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ABSTRACT

Due to a lack of funding, New York City's public school buildings fall significantly short of providing adequate classroom space and technology support. Some policy changes that could promote more intensive use of school buildings and thus provide a comprehensive and affordable solution to this problem are described. It is suggested that instruction be extended throughout the year so that the extended school hours would allow two shifts of children to be instructed in the same building over the course of a single day without overcrowding the facility or reducing the amount of instruction each child receives. Using each school more intensively also would reduce the number of buildings the school system needs. This would allow the School Board to target its limited resources to create a network of facilities that would support better learning. It is recognized that instituting such changes would place demands on school administrators, families, and social service institutions, but such demands are not insurmountable. Two appendixes provide methodologies for estimating the capital impact and the operational impacts that such a plan would require. Contains 7 tables and 11 graphs. (RJM)

SCHOOL BUILDINGS FOR THE NEXT CENTURY

An Affordable Strategy for Repairing and Modernizing New York City's School Facilities

September 1996

Citizens Budget Commission

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FOREWORD

Founded in 1932, the Citizens Budget Commission is a nonpartisan, nonprofit civic organization devoted to influencing constructive change in the finances and services of New York City and New York State government. This report was completed under the auspices of the Commission's Finance and Capital Investment Committee, which we co-chair. The Committee's members are Jonathan Ballan, Denis V. Curtin, Morton Egol, Paul J. Finn, Ronald T. Gault, David R. Greenbaum, William R. Howell, Thomas N. Keltner, Jr., Walter Kicinski, Marianne E. Kozlowski, James A. Lebenthal, Felix A. Orbe, Laurence G. Preble, Heather L. Ruth, Barry Sullivan, Richard B. Teiman, Robin L. Weissman, and Lawrence B. Buttenwieser, ex-officio.

For several years, the condition of New York City's school buildings has been a serious infrastructure problem. Overcrowded buildings that are poorly maintained and ill-equipped severely limit efforts to improve the quality of education for over one million children. With the City's capital budget already strained, a massive infusion of additional resources to upgrade the more than 1,000 buildings the Board of Education operates has not been possible. This study examines whether scheduling changes that reduce the number of school buildings the Board needs and use the remaining buildings more intensively would provide the framework for a comprehensive and affordable solution to the school facilities crisis.

The report was written by Richard J. Delaney, a research consultant to the Commission, under the direction of Charles Brecher, Executive Vice President and Director of Research, and prepared for publication by Dean M. Mead, Assistant Director of Research. Matthew Lesieur provided research assistance. Word processing was performed by Michael Anderson. The New York City Community Trust provided financial support for the study; however, all conclusions and recommendations presented here are solely those of the Citizens Budget Commission.

The Commission expresses its appreciation to all individuals and organizations who provided information, comments and other forms of assistance in the completion of this report.

Deborah A. Buresh
William H. Hayden
September 16, 1996

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OVERVIEW

An appropriate physical plant is critical for high quality learning. Well-maintained schools signal to children and their families that education is important and inspire them to make the commitment to learn. Adequate classroom space allows teachers to pursue innovative instructional methods. Renovations that support digital technologies promote the integration of computers into the curriculum and prepare students to be better citizens and workers in the information age.

Unfortunately, New York City's public school buildings fall significantly short of meeting these standards. Despite the growing attention to this issue, no viable solutions have been proposed. For school officials, locked into a strategy to rebuild the entire network of 20th Century schools while simultaneously developing new schools for the enrollment growth and changing technology of the 21st Century, the solution has remained securing more money. However, with shrinking resources to support a capital program and the growing needs of other city infrastructure, public officials can offer only incremental amounts for new school capital projects. As long as the terms of discussion continue along these lines, with the New York City Board of Education committed to an ever-expanding system of schools and the City of New York confronted with what seems like an ever-contracting pool of resources, no true solution to the facility needs of the public school system can emerge. A new way of thinking about the problems of the City's school facilities is needed.

This report demonstrates that policy changes that promote more intensive use of individual school buildings provide the framework for a comprehensive and affordable solution. Extending instruction over more of the year and increasing the number of hours each day that schools operate would allow two shifts of children to be instructed in the same building over the course of a single day without overcrowding the facility or reducing the amount of instruction each child receives. Using each school more intensively also would reduce the number of buildings the school system needs. As a result, the Board could target its limited resources to create a network of facilities that would support better learning.

Summary of Findings and Recommendations

New York City's public school buildings are plagued by three problems. First, nearly 60 percent of all school buildings were constructed over 50 years ago, and even the more recently constructed ones often suffer from structural or system defects. As a result, over four-fifths of all school buildings require significant repairs.

Second, in too many schools, children receive instruction in spaces that were designed for other uses, such as libraries, auditoriums, gymnasiums, and offices. While the recent surge in enrollment has contributed to this overcrowding in a number of schools, the problem is not system wide yet. Approximately one-half of all elementary schools (358 of 753), one-fifth of all intermediate schools (39 of 187), and two-thirds of all high schools (88 of 133) have enrollment

that significantly exceeds stated capacity. In elementary and intermediate schools, the overcrowding has been caused largely by enrollment growth; in the high schools, reductions in stated building capacity have caused a large portion of the reported overcrowding problem.

Finally, New York City schools are ill-prepared for more modern methods of instruction. Fixed seating arrangements make small group instruction within a classroom difficult. Science labs are outfitted with outdated equipment. Perhaps most importantly, few computers are available to support classroom instruction.

The future holds little relief for the City's school facilities. Nearly 50 buildings a year are moving from needing minor capital work to needing extensive repair or replacement. Over the next several years, hundreds of thousands of new students are expected to enter the City's public school system and cause even more overcrowding. Information technologies are changing rapidly, and facilities that are not equipped to handle today's technology will be even further behind in the near future.

The deteriorating condition of New York City schools has spurred a number of proposals designed to correct this situation. Three years ago, the Board put forth a $28.1 billion program (in current dollars) to rebuild existing schools, construct over 350 new schools, and support educational enhancements such as computer technology. Simply put, this approach was too expensive: It would have required the City to earmark 90 percent of its planned capital expenditures for school projects. While providing adequate school facilities is a high priority, it cannot be achieved by eliminating investment in the City's roads, bridges, water supply and sewage treatment system, and other infrastructure.

Initially, the City had provided only $8.6 billion over ten years for the Board's school construction plan. As part of the negotiations surrounding adoption of the 1997 budget, the Mayor and the City Council agreed to fund $1.4 billion in new school capital projects over the next four years. Unfortunately, this amount provides little relief to the enormous problems facing City school facilities. Even with this additional investment, only half of the work necessary to bring schools into a state of good repair would be completed, enrollment soon would exceed capacity by as much as 186,000, and only one out of nine schools could be provided with the educational and technological enhancements necessary to support new pedagogical approaches.

Alternative school year schedules that promote more intensive use of a smaller number of school buildings can provide the basis for a strategy that more completely and affordably meets the facility needs of the public school system. Under current schedules, school buildings remain an underutilized asset: For many hours during the day and many days during the year, schools are vacant. A year-round calendar would utilize buildings for the same number of hours each day but would extend instruction into summer months. By alternating groups of students who are in session at any given time, year-round calendars can increase capacity by 33 percent or more. By combining an extended school year with a longer school day, double shift calendars can have two groups of students use the same school during more of the day *and* for more months of the year. Therefore, it doubles a school building's capacity.

By providing instructional space for more students within each building, alternative schedules would reduce the total number of schools that the New York City public education system would need to operate. Currently, the Board operates in 1,070 school buildings and, given anticipated new construction, that figure could rise to 1,141 without a change in the school calendar. Operating the schools year-round would reduce the number of schools needed to between 944 and 1,023, depending on projected enrollment. Combining an extended school year with a longer school day and double-shifting students would require just 648 to 709 school buildings.

New school calendars would ensure adequate space for projected enrollment growth. With virtually no new school buildings to construct and fewer school buildings to maintain, new school calendars also would allow the Board to invest more of its limited resources into the buildings that remain. Consequently, with year-round schools, 67 to 92 percent of the work needed to bring every school into good repair could be completed; with a double shift plan, every school that remained in operation could be brought up to standard. Moreover, because a double shift plan would utilize school buildings more intensively, enough resources would be available within current funding levels to outfit each school with five networked computers in each classroom, plus a computer lab and multimedia library in each school, improved science labs in intermediate and high schools, and flexible seating throughout the system. Finally, with less schools in operation, the Board could concentrate its limited expense budget allocation for building maintenance more intensely. As a result, with new school year calendars, the Board would be able to spend as much as four times more on maintenance for each building that remained in operation in the school system.

While operating the schools year-round would provide a significant improvement over the current program, it would not address completely each of the schools system's three pressing needs. Only a combination of an extended school year and extended school day would provide a route for the Board and the City to craft a strategy that comprehensively and affordably provides a system of schools adequate for the task of educating the City's school children in the 21st Century.

Adopting this schedule change would allow the City and the Board to escape from the dead-end approaches they have been pursuing. However, implementation would present some difficulties. Air conditioning may be required throughout the school system if instruction is extended through the summer months. The calendar for teachers and other personnel must be adjusted to reflect the schedule changes. Finally, the introduction of more computer technology would not reap many benefits if teachers and other personnel were not trained to use it effectively.

In addition, extending the school day and school year would have a number of social impacts within the families of public school children. While it is possible to ensure that enough buildings remain in each district to house that area's projected enrollment, some children undoubtedly would have to travel further to get to school. Parents, whose schedules and child care arrangements now are designed to accommodate an 8:30 to 3:00 school day from September to June, would have to alter those arrangements if the school day or school year were changed.

After-school programs, in both the schools and outside youth service agencies, may need to be augmented to assist parents in their adjustment to the new calendars.

While implementing these schedule changes would place significant demands on school administrators, families, and social service institutions, the demands are not insurmountable. More importantly, the alternative is unacceptable. The current school facilities strategy will sentence millions of New York City school children to be educated in cramped, deteriorating buildings designed for outdated instructional methods. Under an approach that reduced the number of school buildings but used each more intensively, they would attend spacious, structurally sound, well-maintained and well-equipped schools. New York City's children deserve nothing less than this.

SCHOOL FACILITIES FACE THREE PROBLEMS

Over Four-fifths of All School Buildings Are in Disrepair

The New York City school system is the largest in the nation, educating over a million students in 1995.[1] During that year, the Board of Education operated 1,147 buildings containing 108.9 million square feet of interior space.[2] New York City has developed this system of facilities over time to meet the demands of a changing population of school age children. In the latter part of the 1800s and the first half of this century, immigration, urbanization, and climbing birth rates created large increases in the number of students educated in the city's public schools. As a result, many new schools were constructed and a substantial portion of these are still in operation today. In fact, ***nearly 60 percent of the system's school buildings are more than 50 years old and 10 buildings were constructed before 1890.***[3] (See Figure 1.)

Building age does not necessarily correlate with building condition. Sturdy designs executed with quality materials have left many of the oldest schools with structures that have withstood the test of time admirably. However, electrical, heating, and other systems within these exteriors often are outdated and few have undergone recent modernization. Of the 592 school buildings that are over 50 years old, over 10 percent have not been modernized at all and another 80 percent were last "modernized" at least 25 years ago.[4] (See Figure 2.)

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[1] All years cited in this report refer to either school years or fiscal years. In both instances, the convention followed is to identify school years and fiscal years by the calendar year in which they end. For example, the school year that began in September 1994 and ended in June 1995 is referred to as "1995." Similarly, the fiscal year that started in July 1994 and ended in June 1995 also would be referred to as "1995." No calendar year data are presented in this report.

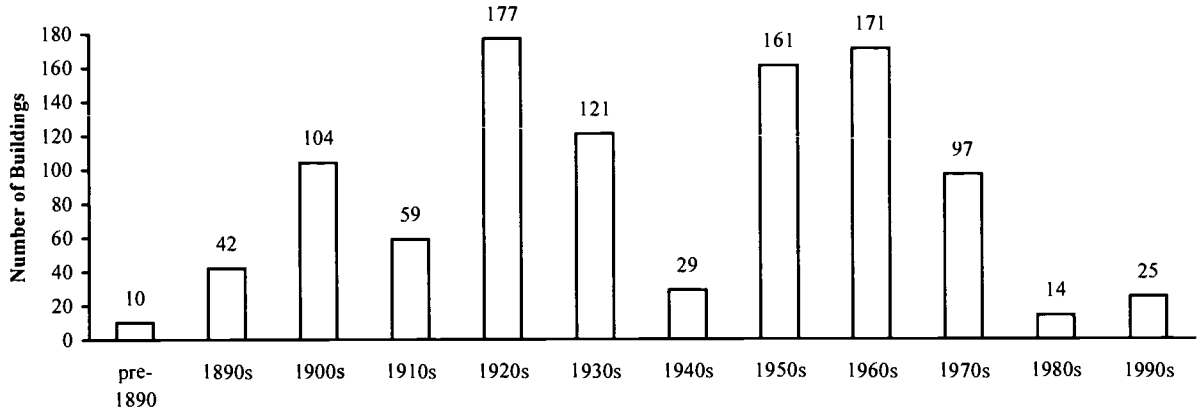
[2] City of New York, Office of Operations, *The Mayor's Management Report,* September 14, 1995.

[3] New York City Board of Education, Division of School Facilities, Office of Strategic Planning, Department of Capacity Planning and Utilization, *School Buildings with the Year of Construction, as of September 1995,* April 3, 1996.

[4] *Ibid.*

Figure 1

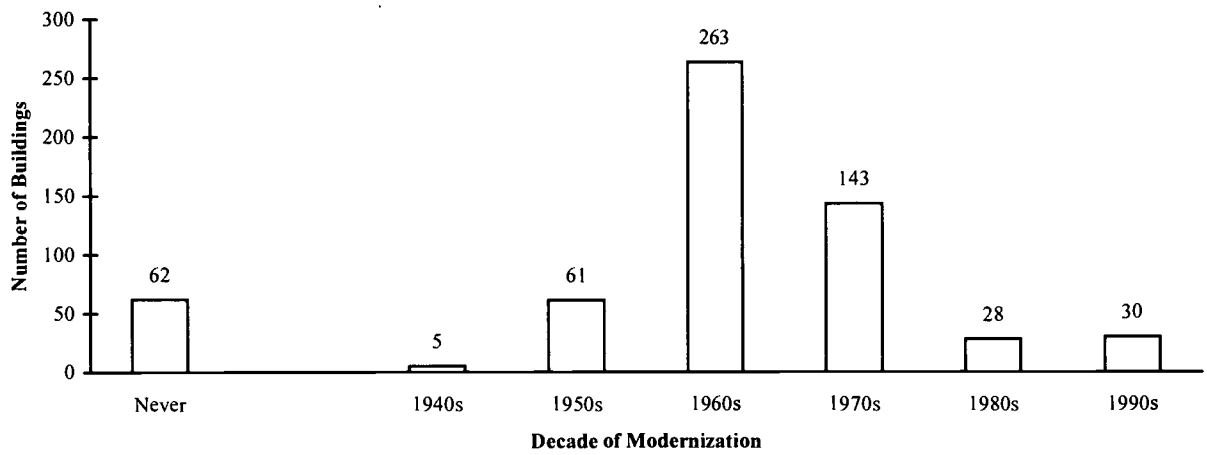
Distribution of New York City Public School Buildings by Decade of Construction



Source: New York City Board of Education, Division of School Facilities, *School Buildings with the Year of Construction,* April 3, 1996.

Figure 2

Most Recent Modernization of New York City Public School Buildings Over 50 Years Old



Source: See Figure 1.

The newer buildings in the system are not immune from physical defects. Many constructions of the 1960s and 1970s used cheaper building materials that decay more quickly than the materials used in earlier constructions. As a result, a number of newer schools already

are showing signs of significant wear and tear, some in less than two decades since they were built.

Two government organizations have responsibility for implementing strategies to combat this deterioration of school buildings. The Board of Education is responsible for the operation, maintenance and minor repair of school buildings. Its Division of School Facilities (DSF) employs skilled tradespeople, such as carpenters, plumbers, and electricians who are responsible for moderately complex repairs, and custodial staff who are responsible for daily cleaning, building operations, maintenance, and some routine minor repairs.[5] The School Construction Authority (SCA) manages all capital construction for the City's school system. Created in December 1988 by the New York State Legislature, the SCA shepherds specific projects through the study, design and construction phases. However, the Board itself, through its capital budget process, sets priorities and determines particular projects.

The City provides the funding to support the programs of these two organizations, so its fiscal situation sets limits on the level of resources available to keep schools in good repair. Twenty years ago, the City's fiscal crisis forced it to target limited resources to fund its most critical operations. Since 1990, a stagnant revenue base again has forced the City to target its finances.

