

# Memo

**To:** Citizens' Facilities Advisory Committee  
**From:** Carolyn Staskiewicz  
**Re:** Cost per Student  
Cost per Square Foot  
Gwinnett County  
**Date:** March 22, 2007  
**cc:** Don Haydon  
Mike Burriss  
Chuck Dulaney  
Johnna Rogers  
Nicole Kreiser  
John Roberson  
Mark Forestieri

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The following memorandum provides further clarification to data presented in the January 31, 2007 Construction Cost Analysis Report and the subsequent Addendum provided on February 13, 2007 as follows:

- **Cost per Student** – Discussion regarding the cost per student data provided to the Citizens' Facilities Advisory Committee in the Addendum on February 13<sup>th</sup>.
- **Square Foot per Student** – Provides data regarding the square foot per student for the schools included in the cost analysis portion of the study.
- **Prior Addendum** - Corrects data previously reported as building cost per square foot that should had been reported as total project cost per square foot.
- **Gwinnett County** – Discussion regarding the general differences between Gwinnett County's data and the other districts and how those differences affect the cost numbers.

## Cost Per Student

The cost per student data provided to the CFAC committee on February 13, 2007 was determined simply by dividing the original total building cost by the design capacity of each project within the study. For the purposes of the Construction Cost Analysis, the capacity number as reported by each district for each facility was utilized. There was no further analysis of the development of this number or subsequent validation by counting classrooms and teaching stations of each project.

School districts may use a variety of formulas to determine capacity. For example, one elementary school can generate different capacity numbers. Design capacity is usually determined by counting the number of general classrooms and multiplying by an average class size regardless of program. Often, a building may be designed before the final program is determined and this is the simplest formula for planning and design purposes. However, it is possible that some of the districts calculated the functional capacity, which takes into account programmatic implications of school facilities such as art, science, and music spaces, and reported this number as the design capacity for the schools included in the cost analysis portion of the study.

$$\begin{array}{rcl} & \# \text{ of Classrooms} & \\ & \times \text{ Avg. \# of students/classroom} & \\ \hline & = \text{Design Capacity} & \end{array} \qquad \begin{array}{rcl} & \# \text{ of Classrooms} & \\ & \times \text{ Avg. \# of students/classroom} & \\ & + \text{ Program Implications} & \\ \hline & = \text{Functional Capacity} & \end{array}$$

In addition, class size can significantly alter the design or functional capacity number. If the average class size of 22 is utilized for a K-5 elementary school with 40 teaching spaces, the capacity would equal 880 students.

$$\begin{array}{r} 40 \text{ teaching spaces} \\ \times 22 \text{ avg. students/classroom} \\ \hline = 880 \text{ student capacity} \end{array}$$

In Wake County, as in most districts, grade levels and special education programs maintain differing class sizes. If the same elementary in this example is utilized, the capacity formula might look like the following.

$$\begin{array}{r} \text{Grades K-3} = 20 \text{ teaching stations} \times 21 \text{ students} = 420 \\ \text{Grade 4-5} = 10 \text{ teaching stations} \times 24 \text{ students} = 240 \\ \hline \text{Special Education} = 10 \text{ teaching stations} \times 9 \text{ students} = 90 \\ \hline = 750 \text{ student capacity} \end{array}$$

Thus, an elementary school with the same number of teaching spaces could generate two different numbers reported as the design capacity.

Furthermore, at the high school level, capacity can be determined by multiplying the number of teaching stations [not necessarily one per classroom] by an average classroom size, and applying a utilization factor, often 85-90%, to recognize that high school class sizes vary significantly especially for the specialty classes such as band or career technology. Districts apply different utilization factors, which create different capacities for schools with similar teaching spaces. Program capacity for the same building can change from year to year based upon the type of programs implemented in that particular school for that particular year. For example, the location of a special education classroom can reduce the capacity of building as those programs usually house a smaller number of students due to their special needs. Actual capacity of a building could reflect the use of nonstandard teaching spaces such as conference rooms and storage centers to house students even though these spaces were not designed as a teaching space to deliver academic instruction.

The following factors may cause capacity numbers to change on an annual basis.

- Class Size Reduction – by districts and legislators
- Art/Music Classrooms
- Computer Labs
- Full-Day Kindergarten
- Special Education
- Pre-School Programs
- At-Risk Students

Finally, capacity and subsequently cost/student, is a result of both program and efficient use of space. Programmatically, policy decisions such as separate art rooms at the elementary level instead of art delivered on a cart would increase the square footage of an elementary school. On the other hand, it could be more efficient to share one room for art and music. While one room could be utilized more efficiently, the program and schedule would have to allow for this to happen. It wouldn't work if school policy required elementary students to take both art and music three days per week.

Another example of both program and efficiency determining square footage is class size. Fifty years ago a typical first grade class size was 30 students per teacher in a single, general classroom usually between 800-900 square feet. Research and educational pedagogies have indicated that students learn and achieve more with a lower student per teacher ratio. If class sizes at the elementary level are closer to 22 students, would it not be more efficient to construct smaller classrooms

perhaps at 600-700 square feet? Again, program is a determining factor as instruction methodologies today include multi-media components and active/exploratory learning.

