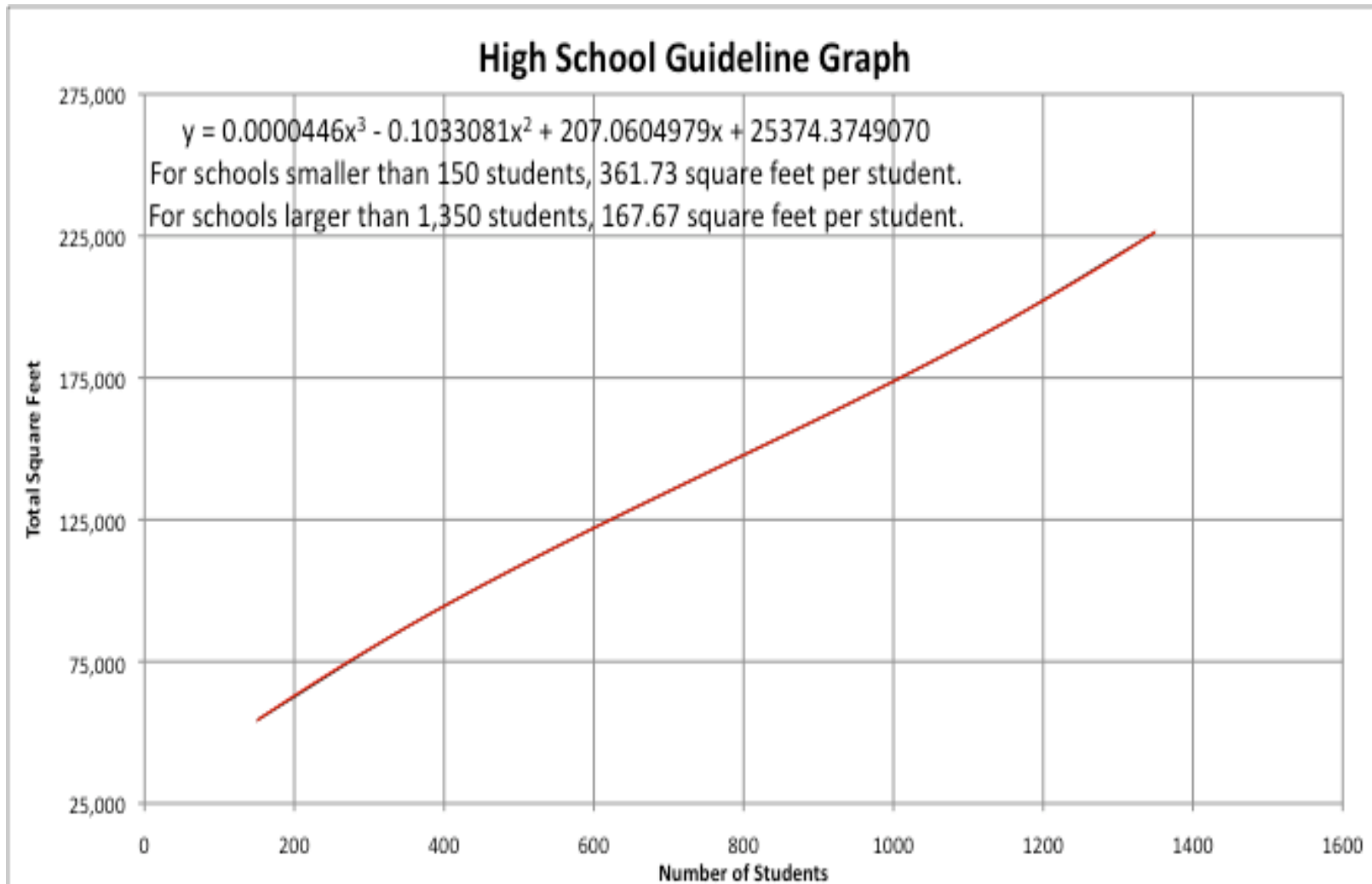


Figure D-4: K-8 School Total Square Footage Guideline Graph