In both of these instances of fiscal restructuring, the policies of the City and the Board have protected funds that seemed more directly related to classroom instruction over those that supported building maintenance and reconstruction. As a result, funding for maintaining and repairing buildings rose and fell with the fortunes of the City's treasury. Between 1977 and 1983, the Board's operating budget, adjusted for inflation, declined by nearly 30 percent.[6] While specific figures on the decrease in facilities maintenance spending are not available, the general belief is that repair work was hurt disproportionally during this period. Between 1983 and 1990, as the City's financial picture improved, funding to support school operation and maintenance, adjusted for increases in inflation and square footage in the system, grew by 34 percent. Since 1990, however, this trend has been reversed—expense budget spending per square foot, adjusted for inflation, has declined 12 percent. Of course, a large portion of this spending covers building operation. Isolating spending on building maintenance indicates that ***the Board spent 16 percent less to maintain facilities in 1995 than it did in 1990.***[7] (See Figure 3.)

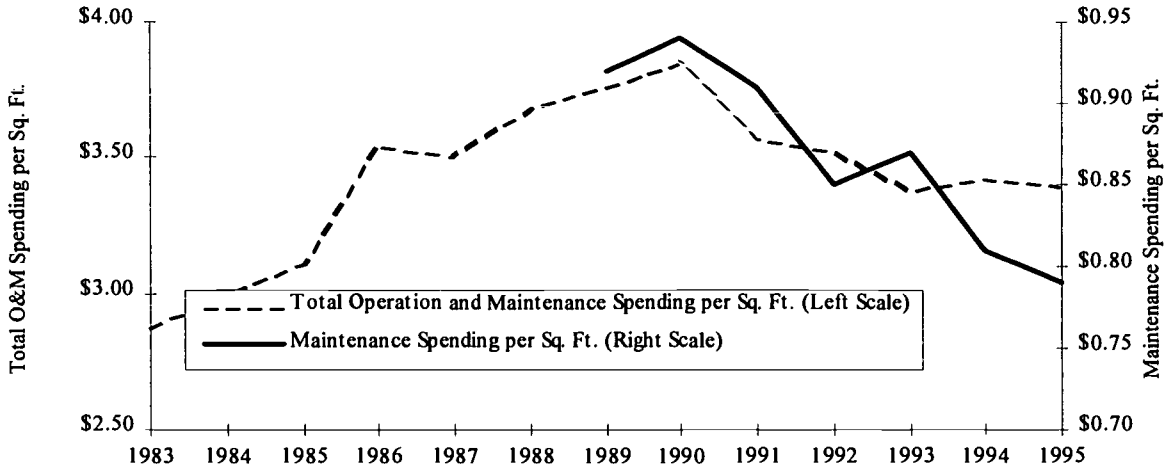
[5] The custodial contract (Memorandum of Agreement, November 1, 1994) itemizes the custodian's responsibilities for the upkeep of school structures. These responsibilities generally are limited to routine inspection and maintenance, such as replacement of window panes and minor patching of surfaces. For example, the contract states, "The custodian shall be responsible for...maintenance [and] minor repairs...of the architectural and structural part of the buildings within the capabilities of the custodial staff." Repairs that the custodian does not deem within his capacity are reported to the central office of the DSF.

[6] City of New York, *Comprehensive Annual Financial Report of the Comptroller,* various fiscal years, for Board of Education nominal operating expenditures; figures adjusted by U.S. Bureau of Labor Statistics, "Consumer Price Index for All Urban Consumers (CPI-U) for the New York-Northeastern New Jersey Area."

[7] *Ibid.*; and City of New York, Office of Operations, *op. cit.*, various years.

Figure 3

Real Operation & Maintenance Expenditures Per Square Foot
In New York City Public School Buildings, 1983-1995



Sources: City of New York, Office of Operations, *The Mayor's Management Report,* various years, for nominal maintenance expenditures and square footage; City of New York, *Comprehensive Annual Financial Report of the Comptroller*, various fiscal years, for total O&M expenditures; all expenditure figures adjusted by CPI-U for New York-Northeastern New Jersey.

The changing fiscal condition of the City also has created swings in the capital budget of the Board of Education. Capital expenditures, adjusted for inflation, averaged nearly $700 million a year between 1970 and 1976. For the 1977-1983 period, however, that figure dropped to just over $150 million annually, a 78 percent decline. As with expense budget support for facilities, the Board's capital expenditures increased from 1983 to 1990; adjusted for inflation, capital expenditures for this period averaged nearly $240 million annually, a 54 percent increase. However, unlike expenditures for maintenance during the 1990s, ***the Board's annual capital expenditures have more than tripled, averaging $785 million annually from 1990 to 1995.***[8] (See Figure 4.)

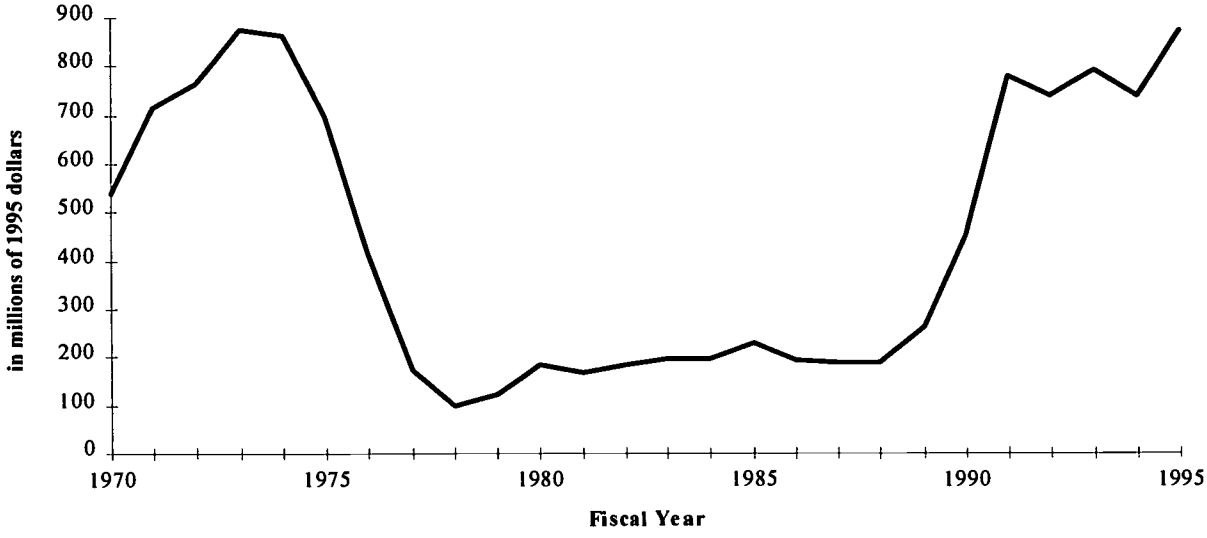
Unfortunately, this large jump in capital financing has not reversed the major deterioration of the school system's physical plant. ***The combination of aging school buildings and extended periods of capital and operating budget underfunding have created systemic decay of school infrastructure that has not been fixed by the recent infusion of additional capital resources.*** In 1993, the Board issued its *Year 2003 Master Plan*, which included a comprehensive facility needs assessment. According to that assessment, 85 percent of the buildings surveyed needed substantial capital work: 42.5 percent of the buildings required either replacement or complete modernization and another 42.5 percent had one or two inadequate structures or systems. At the present pace of deterioration, 47 schools a year are moving from

[8] City of New York, *Comprehensive Annual Financial Report of the Comptroller,* various fiscal years, for Board of Education nominal capital expenditures; figures adjusted by CPI-U for New York-Northeastern New Jersey.

requiring major system repair to requiring complete modernization or replacement.[9] (See Table 1.)

Figure 4

Real Expenditures, New York City Board of Education Capital Projects, Fiscal Years 1970-1995



Sources: City of New York, *Comprehensive Annual Financial Report of the Comptroller*, various fiscal years, for nominal capital expenditures; all expenditure figures adjusted by CPI-U for New York-Northeastern New Jersey.

Numbers in charts suggest the breadth of the infrastructure problem facing New York City public schools, but do not provide a picture of how inadequate facilities affect children and staff. Falling plaster, drafts through cracked or broken windows, broken toilets and warped floors are distracting at best, and dangerous at worst. Left unattended, these "minor" problems eventually can become major ones and, in extreme cases, are transformed into safety hazards. A commission impaneled by the Board to examine the condition of school facilities cited a number of recent instances in which structural defects could have led to serious injury.[10] At P.S. 109 in Manhattan, a crumbling brick gable fell from the top floor of the building to the school yard below. At P.S. 102 in the Bronx, high winds brought the top of a parapet tumbling down a few feet from the school's exit at 3:00 p.m., as students were leaving the building. Based on incidents such as these, this commission concluded that "...there are too many buildings where the hazards are not evident but could well cause injury because capital maintenance has been so long delayed. There is simply not an adequate margin of safety."

[9] New York City Board of Education, *Year 2003 Master Plan, Ten Year Facility Needs Assessment for the New York City Public Schools*, April 28, 1993.

[10] *Report of the Commission on School Facilities and Maintenance Reform*, June 1995.

Table 1
Assessment of New York City Public School Buildings, 1993

	NUMBER OF BUILDINGS	PERCENT OF TOTAL
BUILDINGS REQUIRING MODERNIZATION/REPLACEMENT	**447**	**42.5%**
Replacement	23	2.2%
Interior modernization	156	14.8%
Exterior modernization	135	12.8%
Full modernization	133	12.6%
BUILDINGS REQUIRING MAJOR SYSTEM REPLACEMENT [a]	**448**	**42.5%**
Structural repairs include:		
Floors	307	29.2%
Roofs	328	31.1%
Windows	268	25.5%
System repairs include:		
Coal boiler replacement	353	33.5%
Electrical	174	16.5%
Heating distribution/ventilation	416	39.5%
Toilets	246	23.4%
Other plumbing	300	28.5%
BUILDINGS REQUIRING NO CAPITAL REPAIRS	**158**	**15.0%**

Source: New York City Board of Education, *Year 2003 Master Plan, Ten Year Facility Needs Assessment for the New York City Public Schools*, April 28, 1993.

Note: [a] Many school buildings may have more than one type of structural or system defect. Therefore, the total number of schools requiring major system replacement is less than the sum of the buildings with specific types of defects.

Nearly One-Half of All School Buildings Are Overcrowded

In 1983, New York City public schools ended an eleven-year long enrollment decline, during which the number of students dropped nearly 20 percent from a peak of 1,149,068 in 1972 to 918,384 in 1983. Since then, enrollment has increased in every year except one, for a cumulative gain of 12.6 percent that has brought the population served to 1,034,235 in 1995.[11] To put this growth in perspective, the number of students added to the New York City system over the last five years was greater than the entire population of school districts in large cities such as Boston, Cleveland, Denver, New Orleans, San Francisco and Washington, DC. (See Figure 5.)

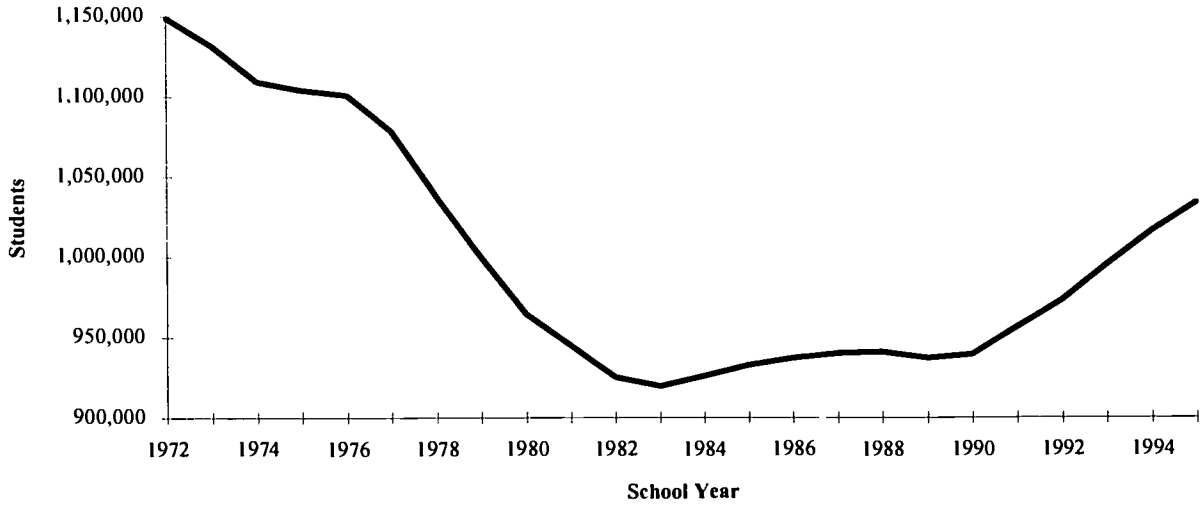
The large number of additional students the City's public schools must educate would appear to be the logical culprit behind the system's publicized overcrowding problems. However, this straightforward cause-effect relationship does not hold up as neatly once enrollment changes are reviewed in more detail. As Figure 5 illustrates, the growth in student enrollment has not

[11] City of New York, Office of Operations, *op. cit.*, various years.

been uniform over the last dozen years. In addition, student growth has not been similar across all grade levels. Table 2, which analyzes enrollment growth over the last twelve years by ① separate time periods (1983-1990 and 1990-1995) and ② various grade segments, suggests three findings that challenge the simple linkage between the recent enrollment growth and the claims of systemic overcrowding in school facilities.

Figure 5

New York City Public School Enrollment, 1972-1995



Sources: City of New York, Office of Operations, *The Mayor's Management Report,* various years, and New York City Board of Education.

First, ***policy choices have fueled a substantial portion of recent enrollment changes.*** The quality of early childhood instruction is critical in determining future educational success. Recognizing this, outreach efforts to ensure that a larger share of young children are in early education programs, coupled with demographic trends that have increased the absolute number of younger children, has expanded the number of children in pre-kindergarten and kindergarten classes substantially. Over one-third of the increase in students in the elementary schools and intermediate schools run by community school districts (CSDs) between 1983 and 1995 (33,244 of 90,096) has been concentrated in these programs.[12]

At the other end of the grade spectrum, the number of tenth through twelfth grade students declined by 27,750 between 1983 and 1990. Over the same period, enrollment in pre-kindergarten through the ninth grade grew by 45,470. In response to this changed distribution of students, the Board increased its practice of educating ninth grade students in high schools rather than in intermediate schools in the CSDs. Unfortunately, this policy shift was implemented

[12] New York State Department of Education, *Public School Enrollment and Staff,* various years.

during a period in which tenth through twelfth grade enrollment growth rebounded. As a result, the number of high school students has increased by 39,004 over the last five years. Even with this sudden surge, the number of high school students is only 17,291 or 6.6 percent more than it was in 1983.[13] However, because the growth has been concentrated in recent years, overcrowding in high school facilities may seem more severe.

Table 2
New York City Public School Enrollment Changes by Grade, 1983-1990 and 1990-1995

				CHANGE		
	1983	1990	1995	1983-1990	1990-1995	1983-1995
Pre-kindergarten/kindergarten	56,013	74,414	89,257	18,401	14,843	33,244
Grades 1 - 6	371,062	414,002	446,390	42,940	32,388	75,328
Grades 7 - 9	221,893	206,022	230,165	(15,871)	24,143	8,272
K - 9 students in high school buildings	(61,291)	(67,328)	(88,039)	(6,037)	(20,711)	(26,748)
TOTAL STUDENTS IN CSD SCHOOLS [a]	**587,677**	**627,110**	**677,773**	**39,433**	**50,663**	**90,096**
Grades 10 - 12	200,940	173,190	191,483	(27,750)	18,293	(9,457)
K - 9 Students in High School Buildings	61,291	67,328	88,039	6,037	20,711	26,748
TOTAL STUDENTS IN HIGH SCHOOLS	**262,231**	**240,518**	**279,522**	**(21,713)**	**39,004**	**17,291**
SPECIAL EDUCATION STUDENTS [b]	**68,476**	**71,017**	**75,847**	**2,541**	**4,830**	**7,371**
HOME INSTRUCTION [c]			**1,093**			
TOTAL STUDENTS	**918,384**	**938,645**	**1,034,235**	**20,261**	**94,497**	**114,758**

Source: New York State Department of Education, *Public School Enrollment and Staff,* various years.

Notes: [a] CSD schools are elementary and intermediate schools operating under the direction of the 32 Community School Districts.
[b] These full-time special education students receive instruction in separate classrooms within CSD schools or high schools, or in separate special education facilities.
[c] Students receiving home instruction were not included in enrollment figures in 1983 and 1990.

Second, ***even after accounting for these policy choices, there appears to be a mismatch between where enrollment growth has occurred and where overcrowding exists.*** As the student population has increased, the Board has attempted to cope through a series of different approaches. It has brought on-line 32 new school buildings since 1983.[14] In addition, some community school districts and high schools have obtained additional space by leasing buildings as annexes to existing schools, and others have acquired quickly-assembled modular classrooms, which typically are placed in school yards. As a result of changes such as these, New York City public schools have added 6.8 million square feet of additional space since 1983.[15]

[13] *Ibid.*
[14] New York City Board of Education, Division of School Facilities, *School Buildings with the Year of Construction,* April 3, 1996.
[15] City of New York, Office of Operations, *op. cit.*

In other words, during a period in which the student population increased by 12.6 percent, available space in public school buildings increased 6.7 percent. Based on the pattern of enrollment growth, elementary schools, in which the number of students has increased by 25.1 percent, should be suffering from the most severe overcrowding, while high schools, with their 6.6 percent growth, should be near capacity and intermediate schools, in which enrollment has declined by 10.5 percent, should have a surplus of space. For elementary and intermediate schools, an examination of school-by-school enrollment and capacity data confirms these expectations. As Table 3 indicates, nearly half of all elementary school buildings (358 of 753) have current enrollment that exceeds the stated capacity of the building by more than 5 percent. For intermediate schools, only one out of five buildings (39 of 187) are in that condition.

