

BALTIMORE COUNTY PUBLIC SCHOOLS

DATE: March 20, 2012

TO: **BOARD OF EDUCATION**

FROM: Dr. Joe A. Hairston, Superintendent

SUBJECT: **REPORT ON SCHOOL FACILITIES**

ORIGINATOR: Renee A. Foose, Deputy Superintendent

RESOURCE

PERSON(S): Michael G. Sines, Executive Director, Department of Physical Facilities

RECOMMENDATION

To apprise the Board of Education of the status of school facilities.

* * * * *

Attachment I – Executive Summary

Attachment II – PowerPoint

Baltimore County Public Schools

Department of Physical Facilities

Report on School Facilities

Executive Summary

An effective and efficient facilities management program has been established by the department during the past several years. An overview of the school system's demands including the department's accomplishments, evolution of capital programs, and future demands for facilities is presented in the report.

The presentation includes a history of the crisis in school facilities within the school system and the status of stabilizing the condition of an aging building inventory. There is an explanation of the importance of maintaining the critical infrastructure of the school buildings. The department's objectives to that end are highlighted by the accomplishments in the past twelve years.

While BCPS has a successful Capital program in place, the future challenges to the school system are many. Preventing a return to the former crisis in facilities, that was addressed partially in the past decade, is paramount. A recent clamor to provide air conditioning in all of the remaining aged school buildings only emphasizes one of the critical needs of the Capital program.

An analysis of the introduction of air conditioning into aged school buildings is presented with a review of alternative systems that may be acceptable for adequate service for a safe environment conducive to learning. The department's strategy to achieve all of the Capital improvements to include air conditioning is described and given the long term perspective based upon the history of the former crisis and preventing its return.

Baltimore County Public Schools Department of Physical Facilities



Report on School Facilities

March 20, 2012



Department of Physical Facilities

Organization and Responsibility

Organization

- Office of Engineering and Construction
- Office of Operations
- Office of Maintenance and Grounds



Department of Physical Facilities

Organization and Responsibility

Responsibility

Facilities Management for...

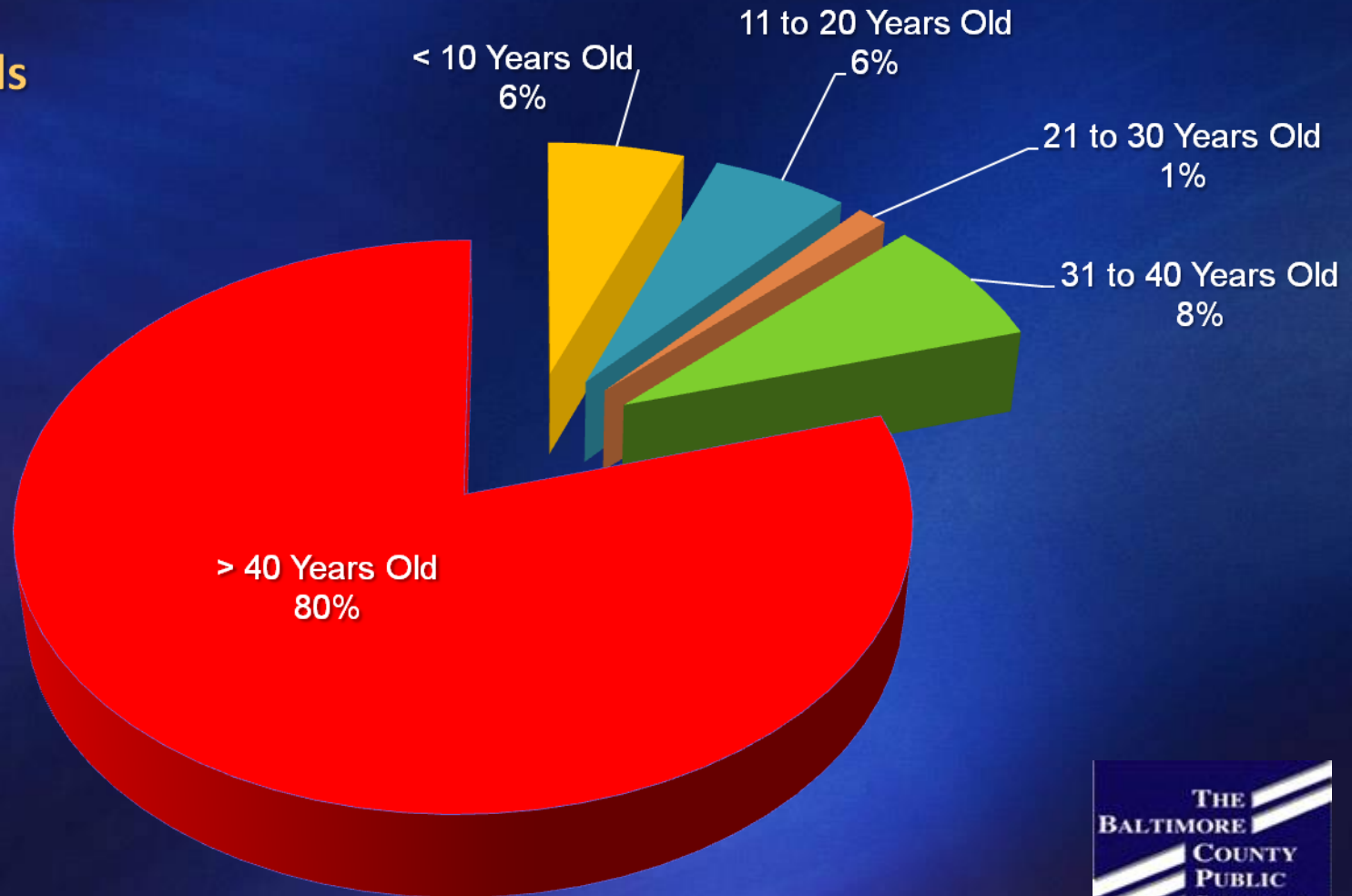
- 164 schools, 10 centers, and 2 programs housing 105,315* students
- Administrative buildings
- Maintenance buildings
- Grounds buildings
- Warehouses
- Transportation buildings