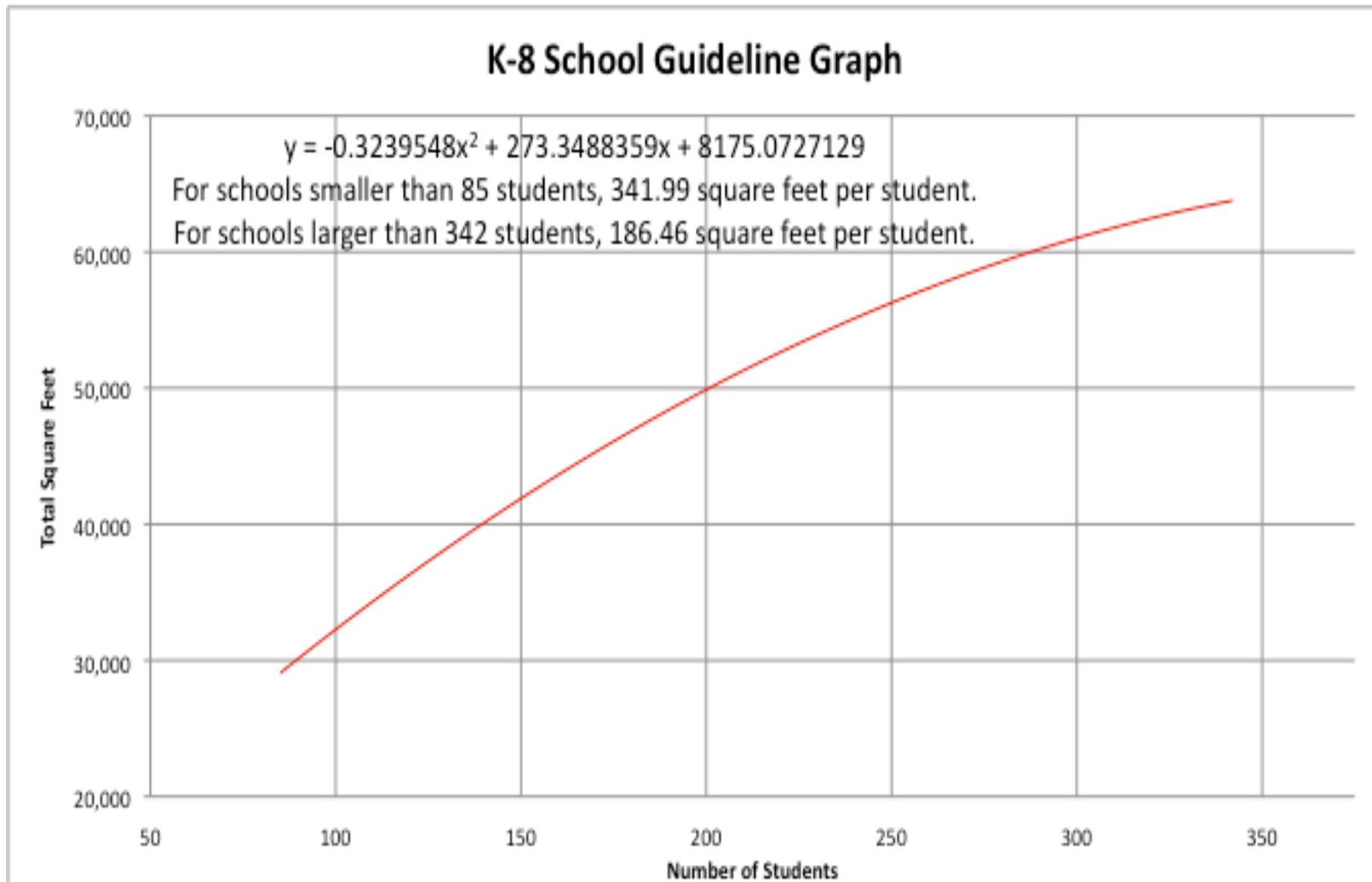


Figure D-5: 6-12 Secondary School Total Square Footage Guideline Graph

