

Myth and Reality:

A Study of Excess Space in the District
of Columbia Public High Schools

A Case Study of Cardozo and McKinley
Technology Senior High Schools

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Prepared by **21st Century School Fund** and **SHAPPE** (Senior High
Alliance of Parents, Principals, & Educators)

The **21st Century School Fund** is a non-profit organization dedicated to building the public will and capacity to modernize public school facilities so they support quality education and community revitalization.

The **Senior High Alliance of Parents, Principals & Educators (SHAPPE)** is a coalition of parent leaders, principals and educators who are dedicated to continuous improvement of the District's public high schools. They are also committed to ensuring that those actually in the high schools are a part of the decision making to bring about this improvement.

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Introduction

Public Education Facilities Planning

The District of Columbia is in the early years of a ten to fifteen year initiative to either modernize or replace nearly all of its public school buildings. The District of Columbia Public Schools (DCPS) developed a Facility Master Plan, adopted by the District Board of Education on March 7, 2001, that outlines a process for this initiative. Annually, the DCPS prepares a six year capital improvements program that describes the spending plan and priorities of the school district's master plan on a project specific basis. This budget is set by the mayor based on the school systems request, and approved or authorized by the Council and Congress. Once the capital budget is authorized, the District government borrows the funds necessary to carry out the capital improvements program and to meet the spending requirements of the approved capital projects.

The development of the Facility Master Plan was a tremendous step forward for the District. However, an additional planning effort is needed for the high schools. One reason is that the high schools were unevenly spread among the eight regional planning areas utilized in the overall planning process (i.e., some planning areas had one high school, while other areas had multiple high schools). Another reason is that the affect of modernizing, expanding or decreasing enrollment in one high school has a considerable effect on the other high schools. This is made more pronounced since high school students are able to travel to attend a wide selection of high schools. A third reason is that career technical education, special education, athletics and specialty magnet programs need to be coordinated and planned so there is an equitable and efficient distribution of these opportunities.

Need for Better Understanding of High School Buildings

In support of the high school planning process, the 21st Century School Fund (21CSF) and the Senior High Alliance of Parents, Principals, and Educators (SHAPPE) jointly undertook: (1) an in-depth floor space analysis of Cardozo Senior High School, the first on the list of thirteen District high schools that have yet to begin renovation; and (2) a review of design plans for a modernized McKinley Tech High School, the first high school for which renovation work has begun. Cardozo is located at 1300 Clifton St., NW, and in 2001-2002 it has an enrollment of 780 students. McKinley is located at 2nd and T Streets, NE, and was closed in 1997. Before closing, it had an enrollment of 859 students.

There are four compelling reasons 21CSF and SHAPPE undertook this study.

A belief that a DCPS estimate of the quantity of excess floor space in the high schools may be incorrect.

An immediate need to accurately assess the quantity of excess floor space that is available for swing space, special education programs, charter schools, and community use.

A belief that the DCPS enrollment capacity assignments, and estimates of capacity utilization, for the high schools may be incorrect.

A concern that strict adherence to a DCPS floor space standard and guidelines will make the cost of modernization beyond the reach of the District, and result in major interior demolition at an extremely high cost.

With this study, 21CSF and SHAPPE hope to prompt DCPS to: (1) develop accurate measurements of useable (a.k.a. *net*) floor space (which includes classrooms, offices, storage, instructional support and physical education, assembly and cafeteria areas) for all schools, beginning with the high schools; (2) do a quality check on the quantity of total *gross*¹ floor space

¹ *Gross* floor space encompasses all of the roofed interior spaces within a school building, and is measured from the exterior face of outer walls. It is the *net* floor space plus the floor space for mechanical and electrical rooms, maintenance rooms, pipe tunnels, hallways, passages, elevators, stairwells, and toilets.

of existing schools, beginning with the high schools; (3) revise existing Standard Education Specifications and a floor space design standard to be flexible enough to accommodate the modernization of the District’s old and historic schools, beginning with the high schools; and (4) develop a plan to assist the high schools use their space more efficiently.

