THE CENTER
FOR GREEN SCHOOLS

# 2013 STATE OF OUR SCHOOLS REPORT

# PREFACE FROM
# RICK FEDRIZZI + RACHEL GUTTER

Few subjects in American life elicit more hand-wringing and finger-pointing than the state of our public schools. We complain that administrators and policymakers meddle too much, that teachers are disempowered, that parents are disengaged and that students are disinterested. We regularly decry the teach-to-the-test mentality and outdated curricula that fail to prepare the students of today for the opportunities of tomorrow.

We've spent so much time spinning our wheels over how to fix the *who* and the *what* of education, we've ignored what needs to be done to fix the *where*. Not only are the places where our children learn vitally important to a quality education, but improving those places is something we know how to do.

We know how to increase energy and water efficiency to save taxpayer dollars and put money back into the classroom where it belongs. We know that increasing daylight, optimizing acoustics and improving indoor air quality will enhance our children's ability to learn and our teachers' ability to teach.

Although we know how to repair the crumbling infrastructure of our nation's schools, we don't know where to begin, nor do we understand the full scope of the problem. The fact is, it has been a whopping 18 years since the U.S. government took a comprehensive look at the physical condition of the nearly 100,000 primary and secondary public schools in our country. We can't continue to ignore a problem just because we don't understand the extent of it.

In this first annual State of Our Schools report, our best guess is that it will take approximately $271 billion to bring school buildings up to working order and comply with laws. If we add to that modernization costs to ensure that our schools meet today's education, safety and health standards, we estimate a jaw-dropping $542 billion would be required.

We need more precise, more detailed and more accurate information to direct our efforts to restore, repair and revive our schools. That's why the Center for Green Schools at the U.S. Green Building Council, along with our partners, is calling for an updated survey on the condition of America's schools. A clear understanding of the current state of educational facilities would allow us to direct our limited dollars to where they are needed most, ensuring that all of our children have the opportunity to attend a school that is healthy and safe, and one that enhances their ability to learn, grow and thrive.

***Rick Fedrizzi***
President, CEO and Founding Chair
The U.S. Green Building Council

***Rachel Gutter***
Director
The Center for Green Schools at
the U.S. Green Building Council

# FOREWORD FROM PRESIDENT CLINTON

Since I first became governor more than 30 years ago I have visited countless schools, and I know that where our kids learn is critical to their success. That's why, as President, I prioritized classroom modernization, renovation and new construction with several key initiatives — including the release of a Government Accountability Office report that was the first comprehensive federal assessment on the state of our school buildings since 1965.

The report, *School Facilities: Condition of America's Schools*, began a national conversation with governors, mayors, state legislators, and local officials on the importance of safe, healthy and energy-efficient classrooms. We also released *Schools as Centers of Community: A Citizens' Guide For Planning and Design*, a report still used today, and we created the National Clearinghouse for Educational Facilities with funding from the Department of Education.

Yet nearly 20 years later, in a country where public education is meant to serve as the "great equalizer" for all of its children, we are still struggling to provide equal opportunity when it comes to the upkeep, maintenance and modernization of our schools and classrooms.

Through the work of organizations like the Center for Green Schools at the U.S. Green Building Council, the American Federation of Teachers, the American Lung Association, the National Education Association and the National PTA, there are forward-looking, sustainable and affordable solutions well within our grasp—and it's time to act. Every day we let pass without addressing inefficient energy practices, poor indoor air quality, and other problems associated with unhealthy learning environments, we are passing up tremendous opportunities.

Today, school districts can make significant infrastructure improvements with little to no upfront cost to their communities—improvements that will free up critical dollars for more teachers, computers, or textbooks. And the schools that undergo retrofits will be improving their learning spaces while creating jobs and supporting local economies.

I hope everyone who is interested in the state of American public education reads this report from the Center for Green Schools, and that you will join us as we transform long-term challenges into new opportunities. I'm optimistic that by working together, we can give our children the best possible education and make America the world's greatest innovator for generations to come.