**While DeJONG obtained the stated design capacity as reported by the schools included in the cost analysis portion of the study, we did not obtain the methodology by which different school districts in the study calculated that design capacity.**

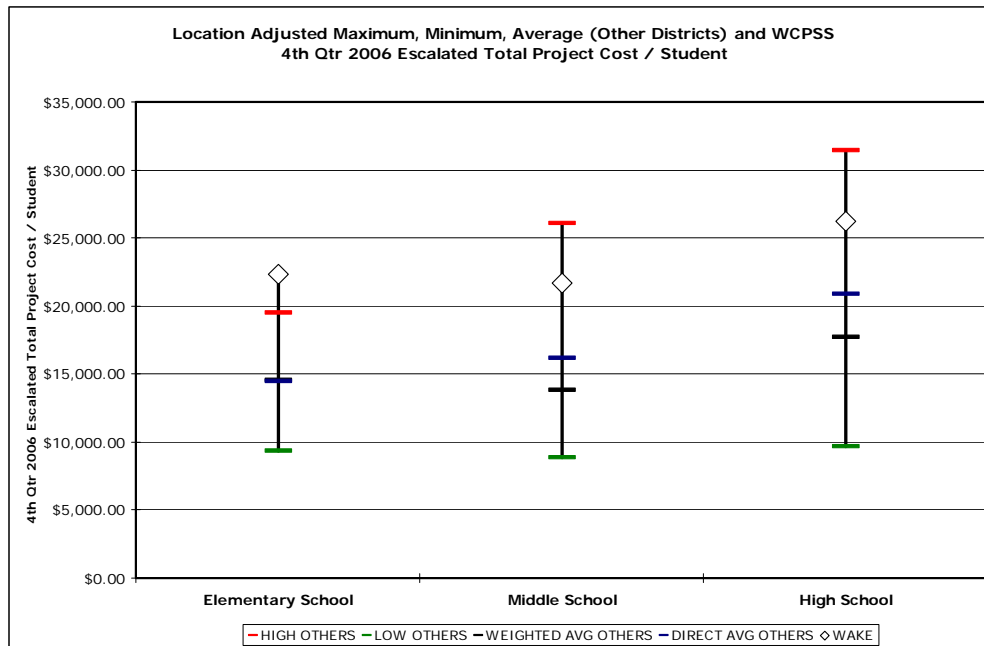
The following charts illustrate the total project cost/student as a result of the Construction Cost Analysis. Please note these charts have been updated to reflect new square footages and costs as a result of subtracting the appropriate numbers for the community centers built jointly with WCPSS and the respective municipality or organization. While the adjustments have been made and reflect a significant difference in cost per student, WCPSS remains higher than both the weighted and direct average for all school levels. Again, please note that the design capacity reported by each district is a major factor in this equation.

**Total Project Cost per Student**  
**ESCALATED AND LOCATION ADJUSTED NUMBERS**

| District                             | Elementary School | Middle School | High School  |
|--------------------------------------|-------------------|---------------|--------------|
| Charlotte/Mecklenburg Schools        | \$ 15,288.27      | \$ 17,205.67  | \$ 25,548.25 |
| Clark County School District         | \$ 16,125.29      | \$ 12,551.62  | \$ 15,756.27 |
| Fairfax County Public Schools        | \$ 13,273.14      | not reported  | not reported |
| Guilford County Schools              | \$ 19,514.29      | \$ 26,104.83  | \$ 31,400.55 |
| Gwinnett County Public Schools       | \$ 9,338.39       | \$ 8,890.02   | \$ 9,685.88  |
| Orange County Public Schools         | \$ 14,011.84      | \$ 17,575.67  | \$ 17,805.73 |
| Wake County Public Schools           | \$ 22,326.38      | \$ 21,655.25  | \$ 26,265.41 |
| Winston-Salem/Forsyth County Schools | \$ 13,389.23      | \$ 14,441.00  | \$ 25,145.43 |
| HIGH OTHERS                          | \$ 19,514.29      | \$ 26,104.83  | \$ 31,400.55 |
| LOW OTHERS                           | \$ 9,338.39       | \$ 8,890.02   | \$ 9,685.88  |
| WEIGHTED AVG OTHERS                  | \$ 14,544.04      | \$ 13,783.36  | \$ 17,717.66 |
| DIRECT AVG OTHERS                    | \$ 14,420.07      | \$ 16,128.13  | \$ 20,890.35 |
| WAKE                                 | \$ 22,326.38      | \$ 21,655.25  | \$ 26,265.41 |

WCPSS Old Data  
WCPSS New Data

|              |
|--------------|
| \$ 25,944.99 |
| \$ 22,326.38 |



**Square Footage Per Student**

At the February 13, 2007 CFAC meeting, committee members requested square footage per student for the schools included in the cost analysis portion of the report. The following tables illustrate and compare the respective districts' latest planning assumptions for capacity and square footage with the reported design capacities and square footages for the projects included in the Construction Cost Analysis. As noted in the Construction Cost Analysis report, the WCPSS planned capacities reflect the large models as stated in the Capital Planning Assumptions Addendum. Wake County schools included in the cost analysis portion of the report reflect schools built between 2001 and 2006. The design capacity of these schools is typically lower than the planned capacities for future schools as stated in the Capital Assumptions Addendum. This difference is reflected in the planned and designed comparison below. On average, most districts constructed smaller schools at all levels than planned; however at the elementary level, there was an additional 2 square feet allocated per student.

| ELEMENTARY                    | Wake    |         | Guilford |        | Mecklenburg |        | Forsyth |        | Orange  |        | Clark   |        | Gwinnett |         | Fairfax |        | Direct Average Excluding WCPSS |        |
|-------------------------------|---------|---------|----------|--------|-------------|--------|---------|--------|---------|--------|---------|--------|----------|---------|---------|--------|--------------------------------|--------|
|                               | Planned | Design  | Planned  | Design | Planned     | Design | Planned | Design | Planned | Design | Planned | Design | Planned  | Design  | Planned | Design | Planned                        | Design |
| Capacity                      | 800     | 738     | 720      | 720    | 800         | 800    | 800     | 685    | 860     | 974    | 720     | 718    | 1,102    | 1,073   | 1,100   | 950    | 872                            | 846    |
| Gross Square Footage          | 104,039 | 102,064 | 85,000   | 95,800 | 92,000      | 88,324 | 80,000  | 74,557 | 97,143  | 95,273 | 62,568  | 64,223 | 135,000  | 125,200 | 98,000  | 98,479 | 92,816                         | 91,694 |
| Gross Square Foot Per Student | 130     | 138     | 118      | 133    | 115         | 110    | 100     | 109    | 113     | 98     | 87      | 89     | 123      | 117     | 89      | 104    | 106                            | 108    |