Table 3
Enrollment vs. Capacity in New York City Public Schools, 1995

	ENROLLMENT			
	OVER CAPACITY	AT CAPACITY	UNDER CAPACITY	TOTAL
ELEMENTARY				
Number of buildings	358	137	258	753
Students over/(under) capacity	50,335	17	(44,031)	6,321
INTERMEDIATE				
Number of buildings	39	26	122	187
Students over/(under) capacity	8,114	(92)	(42,536)	(34,514)
HIGH SCHOOLS				
Number of buildings	88	8	34	130
Students over/(under) capacity	62,549	83	(9,277)	53,355
TOTAL				
Number of buildings	485	171	414	1,070
Students over/(under) capacity	120,998	8	(95,844)	25,162

Sources: New York City Board of Education, *School Facilities: Enrollment-Capacity-Utilization, School Year 1994-1995,* and *High School Capacity, School Year 1994-1995.*

Note: "Schools over capacity" are defined as those with enrollment above 105 percent of stated capacity. "Schools at capacity" are those with enrollment between 95 and 105 percent of stated capacity. "Schools under capacity" have enrollment below 95 percent of stated capacity. Because special education schools, administrative offices, and support facilities are not included in these figures, the total number of buildings reported in this table is lower than the 1,147 figure cited earlier in this report.

Space availability in high schools presents a more perplexing problem. High school enrollment has increased at approximately the same pace as the total space available in all Board facilities and there is no indication that high schools have not received their share of new spaces. (For example, high schools represent less than 13 percent of all school buildings and 15 percent of all new buildings constructed since 1983 have been high schools.) Despite this apparent congruence between growth in students and growth in space, high schools cause a disproportional share of the Board's stated overcrowding problem. Although the number of students in high schools has increased by just 17,000 since 1983, or less than 20 percent of the

total enrollment growth for the period, high schools account for over half of the total seats needed in overcrowded facilities in the system (62,549 of 120,998).

The Board's method for calculating the capacity of its high schools may contribute to the reported level of overcrowding in these facilities. Because the DSF accumulates a comprehensive inventory of room assignments in each elementary and intermediate school, it can determine the actual amount of space available for grade level instruction quite accurately, and it also can determine whether a school has space that can be shifted from specialized instruction or non-instructional uses to support increased enrollment. In contrast, the Division of High Schools provides the DSF instructional capacity figures calculated by the high schools themselves. No information on the specifics of these calculations nor data on space utilization by special instruction or non-instructional programs are available. In other words, the part of the school system that reports the severest overcrowding problem provides no method for assessing the validity of its estimate of available space.

To illustrate the lack of rigor in the Board's approach to defining the number of students that high schools can accommodate, the *Year 2003 Master Plan* listed the capacity of each high school in the public school system for 1992. Three years later, the Board again published capacity for each high school. After adjusting for old schools that ceased operations and new schools that started during the intervening three years, the total capacity of the identical buildings dropped from 212,800 in 1992 to 193,928 in 1995.[16] The 18,872 spaces "lost" over this period, for no apparent reason, actually exceeded the enrollment growth in these schools. In other words, ***from 1992 to 1995, the growth in the problem of overcrowding in the high schools was caused more by changes in the estimate of available space than by increases in the student population.***

The analysis of enrollment and capacity yields a third finding: ***Despite the substantial growth in student enrollment it has absorbed recently, the New York City public school system still has underutilized space.*** Enrollment in 258 elementary school buildings and 122 intermediate school buildings is at least 5 percent less than capacity. Using seats as the basis of measurement, the number of excess seats in undercrowded elementary schools would cover seven-eighths of the need in overcrowded schools. In intermediate schools, excess seats in undercrowded schools are 34,514 greater than the need in overcrowded schools. Of course, matching students with available space can be difficult when the geographic dispersion of enrollment and space is dissimilar, and the Board's figures suggest that even overcoming these difficulties would not ease overcrowding in high schools. Although there would be problems accessing it, substantial flexibility remains in the system to accommodate much of the current student population.

This discussion is not meant to minimize the impact of inadequate space on the education of New York City public school children. When enrollment growth exceeds a building's capacity to handle it, new space must be "created." Often, this involves bumping or eliminating discretionary activities. For example, common rooms such as libraries and auditoriums will be

[16] New York City Board of Education, *Year 2003 Master Plan*, April 28, 1993, and *High School Capacity, School Year 1994-1995.*

reassigned for one or more classrooms. Alternatively, more students will be crammed into regular classrooms, testing the limits of reasonable comfort as well as contractually mandated class sizes. In the most extreme cases, bathrooms, supply closets, and other specialized spaces will be used for instruction. Generally, this menu of strategies does little to solve the school's space needs. ***Too many schoolchildren still receive instruction in overcrowded classrooms or in spaces that were never designed for instruction***, such as hallways, offices and other makeshift locations that school administrators identify to deal with larger student bodies. While it may be guilty of hyperbole, another commission appointed by the Board, this one to examine the impact of enrollment growth on school facilities, characterized the New York City public education system as "bursting at the seams."[17]

School Buildings Are Not Equipped to Support New Instructional Methods

In the traditional model of classroom instruction, teachers transmit a fixed core of knowledge to students, whose performance then is judged by their ability to absorb and repeat that information. In a mass-production economy, such as the one that was in place in the United States when this model of instruction was established, the ability to perform narrow tasks defined by central authorities in an established chain of command was a critical skill to learn. As the next century approaches, established knowledge will change more rapidly, flatter hierarchies will lead to less supervision in the workplace, and a firm's success will depend less on workers who individually follow orders well and more on employees who have the ability to work collaboratively to determine for themselves what they should do. Consequently, classroom instruction needs to move beyond the teacher-centered model and more toward an "inquiry-based" approach that emphasizes *how* to learn more than *what* to learn.

Unfortunately, most classrooms throughout the United States have been designed to support the older method of classroom instruction. Fixed seats face forward so that students can accept with ease the knowledge teachers impart, but can confer with the classmates only with difficulty. Labs and shops, in which students learn by doing rather than listening, often are outfitted with outdated equipment. Televisions with cable connections that provide links with instructional programs from distant locations are not available in many schools. Most schools have purchased computers, but generally too few of them to allow easy access by a large number of students. In addition, these computers often are organized in labs and therefore not integrated into classroom instruction. Isolated in a lab, particularly if they are not linked to other computers in and outside the school, computers by themselves may become merely a replacement for typewriters and do little to promote interactive learning.

New York City's schools trail significantly behind the rest of the state in being equipped to support new, technology-based pedagogical approaches. Because so many of these buildings were built in the early part of this century, fixed seats are the standard throughout virtually the whole system, so small group instruction within a classroom is more difficult. In addition, the age and physical condition of school facilities have limited the deployment of new learning

[17] *Bursting at the Seams: Report of the Citizens' Commission on Planning for Enrollment Growth*, January 30, 1995.

technologies. The cables, phone lines and electrical wiring needed to support new technologies are more complicated and expensive to install in older buildings, and it has been estimated that only 30 percent of schools currently have adequate wiring.[18] Consequently, City schools lag significantly behind their counterparts throughout the rest of the state in providing students with access to technologies that support learning. While other districts have 11.6 computers for every 100 students, New York City has only 6.7.[19] Table 4 demonstrates that on other measures of technology use, New York City also trails behind the rest of the state.

Table 4
Technology in New York City & New York State Public Schools

	NEW YORK CITY	REST OF STATE
Computers per 100 students	6.7	11.6
Percent of schools with CD-ROMs	57%	73%
Percent of regular computer use by:		
Teachers	62%	81%
Students	28%	60%
Televisions per 100 students	0.7	2.3
Percent of schools with cable TV connection	43%	89%

Source: New York State Department of Education, *The State of Learning in New York State,* February 1996.

The Future Will Exacerbate these Three Problems

Poorly maintained, overcrowded school facilities, with little modern technology to support instruction, limit the quality of education in New York City public schools right now. Given the continuation of recent trends and the absence of a comprehensive strategy to deal with them, the negative effects of inadequate infrastructure on education soon will be even worse.

When maintenance and repairs are deferred, small problems can mushroom and create much graver deterioration of school facilities. For example, long-term water seepage resulting from failure to patch a roof can corrode structural supports, walls, and electrical systems. As noted above, ***under the current pace of maintenance and repair work, 47 buildings a year are moving from requiring minor repairs to needing major renovations.***

The demands of new technologies also are changing rapidly. Newer computers with faster processing capacity have greater power demands than the previous generation of equipment. As more information becomes available via the internet, more sophisticated communications networks that can access this data quickly also will be needed. ***Those schools that are not***

[18] *Ibid.*

[19] New York State Department of Education, *The State of Learning in New York State,* February 1996. It should be noted that the number of computers reported to the state include those used by administrative offices within schools. Therefore, the figures quoted here do *not* indicate the availability of computers that support instruction.

equipped to handle current technologies will fall even further behind in their ability to provide instruction based on the future technology that students will be using in the next century.

The continued growth of the student population may pose the greatest challenge to New York City school facilities. The forces behind recent increases, such as the immigration of larger numbers of school age children and the changes in birth rates among women already in the city, may continue to some extent for the foreseeable future. More importantly, recent growth has been concentrated in the early grades and the vast majority of these children will remain in the public school system until they graduate or drop out. Consequently, ***the number of students in New York City public schools will continue to increase through the early part of the next century even if immigration and birth rates fall off. Estimates of enrollment growth from 1995 to 2004 range from 125,000 to 230,000.***

The wide range in these estimates occurs because the different government organizations that produce them make somewhat different underlying assumptions. The New York City Board of Education,[20] the Department of City Planning,[21] and the State Department of Education[22] each project student populations using a "cohort survival methodology," which uses past patterns in the way students move through the system to determine the size of future populations. Each supplements this approach with assumptions about other factors that affect the size of the student population, such as births, migration into, out of and within the city, transfer of students between schools, and long-term absence and dropout rates.

Each methodology forecasts an increase in the number of students between 1995 and 1999 close to the level experienced during the early part of this decade. City Planning's estimate, approximately 71,000 over the four-year period, averages nearly 18,000 per year, which is 7.6 percent below the average annual growth between 1990 and 1995. The Board's and the Education Department's estimates are nearly identical, 90,000 during the four years or over 22,000 per year, which is 17.5 percent more than the actual 1990-1995 annual growth. Where the methodologies diverge more substantially is in later years. While the Board expects enrollment growth to accelerate from its current high levels to 28,000 additional students annually, City Planning (11,000 additional students annually) and the State Department of Education (12,000) each predict a slowdown in growth. (See Figure 6.)

Because the number of students that are served by the school system is determined by the aggregation of millions of intensely personal decisions which are difficult to predict—whether to emigrate to a new country, how many children to have, whether to send a child to public or nonpublic school—each of these methodologies has had substantial errors in its previous forecasts, and it would not be surprising if those errors happened again. Therefore, rather than

[20] The Grier Partnership, *Final Report: Enrollment Projections 1994 to 2003, New York City Public Schools,* January 1995.

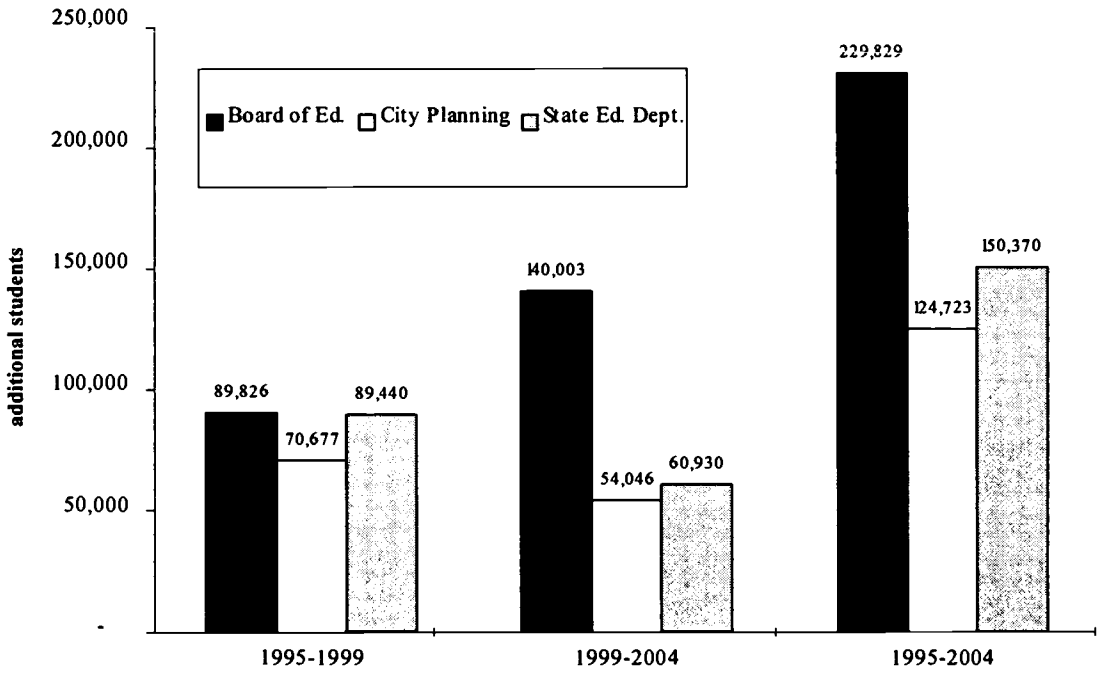
[21] City of New York, Department of City Planning, Education and Social Planning Division, *1994 Enrollments and Projections to 1999 and 2004,* August 1995.

[22] New York State Department of Education, *Projections of Public and Nonpublic School Enrollment and High School Graduates to 2003-04, New York State,* July 1994.

choosing one approach as representing the "best" estimate,[23] the different projections should be seen as bounding a reasonable range of how many students might be in New York City public schools at the beginning of the next century.

Figure 6

Alternative Projections of Enrollment Growth In New York City Public Schools, 1995 to 2004



Sources: The Grier Partnership, *Final Report: Enrollment Projections 1994 to 2003, New York City Public Schools,* January 1995; City of New York, Department of City Planning, Education and Social Planning Division, *1994 Enrollments and Projections to 1999 and 2004,* August 1995; New York State Department of Education, *Projections of Public and Nonpublic School Enrollment and High School Graduates to 2003-04, New York State,* July 1994.

From this perspective, even if City Planning's more optimistic projections prove accurate, school facilities soon will face a daunting challenge. To a system in which 45 percent of the schools currently are listed as overcrowded and in need of seats for over 100,000 students, another 71,000 students will be added over the next four years, with 54,000 more to follow in the subsequent five years. This need for an additional 125,000 seats would nearly double if the Board's more pessimistic enrollment projection were to come true.

[23] *Bursting at the Seams* did attempt to compare the Board's methodology with City Planning's and determined that the Board's was more accurate for predicting 1991-1993 enrollment changes. Still, the Board's "more accurate" approach overstated elementary and intermediate school enrollment by 18,000 and understated high school enrollment by 16,000 in 1993.

CURRENT STRATEGIES WILL NOT SOLVE THESE PROBLEMS

The Board of Education Master Plan Was Incomplete and Unaffordable

The Board of Education has attempted to address these growing problems in its school facilities. Realizing that planning basic repairs and capital improvements for its extensive infrastructure system requires reliable, comprehensive information, the Board has instituted more sophisticated approaches to determining repair and construction needs.

Previously, field-initiated requests largely determined the schedule for repairs funded by the expense budget and construction funded by the capital budget. Repair requests accumulated at the DSF with little systemic review or prioritization. As a result, duplicate and overlapping orders clogged the system and, in some instances, delays in servicing requests turned minor repair needs into major capital rehabilitation needs. Similarly, requests from individual schools, not a systemic overview of the highest-priority infrastructure needs, determined the schedule of capital-funded projects.

Recent changes by the Board have developed better procedures for scheduling repairs and capital work. In 1994, then-Chancellor Ramon Cortines discarded all repair work orders in the system (which, including duplicate and outdated requests, had grown to 51,000[24]) and established a new system to prioritize repair work and to communicate with schools when resources were not available to initiate work within 90 days.

For capital budget work, the Board has conducted several comprehensive surveys of building conditions to assess the needs of its entire system of facilities. In 1992, for example, the Automated Building Condition Survey linked field personnel observations of building conditions to formulas that provided a summary measure of the status of individual schools. The survey allowed the Board to assess all buildings, determine the relative priority of different projects, and estimate the cost of funding those projects. Using this information, it developed in 1993 the *Year 2003 Master Plan,* a blueprint for a ten-year capital program to repair existing school facilities, build new schools for projected enrollment gains, and outfit schools with technology that met the needs of the next century.