***President Bill Clinton***

# LETTER TO CONGRESS

## Call for GAO Study on America's School Facilities

**Chairman Tom Harkin**
**U.S. Senate Committee on Health, Education, Labor and Pensions**
428 Dirksen Senate Office Building
Washington, D.C. 20510

**Ranking Member Michael Enzi**
**U.S. Senate Committee on Health, Education, Labor and Pensions**
835 Hart Senate Office Building
Washington, D.C. 20510

**Chairman John Kline**
**U.S. House Committee on Education and the Workforce**
2181 Rayburn House Office Building
Washington, D.C. 20515

**Ranking Member George Miller**
**U.S. House Committee on Education and the Workforce**
2101 Rayburn House Office Building
Washington, D.C. 20515

*Dear Chairmen and Ranking Members:* *January 14, 2013*

We write today to ask for your help in requesting a new Government Accountability Office (GAO) study on the condition of America's school facilities.

The last comprehensive report on America's school facilities was conducted by GAO in 1995 (GAO/HEHS-95-61), with portions updated in 1996. This report highlighted the dire need to improve our school facilities, including the fact that 15,000 U.S. schools were circulating air that at the time was deemed unfit to breathe. The anecdotal data and less comprehensive reports issued since the 1995 GAO study have suggested that our nation's educational facilities are continuing to deteriorate without proper maintenance, and that the comprehensive understanding of the current conditions of our nation's educational facilities is lacking. At the time of the 1995 GAO report, it was estimated that our nation's schools needed approximately $112 billion dollars to be brought to sound overall conditions. Some estimates now put that figure three times higher. Without this information, adequate resources cannot be properly planned for or prioritized to address this critical issue.

While many have been dedicated to improving learning spaces for our children since the last comprehensive federal report, too many of our nation's schools are still compromising our children's ability to learn. The results from a new GAO study on the condition of our school facilities would greatly benefit the hard work of school districts, teachers, parents and organizations around the country toward ensuring that every child can learn in a safe, efficient school within this generation.

We look forward to working with you to issue a new GAO report. Please contact any of our organizations if we can provide additional information to help advance this request.

*Signed by,*

21st Century School Fund / American Architectural Foundation / American Federation of Teachers / American Institute of Architects / American Institute of Architects Committee on Architecture for Education / American Lung Association / American Society of Civil Engineers / American Society of Landscape Architects / ASHRAE / BlueGreen Alliance / Campaign for Environmental Literacy / Council of Educational Facilities Planners International / Evangelical Environmental Network / Healthy Schools Campaign / National Wildlife Federation / Healthy Schools Network, Inc. / International Association of Sheet Metal, Air, Rail and Transportation Workers (SMART) / National Association of School Nurses / National Association of State Energy Officials / National Education Association / National Education Association Health Information Network / National PTA / National School Supply and Equipment Association / U.S. Green Building Council

# 2013 STATE OF OUR SCHOOLS

Elementary and secondary public schools are centers of nearly 100,000 communities across the United States, yet American citizens and public officials have a poor understanding of the scale of this infrastructure and its condition. School districts often find themselves in the precarious position of having to choose between curricular resources and facility resources, without adequate information to make informed decisions.

Policymakers, parents, educators and taxpayers need to know the state of public school facilities and the extent of the deferred maintenance and capital construction needs of our school districts. We must account for the assets and liabilities associated with the management, planning, design, construction, operation and maintenance of school buildings and grounds.

The federal government can assist our educational system at the national, state and local levels by helping to paint a more complete picture of the scale and scope of our school facilities. By collecting current, comprehensive and comparable school building data, we can become more responsible stewards of our public school facilities. Good information will enable us to make sound fiscal decisions about this important community infrastructure. With greater knowledge and understanding, school districts will be better able to provide the quality public school facilities needed to prepare young people to become active contributors to their communities and productive members of society.

# THE STATE OF OUR SCHOOLS 2013

## THE SCALE OF K-12 PUBLIC SCHOOL FACILITY INFRASTRUCTURE

In the fall of 2012, about 50 million students attended nearly 100,000 public elementary and secondary schools in public school buildings throughout the United States.[i] There is neither national nor comparable state-by-state data on the most basic information about these public school facilities. While some states maintain information on their school facilities, a publicly accessible inventory of the age, number or size of public school buildings and sites does not exist nationally or by state. This information is often difficult to access publicly at the school district level as well.