| MIDDLE                        | Wake    |         | Guilford |         | Mecklenburg |         | Forsyth |         | Orange  |         | Clark   |         | Gwinnett |         | Fairfax |              | Direct Average Excluding WCPSS |         |
|-------------------------------|---------|---------|----------|---------|-------------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|--------------|--------------------------------|---------|
|                               | Planned | Design  | Planned  | Design  | Planned     | Design  | Planned | Design  | Planned | Design  | Planned | Design  | Planned  | Design  | Planned | Design       | Planned                        | Design  |
| Capacity                      | 1,311   | 929     | 878      | 878     | 1,200       | 1,200   | 760     | 750     | 1,354   | 1,571   | 1,750   | 1,700   | 1,500    | 1,650   | 1,500   | not reported | 1,277                          | 1,292   |
| Gross Square Footage          | 199,246 | 155,984 | 142,000  | 143,166 | 145,000     | 150,321 | 100,000 | 100,320 | 171,654 | 158,727 | 149,897 | 148,569 | 200,000  | 197,949 | 176,000 | not reported | 154,936                        | 149,842 |
| Gross Square Foot Per Student | 152     | 168     | 162      | 163     | 121         | 125     | 132     | 134     | 127     | 101     | 86      | 87      | 133      | 120     | 117     | not reported | 125                            | 116     |

| HIGH                          | Wake    |         | Guilford |         | Mecklenburg* |         | Forsyth |         | Orange  |         | Clark   |         | Gwinnett |         | Fairfax |              | Direct Average Excluding WCPSS |         |
|-------------------------------|---------|---------|----------|---------|--------------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|--------------|--------------------------------|---------|
|                               | Planned | Design  | Planned  | Design  | Planned      | Design  | Planned | Design  | Planned | Design  | Planned | Design  | Planned  | Design  | Planned | Design       | Planned                        | Design  |
| Capacity                      | 2,223   | 1,663   | 1,200    | 1,600   | 2,000        | 2,000   | 1,000   | 1,000   | 2,809   | 3,029   | 2,700   | 2,700   | 3,000    | 3,300   | 2,800   | not reported | 2,216                          | 2,272   |
| Gross Square Footage          | 328,774 | 269,745 | 270,000  | 304,878 | 320,000      | 299,000 | 200,000 | 196,500 | 383,602 | 349,510 | 275,119 | 288,920 | 416,000  | 416,000 | 375,000 | not reported | 319,960                        | 309,135 |
| Gross Square Foot Per Student | 148     | 162     | 225      | 191     | 160          | 150     | 200     | 197     | 137     | 115     | 102     | 107     | 139      | 126     | 134     | not reported | 157                            | 136     |

\* Note: Mecklenburg County is currently developing a new high school program. This data has been estimated based upon planning assumptions reported by the District.

### **Prior Addendum & Building Cost Per Square Foot**

On page 66 of the Construction Cost Analysis, the graph entitled Building Cost per Square Foot was actually the Total Project Cost per Square Foot. While the charts were revised in the Addendum – February 13, 2007 to show a weighted and a direct average, it was not clearly communicated that the charts on page 66 of the actual report were mislabeled. This error has caused understandable confusion. Added to the confusion is the necessary adjustment for the WCPSS community center square footage and costs. Subsequently, the charts and graphs on the following pages have been updated to reflect both issues. Ultimately, DeJong will reissue the full report with the correct text in the Summary & Conclusion. The reissued report may also address differences in the data concerning Gwinnet County as described below; this decision is contingent upon further direction from the CFAC.

### **Gwinnett County**

Gwinnett County's building costs per square foot are notably lower than that of the seven other districts and consequently equate to a lower direct average for comparison purposes. Observations have been noted within the individual CSI Division sections of the Construction Cost Analysis explaining and through discussions several of the major differences and include the following.

- Division 11 – Equipment: Gwinnett's Division 11 percentage of overall cost and Division 11 cost/sf are both approximately 25% of the other districts, indicative of the owner furnished kitchen equipment provided by Gwinnett.
- Division 15 – Mechanical: Water-source heat pump system; generally comprised of space specific heat pumps looped to a cooling tower [evaporative cooling] or boiler, depending on the season. The size of the heat pumps generally ranges from .5 tons to 25 tons. This system is employed by Gwinnett County due to their fairly constant yearly environmental temperature/humidity range.
- While not specifically identified in the report, but described at prior meetings with the CFAC, Gwinnett County's construction contracts do not include other items such as furnishings.

Every district included in the study provides and accounts for school facilities in a different way. Based on concerns for equitable comparisons expressed by the CFAC, direct averages have been re-calculated excluding Gwinnett County from the direct averages. As a result of this exercise, the gap between WCPSS costs and direct average costs are certainly closer. WCPSS remained the same in terms of higher or lower than the direct average in all cases with one exception. When Gwinnett County was omitted from the direct averages of Building Only Cost per Square Foot, WCPSS dropped below the new average at the Middle School Level. The subsequent pages include tables, bar graphs, and max./min. charts illustrating the following calculations escalated for time and adjusted for location, by district as follows:

- √ Total Project Cost per Square Foot
- √ Building Only Cost per Square Foot
- √ Site Cost per Square Foot
- √ Total Project Cost per Student

## Total Project Cost per Square Foot

In terms of total project cost per square foot, regardless of whether Gwinnett County data is included, WCPSS is higher than the direct average at the Elementary and High School level, and lower than the direct average at the Middle School level.

