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.
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

*BCPS September 30, 2012 Enrollments, Projections and Capacities Report
Department of Physical Facilities

Age of Original School Buildings

All Schools

- > 40 Years Old: 80%
- < 10 Years Old: 6%
- 11 to 20 Years Old: 6%
- 21 to 30 Years Old: 1%
- 31 to 40 Years Old: 8%

The Baltimore County Public Schools
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** \(\text{krī-səs}\) (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** \(\text{stə-bi-lə-tē}\) (noun) resistance to physical disintegration
Department of Physical Facilities

History of School Closings

Deer Park Elementary
Baltimore Sun
March 28, 1996

Hallways Empty

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
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
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
- Roofs
- Lighting
- Fire Alarm
- Sprinkler
- Chair Lifts
- Elevators
- Technology
- Floors
- Walls
- Ceilings
- ADA
- Security
- Site Improvements
Department of Physical Facilities

Building Components/Systems

- Piping
- Restrooms
- Ventilation
- Heating
- Doors
- Windows
- Floors
- Walls
- Ceilings
- Air Conditioning
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Doors
Ventilation
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Department of Physical Facilities

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Air Conditioning

Power

- Roofs
- Lighting
- Fire Alarm
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- Technology

ADA
Security
Site Improvements

THE BALTIMORE COUNTY PUBLIC SCHOOLS
Department of Physical Facilities

Building Components/Systems

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The Baltimore County Public Schools
Department of Physical Facilities

Building Components/Systems

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[Image: Building components and systems list]
Department of Physical Facilities

Building Components/Systems

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- Restrooms
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Image of a building entrance with a ramp and white doors.
Department of Physical Facilities

Building Components/Systems

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

<table>
<thead>
<tr>
<th>Structural Systems</th>
<th>Electrical Service</th>
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<tbody>
<tr>
<td>Roofing System</td>
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<td>Piping/Plumbing</td>
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<td>Fire Safety System</td>
<td>Accessibility</td>
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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
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
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.
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
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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
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
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
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
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

- Single Systemics or Ineligible: 70%
- New School: 9%
- Renovation: 9%
- Limited Renovation: 7%
- Multi-Systemic: 5%

$1.4 Billion investment in Critical Building Infrastructure since 1998
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
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
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
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
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
Air Conditioning Alternatives

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

- Small Expansion (DX) Units (including window units)
  - Low occupancy offices
  - IT closets/server rooms
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
# Classroom - Air Conditioning Options

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<td>Low/Medium</td>
<td>Medium/High</td>
</tr>
<tr>
<td><strong>Replacement Cycle</strong></td>
<td>5 Years</td>
<td>16 Years</td>
<td>20 Years</td>
</tr>
<tr>
<td><strong>Life Cycle Costs</strong></td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Appropriate Application</strong></td>
<td>Low Occupancy Rooms</td>
<td>Sections of Buildings</td>
<td>Entire School Building</td>
</tr>
</tbody>
</table>

* Automatic Temperature Control
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.
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?

Piping  Air Conditioning  Power
Restrooms  Roofs  Lighting
Ventilation  Fire Alarm  Sprinkler
Heating  Chair Lifts
Doors  Elevators
Windows  Technology
Floors
Walls
Ceilings  ADA  Security
Site Improvements
Department of Physical Facilities

Are We Destined to Repeat History?

- Piping
- Restrooms
- Ventilation
- Heating
- Doors
- Windows
- Floors
- Walls
- Ceilings
- Air Conditioning
- Power
- Roofs
- Lighting
- Fire Alarm
- Sprinkler
- Chair Lifts
- Elevators
- Technology
- ADA
- Security
- Site Improvements
Department of Physical Facilities
Are We Destined to Repeat History?

- Piping
- Air Conditioning
- Power
- Roofs
- Lighting
- Fire Alarm
- Sprinkler
- Chair Lifts
- Elevators
- Technology
- Floors
- Walls
- Ceilings
- ADA
- Security
- Site Improvements
Department of Physical Facilities

Are We Destined to Repeat History?

- Piping
- Air Conditioning
- Power
- Roofs
- Lighting
- Fire Alarm
- Sprinkler
- Chair Lifts
- Elevators
- Technology
- ADA
- Security
- Site Improvements

[Image of a building window, possibly indicating wear and tear or damage.]
Department of Physical Facilities

Are We Destined to Repeat History?