Department of Physical Facilities

Age of Original School Buildings

All Schools



Department of Physical Facilities

Facility Constraints

- The Interagency Committee *Guidelines for Maintenance of Public School Facilities in Maryland* published in 2008, showed an *Average Life Cycle Expectancy for Equipment and Building Components* of between **10 and 40 years** for most of the critical infrastructure
- Increasing maintenance costs in aging school infrastructure
- Growing enrollments
- Indoor Air Quality concerns

Department of Physical Facilities

Crisis and Stability

Crisis \krī-səs\ (noun) an unstable or crucial time or state of affairs in which a decisive change is impending especially one with the distinct possibility of a highly undesirable outcome

Stability \stə-bi-lə-tē\ (noun) resistance to physical disintegration

Department of Physical Facilities *History of School Closings*

Deer Park Elementary Hallways Empty

Baltimore Sun
March 28, 1996

**Fullerton Elementary Troubled By
Mold, Health Concerns**

Baltimore Sun
October 27, 1996

**Asbestos Contamination Closes
Baltimore County School**

Baltimore Sun
October 2, 2001

Concerns About Asbestos Lead To Closing Of School

Baltimore Sun
March 28, 2002



Department of Physical Facilities

Historical Perspective 1997 - 2012

Aging School Inventory

Perks Reutter - Executive Summary

The Perks Reutter Report* prepared in 1997 identified infrastructure needs, based on three priorities:

- Immediate Needs 1 - 4 Years
- Short Term Needs 5 - 9 Years
- Long Term Needs Over 10 Years



*Perks Reutter School Facilities Assessment Report March 1997

Department of Physical Facilities

Historical Perspective 1997 - 2012

Aging School Inventory

Perks Reutter - School System Overview

- School buildings conditions were addressed by BCPS during the late 1990's with local funding to prepare a study and plan for renovating the many aging and dilapidated school buildings in the school system
- The Perks Reutter Study (1997) assessed all of the schools at each level, elementary, middle and high against 100 criteria for renovations
- The Perks Reutter Study recommended that at a minimum, the immediate needs (1-4 years) be addressed to maintain schools in the short term and avert closing schools due to continuing infrastructure system failures
- System Upgrade Plan
 - Elementary schools critical systems
 - Middle schools renovation, while continuing elementary upgrades
 - High schools renovation, while continuing elementary upgrades



Department of Physical Facilities

Internally Commissioned Audit

Phi Delta Kappa Curriculum Management Services Incorporated (PDK-CMSi) Audit Executive Summary