### Total Project Cost per Square Foot ESCALATED AND LOCATION ADJUSTED NUMBERS

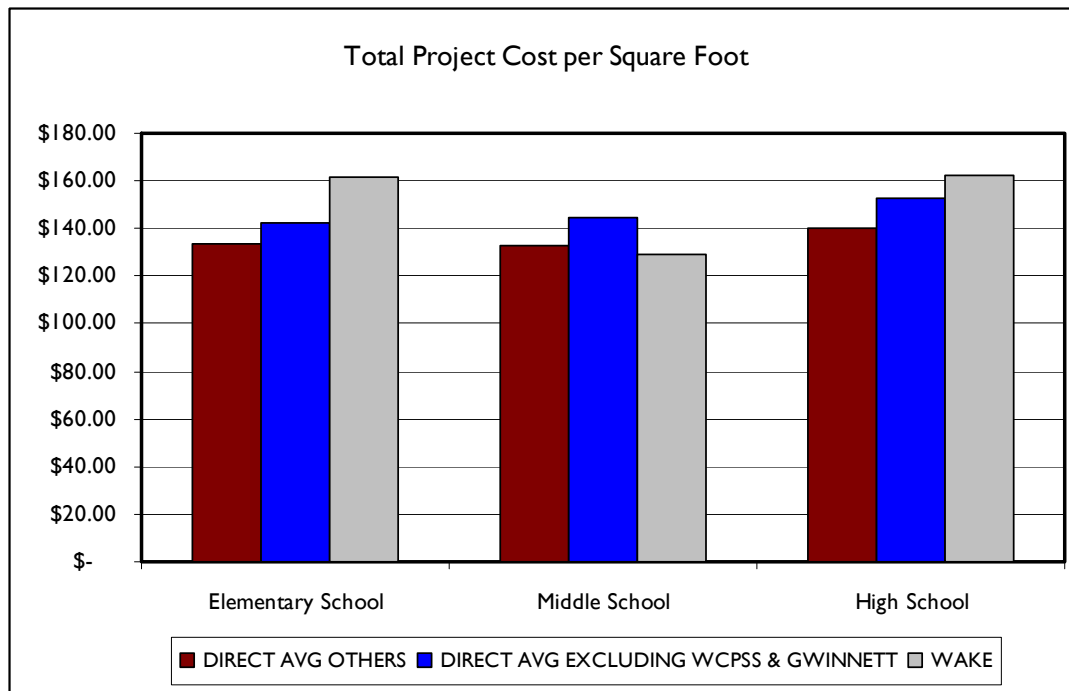
| District                             | Elementary School | Middle School | High School  |
|--------------------------------------|-------------------|---------------|--------------|
| Charlotte/Mecklenburg Schools        | \$ 134.19         | \$ 137.35     | \$ 170.89    |
| Clark County School District         | \$ 180.23         | \$ 143.62     | \$ 147.24    |
| Guilford County Schools              | \$ 146.66         | \$ 160.09     | \$ 164.79    |
| Gwinnett County Public Schools       | \$ 80.00          | \$ 74.10      | \$ 76.84     |
| Orange County Public Schools         | \$ 143.31         | \$ 173.95     | \$ 154.31    |
| Wake County Public Schools           | \$ 161.33         | \$ 128.97     | \$ 161.93    |
| Winston-Salem/Forsyth County Schools | \$ 123.01         | \$ 107.96     | \$ 127.97    |
| Fairfax County Public Schools        | \$ 128.04         | not reported  | not reported |

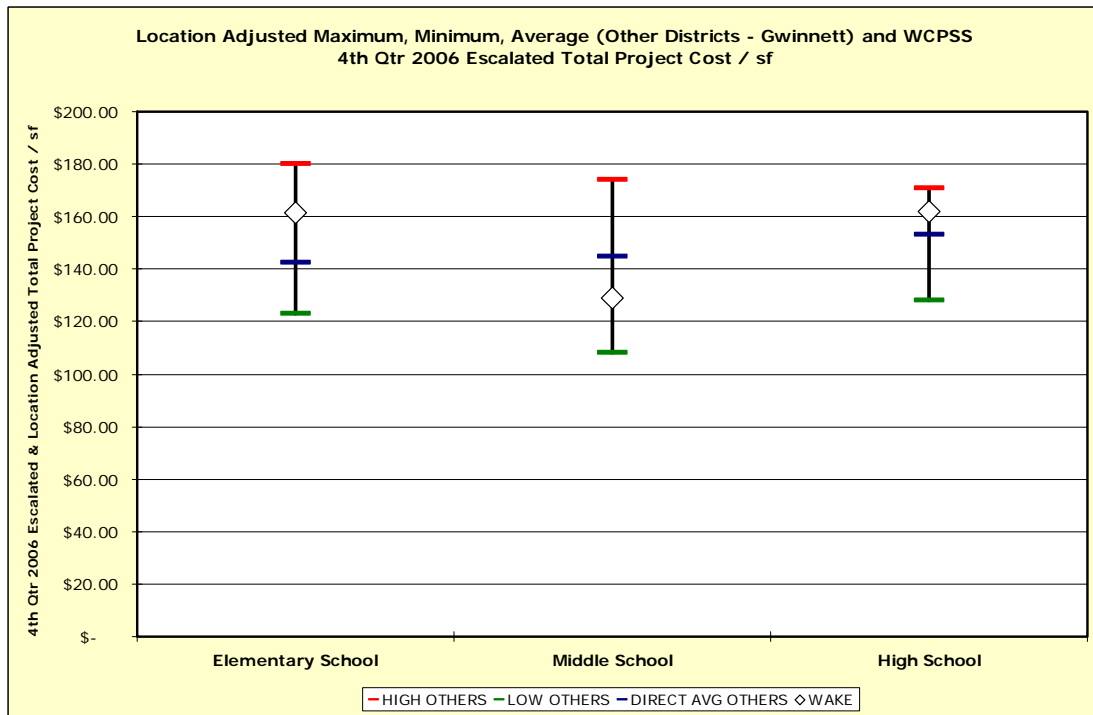
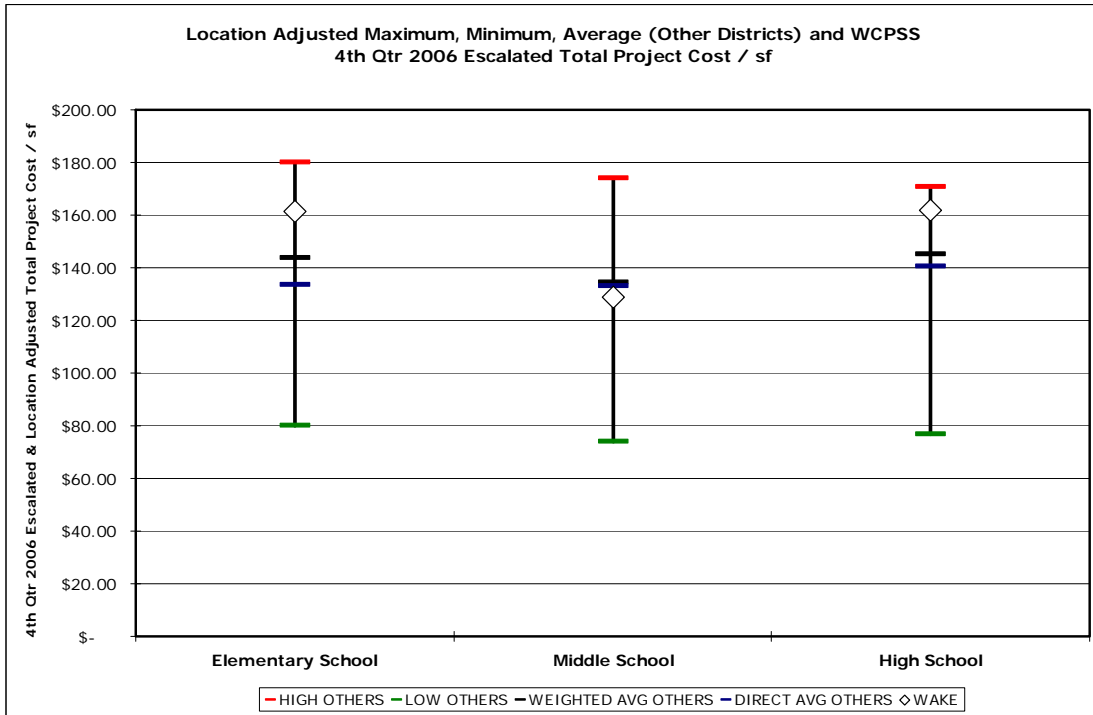
|                                       |           |           |           |
|---------------------------------------|-----------|-----------|-----------|
| HIGH OTHERS                           | \$ 180.23 | \$ 173.95 | \$ 170.89 |
| LOW OTHERS                            | \$ 80.00  | \$ 74.10  | \$ 76.84  |
| WEIGHTED AVG OTHERS                   | \$ 143.67 | \$ 134.20 | \$ 145.28 |
| DIRECT AVG OTHERS                     | \$ 133.64 | \$ 132.85 | \$ 140.34 |
| DIRECT AVG EXCLUDING WCPSS & GWINNETT | \$ 142.57 | \$ 144.60 | \$ 153.04 |
| WAKE                                  | \$ 161.33 | \$ 128.97 | \$ 161.93 |