The *Year 2003 Master Plan* estimated that the Board would need to make capital expenditures of $25.2 billion (in 1992 dollars) between 1994 and 2003 in order to:

- improve the condition of existing facilities by correcting structural and system problems, providing adequate support facilities such as cafeterias, athletic fields, gymnasiums, and auditoriums, and making other improvements that promoted safety or met federal, State or City government mandates ($10.2 billion);

[24] City of New York, Office of Operations, *op. cit.,* September 1994.

- construct new schools and create additional space at existing schools to relieve projected overcrowding ($11.5 billion);
- provide building enhancements that would support changing educational needs, such as the introduction of new information technologies ($2.7 billion); and,
- repair office facilities and purchase administrative computer systems ($0.8 billion).

Each dollar figure needs to be increased by 11.7 percent to reflect the rate of inflation between 1992 and 1996. In other words, the total cost of the Board's plan today would be $28.1 billion.[25] (See Table 5.)

Although the Board has improved the procedures by which it plans infrastructure maintenance and reconstruction, its efforts have not produced a credible, comprehensive strategy. Instead, its "solution" suffers from three fundamental flaws.

Ongoing maintenance of facilities was ignored

The extended period of up-and-down funding to support basic repairs and maintenance has been one of the primary contributors to the current state of decay in New York City's school facilities. While the Board has proposed a long-term strategy for its capital needs, it has developed no similar strategy for how it would better maintain buildings in the future to prevent a renewed cycle of deterioration.

The gap between the current funding for maintenance and the actual need generated by the existing system of school buildings is significant. In 1995, the Board spent $0.79 per square foot to maintain its facilities. By comparison, commercial building owners in lower Manhattan spend about $2.25 per square foot on maintenance, or over three times as much as the Board.[26] While the maintenance needs of commercial buildings are different than those of school buildings, this large discrepancy indicates that, even if the Board were able to implement its proposed capital plan in full, soon the renovated network of schools again would show signs of significant disrepair.

This conclusion is underscored by the recent history of the Board's inability to repair existing facilities using current resources. As noted above, two years ago all existing repair work orders were eliminated and a new system to limit the number of new requests and respond to them quickly was established. According to the last published figures, however, the number of new unfilled requests has grown rapidly and now stands at nearly 17,000.[27] Despite the Board's

[25] Some challenges have been raised to the estimates in the Board's *Master Plan*. For example, the Office of Management and Budget, when reviewing a sample of specific projects, has suggested that the Board overstated the cost of basic repairs by including some enhancements and preventive work in their estimates. On the other hand, the Board's plan was developed four years ago, and additional deterioration of facilities likely has increased the need for repair work.

[26] *Interim Report of the Commission on School Facilities and Maintenance Reform*, October 17, 1994.

[27] City of New York, Office of Operations, *op. cit.*, February 1996.

efforts to target limited resources to the highest priority repairs, the system's deterioration has outpaced the Board's ability to apply triage.

Table 5
Proposed Capital Plan Expenditures, New York City Board of Education Year 2003 Master Plan
(dollars in billions)

	YEAR 2003 MASTER PLAN	
	1992 dollars	1996 dollars
REPAIR AND RENOVATION OF EXISTING SCHOOLS		
Building replacements	$0.5	$0.5
Full modernizations	4.6	5.1
Major system replacements	1.0	1.1
Building upgrades	1.5	1.7
Rehabilitation/construction of common Facilities, phys. ed. facilities, and playgrounds	1.7	1.9
Other improvements	0.9	1.0
SUBTOTAL, EXISTING SCHOOLS	**$10.2**	**$11.3**
NEW CLASSROOM CAPACITY		
New school construction	$10.8	$12.1
Building additions	0.6	0.7
Room partitioning	0.1	0.1
SUBTOTAL, NEW CAPACITY	**$11.5**	**$12.9**
EDUCATIONAL ENHANCEMENTS		
Information technology	$2.0	$2.2
Room conversions	0.5	0.6
High school restructuring	0.2	0.3
SUBTOTAL, EDUCATIONAL ENHANCEMENTS	**$2.7**	**$3.0**
OTHER CAPITAL NEEDS		
District/central offices	$0.1	$0.1
Data processing/other admininistrative systems	0.6	0.7
Scope development	0.1	0.1
SUBTOTAL, OTHER	**$0.8**	**$0.9**
TOTAL	**$25.2**	**$28.1**

Source: New York City Board of Education, *Year 2003 Master Plan: Ten Year Facilities Needs Assessment for the New York City Public Schools,* April 28, 1993; expenditures, which were stated in 1992 dollars in the *Master Plan,* were adjusted by the change in the CPI-U for New York-Northeastern New Jersey between City fiscal year 1992 and City fiscal year 1996.

Only 25 percent of the technological improvements the Board identified in the Master Plan would have been done by 2003

The *Year 2003 Master Plan* presented a vision of New York City schools that are equipped for the 21st Century. In these schools, classrooms are equipped with interactive multimedia work stations, libraries have been transformed into information resource centers, and all of this equipment is linked by local area networks within the schools and by wide area networks to information resources that exist outside the schools.

The Board estimated that making this vision a reality would require a substantial investment of resources. In addition to the computer equipment that would need to be purchased, facilities would require new wiring and cabling to connect the information technologies. Concentration of computer equipment in certain rooms would require the installation of air conditioning in some instances and the reinforcement of floors in others. Finally, security systems to protect expensive equipment also would add to the price tag that the Board estimated. In total, the *Master Plan* estimated that $7.9 billion (in 1992 dollars) would be required.

This figure, which averages over $7 million per school building, seems significantly higher than other estimates of the cost of bringing new technologies to classrooms. For example, a report by McKinsey & Company placed the cost of equipping and connecting one computer for every five students in a classroom at $554,000 per school.[28] Of course, New York's special circumstances (older buildings and higher construction costs, for example) and the broader scope of the Board's plan (upgrading libraries, for example) might raise costs above the nationwide average that McKinsey projects. Unfortunately, while other estimates in the *Master Plan* are presented as an aggregation of detailed estimates of project components, the cost of introducing technology is presented as a lump sum amount, so it is impossible to determine precisely what the additional spending would support in New York City schools. However, using the Board's estimate of the cost of implementing its plan, the Board's request for $2.0 billion would fund completion of only 25 percent of needed technology upgrades by 2003.

Even with its omissions, the Board's plan was too expensive

Although the *Year 2003 Master Plan* did not deal with two central issues (better ongoing maintenance and full computerization across the system), it did present a broad strategy for addressing a substantial portion of its most pressing facilities problems. In that document, the Board estimated the cost of simultaneously bringing all of its existing space into good repair, creating enough new space based on a high-end estimate of enrollment growth, and providing access to new technologies in a large number of schools.

Unfortunately, the Board recognized no practical constraints on achieving its ambitious agenda. For example, its plan to construct over 350 new school buildings to deal with enrollment growth would run into insurmountable difficulties of finding and obtaining so many building sites in reasonable proximity to the area of need and managing such a large number of complex construction projects all at the same time.

More importantly, the price tag on the Board's plan was unaffordable. The City capital plan prior to adoption of this year's budget anticipated providing $7.1 billion to support Board of Education construction projects between 1996 and 2003.[29] Coupled with the $1.5 billion (in 1996

[28] McKinsey & Company, *Connecting K-12 Schools to the Information Superhighway,* undated.

[29] City of New York, Office of Management and Budget, *Message of the Mayor: Executive Budget, Fiscal Year 1996*, May 1995; *Message of the Mayor: Executive Budget, Fiscal Year 1997*, May 1996; and *Ten-Year Capital Strategy: Fiscal Years 1996-2005*, April 27, 1995.

dollars) that was committed for school capital projects in 1994 and 1995,[30] $8.6 billion was available to cover the $28.1 billion in projects the Board identified in its *Year 2003 Master Plan.* This left significant gaps in all of the Board's plan. Less than half of the funds needed to rehabilitate existing buildings had been provided, and the programs to provide educational enhancements and to construct new schools fared even worse. (See Table 6.)

Table 6
Master Plan Statement of Need vs. Capital Funding, 1994-2003

	MASTER PLAN	CAPITAL FUNDING		SHORTFALL	PERCENT FUNDED
	1994-2003	1994-1995 Actual	1996-2003 Plan		
REPAIR AND RENOVATION EXISTING SCHOOLS	$11.3	$1.0	$4.4	$6.0	47%
NEW CLASSROOM CAPACITY	12.9	0.3	2.1	10.5	18%
EDUCATIONAL ENHANCEMENTS	3.0	0.1	0.0	2.9	4%
OTHER	0.9	0.1	0.6	0.2	83%
TOTAL	$28.1	$1.5	$7.1	$19.5	30%

Sources: New York City Board of Education, *Year 2003 Master Plan: Ten Year Facilities Needs Assessment for the New York City* Public Schools, April 28, 1993; City of New York, Office of Management and Budget, *Message of the Mayor: Executive Budget, Fiscal Year 1996*, May 1995; *Message of the Mayor: Executive Budget, Fiscal Year 1997,* May 1996; and *Ten-Year Capital Strategy: Fiscal Years 1996-2005,* April 27, 1995.

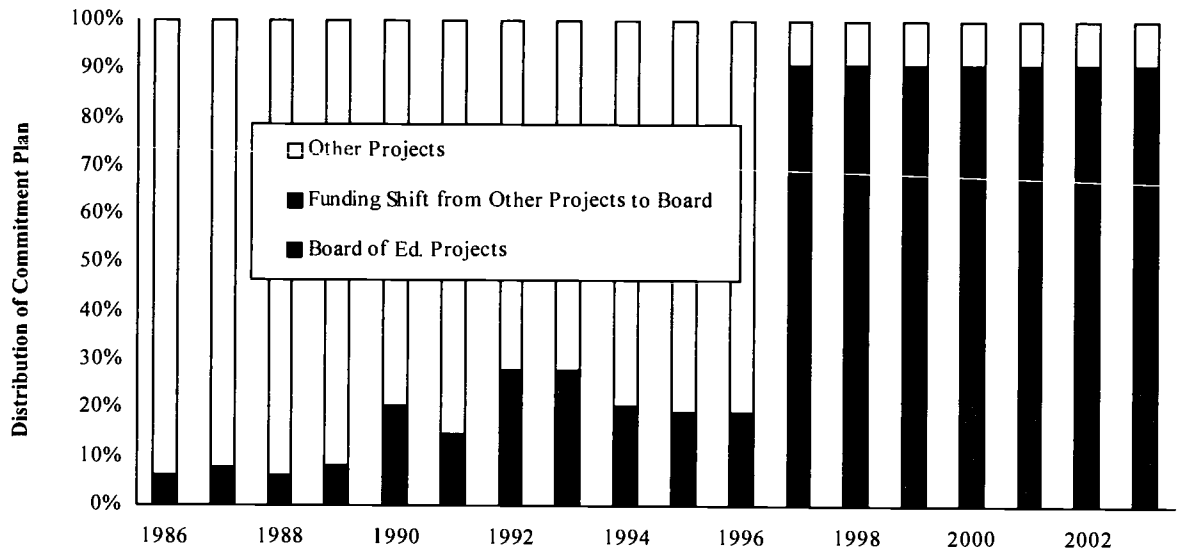
Note: 1996-2003 Plan does not include additional funds provided in the fiscal year 1997 adopted budget. Figures may not add due to rounding

Between 1997 and 2003, before the final adoption of the fiscal year 1997 budget, the total amount the City planned to commit for all capital projects averaged approximately $4 billion annually.[31] ***In order to implement the Board's program fully, the City would have had to earmark approximately 90 percent of its available capital funds. To do so would have required eliminating virtually all funding for bridge and road repair, water and sewer maintenance, and other essential City capital needs.*** While the need for better school facilities is a high priority, other components of the City's infrastructure could not have been abandoned in order to fund the Board's strategy. (See Figure 7.)

[30] City of New York, *Comprehensive Annual Financial Report of the Comptroller,* fiscal years 1994 and 1995 editions. Capital expenditure figures reported in these documents were adjusted for inflation.
[31] City of New York, Office of Management and Budget, *op. cit.*

Figure 7

Shift of Capital Funds Needed To Pay for the New York City Board of Education's Master Plan



Sources: City of New York, Office of Management and Budget, *Message of the Mayor: Executive Budget,* various fiscal years.

The Additional Capital Funding Identified in the Fiscal Year 1997 Adopted Budget Is Inadequate to Meet Minimum Facility Needs as Currently Defined

Recognizing the gross mismatch between the Board's plans for school facilities and the City's ability to pay for them, both the Board and the City have developed new proposals: The Board has scaled back its requested capital program and the City has identified new resources to finance school construction projects.

Based on the same 1993 assessment of system needs which was used for the *Year 2003 Master Plan*, the Board developed the outline of a plan that would lower its capital budget request while meeting its most pressing needs. This *Strategy to Overcome the Facilities Crisis* (hereafter referred to as the *Crisis Strategy*) totaled $17.5 billion between 1996 and 2005.[32] The reductions in scope of work reflected in the lower price tag include:

- *Improvements to existing buildings.* The *Year 2003 Master Plan* called for complete modernization—including installation of modern materials, fixtures, and systems—if a certain percentage of a building's structures and systems were

[32] New York City Board of Education, *Strategy to Overcome the Facilities Crisis,* December 20, 1995. The capital program outlined in this document totaled $14.4 billion but assumed that the level of funding for capacity expansion included in present capital plan ($2.8 billion) would be continued. In addition, this document did not address the cost of repairing administrative facilities, which the current capital commitment plan estimates will be $0.3 billion.

deteriorated; the *Crisis Strategy* included no full modernizations, and would replace only those components necessary to achieve a state of good repair. In addition, the *Year 2003 Master Plan* would improve auditoriums, gymnasiums, cafeterias, libraries, and other communal spaces in schools in which they were inadequate or create them in schools in which they did not exist. The *Crisis Strategy* abandoned this program. Finally the *Crisis Strategy* provided no funds for safety items, emergency lighting, fire safety retrofits, administrative facilities, and other miscellaneous items that were included in the *Year 2003 Master Plan.*

- *New construction.* The *Year 2003 Master Plan* assumed construction of new schools to accommodate all projected overcrowding in the city. The *Crisis Strategy* would provide no new seats to districts that, regardless of intra-district regional overcrowding, are projected to have excess capacity. In addition, it assumed that half of the new seats will be in less expensive modular or leased spaces.

- *Educational enhancements.* The *Year 2003 Master Plan* called for providing information technology for classrooms, libraries, and computer labs, upgrading science labs, eliminating fixed-seating, and installing wiring for new technology in all schools. The *Crisis Strategy* would provide only for the wiring and a more limited set of science lab improvements. The vision of schools for the 21st Century put forth in the *Master Plan*—libraries that were multi-media resource centers, classrooms that each had computers—was abandoned almost entirely.

Even given the Board's substantially scaled-back plans for capital improvements, City funding levels before the fiscal year 1997 adopted budget would have allowed completion of just over half of it. Because even full funding of the Board's *Crisis Strategy* would not have produced adequate classroom space in schools that were in good repair and provided with advanced educational technologies, partial funding of the plan would result in school facilities that continue to be plagued with the same three problems they currently face. Before the 1997 adopted budget, $8 billion of additional capital funds were needed to fund this "bare-bones" $17 billion program.

Over the last year, three separate proposals identifying new sources of funds that might bridge this gap partially were introduced. In May 1995 Mayor Rudolph Giuliani, as part of his fiscal year 1997 executive budget, proposed selling the assets of the City's water system to the New York City Water Board.[33] This transaction, if enacted, would have produced $800 million over a four-year period that could have been used for pay-as-you-go school construction projects. In January 1996 State Assembly Speaker Sheldon Silver proposed that the City cede $200 million of revenue from the State lottery to secure bonding authority for $2 billion of education capital projects.[34] Also in January 1996, City Council Speaker Peter Vallone unveiled a plan to

[33] City of New York, Office of Management and Budget, *Message of the Mayor: Executive Budget, Fiscal Year 1997*, May 1996.

[34] Jacques Steinberg, "Three Men, Three Plans to Rebuild the Schools," *New York Times,* January 14, 1996.

provide additional capital funds for the Board of Education.[35] Under the Speaker's proposal, one of the two surcharges on the City's personal income tax (PIT), introduced to fund the hiring of additional police officers, would be continued beyond its current expiration date at the end of calendar year 1996. Continuing this tax increase for another three years would generate $1.4 billion, according to the Speaker's analysis. His proposal was to use $1.3 billion to fund pay-as-you-go school construction projects, with the remainder being used to purchase more current text books. As part of the negotiations surrounding adoption of the City's fiscal year 1997 budget, the Mayor and the City Council agreed to identify $1.4 billion of additional financing for capital projects for the Board of Education, although this money would not come in the form of pay-as-you-go capital from the extension of PIT surcharge, as the City Council Speaker originally proposed.