- *“In September 2006, at the direction of Superintendent Dr. Joe A. Hairston, Baltimore County Public Schools (BCPS) contracted PDK-CMSi to conduct a curriculum management audit. The level of scrutiny and accountability that public schools face today is unprecedented. Dr. Hairston chose to undertake this initiative to objectively examine and continue to advance the quality of education delivered to all students.”*
- *One of the primary recommendations from the audit stated that BCPS should, “Immediately act to eliminate substandard educational environments by eliminating safety hazards and instructional barriers, by establishing a responsive and effective system of maintenance executed on the basis of need, and take steps to eliminate the detrimental backlog of uncompleted maintenance operations and needs.”*



Department of Physical Facilities

Building Components/Systems

Piping *Air Conditioning* *Power*
Restrooms *Roofs*

Ventilation

Lighting

Heating

Fire Alarm

Doors

Sprinkler

Windows

Chair Lifts

Floors

Elevators

Walls

Technology

Ceilings

ADA

Security

Site Improvements



Department of Physical Facilities

Building Components/Systems

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Department of Physical Facilities

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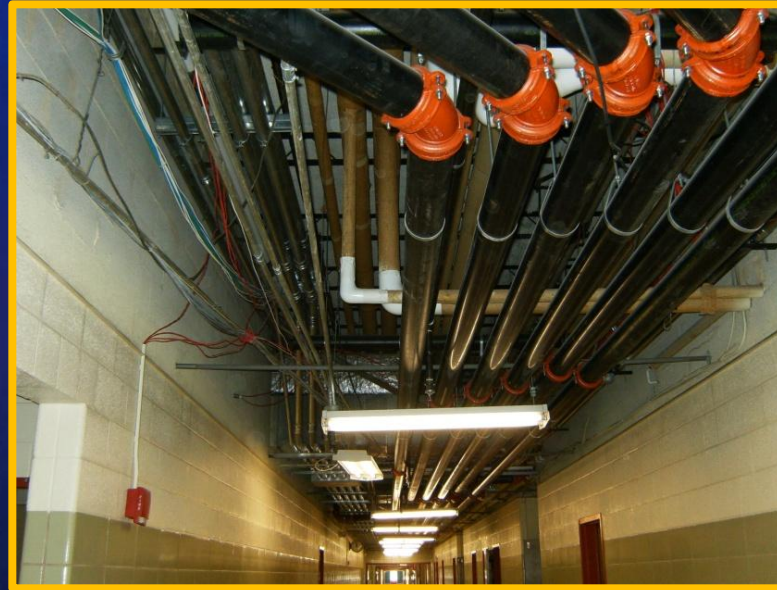


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Critical Building Infrastructure

Critical Building Systems are those which will, should they fail, result in long term school building closure.

Structural Systems

Roofing System

Window System

Fire Safety System

Electrical Service

HVAC

Piping/Plumbing

Accessibililty

Department of Physical Facilities

Building System Upgrades at the Parkville HS Limited Renovation Project

- Building Systems

- Accessibility
- Mechanical systems including air conditioning
- Electrical
- Windows
- Doors
- Interior and exterior lighting and controls
- Sprinklers
- Plumbing piping and fixtures
- Mill and overlay paved areas
- Curb, gutters, storm drainage and walk replacement
- Emergency generator
- Elevator

- Educational Enhancements

- Renovate science classrooms and laboratories
- Renovate art classroom
- Renovate career & technology
- Education classrooms and laboratories
- Additional computer classrooms
- Auditorium addition

- Project Footprint

- 202,215 square feet



Department of Physical Facilities

Departmental Objectives

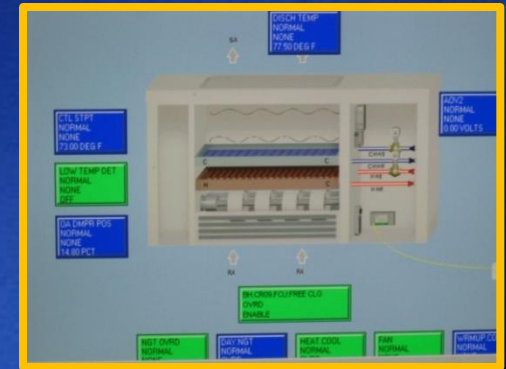
- Provide safe and secure learning environments
- Support sustainable school buildings with a preventive maintenance program
- Accommodate enrollment growth and population shifts
- Renovate and improve condition of aging schools and critical building infrastructure
- Provide school buildings that enhance the delivery of a 21st century curriculum



Department of Physical Facilities *Offices of Maintenance and Grounds and Operations*