WCPSS Old Data \$ 163.31

WCPSS New Data **\$ 161.33**

LOW excluding GWINNETT \$ 123.01 \$ 107.96 \$ 127.97





## Building Cost per Square Foot

WCPSS is higher than the direct average at the Elementary, Middle and High School levels when comparing the direct average of the other districts. When Gwinnett County is omitted, WCPSS is lower than the direct average at the Middle School level.

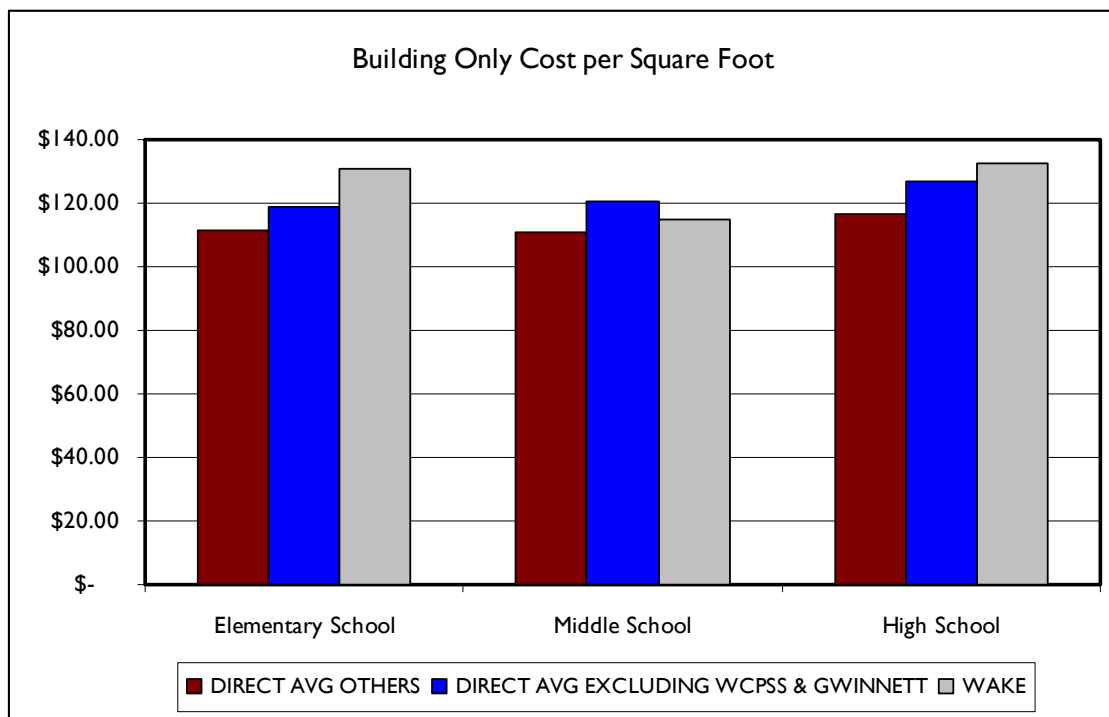
### Building Only Cost per Square Foot ESCALATED AND LOCATION ADJUSTED NUMBERS