Despite the various proposals that have been introduced and enacted, the current debate concerning funding for school facilities has not produced credible solutions. ***The Board's* Crisis Strategy *would not create a system of schools that were adequately maintained, large enough to handle comfortably the anticipated number of students, nor well-equipped with the newest technologies, even if it were fully funded. And the infusion of cash to fund the bare-bones strategy recently agreed to by the Mayor and the City Council still would leave the Board over $6 billion short of the funds it needs to implement even these modest plans.*** For New York City public schools to be of a quality that students and taxpayers deserve, a fundamentally new approach to solving the system's infrastructure problems needs to be pursued.

REDUCING THE NUMBER OF SCHOOLS IN THE SYSTEM AND INVESTING MORE IN EACH OF THEM WOULD CREATE A NETWORK OF FACILITIES THAT BETTER MEET THE EDUCATIONAL NEEDS OF THE NEXT CENTURY

New Principles Should Guide an Investment Strategy for School Facilities

The debate on how to correct the substantial failings in New York City public school facilities has not produced a credible investment strategy. On the one hand, for school officials locked into a strategy to rebuild the entire network of 20th Century facilities while also developing new schools for the enrollment growth and changing technology of the early 21st Century, the issue always will be one of money. On the other hand, because of the large price tag associated with such a program, public officials at best can hope to provide small, incremental amounts that cover a very limited portion of the funding shortfall. As long as the terms of discussion continue along these lines, with the Board committed to an ever-expanding system of schools and the City confronted with what seems like an ever-contracting pool of resources, no strategy that truly solves the facility needs of the public school system can emerge.

[35] The Council of the City of New York, *Safe City...The Next Generation: School Construction and Textbook Proposal,* January 7, 1996.

Businesses in capital-intensive industries often face a similar dilemma: Given limited funds for investing in their infrastructure, how much should be allocated to repair and rebuild current technologies and how much should be invested to develop new technologies? While no hard and fast rules can determine this split exactly, some lessons from the capital planning experience of other organizations can provide guidance for New York City public schools.

For example, limited funds should not be spread thinly over a wide range of capital investments. Giving some funding to every part of an organization's infrastructure generally leads to each component exhibiting some failures. The alternative strategy, targeting resources so that a limited number of areas are functioning effectively, allows an organization to operate up to standard in some areas rather than underperforming in all areas. Another lesson suggests that, when production processes are stable, an organization should focus its resources on repairing existing infrastructure but, when processes are evolving more rapidly, an organization should invest more in creating a new capital plant. Finally, if restrictions on resources limit the number of production facilities that can be maintained, an organization should maximize its output from each of these facilities.

Each of these lessons can be used to create an investment strategy for New York City public school buildings. ***The Board should concentrate its resources in a smaller number of buildings that are maintained at a level of good repair, that provide children with appropriate, adequately sized classrooms, and that furnish space for critical activities that support core academic instruction, such as physical education, theater, and art.*** As noted above, the Board of Education operates a system of over 1,100 school buildings. The Board's current strategy, which allocates limited funds across all these buildings, results in nearly every school suffering from continued deficiencies and very few schools that meet high standards. For example, under the Board's *Crisis Strategy*, the major structural defects in all schools would be repaired, but many schools would sacrifice needed repairs to communal spaces, such as playgrounds, cafeterias, and auditoriums.

Pedagogical practices have been evolving rapidly over the last few years. Combining large class lectures with more individualized instruction for small groups within the class requires more flexible classroom space. Similarly, curricula designed to be used to instruct multiple grade levels simultaneously need more fluid designs. Perhaps most importantly, new information technologies have opened up new methods of teaching that rely extensively on computers. However, to support these technologies, buildings require wiring that can handle the increased power and telecommunications requirements, as well as space to house the equipment. Because the technology of education has shifted so dramatically, ***the Board should focus a large share of its capital resources to create facilities that support new methods of pedagogy.*** In its *Crisis Strategy*, the Board followed exactly the opposite approach, reducing educational enhancement projects by 77 percent from the *Master Plan* level while projects that repaired existing facilities were reduced by only 38 percent and new capacity projects by just 27 percent.

While targeting a limited number of facilities would create some school buildings that really worked, it also would allow some buildings that currently are functioning poorly to deteriorate even further. If some children are forced to remain in these buildings, improvements

in the education of some would be achieved at the expense of others. To avoid this zero-sum-game situation, ***the Board should develop strategies that use the best buildings in its system as intensively as possible.***

Scheduling Changes Promote More Intensive Utilization of School Facilities

Year-round schedules increase building utilization by one-third or more

Year-round education (YRE) is not a new concept in U.S. schools. Through the 1800s, cities such as New York, Philadelphia and Boston operated schools for eleven to twelve months a year. Over the same period, rural schools generally were in session for only five to six months to coincide with the time of year when the need for agricultural labor was lowest.[36] From the 1900s through the 1940s, however, as the nation became more urbanized and the education system more uniform, the nine-month school year became the national norm.

Beginning in the late 1960s and continuing today, YRE began to be re-introduced in many school systems, particularly in districts that were experiencing rapid enrollment growth. According to the National Association for Year-Round Education (NAYRE), in 1996 437 public school districts with 2,368 schools and 1.7 million students implemented year-round calendars.[37] Most of these efforts are concentrated in three states whose enrollments, like New York's, have increased substantially do to higher births rates and immigration—California, Florida and Texas account for 276 of the districts and 1,804 of the schools with YRE.

Year-round schools can be organized into "single tracks" or "multi-tracks." In the single track approach, every student in the school attends classes based on the same calendar. Proponents claim that extending instruction over twelve months produces two benefits. First, it provides an opportunity to increase contact hours between teachers and students. Even if instructional time remained constant, however, YRE can increase academic achievement. Because students, particularly those who are academically challenged, do not retain a substantial portion of their previous learning after an extended break from school, the first weeks of the new school year under the traditional calendar generally are spent reviewing old material. Therefore, the second claim YRE advocates make is that spreading instruction over the entire year with more numerous, but shorter, breaks in between enhances learning by increasing retention of old material and allowing the speedier introduction of new material.

While single-track YRE may improve academic achievement, it does not increase the capacity of limited school space; multi-track YRE does, however, provide this benefit. In multi-track systems, students and their teachers are organized in separate tracks. At different times during the year, some groups of students and teachers are in school ("on track") while others are on vacation ("off track"). For example, under the so-called "45/15" plan, all students and teachers are organized into four groups. At any one time, three of these groups will be in the

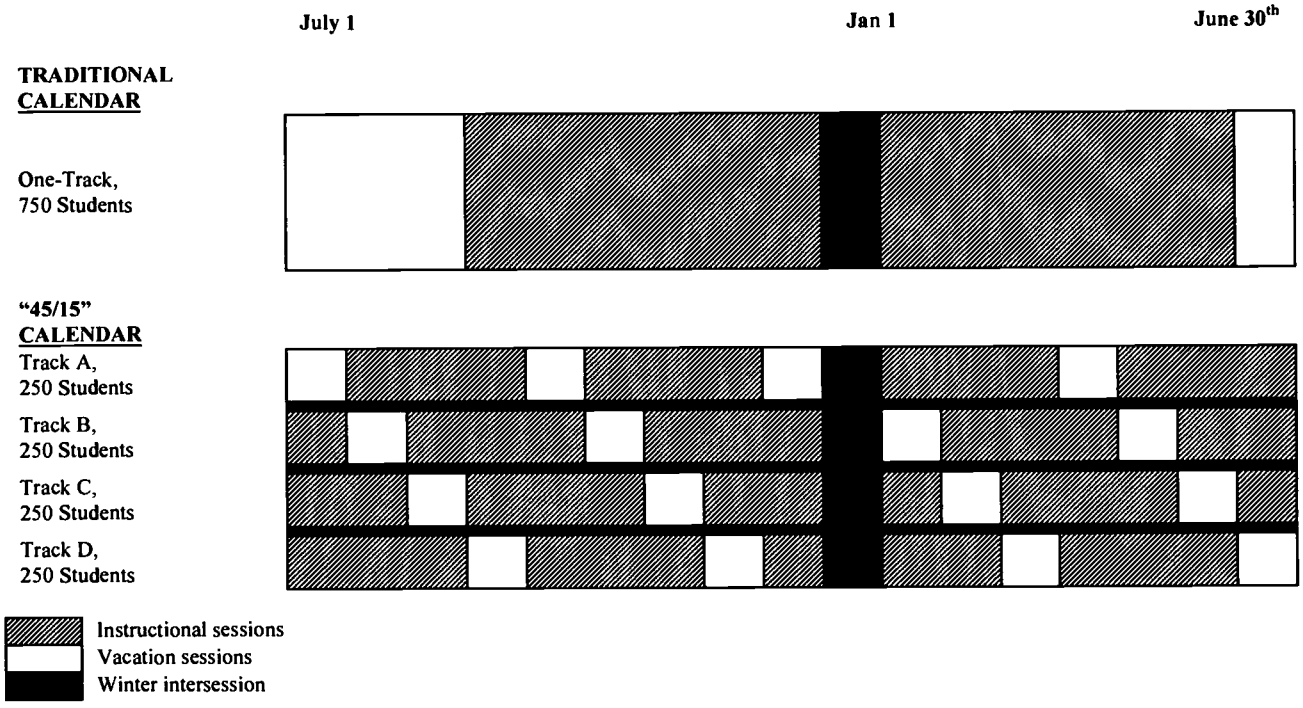
[36] Norman Brekke, "Year-Round Schools: An Efficient and Effective Use of Resources," *School Business Affairs*, May 1992, pp. 26-37.

[37] National Association for Year-Round Education, *Year-Round Education Fact Sheet,* February 1996.

midst of a 45-day period of instruction while the remaining group will be off track for a 15-day period. As a result, year-round multi-track schedules can increase the capacity of a school, generally by one-third. (See Figure 8.)

Figure 8

Capacity Under Traditional and Year-Round "45/15" Calendars



School and track sizes were chosen for illustrative purposes. Multi-track scheduling could be implemented in any size school.

The "45/15" schedule is not the only approach schools use to extend instruction over the entire year and increase the capacity of existing facilities. Other multi-track YRE schedules include the "60/20" plan (three periods of 60 days each with a common winter intersession and three 20-day breaks in between) and the "90/30" plan (two periods of 90 days each with a common winter intersession and two 30-day breaks in between), both of which also increase school capacity by one-third. Together, the "45/15," "60/20," and "90/30" plans account for 82 percent of all multi-track YRE schedules implemented in the United States.

Combined with a longer school day, an extended year calendar can double building utilization

Other school districts have faced a sudden influx of additional students at a time when their physical plant was not prepared to handle them. In fact, New York City was in such a situation from the mid-1950s to the mid-1960s. The "baby boom" following World War II, coupled with increased migration to the city, caused enrollment in New York public schools to skyrocket during this period. In 1956 903,076 students were in the system; nine years later, in

1965, 1,040,160 students, a 15.2 percent increase, were educated in New York public schools.[38] (By comparison, over the last twelve years, 1983 to 1995, enrollment has grown 12.6 percent.) While a construction program to build new schools to meet increased demand was begun, limited financial resources and difficulty acquiring suitable sites slowed the pace of this response. In need of actions that produced more immediate relief, the school system instituted a "short-time" program, which reduced the length of the school day for thousands of students from five hours to four hours or less. Schools were able to schedule two (or three) shifts of students with these short-time schedules, which in turn doubled (or tripled) capacity.[39]

Multiple shift schedules fall into two categories. New York City's policies in the 1950s and 1960s illustrates one approach, the "end-on" double shift system. Under this approach, a shorter school day permits only one shift of students to be occupying a given facility at any one time. The advantages of this approach are ① it reduces the student management problems that result when several shifts are in the building simultaneously, and ② it allows the students and teachers on each shift to be treated as a discrete unit, which facilitates scheduling of courses, staff meetings, and parent teacher-conferences. On the negative side, end-on systems, by eliminating interaction between shifts, can reduce the sense of community at a school. More importantly, their implementation generally has required the reduction of instructional time.[40]

Strategies such as these that relieve overcrowding by limiting teacher-pupil interaction reduce opportunities for student learning. The second approach, "overlapping" shifts of students, can mitigate the reduction in the amount of instructional time—one shift of students might start their school day at 8:30 and depart at 2:30 while the next will arrive at 10:00 and depart at 4:00. During the periods when shifts overlap, libraries, cafeterias, gymnasiums, and other common spaces are pressed into service to accommodate the increased number of students.[41] While this approach can reduce classroom overcrowding without reducing instructional time, it generally cannot increase the capacity of a school by as much as the end-on approach. It also creates a set of scheduling problems noted above, and leaves the facility severely crowded with children during the overlap periods.[42]

A combination of extending the school year, beginning the school day at an earlier hour, ending it at a later hour, and not scheduling lunch periods within that time frame (i.e., students have lunch either at the beginning or end of their school day) could allow schools to double shift students without reducing the amount of time students are required to be in class. To illustrate this point, take the case of a school with 750 students operating under a 180-day traditional calendar. To mirror the provisions contained in New York City's contract with the United Federation of Teachers, assume that students currently attend this school for six hours and

[38] New York City Board of Education, Bureau of Reference, Research and Statistics, *The Annual Report of the Superintendent of Schools, New York City, Statistical Section,* volumes for school year 1955-56 and school year 1964-65.

[39] Leonard Buber, "City Tries to Ease School Crowding," *New York Times,* March 1, 1995.

[40] Mark Bray, "The Quality of Education in Multiple-Shift Schools: How Far Does a Financial Saving Imply an Educational Cost," *Comparative Education,* Volume 26, Number 1 (1990), pp. 73-81.

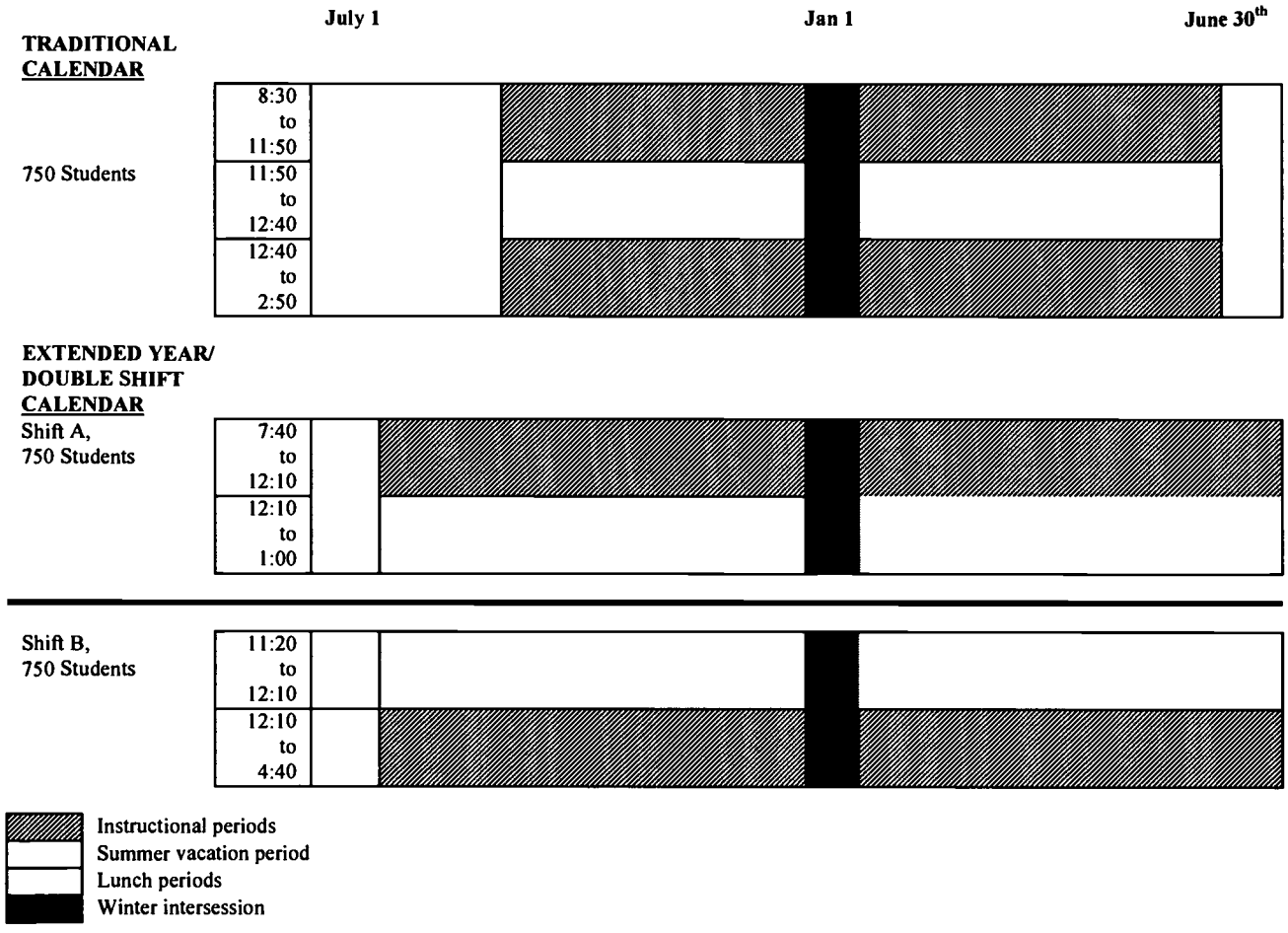
[41] A number of New York City high schools with significant overcrowding operate under an approach such as this.