> *" In 1999. . . the average age of the nation's main school buildings was 40 years old—putting the average date of construction for our nation's schools at 1959."*

As a result, "independent, smaller-scale studies" have been conducted to assess the current state of the nation's K-12 public facility infrastructure. In 1999, the National Center for Education Statistics surveyed a sample of school districts and estimated that the average age of the nation's main school buildings was 40 years old—putting the average date of construction for our nation's schools at 1959.[ii]

In 2008, the 21st Century School Fund estimated the nation's K-12 public school building space at 6.6 billion square feet. This estimate was developed by multiplying the total enrollments at public elementary and secondary schools by the national average building size per student. Using a similar approach, a conservative land area estimate was calculated at more than 1 million acres of public school land.[iii]

Another way to appreciate the scale of K-12 facility infrastructure is through its replacement value and the ongoing operating and capital expenditures of school districts and states for school facilities. The replacement value of the nation's K-12 public school facilities in 2008 was estimated at $1 trillion.[iv] For the 2008-2009 school year (Fiscal Year 2009), school districts spent a total of approximately $50 billion for the operations and maintenance of their facilities.[v] The Environmental Protection Agency estimated in 2008 that approximately $8 billion of this $50 billion was for utilities.[vi]

According to the U.S. Census of Governments, from 2005-2008, school district capital outlay for new construction, major building improvements and building and land acquisition averaged $52 billion a year. For the 10 years prior, 1995 to 2004, the U.S. Census of Governments reported $304 billion (2005 dollars) of capital outlay for school construction, major building improvements and building and land acquisition.[vii] Analysis of project level data from 1995-2004 found that 41 percent of the total school district project spending was for entirely new building construction. Only 24 percent was spent on existing buildings alone, and 35 percent was spent on work that included both building additions and improvements to existing buildings.[viii]

## THE CONDITION OF K-12 PUBLIC SCHOOL FACILITIES

Without even a basic inventory of public school facilities, it is difficult to know the condition of the nation's public school buildings and grounds. However, in the absence of a comprehensive public school facility infrastructure inventory, there are ways to piece together a reasonable estimation of the condition of our public school facilities.

One way to assess the condition of school facilities is to estimate the cost of bringing the facilities into good repair. A school facility is in a state of good repair when it operates as it was intended when it was first built. This is a low threshold for school conditions. For example, if a school was built with only one electrical outlet in each classroom, "good repair" just means that these outlets are operable and safe. Good repair does not include the cost for modern use of the building—for example, the cost of adding more outlets in each classroom to support standard educational equipment and the cost of an electrical service upgrade to support higher electrical load demands of modern schools.

The last comprehensive survey and study of the condition of our nation's public schools was conducted by the Government Accountability Office (GAO; formerly General Accounting Office) 18 years ago, in 1995. At that time, the GAO found $112 billion was needed to bring the nation's existing public schools into good repair and eliminate deferred maintenance of major building components, systems and finishes.[ix] This $112 billion did not include the cost of any new construction for enrollment growth, nor did it include any estimates of the cost to modernize public school facilities for educational purposes, such as for early childhood expansion, special education inclusion or for integrating technology into instruction.

Using the survey from the 1995 GAO study, the National Center for Education Statistics surveyed a representative sample of school districts in 1999 on the condition of their school facilities and estimated that the deferred maintenance needs had grown by $15 billion in four years, to $127 billion.

A 2008 study by the 21st Century School Fund used a building industry best practice method to estimate deferred maintenance in the nation's public schools. It compared what school districts had spent since the 1995 GAO study and what they should have been spending to maintain school facilities in good repair. Based on American School

*"The last comprehensive survey and study of the condition of our nation's public schools was conducted by the Government Accountability Office (GAO) 18 years ago, in 1995."*

and University's *Annual Maintenance & Operations Cost Studies For Schools* and project start data collected by McGraw-Hil Construction, it is estimated that school districts spent about $211 billion for maintenance, repair and capital renewals between 1995 and 2008 (in 2008 dollars). However, using a 50-year depreciation schedule for keeping facilities in good repair, school districts should have spent about $482 billion to keep the existing school buildings and grounds in good repair. So while school districts spent more than the $112 billion GAO estimate, the ongoing obligations of maintaining, repairing and renewing facilities that serve more than 50 million people daily grew; and in 2008, there was $271 billion of deferred maintenance.[x] This deferred maintenance "deficit" represents an estimated $41 per square foot of building space, or $5,450 per student to bring the nation's public schools into good repair.