Accomplishments

- Integrated Building Automation Services (BAS)
 - To provide remote monitoring capabilities of the building heating and/or cooling systems
 - To provide remote troubleshooting of reported maintenance concerns
- Integrated Security Systems
 - Closed Circuit Television (CCTV)
 - Motion sensitive devices
 - Interior alerts, alarm systems
 - Fire systems, card access systems



Department of Physical Facilities

Offices of Maintenance and Grounds and Operations

Accomplishments

- July 2006 - Implementation of a Computerized Maintenance Management System (CMMS) including integration and training for school staff
 - FY07- 79% completion rate
 - FY11- 93% completion rate
 - Additionally, the CMMS provides the following;
 - Prioritization capabilities
 - Real-time reports of ongoing work activity, and
 - Historical tracking of all work orders that are sortable by
 - Equipment
 - Date
 - Person responding, etc.



Department of Physical Facilities *Offices of Maintenance and Grounds and Operations*

Accomplishments

- Indoor Air Quality (IAQ) Tools for Schools
 - U.S. EPA* - *Great Start Award* – 2006
 - U.S. EPA - *Leadership Award* – 2007
 - U.S. EPA - *Excellence Award* – 2007
 - American Lung Assoc. - *Distinguished Service Award for Clean Air* - 2008
 - U.S. EPA - *Model of Sustained Excellence* – 2010
- U.S. EPA - *National Mentorship Award* – 2010



* United States Environmental Protection Agency

Department of Physical Facilities *Office of Engineering and Construction*

Capital Program

- New schools
- Additions
- Renovations
- Limited renovations
- Systemic projects



Department of Physical Facilities *Office of Engineering and Construction*

Accomplishments

New Schools

- New Town Elementary School – 2001
- New Town High School – 2003
- Woodholme Elementary School – 2005
- Windsor Mill Middle School – 2006
- Vincent Farm Elementary School – 2008
- West Towson Elementary School – 2009
- George Washington Carver Center for Arts and Technology – 2012
- Dundalk and Sollers Point Technical High Schools - 2013



Department of Physical Facilities *Office of Engineering and Construction*

Accomplishments

Additions

- Catonsville High School – 2001
- Johnnycake Elementary School -2001
- Stoneleigh Elementary School - 2002
- Woodlawn High School – 2002
- Kenwood High School – 2007
- Catonsville Middle School – 2009
- Cedarmere Elementary School – 2009
- Catonsville High School - 2010
- Dogwood Elementary School – 2010
- Hillcrest Elementary School – 2011
- Hampton Elementary School – 2013
- Stoneleigh Elementary School – 2013



Department of Physical Facilities *Office of Engineering and Construction*

Accomplishments

Renovations and Limited Renovations

- Twenty-six middle schools 2003 – 2010
- Twelve high school science room renovations 2001 – 2004
- Chesapeake High School
 - Information Technology Lab – 2002
 - Virtual Learning Environment – 2010
- Kenwood High School
 - Career Technology Labs – 2007
- Catonsville High School – 2010
- Parkville High School – 2012
- Milford Mill Academy – 2013



Department of Physical Facilities *Office of Engineering and Construction*

Accomplishments

Closures Avoided due to Proactive Investment

- Structural Systems
 - Woodlawn Middle School - 2008
 - Pine Grove Middle School - 2008
 - Victory Villa Elementary School - 2010
- Heating Ventilation and Air Conditioning (HVAC) Systems
 - Sandalwood Elementary School - 2006
 - Chesapeake High School - 2009
 - Loch Raven High School - 2009
 - Randallstown High School - 2010