[42] Bray, *op. cit.*

20 minutes each day (8:30 to 2:50), with 50 minutes off for lunch. The amount of instructional time in this schedule could be reproduced if children attended school for five hours and 10 minutes each day (again with 50 minutes for lunch) over a 220-day calendar. If this school extended the hours it operated, from 8:30-2:50 to 7:40-4:40, it could educate two separate shifts of students on the revised schedule, increasing its capacity to 1,500. (See Figure 9.)

Figure 9

Capacity Under Traditional and Extended Year/Double Shift Calendars



School and shift sizes were chosen for illustrative purposes. An extended year/double shift calendar could be implemented in any size school.

Under an extended year, double shift calendar, each student would share two common vacation periods, one during the winter and another during the summer. By establishing a common vacation schedule, this calendar would address two issues that develop with some year-round calendars. First, because all children would have the same school breaks, parents with more than one child in the school system would not have difficulty in coordinating their families' vacation plans. Second, common vacation periods would allow school officials to schedule building repair and cleaning that can be accomplished only when the school is vacant.

In Other Jurisdictions, Schedule Changes Have Reduced Costs without Creating Adverse Educational or Social Impacts

The scheduling alternatives outlined above would increase available capacity in schools substantially. Despite the need for New York City's public school system to identify ways to use its facilities more effectively, increased capacity alone cannot determine whether moving to any of these calendars would be a wise policy decision. First, while the arguments linking schedule changes with improved academic achievement make intuitive sense, the actual impact in districts where these changes have been implemented needs to be evaluated. Second, schedule changes also can have a significant impact beyond classroom instruction. For example, parents may need to change their routines in fundamental ways if the length of the school day and year are altered. In another example, student participation in extracurricular activities may be disrupted by scheduling changes. Therefore, the social impacts of schedule changes need to be considered. Finally, while increased capacity would reduce a system's capital costs, longer school days and years also would affect operating costs. For example, building operation and maintenance costs would change if a year-round calendar replaced the traditional schedule. Therefore, a full evaluation of more intensive utilization of school facilities should consider its academic, social, and financial impacts.

Schedule changes to promote more intensive facility use might improve academic achievement but, at the very least, should not reduce it

As noted above, because students have higher retention when instruction is interrupted for only short periods of time, extending the school year should facilitate more continuous learning by reducing the length of school breaks. Evaluations in a number of school districts that have implemented year-round calendars support this claim. Houston, for example, found that in the first year after YRE was introduced, students in year-round schools had gained significantly more in their standardized test scores than had a comparison group of students who attended schools with the traditional calendar,[43] and similar results were reported in Colorado school districts in the first year after they introduced YRE.[44] Evaluations conducted over longer periods also have suggested a positive academic impact from YRE. In San Diego, six years after the introduction of YRE, students in year-round schools scored as high or higher than their counterparts in schools with traditional calendars on 17 of 18 indicators of academic performance.[45] Looking at a set of 19 studies that examined year-round schooling in different states over different time periods, the NAYRE concludes "students participating in a year-round

[43] Tanya Guthrie, *Year-Round Schools Final Evaluation Report, 1984-85* (Houston: Houston Independent School District, November 20, 1985).
[44] Morris Shephard, *The Importance of Year-Round Schools* (Cambridge, MA: Abt Associates, 1975).
[45] Richard Alcorn, "Test Scores: Can Year-Round School Raise Them?" *Thrust for Educational Leadership,* April 1992.

educational setting performed better on tests than did their counterparts in a traditional calendar setting."[46]

Two cautions prevent this evidence from being viewed as conclusive. First, the designs of many YRE evaluations are suspect. For example, in Houston intensive intersession educational programs were introduced at the same time as YRE, and the evaluation of student test scores did not separate the impact that this program had from the general impact of YRE.[47] Second, not every evaluation of YRE has indicated that it improves student learning. Albuquerque reported that students in three schools were scoring lower in reading and math tests two years after the introduction of a pilot YRE program, although language, spelling, science and social studies scores were higher.[48] In addition, one study of YRE in California schools found no significant improvement in academic achievement,[49] while another California study actually found consistently *lower* scores in the YRE schools sampled.[50]

While some evaluations may suggest academic loss from YRE, the preponderance of evidence seems to suggest that its impact most likely is positive or, at the least, not negative. In addition to the studies cited above that directly examined test results, a number of studies assessed YRE impact on measures that indirectly could improve academic performance. For example, teachers, students, and parents generally approve of YRE calendars after their implementation, although strong opposition is often voiced beforehand.[51] Because it provides a greater diversity of time in which vacations and other breaks can be scheduled, YRE seems to reduce absenteeism for both students and teachers.[52] Finally, one district in Colorado indicated that YRE had a positive impact on its drop-out rate: Because students had to miss less instructional time when personal problems forced them to take a leave, they were more likely to return to school.[53]

Parents, students, teachers, and other members of the community must make adjustments to accommodate changes in the school calendar

Students, parents, teachers, businesses and other community institutions all have adapted to the traditional school calendar. Working parents arrange child care based on a school day that

[46] Walter Winter, *A Review of Recent Studies Relating to the Achievement of Students Enrolled in Year-Round Education Programs, Second Edition* (San Diego: National Association for Year Round Education, November 1994).
[47] Sue Mutchler, "Year-Round Education," *SEDL Insights*, Volume 2 (March 1993), pp. 1-5.
[48] Sandra O'Neal, *Year-Round Education: The Second Year, 1990-91* (Albuquerque, NM: Albuquerque Public Schools, Office of Planning, Research, and Accountability, October 1991).
[49] Barbara Merino, "The Impact of Year-Round Schooling: A Review," *Urban Education*, Volume 18, Number 3, pp. 298-316.
[50] C. Quinlan, C. George and T. Emmett, *Year-Round Education, Year-Round Opportunity: A Study of Year-Round Education in California*, Report No. 143 (Los Angeles: California Department of Education, 1987).
[51] Morton Inger, *Year-Round Education: A Strategy for Overcrowded Schools* (NY: ERIC Clearinghouse on Urban Education, December 1994); Gary Knox, "Seven Rules to Year-Round Schooling: Research and Dialogue Make Implementation Possible," *The School Administrator*, March 1994, pp. 22-24; Utah Foundation, *Evaluation of Year-Round Schools in Utah,* December 1990.
[52] Brekke, *op. cit.*, and Guthrie, *op. cit.*
[53] Cited in Inger, *op. cit.*

starts at 8:00 or 8:30 and ends around 3:00. Families take longer summer vacations because their children have over two months off during that time, but they rarely plan extended trips at other times of the year. Teachers use summer recesses to take a temporary job to supplement their income or to enroll for courses toward earning a higher academic degree. Businesses whose need for workers peaks in summer months depend on high school students to augment their labor pool. Summer camps are designed to accommodate the need for the supervision and development of younger children during their extended break. All of these arrangements may need to be altered if a school district shifts from a traditional calendar to one that makes more extensive use of school facilities.

Schools offer students opportunities for learning and social interaction beyond those that occur in academic classrooms. These too have been structured based on the traditional school calendar and they could be affected by new schedules that use facilities more intensively. Art, music and drama classes might be more difficult to schedule in schools running double-shifts because all available time and space may be needed to complete core academic instruction for the two sets of students. Participation on athletic teams may be disrupted if the time a student-athlete was off-shift coincided with her team's season. Membership in other extracurricular activities might drop if students in split-shift schools who finish classes at noon have to wait until 4:00 p.m. or later for club meetings to take place.

These concerns are not inconsequential. In one survey of parents whose children shifted to year-round schools, over four-fifths indicated that they had faced substantial difficulties in adjusting their family schedule to the demands of the new calendar.[54] Another evaluation of YRE found that parents transferred their children out of year-round schools for day care considerations more than for any other reason.[55]

Schools on year-round schedules have developed some strategies to address the social impact of changing from the traditional calendar. Implementing schedule changes on a district-wide basis reduces the difficulties in coordinating vacation, recreational activities and child care that families with children in different schools with different calendars face. Converting the entire school system to the same calendar also provides an incentive for other social institutions (day camps, employers, etc.) to alter their operations to accommodate the change. Allowing teachers to volunteer to teach sessions when they are off shift or off track permits them to augment their pay in their field and often is seen by them as an improvement over the practice of temporary summer employment.[56]

While there are methods for reducing its impact, changing from a schedule that has been so deeply ingrained in the lives of students, parents and teachers necessarily produces substantial hardship, particularly in the transition from the old calendar to the new one. However, the fact that, over time, these three groups express a preference for YRE over the traditional schedule indicates that many of the most pressing concerns can be mitigated, if not eliminated.

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[54] Utah Foundation, *op. cit.*

[55] Sandra O'Neal, *op. cit.*

[56] Gene Glass, *Policy Considerations in Conversion to Year-Round Schools,* Policy Briefs of the Education Policy Studies Laboratory, No. 92-01, Arizona State University, Tempe College of Education, 1992.

Alternative schedules save money for crowded districts

Year-round schools affect three categories of educational spending. First, by reducing the need to build new space, alternative schedules reduce a school district's annual capital budget costs. Second, because these schedules affect the basic school operations, they produce changes in a district's ongoing expense budget as well. For example, operation and maintenance costs for each building increase because they are used more intensively under these calendars. Finally, school systems often face transitional capital and operating costs during the process of converting calendars. For example, the addition of air conditioning units in schools can increase capital costs, while the purchase of carts to store a class' supplies for periods when it is off shift increases expense costs.

In other words, a change in schedules reduces some costs while increasing others. Determining the overall financial impact, therefore, requires aggregating all of these potential changes. One model of the potential changes in these costs indicates that, overall, the shift to a year-round calendar produces a net savings compared to alternative strategies when school enrollment exceeds available capacity by 15 percent or more—at that point, according to this analysis, capital savings outpace operating and transitional costs.[57] When enrollment exceeds capacity by more than 20 percent, according to another analysis, savings occur in both capital and operating costs that far surpass the transitional costs of creating the system.[58] Examinations of changes in costs in specific districts that have implemented YRE also support the conclusion that YRE in crowded school districts creates substantial savings.[59]

MORE INTENSIVE USE OF A SMALLER NUMBER OF BUILDINGS WOULD PROVIDE THE FRAMEWORK FOR AN AFFORDABLE, COMPREHENSIVE CAPITAL STRATEGY FOR NEW YORK CITY SCHOOL FACILITIES

The experience of other jurisdictions indicates that schedule changes that use school buildings more intensively produce a more affordable capital investment strategy, and may improve academic achievement in the process. If New York City followed these models and adopted policies that promoted greater use of its school facilities, it would surpass the current dead-end approaches that have produced either incomplete or unaffordable "solutions." To illustrate the advantages of a strategy based on greater utilization of school facilities, this section evaluates four different options:

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[57] Brekke, *op. cit.*

[58] James Bradford, "Year-Round Education: Impact on Support Services, Transportation, Operation, Facilities, and Maintenance," Paper Presented to the Annual Meeting of the Association of Business Officials of Maryland and Washington, DC, January 1995.

[59] Arthur Andersen & Co., *Cypress-Fairbanks Independent School District Financial Analysis of Year-Round Education,* May 1993; Price Waterhouse, *Cherry Creek School District: Selected Cost Analysis of Year-Round Education versus Traditional Calendar Education,* undated.

① the **Baseline Plan,** which assumes that ① current building utilization remains unchanged and ② the funds provided for facility construction and maintenance as of the fiscal year 1997 executive budget had not been increased;

② the **Cash Infusion Plan**, which augments the funding contained in the fiscal year 1997 executive budget by $1.4 billion to reflect the agreement by the Mayor and City Council to identify new revenue sources, but contains no reforms to use buildings more intensively;

③ a **Year-Round (YR) Plan**, which includes, to the extent necessary, the $1.4 billion in additional capital funding but assumes that the academic calendar will be revised to provide instruction over the course of the entire year under a "45/15" program or other YRE approach that produces a 33 percent gain in capacity; and,

④ an **Extended Year/Double Shift (EY/DS) Plan,** which also includes, to the extent necessary, the additional $1.4 billion of capital funding but extends both the school year and the school day to allow two shifts of students, doubling school capacity.

Four criteria are reviewed to evaluate how comprehensively each of these plans would correct the critical capital problems facing school facilities within the applicable funding constraints:

① the extent to which each strategy would provide adequate space for every student who will be in New York City public schools at the beginning of the next century;

② the extent to which each strategy would bring school buildings into a state of good repair;

③ the resources each strategy would provide for the effective deployment of up-to-date information technology; and,

④ the other impacts each strategy would have on the Board's capital spending.

After these four capital criteria are evaluated, this report will examine the impact of schedule changes on school operations.

Alternative Schedules Would Eliminate the Need for Hundreds of School Buildings While Providing Adequate Space for Future Projected Enrollment

As noted above, New York City's Board of Education in 1995 operated 1,070 buildings that provided elementary, intermediate, academic high school, and vocational high school instruction. The capital funding for constructing new capacity available to the Board under the

Baseline Plan, $2.4 billion between 1994 and 2003, would permit the addition of nearly 50 new school buildings.[60] However, given the range of estimates in enrollment growth between now and 2004, the additional capacity included in the baseline plan would not keep pace. Using the Department of City Planning's less aggressive estimate for enrollment growth yields a projected need for additional space of 102,439 seats; if the Board's own estimates are used, projected enrollment exceeds projected space by 209,037.

The $1.4 billion of additional funds included in the Cash Infusion Plan must be divided among the three pressing school facilities needs—creation of additional capacity, repair of existing facilities, and introduction of new technologies and other educational enhancements. If the funds were allocated among these three purposes based on the distribution of the shortfall between the Board's *Master Plan* and capital funding prior to adoption of the fiscal year 1997 Budget, projects that provided additional capacity would receive 55 percent of the additional funds, or $0.8 billion. Based on the mix of new construction, portable classroom installation, and leasing included in the Board's *Crisis Strategy*, the average cost of providing an additional seat is approximately $34,000. In other words, the supplemental resources that the Mayor and the City Council have agreed to add to the Board's capital plan would create seats for 23,400 additional students, leaving a system-wide need for 79,038 to 185,638 more seats.

The YR Plan would reduce the need for public school buildings. Assuming that ① enough elementary and intermediate buildings would be located in each Community School District to house the projected number of students in that geographic area,[61] and ② enough high school buildings would be located in each borough to provide space for that borough's projected enrollment, the public school system on this year-round schedule would require 944 to 1,023 buildings. This approach would eliminate the need to construct new elementary and intermediate schools, except in a limited number of geographic areas where projected enrollment growth is so large that existing capacity would be insufficient even with the year-round calendar. Based on the Board's figures on current space availability, a large amount of additional high school space still would need to be constructed, even under a year-round calendar. While there are significant doubts about the accuracy of the Board's capacity figures, using them provides a conservative estimate of the projected impact of increasing the utilization of buildings. Accordingly, the cost of providing adequate space in a nearby school for each student under the YR Plan would be $1.3 billion to $3.0 billion, depending on projected enrollment.

The EY/DS Plan would reduce the need for school buildings even further. Again, using a methodology that matches the geographic distribution of remaining schools to projected enrollment, providing space for the entire student population in 2004 would require 648 to 709 school buildings. This strategy would eliminate the need to create any new space, whether one uses the City Planning enrollment projection or the one produced by the Board. ***By avoiding the***

[60] Appendix A provides a description of the sources and methodology used to calculate the figures cited in this section.

[61] Retaining the breakdown of Community School Districts is used as a proxy for geographic proximity of schools to the student population and is not meant as an endorsement of the CSDs as part of the public school system's governance structure.

cost of new construction, the Board, if it introduced an EY/DS Plan, could reallocate the entire $2.4 billion that had been scheduled for projects to increase capacity.

With Fewer Buildings in Operation, the Board of Education Could Bring More to a Standard of Good Repair

The *Year 2003 Master Plan* provides the best yardstick against which to assess how well the four plans would ensure that each school building was repaired adequately. Because the *Master Plan* was based on a comprehensive inventory of all projects necessary to renovate building exteriors, repair or replace internal systems, and provide each school with the basic facilities it needed, the extent to which the four plans would fund every project in those buildings that remained in the system should approximate the gap between the likely condition of school infrastructure after implementation of each plan and the ideal condition of that infrastructure.

The Baseline Plan, as noted above, would have funded less than one-half of the projects that would be necessary, according to the *Master Plan*, to make all of the necessary repairs in the current system of school buildings. Funding under the Baseline Plan also fell short of providing the resources necessary to meet the standards contained in the *Crisis Strategy*: Approximately $1.6 billion worth of projects that the Board estimated were necessary to meet minimum standards of repair in the schools would not be funded under the Baseline Plan.

The Cash Infusion Plan would support additional projects for the improvement of existing facilities. Again, if the supplemental funds under this plan were distributed based on the relative shortfall in meeting the Board's need (as defined in the *Master Plan)*, $0.4 billion would be available to promote modest gains in the condition of school buildings. However, this plan still would fund barely half of the improvements envisioned in the *Master Plan,* and even the minimum standard established in the Board's *Crisis Strategy* would not be met completely.