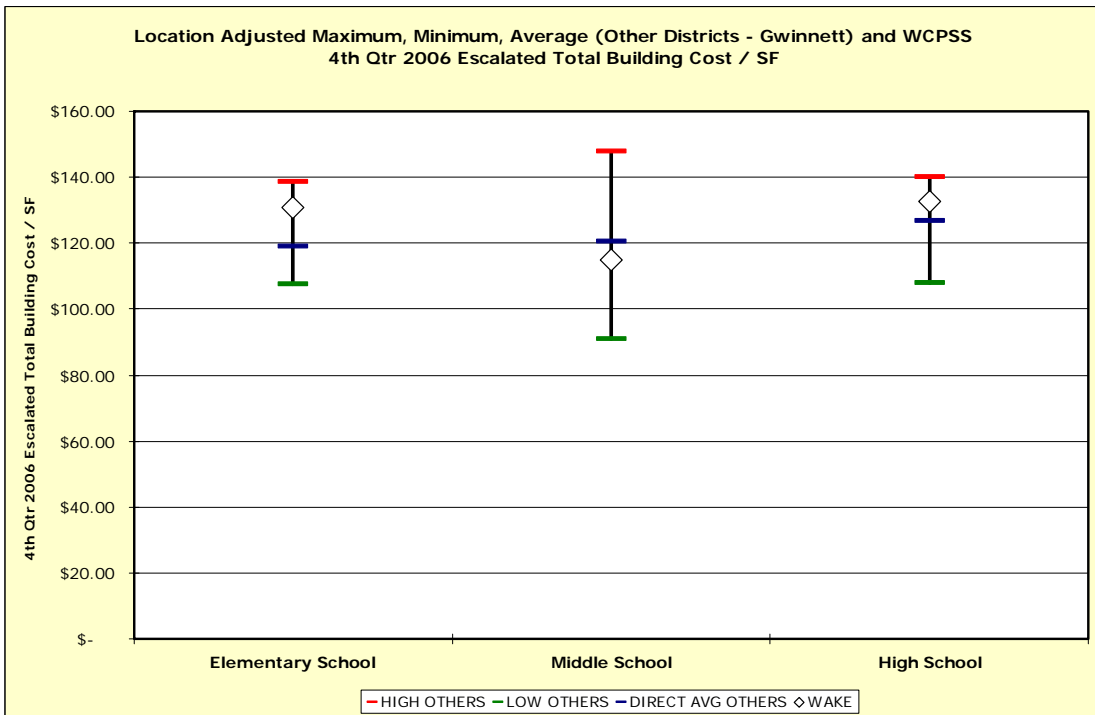
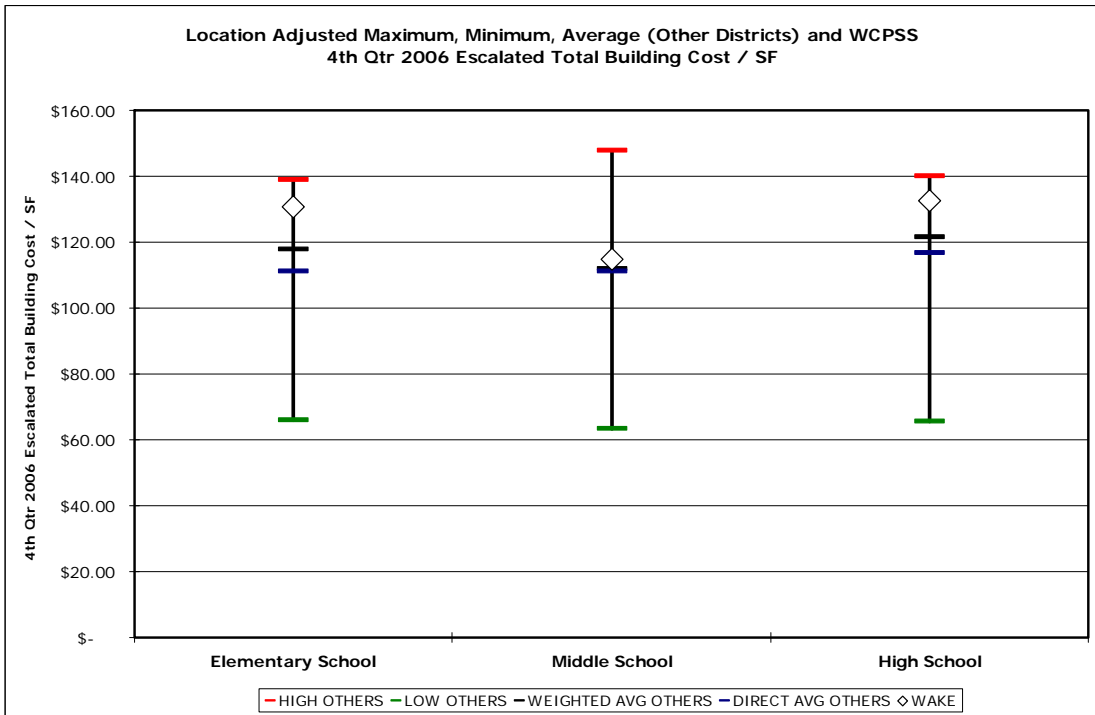
| District                             | Elementary School | Middle School | High School  |
|--------------------------------------|-------------------|---------------|--------------|
| Charlotte/Mecklenburg Schools        | \$ 115.55         | \$ 118.88     | \$ 139.92    |
| Clark County School District         | \$ 138.75         | \$ 116.32     | \$ 122.46    |
| Fairfax County Public Schools        | \$ 107.45         | not reported  | not reported |
| Guilford County Schools              | \$ 119.17         | \$ 128.38     | \$ 130.72    |
| Gwinnett County Public Schools       | \$ 65.87          | \$ 63.47      | \$ 65.45     |
| Orange County Public Schools         | \$ 121.69         | \$ 147.80     | \$ 133.37    |
| Wake County Public Schools           | \$ 130.90         | \$ 114.97     | \$ 132.69    |
| Winston-Salem/Forsyth County Schools | \$ 110.29         | \$ 91.00      | \$ 108.06    |

|                                       |           |           |           |
|---------------------------------------|-----------|-----------|-----------|
| HIGH OTHERS                           | \$ 138.75 | \$ 147.80 | \$ 139.92 |
| LOW OTHERS                            | \$ 65.87  | \$ 63.47  | \$ 65.45  |
| WEIGHTED AVG OTHERS                   | \$ 117.76 | \$ 111.96 | \$ 121.48 |
| DIRECT AVG OTHERS                     | \$ 111.25 | \$ 110.98 | \$ 116.66 |
| DIRECT AVG EXCLUDING WCPSS & GWINNETT | \$ 118.82 | \$ 120.48 | \$ 126.90 |
| WAKE                                  | \$ 130.90 | \$ 114.97 | \$ 132.69 |