Department of Physical Facilities *Office of Engineering and Construction*

Accomplishments

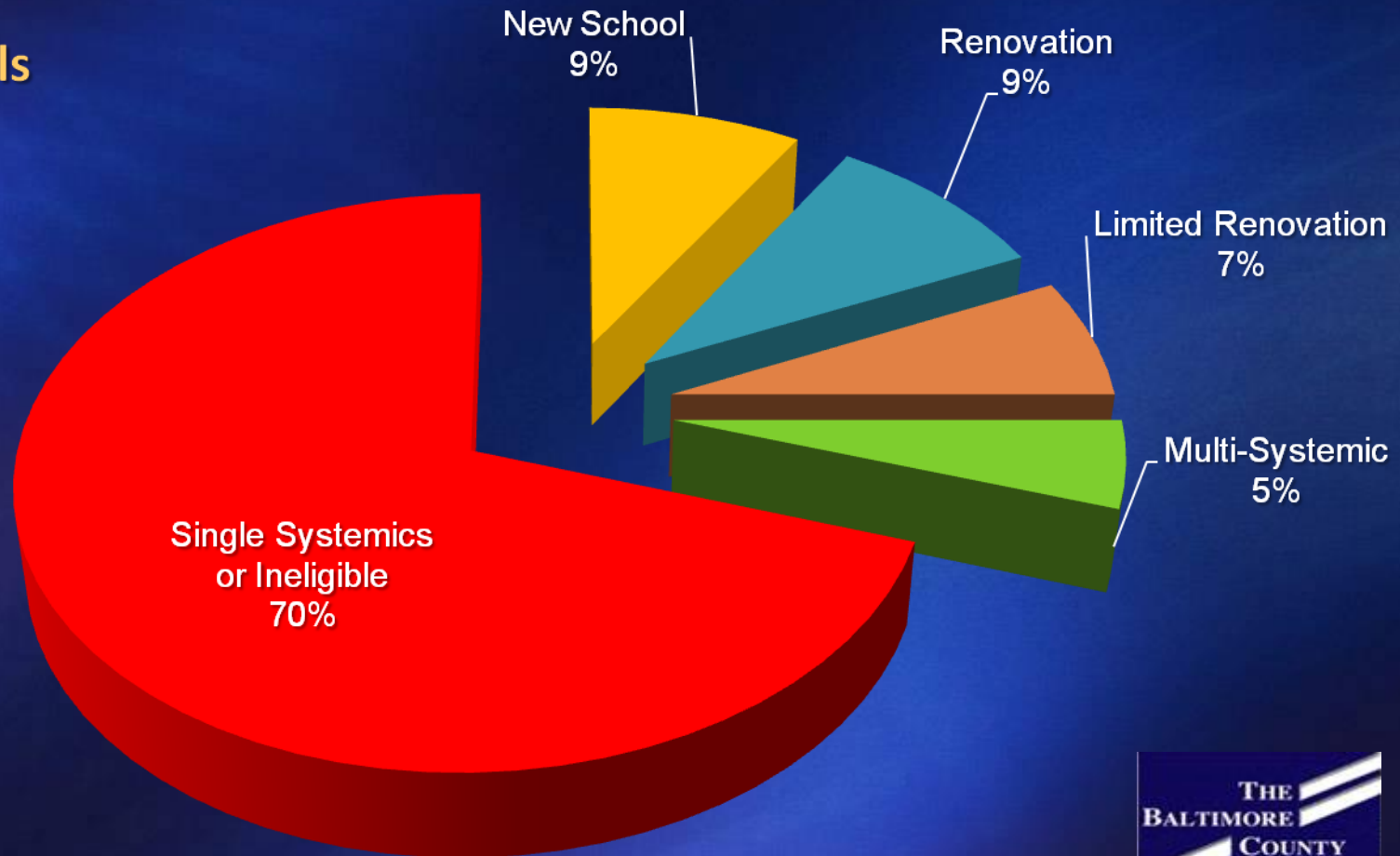
Immediate Professional Response to Natural Disasters

- Earthquake (August 23, 2011)
 - All school buildings were assessed immediately by school based personnel
 - 52 school buildings investigated by professional staff within 24 hours
 - 11 required consultant and contractor attention
 - 41 were addressed by in-house maintenance staff
- Hurricane Irene (August 26, 2011)
 - 77 school buildings and sites were impacted
 - All school issues were addressed by in-house staff



Department of Physical Facilities *Facility Improvements 1998 - 2012*

All Schools



\$1.4 Billion investment in Critical Building Infrastructure since 1998



Department of Physical Facilities

Capital Program

Future Challenges:

- New school construction
 - Lutherville Area Elementary
 - Northwest Corridor Study
- Renovations/limited renovations
 - 18 high schools
 - 8 middle schools
 - 94 elementary schools
- Site Improvements
 - Grading
 - Stormwater management
 - Sidewalks
 - Parking lots - paving and expansions
 - Tracks
 - Tennis courts



Department of Physical Facilities

Capital Program

Future Challenges:

- Building Systems Installation and Upgrades
 - Critical Building Infrastructure
 - Mechanical Systems
 - Chillers
 - Boilers
 - Air handling units
 - Unit ventilators
 - Electrical Systems
 - Electrical panels
 - Switch gear
 - Lighting
 - Air Conditioning
 - 15.5 million total square feet
 - 9.3 million square feet - 98 schools air conditioned
 - 6.2 million square feet - 66 schools not air conditioned
 - Structural Systems
 - Roofs
 - Windows
 - Walls
 - Ceilings
 - Technology Systems
 - Controls
 - Plumbing