Because both the YR and EY/DS Plans reduce the number of buildings in the public school system, more resources can be targeted to each facility. Importantly, fewer buildings can produce a reduction in the cost of repairing the system that is well beyond the percent reduction in the number of facilities: those buildings in a particular area requiring the most extensive repairs are the ones that likely would cease operations. Based on the detailed list of projects by school included in the *Master Plan,* the reduction in the number of schools needed under the YR Plan would lower the cost of repairing and renovating the buildings remaining in the system from $11.3 billion to $8.4 billion, assuming the lower enrollment projection, or to $8.9 billion using the higher one. Under either enrollment scenario, the YR Plan would not free up enough resources to fund these projects totally. However, if the lower projection held true, 92 percent of the system's repair needs could be financed within existing funding levels; because more resources would be consumed constructing additional capacity if higher enrollment growth occur, only 67 percent of all repair needs could be financed given current funding. Both instances mark significant improvements over the Cash Infusion Plan.

Under the EY/DS Plan, the cost of repairing all remaining facilities is even smaller, between $7.1 billion and $7.8 billion, depending on enrollment projections. Because the need to construct new space is eliminated, allowing billions of dollars to be re-allocated to other capital needs, under either enrollment growth scenario ***enough resources are available within the Board's current capital funding to support all necessary repair and renovation projects fully if the EY/DS Plan were implemented.***

With Fewer Buildings in Operation, the Board of Education Could Afford to Provide More Technology and Other Educational Enhancements

Classrooms, libraries, and laboratories need to be modernized if New York City schools are going to provide the type of instruction that the 21st Century will demand. Facilities should be outfitted with computers that are networked to other computers within and outside the school, seating that allows flexible arrangements of students, laboratories with up-to-date equipment, and libraries that are multimedia resource centers. The extent to which the four plans fund these improvements was assessed based on an estimate of the cost of providing the following:

- one classroom computer for every five students in the school;
- printers and scanners to work with the computers in each classroom;
- one large computer lab for each school;
- networking of all computers;
- electrical and other system changes to support the new technologies;
- room conversions to allow more flexible seating arrangements;
- upgrade of science labs in intermediate and high schools; and,
- improvements in libraries in each school.

Under the Baseline scenario, the cost of providing these improvement would total $1.6 billion. Virtually none of these plans could have been implemented with the funding available before the $1.4 billion was added to fund Board projects. With the extensive new capacity construction and existing building repairs it needed, the Board had assigned educational enhancements the lowest priority when allocating scarce capital resources.

The new funds provided by the Cash Infusion Plan would do little to change this. Given the Board's current approach, the need for creating new capacity and repairing existing capacity is so large that these two problems would consume the majority of new funds. As a result, even if $0.2 billion in additional resources were made available, the Board would be able to fund just 11 percent of the cost of improving the current system of buildings. It should be noted that plans to promote voluntary efforts to wire every school building in New York State would not improve

the situation much: If the cost of wiring school buildings is deducted from the estimated price tag of educational improvements, the Board would be able to fund only 12 percent of the remainder under the Cash Infusion Plan.

While the YR Plan avoids much of the cost of constructing new capacity, the savings generated are consumed entirely by the cost of ensuring that the buildings in use have received as many of the necessary structural renovations and system repairs as possible. Therefore, additional funds for educational enhancements over the amount assumed in the Cash Infusion Plan would not be available. However, because the YR Plan reduces the number of schools in the system, the cost of providing those buildings with the full array of educational enhancements is reduced. Consequently, the $0.2 billion from the Cash Infusion Plan assumed to be earmarked for educational enhancements would cover 12 to 13 percent of the total costs; if voluntary efforts could provide the necessary wiring of every school, 13 to 15 percent of the total enhancement program could be funded.

The more substantial reduction in the number of needed school buildings under the EY/DS Plan creates the opportunity for greater investment in educational enhancements. Based on either enrollment projection, ***the EY/DS Plan would save enough money from avoided construction costs to fund all necessary structural and system repairs*** **and** ***have enough funds remaining to fund fully the educational enhancements program outlined above.***

If Affordable, Schools Should Be Air-Conditioned to Facilitate Longer School Years

Under both the YR Plan and the EY/DS Plan, New York City school buildings would be used further into the summer months. Air-conditioned school buildings would make instruction during July and August more comfortable. In the *Year 2003 Master Plan*, the Board estimated that retrofitting school buildings with air conditioning would cost $655,000 per building, in 1992 dollars; escalating that figure to reflect recent inflation rates would bring it to $730,000 per building. Based on that cost, air conditioning every school building anticipated under the YR Plan would require over $0.6 billion. For the EY/DS Plan, the cost would run between $0.4 and $0.5 billion. As noted above, repairing remaining facilities would consume all the savings from the YR Plan. However, under the EY/DS Plan, enough capital resources would remain at the Board's disposal to retrofit 60 to 100 percent of all remaining school buildings with air conditioning.

Summary: Strategies That Promote More Intensive Use of Buildings Would Relieve Overcrowding, Repair More Buildings, and Invest Greater Amounts in Educational Enhancements

The Baseline Plan presented an unacceptable solution to the problems of New York City school facilities. There would not have been sufficient space for 102,000 to 209,000 students. In

addition, only 48 percent of the work needed to repair school buildings would have been completed, and no investment in new technologies would have been possible. (See Table 7.)

Table 7
Summary of Capital Impacts of Alternative Strategies

	LOW ENROLLMENT PROJECTION				HIGH ENROLLMENT PROJECTION			
	BASE-LINE	CASH INFUSION	YR PLAN	EY/DS PLAN	BASE-LINE	CASH INFUSION	YR PLAN	EY/DS PLAN
NUMBER OF BUILDINGS								
Elementary Schools	777	787	636	430	777	787	691	478
Intermediate Schools	189	191	157	115	189	191	167	121
High Schools	151	163	151	103	151	163	165	110
TOTAL	1,117	1,141	944	648	1,117	1,141	1,023	709
CAPITAL FUNDING:								
1993 to 2003 ($ in billions)								
New capacity	$2.4	$3.2	$1.3	$0.0	$2.4	$3.2	$3.0	$0.0
Repair of existing capacity	5.4	5.8	7.7	7.1	5.4	5.8	6.0	7.8
Educational enhancements	0.0	0.2	0.2	1.1	0.0	0.2	0.2	1.1
Air conditioning	-	-	-	0.5	-	-	-	0.3
TOTAL	$7.8	$9.2	$9.2	$8.7	$7.8	$9.2	$9.2	$9.2
MEASURES OF STRATEGY EFFECTIVENESS								
OVERCROWDING								
Projected Enrollment Over/(Under) Capacity								
Elementary schools	14,110	7,118	(13,589)	(23,306)	73,827	64,803	(990)	(25,041)
Intermediate schools	(996)	(4,946)	(22,899)	(49,591)	16,177	12,432	(21,683)	(47,520)
High schools	89,325	76,866	(1,986)	(10,626)	119,033	108,403	(1,487)	(2,395)
TOTAL	102,439	79,038	(38,474)	(83,523)	209,037	185,638	(24,160)	(74,956)
REPAIR								
Percent of:								
Master Plan funded	48%	51%	92%	100%	48%	51%	67%	100%
Crisis Strategy funded	84%	90%			84%	90%		
EDUCATIONAL ENHANCEMENTS								
Percent of:								
Program funded (incl. wiring)	0%	11%	13%	100%	0%	11%	12%	100%
Program funded (excl. wiring)	0%	12%	15%	106%	0%	12%	13%	114%

The agreement between the Mayor and the City Council provides only moderate relief from these conditions if it were spent based on the Board's current strategy. While fewer students would go without adequate space and more buildings would be repaired, the improvements would be modest—enrollment would exceed capacity by 79,000 to 186,000, and only 51 percent of building repairs and 11-12 percent of educational enhancements would be completed.

With the YR Plan, the additional money approved by the Mayor and Council would be used more wisely. That plan would provide enough space for every student, repair 67 to 92 percent of the buildings in the system, and fund 12 to 15 percent of the educational enhancement

program. However, this particular schedule would not permit funding of all necessary projects: At least five-sixths of educational enhancement projects would be deferred and no air-conditioning would be provided in buildings where instruction was occurring in July and August.

The EY/DS Plan provides the most complete and affordable strategy. Regardless of the level of enrollment projected for the beginning of the next century, sufficient space would be available for all students, every school would be in a state of good repair, and the entire educational enhancement package would be funded. In addition, nearly every building would be air conditioned to make summer instruction more comfortable.

USING BUILDINGS MORE INTENSIVELY WOULD ALTER SCHOOL OPERATIONS

Schedule changes affect more than just the utilization of school facilities. Teacher assignments must be altered to conform to the calendar changes. Other pedagogical personnel, such as principals, guidance counselors, and school secretaries also must be used differently if the school calendar becomes year-round. Building operation and maintenance must be changed. Finally, shifting from a traditional to a year-round calendar creates some transition needs. In addition to the changes engendered by a Year-Round (YR) or Extended Year/Double Shift (EY/DS) calendar themselves, the extensive introduction of new information technologies in schools that could be funded under the EY/DS Plan also would result in different operational needs.

The Hours Worked and Students Served by Each Teacher Should Remain the Same with Year-Round and Extended School Year Calendars

Under the various extended school year options described above, teachers' schedules would be altered to mirror the new schedule for children. For example, if children shift to a 45/15 year-round calendar, teachers also would have four sessions of 45 days of instruction with four 15-day periods of break interspersed between them. As with the children, in this example three-quarters of teachers would be on-shift at any one time while one-quarter would be off-shift. Similarly, under a double shift calendar teachers also would be divided into shifts.

Because changing from a traditional school year calendar to a year-round or extended year calendar should maintain the number of hours that students receive classroom instruction, the number of hours that teachers provide classroom instruction and the number of children in each class should remain the same under the YR or EY/DS plans. Consequently, a shift in calendars should create neither additional costs nor savings to the operating budget.

In some instances, however, the costs associated with hiring teachers may change. Take for example an elementary school serving grades one through six. Each of the six grades is designed to have three classes of 25 students apiece. The capacity of such a school would be 450

students (six grades times three classes per grade times twenty five students per class) and the number of teachers would be set at 18. If this school were operating at 133 percent of capacity, each classroom would contain 33 children instead of the planned 25. By shifting to a 45/15 year-round schedule, the school's capacity would be raised to 600 (six grades times four classes per grade times twenty five students), enough to handle the student population. However, to implement this calendar the school would need to hire one additional teacher in each grade.

Of course, the opposite situation also holds true. If a school is significantly under capacity, a shift to a calendar that uses the school more intensively might allow the consolidation of classes and reduce the demand for teachers while maintaining target class sizes. Because the number of buildings now under capacity is roughly equal to the number over capacity, a shift to an extended school year calendar, at least in the short term, should be accomplished largely by shifting teachers among schools.

More Non-Teaching Pedagogical Personnel Would be Available at Each School under Year-Round and Extended School Year Calendars

In 1995, the average school building employed 7.6 principals, assistant principals, guidance counselors, school secretaries, and other non-teaching pedagogues.[62] If the number of buildings in the school system increased as estimated under the Baseline and Cash Infusion scenarios, the number of these non-teaching pedagogical personnel would drop to approximately 6.0 per school building if no additional resources were identified to hire more workers. (See Figure 10.)

Under extended year calendars, these pedagogical employees, unlike teachers, would not be assigned on shifts to mirror the calendar of the students. Particularly with positions such as principal, where there is only one per school, it would be more practical to extend the work year and adjust compensation accordingly.

Increasing compensation to reflect the longer work year of non-teaching pedagogues would increase the Board's operating costs. On the other hand, the reduction in the number of schools in the system would lower the need for some of these types of employees and make resources available to fund salary increases. For example, with no additional funding, a YR calendar would allow 6.7 to 7.2 non-teaching pedagogues to be employed on a year round basis at the average school, an 11.8 to 20.9 percent improvement over the Cash Infusion scenario.[63] The gains under the EY/DS plan are more substantial—9.6 to 10.5 non-teaching pedagogues could be employed for the full year in the average school without increasing spending. This represents a 60.9 to 76.1 percent improvement over the Cash Infusion scenario and, moreover, a 25.8 to 37.6 percent improvement over 1995 actual conditions.

[62] Appendix B provides a description of the sources and methodology used to calculate the figures cited in this section.

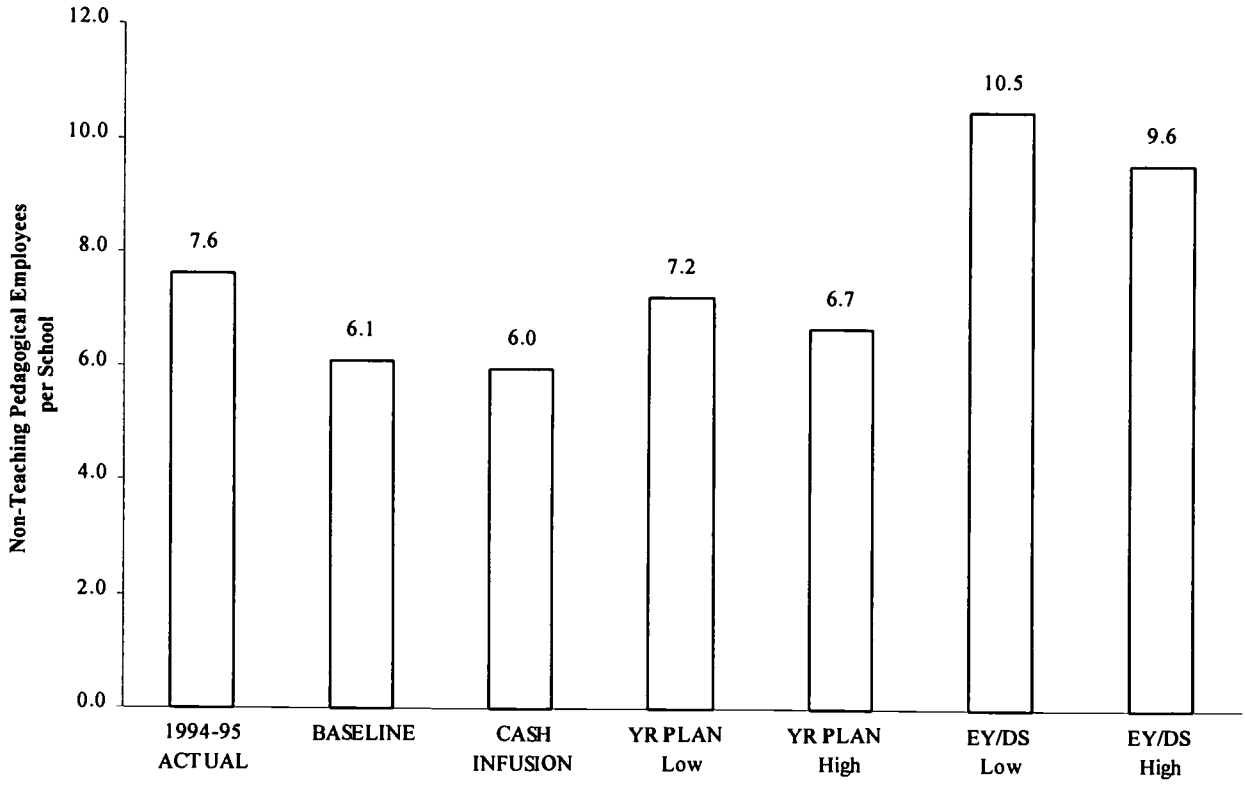
[63] The range of values for non-teaching pedagogical personnel per school reflect the range in the number of schools that would be required based on the different projections of enrollment increases.

More Funds Would Be Available for Building Maintenance under Year-Round and Extended School Year Calendars

In addition to changing the way teachers and instructional support personnel are used, shifting from a traditional school calendar to one that extended the length of the school year also would alter auxiliary functions. Most importantly, the operation and maintenance (O&M) of a school using an extended year calendar would be different than that of a school on a traditional calendar.