Background

High School Inventory

There are 18 high schools within DCPS. These schools are listed in chronological order in Table I, along with the year they were built, their age, and whether they are to be modernized or replaced.

Table I: Year Built, Age, and Proposed Action for District High Schools

School	Year Built	Age	Proposed Action
School Without Walls	1882	120	Modernize
Luke Moore	1891	111	Modernize
Ellington	1898	104	Modernize
Bell	1910	92	Replace
MM Washington	1912	90	Modernize
Cardozo	1916	86	Modernize
Eastern	1923	79	Modernize
McKinley Tech	1928	74	Modernize
Roosevelt	1932	70	Modernize
Phelps	1934	68	Modernize
Anacostia	1935	67	Replace
Wilson	1935	67	Modernize
Banneker	1939	63	Modernize
Coolidge	1940	62	Modernize
Spingarn	1941	61	Modernize
Ballou	1960	42	Modernize
Woodson	1973	29	Replace
Dunbar	1977	24	Modernize
Average Age		73	

The average age of the 18 high schools is 73 years. According to The 21st Century School Fund's Format Pro² database, these high schools have the following building and enrollment statistics:

- there is 3,868,811 *gross* square feet (GSF) of floor space in all of the high schools combined
- the total enrollment capacity is 18,381 students
- the total enrollment in the 2000-2001 school year was 12,829 students, or 70% capacity utilization

High School Space Requirements

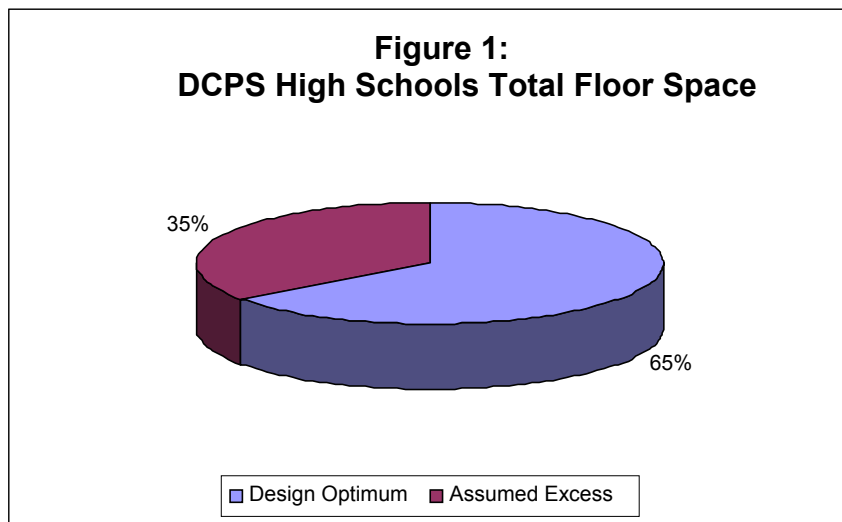
In December 1999, DCPS released Standard Education Specifications for the District's high schools. Education specifications (ed specs) are architectural guidelines for a school building, including floor space and student capacity requirements, which have been distilled from information about planned educational and operational activities of the school. Site-specific ed specs, based upon the standard ones, are developed for each school renovation.

As part of the Facility Master Plan, DCPS then set a *gross* floor space design standard for the high schools of 180 GSF per student (GSF/S). In the Capital Improvements Program of 2001, this value was changed to 192 GSF/S, due to significant challenges in trying to program existing high schools with large cafeterias, auditoriums, and other specialty spaces. The large size of these spaces has the effect of making the high schools appear oversized, on a GSF/S basis.

Using the revised floor space design standard, and multiplying it by the total high school enrollment of 12,842 students, results in an optimum *gross* floor space for all of the high schools combined of 2,465,664 GSF. A comparison of the optimum *gross* floor space of 2,465,664 GSF to the total existing *gross* floor space of 3,789,900 GSF in DCPS records leads to the estimate that has

² "Facilities, Operations Resource, Management Analysis, Tool (Format Pro)." A facilities database managed by The

been drawn by DCPS that there is 1,324,236 GSF of excess *gross* floor space in all of the high schools. In other words, DCPS estimates that the total *gross* floor space of the existing high schools is underutilized by 35%, as seen in Figure 1, even after increasing the floor space design standard.