As noted, however, bringing schools into good repair does not address the critical need to modernize facilities to meet current health, safety and educational standards. Estimates for the cost of both bringing schools into good repair and addressing modernization needs are much higher. If schools were to be modernized on a 25-year lifecycle—a defensible schedule, given rapid changes in building technology, educational demands and population change — $542 billion would be required over the next 10 years to modernize our Pre-K through 12th grade educational infrastructure.[xi] Again, this would not include new construction to accommodate enrollment growth.

**$542 BILLION WOULD BE REQUIRED OVER THE NEXT 10 YEARS to MODERNIZE OUR PRE-K THROUGH 12TH GRADE EDUCATIONAL INFRASTRUCTURE**

## THE QUALITY OF K-12 SCHOOL FACILITIES

While the basic condition of school buildings and grounds is important, an adequate school facility is more than just a building that is in good repair. A school facility needs to be safe, healthy, educationally appropriate and environmentally sustainable. Public schools must be affordable but should also be a source of civic pride. A growing body of research is helping to clarify the impact that school facility planning, design, construction, operations and maintenance can have on safety, the environment and our communities.

### FACILITIES AND STUDENT BEHAVIOR

Researchers have found a relationship between various aspects of the physical environment and problematic student behavior in high schools.[xii] In examining a "broken-windows" theory of physical disorder in schools, researchers found a direct association between physical disorder and social disorder in schools and suggest that the physical disorder may operate through increased fear and decreased collective efficacy to affect perceptions of threats or violence.[xiii]

### FACILITIES AND HEALTH

School facilities can affect occupant health—that of both children and adults. A review of an array of studies found that air quality, acoustics, levels of thermal comfort and levels of daylight affect the stress levels, health and well-being of occupants in schools.[xiv] Public health research has shown that respiratory health and air pollutants are strongly related. The understanding of the direct connection between indoor air quality and Sick Building Syndrome has also become well-established.[xv]

*"Homebuyers value good quality school facilities, even without knowledge of the research evidence. A 2010 study of the impact of public school facility bond passage on home prices found buyers were willing to pay immediate and sizable increases in home prices."*

Researchers have found that increased ventilation rates are, on average, associated with fewer adverse health effects, with superior work and school performance and with lower rates of absenteeism. A clear increase in respiratory illness occurs with the very low ventilation rates that have been found in some schools.[xvi] Teachers in Washington, D.C. and Chicago reported missing an average of four days annually because of health problems caused by adverse building conditions (with poor indoor air quality cited as the biggest problem).[xvii] Substitute teacher costs for these absences alone would total $1.5 and $9 million dollars, respectively.

### FACILITIES AND EDUCATION

Through ongoing research into the interaction between the design and condition of school buildings and the teaching and learning happening within, we are gaining a clearer understanding of the power of the facility to inhibit or enhance teaching and learning. Studies have found that higher levels of student achievement, controlled for socio-economic status, are associated with better quality facility design and condition.[xviii/xix]

In one such study of teachers' perceptions of facility conditions in their schools, researchers found that teachers are more likely to stay in schools and continue teaching careers when they are in facilities that they rate as being in good or excellent condition.[xx] School location and siting can also have an impact on teaching effectiveness and student performance. In another study, researchers found that in one school located in the regular flight path of an airport, with controls for socio-economics and other factors, students performed as much as 20 percent lower than their peers on reading tests, which the researchers attributed to the high levels of noise.[xxi]

## FACILITIES AND COMMUNITIES

School facilities not only affect the students, staff and other daily users of the buildings and grounds, but they also affect our communities and the larger environment within which they are located. The environmental effects of school facilities are a function of where schools are sited, their size, the sustainability of their design and the efficiency of their operation and use.[xxii]

Homebuyers value good quality school facilities, even without knowledge of the research evidence. A 2010 study of the impact of public school facility bond passage on home prices found buyers were willing to pay immediate and sizable increases in home prices. They found that house prices rose by about six percent over the two to three years following bond passage and persisted for at least a decade. The researchers did not think these effects were a result of changes in the income or race of homeowners.[xxiii]

*"A 2004 survey of school principals by the National Center for Education Statistics found significant disparity in educational spaces available in schools with the highest poverty concentration compared to schools with the lowest poverty concentration."*

## INEQUITY IN SCHOOL FACILITY QUALITY

In the United States, public education has deep roots in systems of local control. Nowhere is this stronger than in regard to public school facilities.[xxiv] The federal government has virtually no role in funding or regulating public school facilities. States have widely varying levels of funding, regulation and technical assistance for local district facility responsibilities. One result of this structure of local responsibility and control is that the quality of school facilities varies by the income of the communities responsible for supporting the public schools.