Figure 10

Non-Teaching Pedagogical Personnel Per School Under Alternative Strategies



Source: New York City Board of Education, Division of Human Resources and Labor Relations

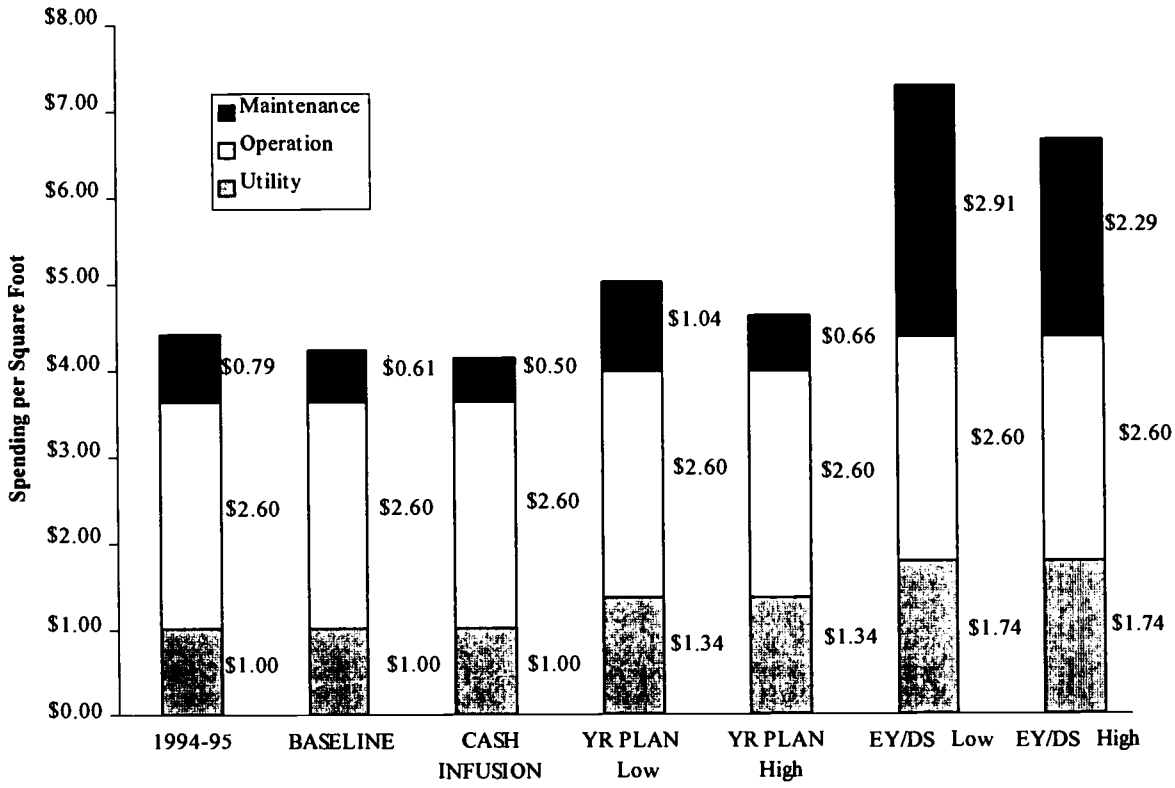
In 1995, the Board of Education spent nearly $500 million to operate and maintain the 108.9 million square feet of space in Board facilities, or $4.39 per square foot. Only $0.79 per square foot was spent to maintain schools. The rest of the money was spent on utilities such as electricity and gas for school buildings ($1.00 per square foot), and personnel costs for school custodians and other workers and other-than-personal service costs related to building operation ($2.60 per square foot).

As noted above, the $0.79 per square foot maintenance spending is significantly below the standard others follow to prevent deterioration of facilities. Assuming that no additional resources are added to the Board's O&M budget, if the number of schools in the system increases in order to meet enrollment needs, maintenance costs would decline further. Utilities costs necessarily would grow with additional buildings, as would the number of personnel, such as custodians, needed to direct their operations. As a result, funds for maintenance would be diverted to support basic operations if the size of the school system's infrastructure increases without an increase in the total O&M budget.

Therefore, the future prospects for adequate maintenance of school facilities are not promising. Using the Baseline Plan and holding O&M funding constant, maintenance spending would drop to $0.61 per square foot. (See Figure 11.) Under the Cash Infusion Plan, the results would be even worse, with spending falling to $0.50 per square foot, a decline of 37 percent from the already-inadequate level in 1995.

Figure 11

Operation, Maintenance and Utility Costs Per Square Foot



Source: City of New York, *Comprehensive Annual Report of the Comptroller* and *Mayor's Management Report.*

By reducing the number of buildings that must be maintained, both the YR and EY/DS plans would provide relief from this downward spiral. Buildings would be in operation for longer hours, so utility costs per square foot would increase under extended school year calendars.

However, even after this adjustment, enough of the Board's current O&M allocation would remain to fund maintenance spending per square foot that significantly exceeds the levels projected under the Baseline and Cash Infusion plans. With the YR approach and current funding levels, maintenance spending per square foot would be $0.66 to $1.04. With the EY/DS Plan, the gains are even greater—maintenance spending would be between $2.29 and $2.91 per square foot, more than the amount that managers of downtown Manhattan office buildings reported they spent for maintenance ($2.25 per square foot).

One-Time Operating Costs Associated with Shifting to Year-Round or Extended Year Calendars Would Be Relatively Small

In addition to ongoing changes in O&M costs, a shift to an extended year calendar would incur a limited amount of additional one-time costs. Surveys of administrators in school districts that have implemented new school calendars indicated that the two largest operating costs associated with the transition are for planning for the change and providing storage for classroom materials.

Introducing a new school calendar requires a significant amount of planning. From restructuring the curriculum to determining new bus routes, school administrators and teachers can spend many hours preparing for the schedule change. However, even if the planning tasks associated with the shift to an extended year calendar required the equivalent of one full-time person per school, the total costs would be less than $41 million.

Both the YR and EY/DS plans are based on different groups of teachers and students using the same classroom at different times. School districts that have implemented these types of calendars generally provide carts to store the supplies, educational materials, and student work of one class while another class is using the shared space. If one cart is bought for every teacher the initial start-up cost would be approximately $55 million, with ongoing costs of $11 million a year for replacement, assuming a five-year replacement cycle.

The Introduction of Information Technologies Would Increase Training, Maintenance, and Utility Costs

As demonstrated above, the introduction of an EY/DS calendar would allow every building in the New York City school system to be outfitted with classroom computers, interactive libraries, and science labs with up-to-date technologies. However, this new equipment would be of little value if teachers were not trained to use it for more innovative instruction. In addition, computers and related technologies cause building operation costs to increase (for example, electricity costs increase with greater computer usage) and require maintenance contracts to keep the equipment in good operating order.

As a result, with an EY/DS calendar, additional resources would need to be identified to fund the cost of professional development and the additional operating expenses incurred

because of the introduction of new information technologies. Based on one study of the level of these costs that might be incurred when information technology is introduced, the Board could need to spend an additional $58 to $63 million annually.[64]

Summary: Year-Round and Extended Year Calendars Would Improve the Effectiveness of Current Maintenance Spending and Require Only Limited Additional Operating Funds to Implement.

The analysis outlined above demonstrates that the major operating changes associated with a shift to a year-round or extended year calendar do not present insurmountable difficulties and, in the case of school maintenance, provide an opportunity for substantial gains. The work year of teachers would be altered, but the total amount of time they teach and the number of children they instruct would not increase necessarily to implement these calendars. Principals, assistant principals, and other non-instructional workers would see their work years extended under the new calendars, but their salaries would be increased to compensate them for their increased work hours.

With fewer schools to maintain, the Board's current allocation for operating and maintaining schools could be used more effectively. Even after accounting for the increased operating costs associated with using schools more intensively, schedule changes would allow an 8 to 375 percent increase in maintenance spending per square foot over the amount projected under the Baseline scenario.

The new calendars, and the introduction of new technology that they would permit, would increase some operating costs. However, these increases (approximately $100 million in one-time costs and another $100 million annually of ongoing costs) are small in comparison to the extraordinary relief to overcrowding, crumbling facilities, and inadequate ongoing repair that extended school year calendars promote.

CONCLUSION

Others have recognized that introducing year-round education and double-shifting students separately can provide some relief from the increasing strains being placed on New York City's school facilities, and have recommended that these solutions be implemented in portions of the school system.[65] However, only the combination of an extended school year and extended school day implemented system-wide would support a comprehensive solution for all school infrastructure needs. Therefore, Board of Education administrators, City and State officials, union officers, and other education leaders should develop plans to launch this

[64] McKinsey & Company, *op. cit.*

[65] See in particular City of New York, Office of the Comptroller, *Overcrowding in New York City Public Schools: Where Do We Go From Here?* January 1995.

initiative. Implementing the new schedule would place significant demands on parents, children, school administrators, teachers, and social service institutions, and these difficulties should not be understated. However, the alternative is unacceptable. The current school facilities strategy will sentence millions of students to be educated in cramped, deteriorating buildings designed for outdated instructional methods. Under the new calendar, they would attend spacious, structurally sound, well-maintained and well-equipped schools. New York City's children deserve nothing less than this.

APPENDIX A: METHODOLOGY FOR ESTIMATING CAPITAL IMPACT

This report presents an analysis of the capital impact of four policy alternatives:

① the **Baseline Plan;**

② the **Cash Infusion Plan**, which maintains the baseline approach but augments the funds available to carry it out to reflect an agreement between the Mayor and City Council;

③ a **Year-Round (YR) Plan,** which assumes that the Board introduces year-round instruction that would have each child attend school for 45 days, followed by 15 days off; and,

④ an **Extended Year/Double Shift (EY/DS) Plan,** which also assumes that the Board extends instruction beyond the current September-June calendar, but which also extends the school day to allow two shifts of students to attend the same school.

New Capacity

The Baseline Plan provided $2.4 billion for the construction of new capacity. The Board's *Crisis Strategy* estimated that this funding could produce 50,650 seats. This report assumes that these seats will be allocated based on estimated capacity shortfall; the Board's enrollment and space availability figures were used to calculate elementary, intermediate, and high school space needs in each district and each high school borough and that distribution was used to allocate the newly constructed seats. If enough seats were allocated to any one district or high school borough to constitute an additional school (600 for elementary, 900 for intermediate, 1000 for high schools) in that area, the estimated number of buildings in the system was increased.

As this report was being finished, the Mayor and the City Council agreed in the 1997 adopted budget to add $1.4 billion to fund new capital projects. The distribution of these new funds among the Board's three capital needs (building repair, new capacity, and educational enhancements) was estimated to parallel the shortfall between available funding and the need as stated in Table 6.

The *Crisis Strategy* estimated that Board could create 196,000 seats for $6.7 billion, or approximately $34,000 per seat. Based on this figure, $0.8 billion of additional funding would provide 23,400 seats. These seats were distributed among elementary and intermediate schools in the districts and high schools in the boroughs based on the estimate of space need of each developed for the Baseline Plan, and the number of schools was increased based on the same rule outlined above.

The YR Plan estimated that all existing school capacity would increase by a factor of 1.33 if a year-round calendar were instituted. If enrollment in an individual district's elementary and intermediate schools or a borough's high schools still would have remained more than 5 percent above capacity (the Board's standard for overcrowding) the analysis assumed that another school would be constructed. The cost of providing these additional seats was projected based on $34,000 per seat. If a district or a borough would have excess capacity with the year-round calendar, the number of schools was reduced to bring each district's and borough's capacity in line with its projected enrollment.

The EY/DS Plan estimated that all existing school capacity would increase by a factor of 2.00 with the longer school year and longer school day. The number of schools in each district and borough was reduced to bring capacity down to a level that matched projected enrollment. (Under the EY/DS Plan, no district or borough would need to construct any new space.)

Repair of Existing Buildings

The detailed list of projects contained in the *Year 2003 Master Plan* was used as a measure of the projects that would need to be completed to bring New York City schools into good repair. They were organized on a school (elementary, intermediate, and high) and district/borough level. Both the YR and EY/DS plans would eliminate the need for many of these projects. To estimate the impact, the most expensive repair projects were eliminated based on the estimated reduction in the number of schools needed under different schedules. For example, if a district's elementary schools could be reduced by two under an extended year or year-round calendar, the two most expensive projects would be taken off the list of projects needed to bring the system into good repair.

Educational Enhancements

The analysis of the ability of different plans to provide needed educational enhancements relied on multiple sources. Board officials provided an estimate of the costs for providing wiring for computers and other information technologies ($120,000 for each elementary school, $200,000 for each intermediate school, and $500,000 for each high school), library upgrades ($100,000 per building) and science labs ($175,000 per lab).[66] A McKinsey & Company report produced estimates of the cost of purchasing computers ($2,000), printers ($535), and scanners ($675), establishing computer labs ($53,000), and upgrading internal systems ($271,800).[67] The Board's estimate of the total cost of converting rooms to provide more flexible seating ($500 million in 1992 dollars, $559 million in 1996 dollars) was divided among the 1,070 current buildings to derive a $523,000 cost per building.[68] Each of the these costs was applied to the

[66] Telephone interview with Rose Diamond, Senior Director for Capital Administration, Division of School Facilities, New York City Board of Education.
[67] McKinsey & Company, *op. cit.*
[68] New York City Board of Education, *op. cit.*, April 28, 1993.

estimates of the number of buildings and the number of school children under the various plans and enrollment projections to determine the total costs of providing educational enhancements.

Air Conditioning

The *Year 2003 Master Plan* called for retrofitting 15 elementary schools with air conditioning at a total cost of $9.8 million, or approximately $650,000 per school, in 1992 dollars. Escalating this figure by 11.7 percent to reflect four years of inflation brought the per school figure to approximately $730,000. Also according to the *Year 2003 Master Plan,* 60 school buildings already are air conditioned. The estimate of the total cost of air conditioning the entire system of buildings under the year-round and extended year calendars was derived by reducing the total estimated number of buildings in each scenario by 60 and multiplying the remainder by $730,000.

APPENDIX B: METHODOLOGY FOR ESTIMATING OPERATIONAL IMPACTS

This report analyzes the potential impact of four capital strategies for New York City public schools on ① the number of teachers and other non-teaching pedagogical personnel available per school after the implementation of each strategy, ② the level of maintenance, operation, and utility spending that could be sustained in each building under the alternative scenarios, and ③ the additional expenses that would be associated with providing an extensive array of educational enhancements in every school building.

Number of Teachers

Neither an extended year nor a year-round calendar should change the need for teachers. Under each plan, the total annual number of instructional hours remains constant for both teachers and students.

Number of Non-Teaching Pedagogical Personnel

During 1995, 8,158 principals, assistant principals, and other non-teaching pedagogical personnel were located in New York City schools. This figure excludes non-teaching pedagogical personnel who worked in Community School District and central administrative offices, as well as psychologists, social workers, and other personnel employed in special education and bilingual/English as a Second Language education.[69] With 1,070 school buildings

[69] Data provided by the New York City Board of Education, Division of Human Resources and Labor Relations.

in operation, an average of 7.6 non-teaching pedagogical workers were at each school site. That average would drop to 6.1 with 1,117 buildings (as estimated in the Baseline Plan) and 6.0 with 1,141 buildings (as estimated in the Cash Infusion Plan).

Because schools are in operation from September to June, these employees' salaries cover ten months of work. If they earned the same monthly salary for an additional two months, the total number of employees that could be covered by the current salary pool would be reduced to 6,798 full year employees (ten-twelfths of 8,158). This figure was divided by the number of schools estimated to be needed under the YR Plan and the EY/DS plans to determine the full-year equivalent number of personnel that would be present at each school site given current funding levels.

Operation and Maintenance Spending

Total 1995 spending for operating and maintaining school buildings was determined by combining the Division of School Facilities (DSF) spending ($369 million) with the amount spent for utilities ($109 million).[70] Total square footage in school buildings and maintenance spending per square foot were reported directly.[71] The remainder of the DSF's spending was attributed to building operation and was used to calculate operational spending per square foot and utility cost per square foot.

In the alternative scenarios, the total amount of square footage was assumed to vary in proportion to the number of buildings anticipated. For example, the 1,117 buildings projected under the Baseline Plan, 4.4 percent over 1995 levels, were anticipated to increase total square footage by 4.4 percent. Furthermore, operating cost per square foot was assumed to remain constant (i.e., the cost of operating a building would remain constant whether it was run under current calendars or under extended year calendars). However, utility costs were projected assuming that increased hours of operation would increase utility costs proportionally. Therefore, a utility cost per square foot per hour of operation was calculated for 1995, based on a 180-day, 6-hour-and-20-minute per day calendar. This figure was held constant throughout all scenarios—the YR plan assumed a 240-day, 6-hour-and-20-minute per day calendar, and the EY/DS Plan assumed a 220-day, 9-hour per day calendar.

After the cost of operating and providing utilities to each school building in the system was calculated, the remainder of the current allocation of funds for operation, maintenance, and utilities was assumed to be available for building maintenance. This amount was then used to estimate maintenance spending per square foot.

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[70] City of New York, *Comprehensive Annual Financial Report of the Comptroller for the Fiscal Year Ended June 30, 1995,* October 27, 1995.

[71] City of New York, Office of Operations, *op. cit.,* September 1996.

Transition Costs

The estimate of the one-time additional cost of assigning one full-time staff member to coordinate the transition to an extended year calendar was derived by multiplying the total estimated number of schools (648 to 1,023) by $40,000, a rough estimate of the cost, including fringe benefits, of hiring one new worker.

The estimated cost of providing one storage cart for each teacher was derived by multiplying $800, the highest reported estimate of the cost of one cart,[72] by the total number of teachers in New York City public schools in 1995, 68,161.[73]

Costs Associated with Large Scale Introduction of Computer Technologies

The McKinsey & Company study of the cost of connecting schools to the information superhighway estimated that the average school, after it was provided with modern equipment, would require nearly $90,000 in new funding each year to pay for the cost of the additional professional development and operating costs that would follow.[74] That figure was multiplied by the number of schools anticipated under the EY/DS Plan (648 to 709) to determine the additional operating expense the Board might anticipate to support new information technologies.

[72] Arthur Andersen & Co., *op. cit.*
[73] Data provided by the New York City Board of Education, Division of Human Resources and Labor Relations.
[74] McKinsey & Company, *op. cit.*

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