Department of Physical Facilities

Air Conditioning Analysis

History of School Building HVAC

- Prior to 1960 – Heating and natural ventilation
- 1960's – Begin utilizing mechanical ventilation
- 1970's – Energy conservation began
 - Tightening building envelope
 - Closing outside air intakes
 - Reduction in ventilation
- 1980's – Concerns about indoor air quality
 - Ventilation recommendations adopted into building codes
- 1995 – BCPS adopted program to air condition all new schools and additions
- 2006 – BCPS adopted program to include air conditioning to all major renovation project proposals



Department of Physical Facilities

Air Conditioning Analysis

Environmental Concerns

- Inadequate ventilation
- Human generated contaminants
 - Carbon dioxide
 - Viruses
 - Bacteria
 - Dander
 - Bioeffluents/body odor
- Environment generated contaminants
 - Chemical off-gassing of building materials/contents
 - Mold
 - Building activities
 - Building system operations
 - Cleaning chemicals
 - Science lab



Department of Physical Facilities *Air Conditioning Analysis*

Environmental Concerns

- Moisture/humidity control
 - Bacteria
 - Mold

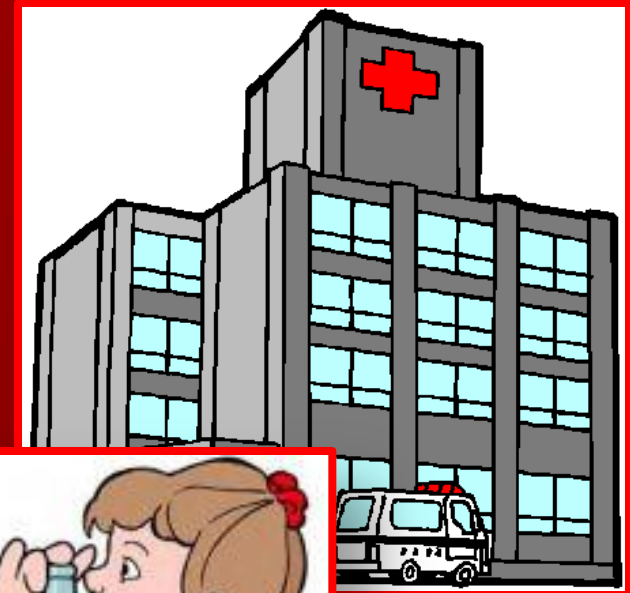


Department of Physical Facilities

Air Conditioning Analysis

Environmental Concerns

- Effects of Inadequate Environment on Occupants
 - Increase of illnesses
 - Increase of asthma attacks
 - Increase of allergy symptoms
- Results
 - Increase of health suite visits
 - Increase of absences
 - Decrease in classroom time
 - Decrease in academic performance



Department of Physical Facilities

Air Conditioning Alternatives

Air Conditioning Alternatives

- Direct Expansion (DX) Units
 - Small DX units
 - Large DX air handlers
- Central System - Hydronic
 - Chilled water
 - Geothermal
- Selection of Appropriate Alternative

Department of Physical Facilities

Air Conditioning Alternatives

Selection of Appropriate Air Conditioning Option

- Small Expansion (DX) Units (including window units)
 - Low occupancy offices
 - IT closets/server rooms