Inequity of conditions in our public school facilities has been a long-standing problem. The 1995 GAO report found that, "...on every measure...the same subgroups consistently emerged as those with the most problems. These subgroups included central cities, the western region of the country, large schools, secondary schools, schools reporting student populations of at least 50.5 percent minority students and schools reporting student populations of 70 percent or more poor students." [xxv] The survey found that "...9.7 million or 67 percent of students in central cities attended schools reporting at least one inadequate building feature, such as plumbing." [xxvi]

A 2004 survey of school principals by the National Center for Education Statistics found significant disparity in educational spaces available in schools with the highest poverty concentration compared to schools with the lowest poverty concentration. High poverty schools had science labs 37 percent of the time, whereas low poverty schools had them 51 percent of the time. High poverty schools had art rooms 50 percent of the time compared to 80 percent of the time for low poverty schools. Disparities of about 20 percent were also found between high poverty schools and low poverty schools in the existence of music rooms and gymnasiums.[xxvii]

A 2006 analysis of public school construction from 1995-2004 found that, while there certainly were low-income communities that benefited from the $304 billion of public school facility improvements during that decade, there was tremendous disparity overall between the capital investment in schools located in the low-income zip codes and those in the more affluent zip codes. Poor communities had far less spent on their school facilities than wealthier communities.[xxviii] This inequitable pattern of spending from 1995-2004 could only have exacerbated the disparities found in the 1995 GAO survey.

## CONCLUSION

The relevance of the quality of school facilities is obvious to students, parents and teachers. More and more studies are finding strong relationships between school facility quality and academic outcomes.[xxix] As public understanding of the impact of facilities on safety, health, education and communities has been growing, local and state governments have been working to build capacity to address the ongoing challenges of managing and modernizing this extensive public infrastructure.

Over the nearly 20 years since the GAO issued its report on the condition of the nation's school facilities, there has been some effort to define an appropriate federal role related to this critical infrastructure. Many federal agencies have programs that affect school facilities. The Environmental Protection Agency, U.S. Department of Education, U.S. Department of Energy, Federal Emergency Management Assistance Agency, Department of Defense Education Agency, Bureau of Indian Affairs, U.S. Department of Agriculture and U.S. Treasury all have programs geared toward helping improve our nation's public school facilities. However, these programs are extremely limited, and tend to be *ad hoc* and isolated. The importance of facility location, design, condition and utilization are not yet integrated into key elements of federal, state and local education initiatives or policy. For example, the signature U.S. Department of Education $4.35 billion Race to the Top program includes no consideration of the health, safety or educational adequacy of school facilities when evaluating proposals to turn around low-performing schools, even though we know there is a high correlation among low-performing schools, or schools in low-income communities and poor quality school facilities.

*"Lack of sufficient, comparable (state-to-state and year-to-year) facility data aligned to basic education data is hindering our ability to address the safety, health, education and environmental challenges of our public school facilities."*

*"The obstacle to a more complete understanding of facility needs is fear: fear that we will be called on to solve the problems but will not have the will or capacity to do so."*

Lack of sufficient, comparable (state-to-state and year-to-year) facility data aligned to basic education data is hindering our ability to address the safety, health, educational and environmental challenges of our public school facilities. At the federal, state, school district and individual school levels, the public needs to understand both the current extent of problems in our facilities and the educational opportunities that high quality public school facilities provide. We need to know the distribution of facility needs and the risks associated with deferred maintenance, crowded schools and insufficient capital investment. With more knowledge and better understanding, we can invest our limited resources more efficiently, effectively and equitably.

The obstacle to a more complete understanding of facility needs is fear: fear that we will be called on to solve the problems, but will not have the will or capacity to do so. Public officials and communities are afraid they will not find the money, time or experience to solve the problems of facilities in poor condition. However, just as inadequately accounting for sub-prime housing debt did not eliminate the underlying roots of impending collapse, deferred school building maintenance will not go away if local districts, states and the nation as a whole do not assess it.

The following recommendations are intended to help communities, states and the nation to get started down a road toward understanding where our school facilities stand. We need to trust that we will find the will and the way to meet these challenges. Our children and grandchildren deserve no less.