Scope and Findings

Details of Study at Cardozo and McKinley

This study examined the validity of the DCPS estimate that 35% of its total *gross* floor space is excess, and the suitability of the current floor space design standard, by comparing the *gross* floor spaces of both the existing Cardozo building and the old McKinley building to DCPS records. Cardozo has a recorded *gross* floor space of 355,400 GSF, and McKinley had a recorded *gross* floor space of 282,200 GSF prior to renovation. In the study, an alternative *gross* floor space value was calculated for Cardozo, while an alternative value for the old McKinley was obtained from a modernization design report. Comparison of these alternate values to the ones in DCPS

records provides an indication of the accuracy level of the DCPS value for total *gross* floor space in all of the high schools.

The study also examined the suitability of the DCPS ed specs for the modernization or replacement of the high schools, by determining the existing *net* floor space at Cardozo and comparing it to the proposed *net* floor space provided in the standard ed specs for an 800 Student Model school. A review of the modernization design work at McKinley provided a comparison between *net* floor space in the same standard ed specs, in site-specific ed specs developed for the modernization, and in the architectural design developed for the modernization.

The study also looked at the DCPS capacity number for Cardozo and compared it to the standard ed specs capacity assignments. Finally, a comparison was made between the existing site facilities at Cardozo and the site facilities provided for in the standard ed specs for an 800 Student Model school.

Findings for Cardozo and McKinley

The results from the in-depth study of Cardozo indicate:

- The calculated *gross* floor space is 290,672 GSF, which is 18% less than the value of 355,400 GSF recorded by DCPS. The DCPS value seems to include some floor space as *gross* that it shouldn't, including uncovered interior courtyards and nonexistent floor space in the upper levels of the auditorium and gymnasiums.
- The measured existing *net* floor space is 145,310 NSF, which is 50% more than the value of 96,590 NSF in the standard ed specs for an 800 Student Model school. Some of the existing spaces in Cardozo are either not included or undersized in the ed specs, including labs, shops, and the armory, rifle range, pool, auditorium, and cafeteria.
- Labs, shops, and the armory, rifle range, pool, auditorium, and cafeteria spaces account for 72% of the difference between the *net* floor space in Cardozo and in the standard ed specs.

Cardozo Auditorium



- The sum of the floor spaces for maintenance rooms (custodial offices and closets), utility rooms (mechanical/electrical rooms, pipe tunnels, and toilets), and building support spaces (hallways, stairwells, passages, elevators, and walls) is 145,362 SF, which is 50% of the total *gross* floor space.

Cardozo Hallway



- The student capacity of the existing building, using ed specs teaching stations, is 1,335, which is 15% less than 1,578 recorded by DCPS. Based on capacity, the standard ed specs provides for 118 NSF per student (96,590 NSF with 820 students), compared to 109 NSF per student (145,310 NSF with 1,335 students) in the existing building.
- The school does not have most of the site facilities that are provided for in the standard ed specs. The only standard ed specs facilities that the school does have are a multipurpose grassy play field, a track, bleacher seating, and tennis courts.

Cars Parked at Cardozo



The results from the review of the modernization work at McKinley indicate:

- The architects designing the modernized McKinley recorded the *gross* floor space of the old building as 300,000 GSF, which is 6% more than the value of 280,200 GSF recorded by DCPS.
- The total *net* floor space after modernization is designed to be 129,074 NSF, which is 18,879 NSF (or 17%) more than the value of 110,195 NSF in the site-specific ed specs, and 32,484 NSF (or 34%) more than the value of 96,590 NSF in the standard ed specs.
- The library, auditorium, gym, and cafeteria account for 95% of the difference in total modernized *net* floor space between the architectural design and the site-specific ed specs.