WCPSS Old Data \$ 132.55  
 WCPSS New Data \$ 130.90

LOW excluding GWINNETT \$ 107.45 \$ 91.00 \$ 108.06





## Site Cost per Square Foot

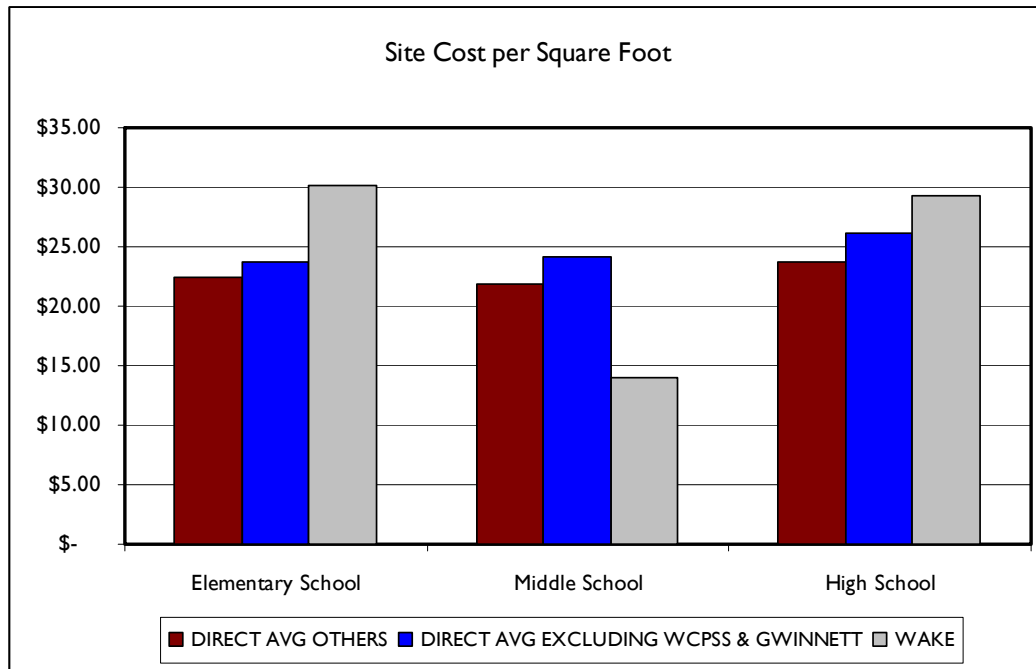
In terms of site cost per square foot, regardless of whether Gwinnett County data is included, WCPSS is higher than the direct average at the Elementary and High School level, and lower than the direct average at the Middle School level.