Department of Physical Facilities

Air Conditioning Alternatives

Selection of Appropriate Air Conditioning Option

- Large DX Air Handlers
 - Administrative suites
 - Libraries
 - Health suites

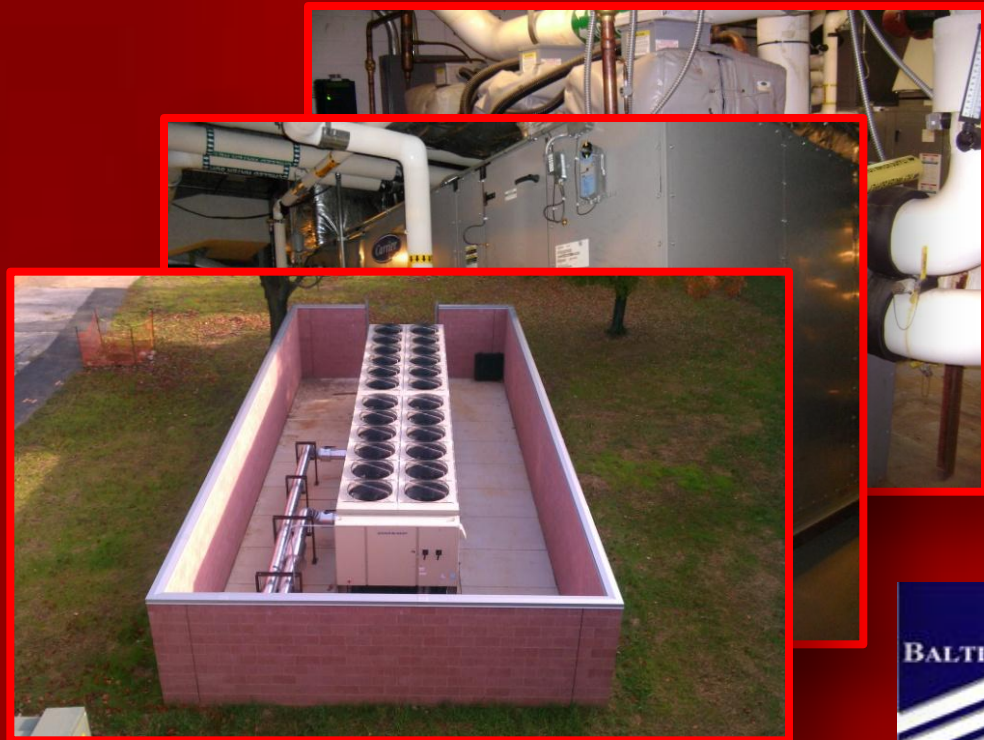


Department of Physical Facilities

Air Conditioning Alternatives

Selection of Appropriate Air Conditioning Option

- Chilled Water
 - Entire school building



Department of Physical Facilities *Air Conditioning Alternatives*

Selection of Appropriate Air Conditioning Option

- Geothermal
 - Entire school building



Department of Physical Facilities

Air Conditioning Alternatives

Classroom - Air Conditioning Options

	System Type		
	Small DX	Large DX air handler	Central Hydronic
Cooling	Yes	Yes	Yes
Heating			
Satisfy Code Required Ventilation			
Humidity Control			
Filtration			
Control with Building ATC*			
Noise Level			
First Cost			
Replacement Cycle			
Life Cycle Costs			

Department of Physical Facilities

Air Conditioning Alternatives

Classroom - Air Conditioning Options

	System Type		
	<i>Small DX</i>	<i>Large DX air handler</i>	<i>Central Hydronic</i>
Cooling	Yes	Yes	Yes
Heating	No	Yes	Yes
Satisfy Code Required Ventilation	No	Yes	Yes
Humidity Control	No	Yes	Yes
Filtration	Poor	Good	Good
Control with Building ATC*	No	Yes	Yes
Noise Level			
First Cost			
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Department of Physical Facilities

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	<i>Small DX</i>	<i>Large DX air handler</i>	<i>Central Hydronic</i>
Cooling	Yes	Yes	Yes
Heating	No	Yes	Yes
Satisfy Code Required Ventilation	No	Yes	Yes
Humidity Control	No	Yes	Yes
Filtration	Poor	Good	Good
Control with Building ATC*	No	Yes	Yes
Noise Level	High	Low	Low
First Cost			
Replacement Cycle			
Life Cycle Costs			

Department of Physical Facilities

Air Conditioning Alternatives

Classroom - Air Conditioning Options

	System Type		
	<i>Small DX</i>	<i>Large DX air handler</i>	<i>Central Hydronic</i>
Cooling	Yes	Yes	Yes
Heating	No	Yes	Yes
Satisfy Code Required Ventilation	No	Yes	Yes
Humidity Control	No	Yes	Yes
Filtration	Poor	Good	Good
Control with Building ATC*	No	Yes	Yes
Noise Level	High	Low	Low
First Cost	Low	Low/Medium	Medium/High
Replacement Cycle	5 Years	16 Years	20 Years
Life Cycle Costs	High	Medium	Low