Methodology

Determination of Gross Floor Spaces

The calculation of the existing gross floor space at Cardozo was performed using measurements from DCPS architectural drawings (i.e., floor plans) of the school. The drawings are scaled, with dimensions, and a basic ruler was used to measure floor lengths and widths in feet. Gross floor space was determined for each floor of the building (and then added together) by calculating the total area within the exterior walls of the building for that floor, and then subtracting the areas for which either no actual floor exists or there is no roof overhead. For example, determination of the gross floor space of the ground floor involved calculating the total area within the exterior walls, and then subtracting the areas of the two courtyards (for which there is no roof). Simple floor diagrams of the layouts at Cardozo and the old McKinley, accompanied by charts listing room usage, are included in Appendix A.

The determination of the gross floor space for the old McKinley design was achieved by obtaining data from a modernization design report prepared by the project architects.³ No actual measurements were performed at McKinley in this study. The design report provides a value for the old gross floor space at McKinley prior to modernization.

Determination of Net Floor Spaces

The determination of the modernized *net* floor space at McKinley was also achieved by obtaining data from the modernization design report. The report provides modernized *net* floor spaces from site-specific ed specs developed for the modernization, and from the modernized design developed by the architects. A summary of these new *net* floor spaces, by functional room categories, is provided in Table II.

³ “Design Analysis: The Technical High School at McKinley,” Volume 1, McKissack & McKissack, Jan. 21, 2002.

Table II: Comparison between Standard Ed Specs, Site-Specific Ed Specs, and the Architectural Design of *Net* Floor Spaces at a Modernized McKinley

Room Category	Modernized <i>Net</i> Floor Space (ft ²)		
	Standard Ed Specs	Site-Specific Ed Specs	Architectural Design
Core Academic	42,700	50,000	51,533
Career Tech. & Educ.	4,375	0	0
Media Center/Library	4,350	4,350	6,186
Visual Arts	1,600	2,900	2,929
Performing Arts	5,625	16,425	27,884
JROTC	2,000	2,000	2,088
Physical Education	19,800	18,950	21,764
Family & Consumer Science	0	1,830	0
Administration	5,440	4,990	5,918
Guidance	1,550	1,550	1,785
Dining/Commons	9,150	7,200	8,987
Total	96,590	110,195	129,074

The measurement of existing net floor space at Cardozo entailed walkthroughs and physical measurements at the school (accompanied by either the principal or members of the custodial staff) on two occasions: January 28, 2002 and February 1, 2002. The physical measurements involved either directly or indirectly measuring the floor dimensions of the following room types: classrooms, labs, shops, media center/library, physical education, JROTC, guidance, health, administration, dining/commons, and storage. The shaded portions of the Appendix A diagrams of Cardozo indicate the rooms measured.

Direct measurements of the rooms at Cardozo were performed, where possible, with a standard hardware tape-measure or a hand-held sonic measuring device. Indirect measurements, in which dimensions were measured with the abovementioned drawings, were performed in rooms that were not easily-accessible or amenable to direct measurement with these tools. Another adjustment that was made in the study, for simplicity, was that the individual rooms in the nurse/health and guidance suites (e.g., offices and waiting rooms) were measured as one large room for each suite.

After the dimensions of individual rooms at Cardozo were measured, their areas were calculated. A sum of the calculated areas for each functional room category and subcategory (i.e., large general classrooms, standard general classrooms, etc.) was then determined. A complete list of the individual rooms measured at the school, their school-assigned IDs, their floor dimensions, and their floor spaces is provided in Appendix B.

The area totals for each of the measured room categories and subcategories at Cardozo (i.e., Current), as well as the room quantity and capacity of each, were then compared with similar data from the standard ed specs for an 800 Student Model school (i.e., Proposed). This information is provided in Appendix C. A summary of floor space and student capacity for each of the room categories, for the existing building and standard ed specs, is provided in Table III.

In addition to examining the net floor spaces, the quantity of the existing site facilities at Cardozo was also compared to the standard ed specs for an 800 Student Model school. This information is listed in Table IV.