# RECOMMENDATIONS

Expand the Common Core of Data collected annually by the National Center for Education Statistics to include school level data on building age, building size and site size.

Improve the current fiscal reporting of school district facility maintenance and operations data to the National Center for Education Statistics so that utility expenditures and maintenance expenditures are collected separately.

Improve the collection of capital outlay data from school districts to include identification of the source of capital outlay funding and distinctions between capital outlay categories for new construction and for existing facilities.

Provide financial and technical assistance to states from the U.S. Department of Education to incorporate facility data in their state longitudinal education data systems.

**Mandate a GAO facility condition survey to take place every 10 years, with the next one beginning immediately.**

## ENDNOTES AND CITATIONS

[i] Numbers and Types of Public Elementary and Secondary Schools from the Common Core of Data: School Year 2010–11," National Center for Education Statistics, accessed December 2012, http://nces.ed.gov/pubs2012/pesschools10/tables/table_02.asp

[ii] U.S. Department of Education: National Center for Education Statistics, *Condition of America's Public School Facilities: 1999,* NCES 2000-032 (Washington, D.C.: National Center for Education Statistics, 2000): vi, retrieved December 2012 from *http://nces.ed.gov/pubs2000/2000032.pdf.*

[iii] Mary Filardo, *Good Buildings, Better Schools: An economic stimulus opportunity with long-term benefits,* Economic Policy Institute Briefing Paper 216 (2008): 2, retrieved December 2012 from *http://www.21csf.org/csf-home/publications/GoodBuildingsBetterSchools-EPI-Paper.pdf.*

[iv] Replacement value was calculated by multiplying estimated square footage at elementary and secondary levels by the McGraw-Hill hard cost national average estimates for elementary and secondary new construction for 2008. McGraw-Hill estimates these costs at $161 per square foot for elementary construction and $154 per square foot for secondary school construction. Construction costs were down from $200 per square foot and $175 per square foot the previous year.

[v] Frank Johnson, Lei Zhou, and Nanae Nakamoto, *Revenues and Expenditures for Public Elementary and Secondary Education: School Year 2008–09 (Fiscal Year 2009),* NCES 2011-329 (Washington, D.C.: National Center for Education Statistics, 2011): 6, retrieved December 2012 from *http://nces.ed.gov/pubsearch.*

[vi] Environmental Protection Agency, *Energy Efficiency Programs in K-12 Schools: A Guide to Developing and Implementing Greenhouse Gas Reduction Programs,* Local Government Climate and Energy Strategy Series (Washington, D.C.: Environmental Protection Agency, 2011): 1, retrieved December 2012 from *http://www.epa.gov/statelocalclimate/documents/pdf/k-12_guide.pdf.*

[vii] Mary Filardo et al., *Growth and Disparity: A Decade of U.S. Public School Construction,* Building Educational Success Together (2006): 1, retrieved December 2012 from *http://www.edlawcenter.org/assets/files/pdfs/facilities/BEST_NationalReport_2008.pdf.*

[viii] Filardo et al., *Growth and Disparity,* 9.

[ix] Government Accountability Office (formerly General Accounting Office): Health, Education and Human Services Division, *School Facilities: Condition of America's Schools,* GAO/HEHS-95-61 (Washington, D.C.: Government Printing Office, 1995): 2, retrieved December 2012 from *http://www.gao.gov/archive/1995/he95061.pdf.*

[x] 21st Century School Fund, *Repair for Success: An Analysis of the Need and Possibilities for a Federal Investment in PK-12 School Maintenance and Repair,* (Washington, D.C.: 21st Century School Fund, 2009): 1, retrieved December 2012 from *hhttp://www.21csf.org/csf-home/Documents/RepairforSuccessAugust2011.pdf.*

[xi] 21st Century School Fund, *Repair for Success,* 2

[xii] Revathy Kumar, Patrick O'Malley, and Lloyd Johnston, "Association between physical environment of secondary schools and student problem behavior: A national study, 2000-2003," *Environment and Behavior 40,* no. 4 (2008): 455-486, retrieved December 2012 from DOI: 10.1177/0013916506293987. (Results based on multilevel logistic and linear regressions indicate that students are sensitive to schools' ambience and that the association of various aspects of the school's physical environment with students' problem behaviors is positive for all students, and greater for 10th-grade students than for 8th- and 12th-grade students.)