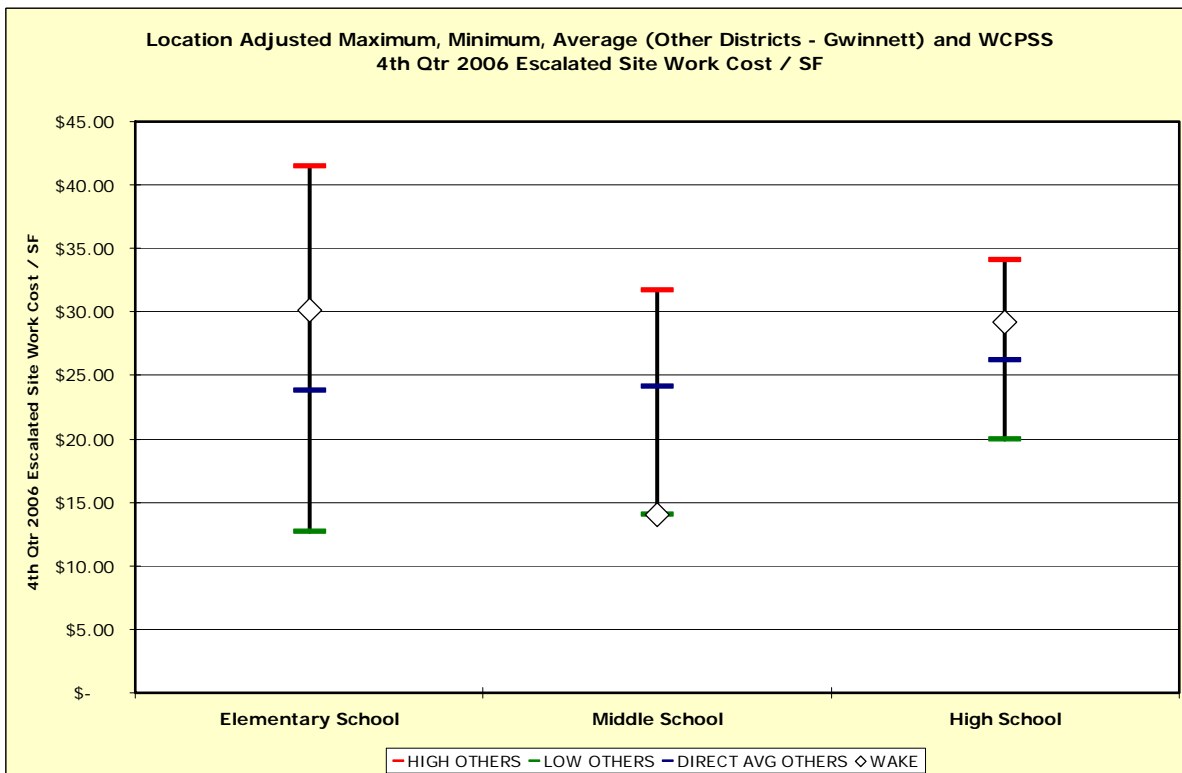
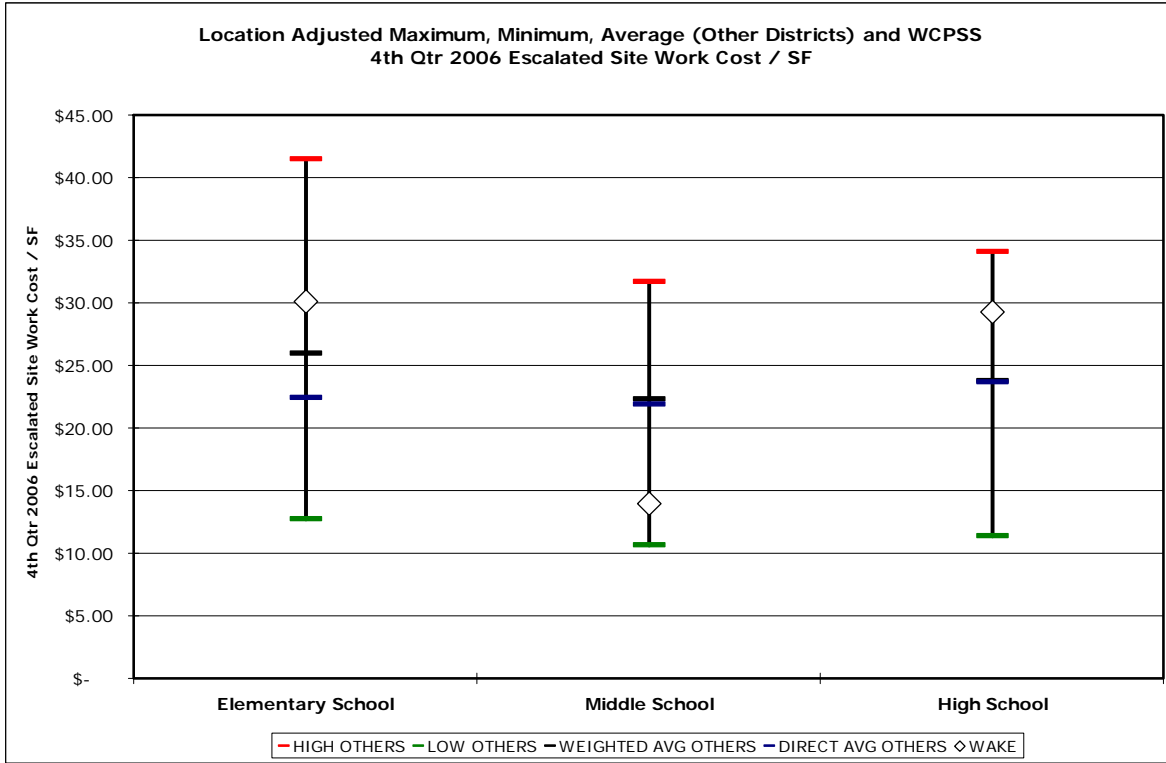
### Site Cost per Square Foot ESCALATED AND LOCATION ADJUSTED NUMBERS

| District                              | Elementary School | Middle School | High School  |
|---------------------------------------|-------------------|---------------|--------------|
| Charlotte/Mecklenburg Schools         | \$ 18.64          | \$ 18.47      | \$ 30.98     |
| Clark County School District          | \$ 41.48          | \$ 27.30      | \$ 24.78     |
| Fairfax County Public Schools         | \$ 20.59          | not reported  | not reported |
| Guilford County Schools               | \$ 27.49          | \$ 31.72      | \$ 34.08     |
| Gwinnett County Public Schools        | \$ 14.13          | \$ 10.63      | \$ 11.38     |
| Orange County Public Schools          | \$ 21.62          | \$ 26.15      | \$ 20.95     |
| Wake County Public Schools            | \$ 30.10          | \$ 14.00      | \$ 29.24     |
| Winston-Salem/Forsyth County Schools  | \$ 12.72          | \$ 16.96      | \$ 19.91     |
| HIGH OTHERS                           | \$ 41.48          | \$ 31.72      | \$ 34.08     |
| LOW OTHERS                            | \$ 12.72          | \$ 10.63      | \$ 11.38     |
| WEIGHTED AVG OTHERS                   | \$ 25.91          | \$ 39.96      | \$ 23.80     |
| DIRECT AVG OTHERS                     | \$ 22.38          | \$ 21.87      | \$ 23.68     |
| DIRECT AVG EXCLUDING WCPSS & GWINNETT | \$ 23.76          | \$ 24.12      | \$ 26.14     |
| WAKE                                  | \$ 30.10          | \$ 14.00      | \$ 29.24     |

WCPSS Old Data \$ 30.76  
 WCPSS New Data \$ 30.10

LOW excluding GWINNETT \$ 12.72 \$ 14.00 \$ 19.91





## Cost per Student

WCPSS spends more than the direct average dollars per student on new facilities at all school levels regardless of whether Gwinnett County is included in the average. It is important to remember that this formula is based on capacity as reported by the participating districts. As discussed previously within in this menu, the way in which capacity is determined can affect amount of dollars per student allotted for total project cost.

### Total Project Cost per Student ESCALATED AND LOCATION ADJUSTED NUMBERS

| District                              | Elementary School | Middle School | High School  |
|---------------------------------------|-------------------|---------------|--------------|
| Charlotte/Mecklenburg Schools         | \$ 15,288.27      | \$ 17,205.67  | \$ 25,548.25 |
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| WAKE                                  | \$ 22,326.38      | \$ 21,655.25  | \$ 26,265.41 |

|                |              |
|----------------|--------------|
| WCPSS Old Data | \$ 25,944.99 |
| WCPSS New Data | \$ 22,326.38 |

|                        |              |              |              |
|------------------------|--------------|--------------|--------------|
| LOW excluding GWINNETT | \$ 13,273.14 | \$ 12,551.62 | \$ 15,756.27 |
|------------------------|--------------|--------------|--------------|