Table III: Comparison of Actual and Standards for Net Floor Space and Student Capacity at Cardozo

Room Category	Net Floor Space (ft ²)		Student Capacity		
	Standard Ed Specs	Existing Building	Standard Ed Specs	Existing Building	DCPS Capacity
Core Academic	42,700	51,456	634	1,105	1,302
Career Tech. & Educ.	4,375	13,104	18	144	90
Media Center/Library	4,350	4,560	0	0	0
Visual Arts	1,600	1,240	21	21	42
Performing Arts	5,625	3,336	42	56	42
JROTC	2,000	6,668	21	21	0
Physical Education	19,800	21,234	84	42	42
Administration	5,440	13,048	0	0	0
Guidance	1,550	1,152	0	0	0
Dining/Commons	9,150	29,512	0	0	0
Total	96,590	145,310	820	1,389	1,518

Table IV: Comparison between Standard Ed Specs and Existing School
Of Site Facilities at Cardozo

Facility	Quantity	
	Standard Ed Specs	Existing
Multi-Purpose Grassy Play Field	1	1
Press Box (10-15 people)	1	0
Concessions/Restrooms	1	0
Exterior Grounds Equipment	1	0
Exterior Athletic Storage	1	0
400 Meter Track, 200 Meter Straight-Away	1	1
Bleacher Seating for 1600	1	1
Long Jump & Triple on one side	1	0
Pole Vault Pit	1	0
Shot Put	1	0
Multi-Purpose Grassy Practice Field	1	0
Tennis (4 courts)	1	1
Outdoor Paved Play Area (3 full courts)	1	0
Fitness Trail (12-16 stations)	1	0
Baseball Field	1	0
Softball Field	1	0

Conclusions

The District's existing high school inventory presents a unique challenge to the school renovation initiative currently underway within DCPS, because of the significant age of most of these buildings and the nature of their designs. 15 of the 18 schools were built prior to World War II, and many of them were built with grand civic specialty spaces, such as auditoriums and armories. Specific conclusions are:

- 1) The current DCPS Standard Education Specifications are unsuitable for modernizing most of the District's high schools, because of their inflexible floor space requirements. These schools contain large specialty spaces (including labs, shops, pools, auditoriums,

gymnasiums, armories, and rifle ranges), which either do not appear or are undersized in the ed specs.

- 2) The current gross floor space design standard of 192 GSF/S is unsuitable for space planning and project estimating in the modernization of the District's high schools. It may work for new construction or replacement of a high school, but 15 of the 18 high schools are expected to be modernized. It is a useful tool for master planning, but needs to be changed when preparing capital budgets.
- 3) The DCPS estimate for total enrollment capacity in all of the high schools of 18,171 students is an exaggeration of the actual capacity of these schools, given their design and the program requirements of the high schools. Consequently, the DCPS estimate that the high schools are as much as 30% underutilized is incorrect.
- 4) It is likely that the DCPS value for total existing *gross* floor space in all of the high schools of 3,868,811 GSF will need to be revised. If so, the DCPS estimate that there is 1,324,236 GSF of excess *gross* floor space in the high schools will also need revision.
- 5) The high schools are lacking so many of the site improvements (parking, field space, field houses, etc.) that, in effect, there are no site standards for the high schools.

Recommendations

On a project-specific basis, architects, planners, local schools, and communities need to proceed in the high school planning process with common and accurate information, and to be creative in modernizing the existing buildings. Where necessary, they should make only modest changes to existing structures in order to make capital projects feasible, remembering that the program and the people are more important than the place. At a District level, DCPS needs to:

1. Revise the standard ed specs to allow greater flexibility. As it stands now, if the ed specs are strictly adhered to, then program requirements will not be met in existing schools without a complete demolition of their interiors, and at an extremely high cost.
2. Change the floor space design standard value of 192 GSF/S, or eliminate use of the standard altogether.
3. Calculate the quantity of *net* floor space in all of the high schools by measuring instructional and administrative space. This will help with the determination of enrollment capacities, and in the analysis of the current utilization of these schools.
4. Reexamine the quantity of total existing *gross* floor space in all of the high schools (3,868,811 GSF). This is critical to the determination of excess space.
5. Undertake site studies to determine whether structured parking or other improvements are possible to alleviate site constraint problems.