[xiii] Stephen Plank, Catherine Bradshaw, and Hollie Young, "An Application of 'Broken-Windows' and Related Theories to the Study of Disorder, Fear, and Collective Efficacy in Schools," *American Journal of Education 115s,* no. 2 (2009): 227-247, retrieved December 2012 from *http://www.journals.uchicago.edu/doi/abs/10.1086/595669.* (Path analyses reveal a direct association between physical disorder and social disorder even when prior levels of collective efficacy are controlled. Further, there is evidence that the effects of physical disorder may be operating through increased fear and decreased collective efficacy to affect perceptions of threat/violence.)

[xiv] Harvey Bernstein and Lindsay Baker, *The Impact of School Buildings on Student Health and Performance,* (Washington, D.C.: Center for Green Schools at USGBC, 2012): 6-17, retrieved December 2012 from *http://centerforgreenschools.org/studies/k12.aspx*

[xv] Indoor Air Quality: Scientific Findings Resource Bank, *The Impact of School Buildings on Student Health and Performance,* (Washington, D.C.: Center for Green Schools at USGBC, 2012): 6-17, retrieved December 2012 from *http://eetd.lbl.gov/ied/sfrb/*

## ENDNOTES AND CITATIONS (CONT'D)


[xvi] Bradley H. Turk et al., "Commercial building ventilation rates and particle concentrations," *ASHRAE Transactions* 95 (1989) 422-433

[xvii] Jack Buckley, Mark Schneider, and Yi Shang, "Fix It and They Might Stay: School Facility Quality and Teacher Retention in Washington, D.C.,", *Teachers College Record 107,* no. 5 (2005): 1107-1123.December 2012

[xviii] School Facilities Improve Learning," California Department of Education: School Facilities Services Division, accessed December 2012 6-17, retrieved December 2012, *http://www.cde.ca.gov/ls/fa/re/documents/learnercenter.pdf.*

[xix] 21st Century School Fund, *Research on the Impact of School Facilities on Students and Teachers: A Summary of Studies Published Since 2000,* (Washington, D.C.: 21st Century School Fund, 2010), retrieved December 2012 from *http://www.21csf.org/csf-home/Documents/ResearchImpactSchoolFacilitiesFeb2010.pdf.*

[xx] Buckley, Schneider, and Shang, *Fix It and They Might Stay"*

[xxi] Lorraine Maxwell and Gary Evans, "Chronic Noise Exposure and Reading Deficits: The Mediating Effects of Language Acquisition, *Environment and Behavior 29,* (Washington, D.C.: 21st Century School Fund, 2010), no. 5 (1997): 638-656.

[xxii] "School Siting Guidelines," Environmental Protection Agency, accessed January 2013, *http://www.epa.gov/schools/siting/download.html.*

[xxiii] Stephanie Riegg Cellini, Fernando Ferreira and Jesse Rothstein, "The Value of School Facility Investments: Evidence from a Dynamic Regression Discontinuity Design," *The Quarterly Journal of Economics 125,* no. 1 (2010): 215-261.

[xxiv] Mary Filardo and Sean O'Donnell, *Federal Spending on PK-12 School Facilities,* 21st Century School Fund (2010), retrieved December 2012 from *http://www.ncef.org/pubs/federal_spending_on_school_facilities.pdf.*

[xxv] Government Accountability Office (formerly General Accounting Office): Health, Education and Human Services Division, *School Facilities: America's Schools Report Differing Conditions,* GAO/HEHS-96-103 (Washington, D.C.: Government Printing Office, 1996): 2, retrieved December 2012 from *http://www.gao.gov/archive/1995/he95061.pdf*

[xxvi] GAO: Health, Education and Human Services Division, *School Facilities: School Facilities: America's Schools Report Differing Conditions,* 17.

[xxvii] U.S. Department of Education: National Center for Education Statistics, *Public School Principals' Perceptions of Their School Facilities: Fall 2005,* NCES 2008-011 (Washington, D.C.: National Center for Education Statistics, 2008), retrieved December 2012 from *http://nces.ed.gov/surveys/frss/downloads.asp#FRSS13.*

[xxviii] Filardo et al., *Growth and Disparity*, 17

[xxix] 21st Century School Fund: National Center for Education Statistics, *Research on the Impact of School Facilities on Students and Teachers: A Summary of Studies Published Since 2000.*

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