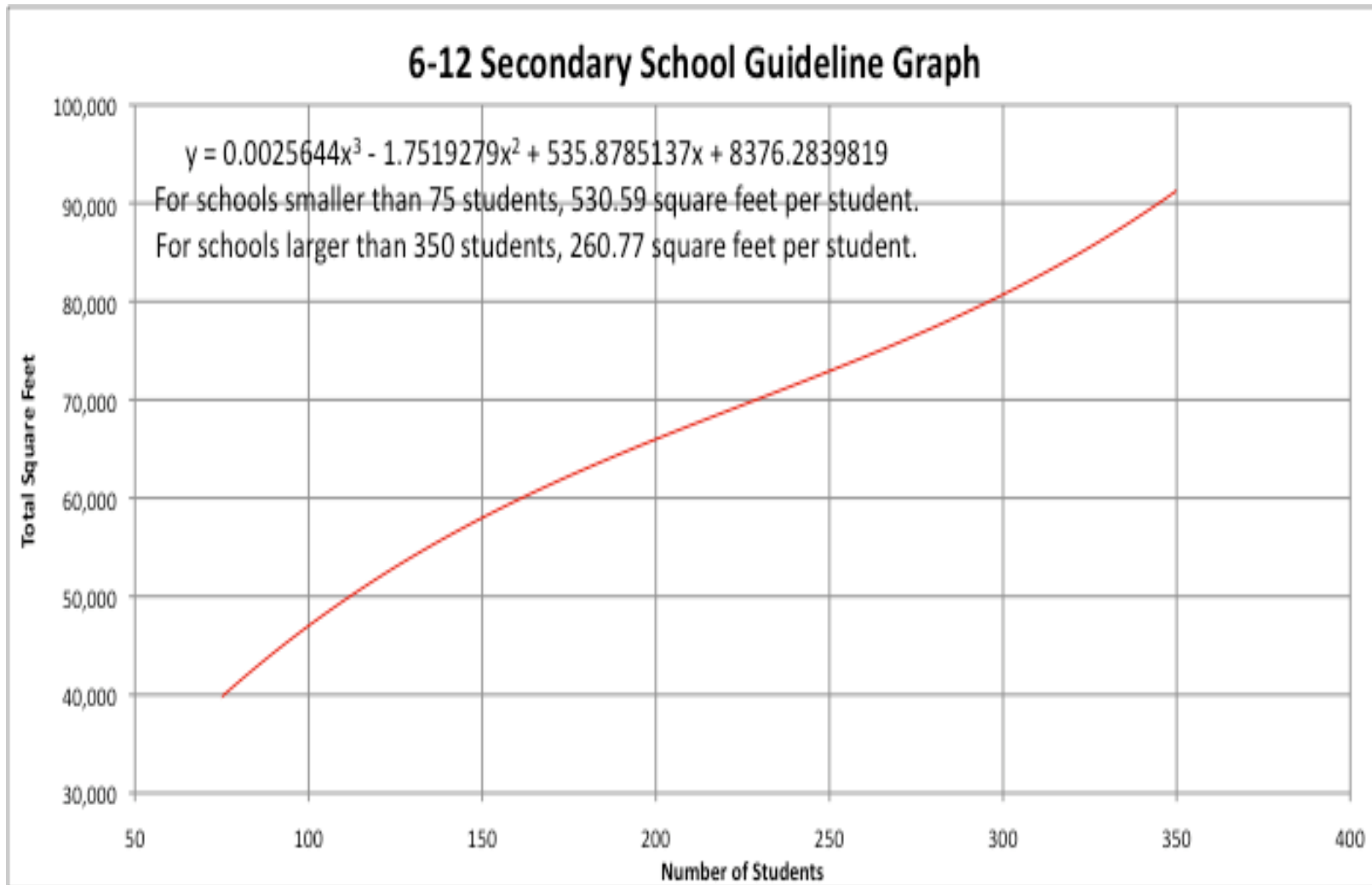


Figure D-6: K-12 School Total Square Footage Guideline Graph