Department of Physical Facilities

Air Conditioning Alternatives

Classroom - Air Conditioning Options

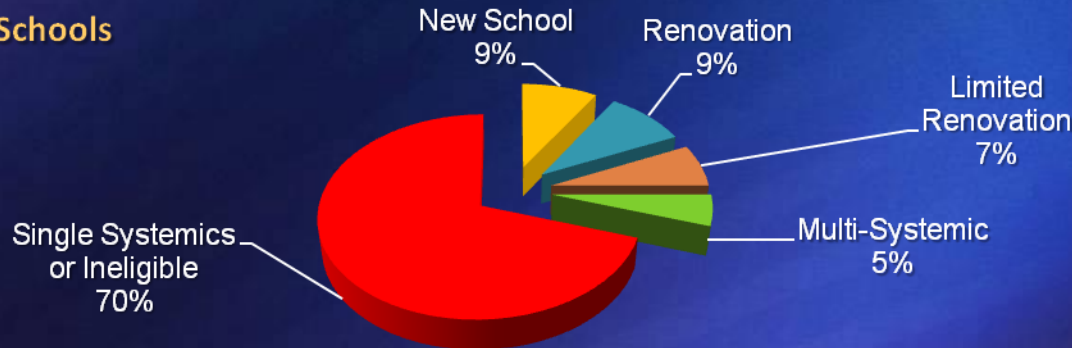
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Cooling	Yes	Yes	Yes
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Satisfy Code Required Ventilation	No	Yes	Yes
Humidity Control	No	Yes	Yes
Filtration	Poor	Good	Good
Control with Building ATC*	No	Yes	Yes
Noise Level	High	Low	Low
First Cost	Low	Low/Medium	Medium/High
Replacement Cycle	5 Years	16 Years	20 Years
Life Cycle Costs	High	Medium	Low
<i>Appropriate Application</i>	Low Occupancy Rooms	Sections of Buildings	Entire School Building

Department of Physical Facilities

Air Conditioning Strategy

- New schools, additions, major renovations include air conditioning.
- Air conditioning will be installed in all schools as the supporting infrastructure is installed through systemic renovations, limited renovations or renovations per State standards.
- Air conditioning will be installed in school buildings where the essential infrastructure (electrical, piping, unit ventilators, etc.) can support the introduction of air conditioning.

All Schools



Department of Physical Facilities

Current Facility Assessment

- \$1.4 billion has been invested in school facilities 1998-2012 to address critical infrastructure, population shifts and enrollment growth
- Nearly 30% of the existing BCPS school facilities have been renovated
- 70% of the existing BCPS school facilities have exceeded the 40-year life cycle without the benefit of a major renovation
- 94 elementary, 8 middle schools, 18 high schools remain vulnerable to critical building infrastructural failure
- An estimated \$1.7 billion must be invested to address remaining critical infrastructure deficiencies and satisfy current code requirements. This figure would include climate control in all schools; however, it does not represent population growth and site issues.
- A significant shift in the prioritization of the capital program objectives and project identification process will likely result in catastrophic consequences.



Department of Physical Facilities

Are We Destined to Repeat History?

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ADA
Site Improvements

Security

Technology

Elevators

Chair Lifts

Sprinkler

Fire Alarm

Lighting



Department of Physical Facilities

Are We Destined to Repeat History?

Piping *Air Conditioning* *Power*
Restrooms *Roofs*



Ventilation
Heating
Doors
Windows
Floors

Lighting
Fire Alarm
Sprinkler
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Elevators

Walls *Technology*
Ceilings *ADA* *Security*
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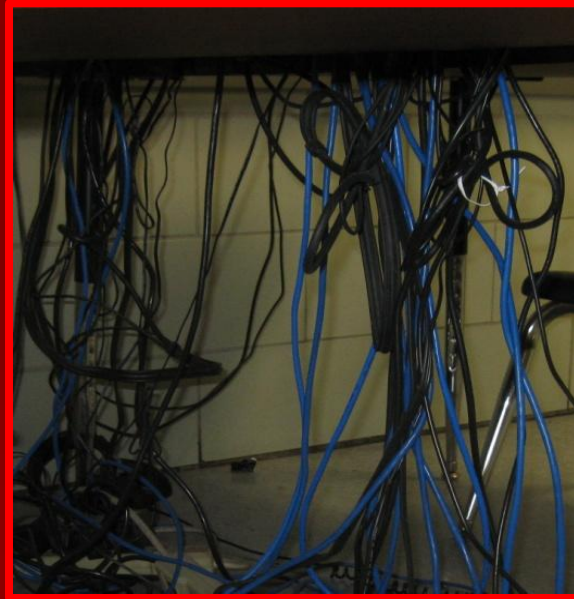
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