- Piping
- Restrooms
- Air Conditioning
- Power
- Roofs
- Ventilation
- Lighting
- Heating
- Fire Alarm
- Doors
- Sprinkler
- Windows
- Chair Lifts
- Floors
- Elevators
- Walls
- Technology
- Ceilings
- ADA
- Security
- Site Improvements
Department of Physical Facilities

Are We Destined to Repeat History?

- Piping
- Restrooms
- Ventilation
- Heating
- Doors
- Windows
- Floors
- Walls
- Ceilings
- Air Conditioning
- Power
- Roofs
- Lighting
- Sprinkler
- Chair Lifts
- Elevators
- Technology
- ADA
- Security
- Site Improvements
Department of Physical Facilities

Are We Destined to Repeat History?

Piping  Air Conditioning  Power
Restrooms  Roofs
Ventilation  Lighting
Heating  Fire Alarm
Doors  Sprinkler
Windows  Chair Lifts
Floors  Elevators
Walls  Technology
Ceilings  ADA
Site Improvements  Security
Department of Physical Facilities
Are We Destined to Repeat History?

Piping  Air Conditioning  Power
Restrooms  Roofs
Ventilation  Lighting
Heating  Fire Alarm
Doors  Sprinkler
Windows  Chair Lifts
Floors  Elevators
Walls  Technology
Ceilings  ADA
Site Improvements  Security
Department of Physical Facilities

Are We Destined to Repeat History?

- Piping
- Restrooms
- Ventilation
- Heating
- Doors
- Windows
- Floors
- Walls
- Ceilings
- Air Conditioning
- Power
- Roofs
- Lighting
- Fire Alarm
- Sprinkler
- Chair Lifts
- Elevators
- Technology
- ADA
- Security
- Site Improvements

THE BALTIMORE COUNTY PUBLIC SCHOOLS
Department of Physical Facilities

Are We Destined to Repeat History?

- Piping
- Restrooms
- Ventilation
- Heating
- Doors
- Windows
- Floors
- Walls
- Ceilings
- Air Conditioning
- Power
- Roofs
- Lighting
- Fire Alarm
- Sprinkler
- Chair Lifts
- Elevators
- Technology
- ADA
- Security
- Site Improvements
Department of Physical Facilities

Are We Destined to Repeat History?

- Piping
- Air Conditioning
- Power
- Roofs
- Lighting
- Fire Alarm
- Sprinkler
- Chair Lifts
- Elevators
- Technology
- ADA
- Security
- Site Improvements

[Image of a roof with a quote or a diagram]
Department of Physical Facilities
Are We Destined to Repeat History?

- Piping
- Restrooms
- Air Conditioning
- Power
- Roofs
- Lighting
- Fire Alarm
- Sprinkler
- Chair Lifts
- Elevators
- Technology
- ADA
- Security
- Ceilings
- Floors
- Walls
- Windows
- Heating
- Doors
- Site Improvements

THE BALTIMORE COUNTY PUBLIC SCHOOLS
Department of Physical Facilities

Are We Destined to Repeat History?

- Piping
- Restrooms
- Ventilation
- Heating
- Doors
- Windows
- Floors
- Walls
- Ceilings
- Air Conditioning
- Power
- Roofs
- Lighting
- Fire Alarm
- Sprinklers
- Chair Lifts
- Elevators
- Technology
- ADA
- Security
- Site Improvements
Department of Physical Facilities

Are We Destined to Repeat History?

- Piping
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- Chair Lifts
- Elevators
- Floors
- Technology
- Walls
- Site Improvements
- Ceilings
- ADA Security
Department of Physical Facilities

Are We Destined to Repeat History?

- Piping
- Restrooms
- Ventilation
- Heating
- Doors
- Windows
- Floors
- Walls
- Ceilings
- Air Conditioning
- Power
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- Chair Lifts
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- Technology
- ADA
- Security
- Site Improvements
Department of Physical Facilities

Are We Destined to Repeat History?

- Piping
- Restrooms
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- Technology
- Floors
- Ventilation
- Heating
- Doors
- Windows
- Walls
- Ceilings
- ADA
- Security
- Site Improvements

The Baltimore County Public Schools
Department of Physical Facilities

Are We Destined to Repeat History?

- Piping
- Restrooms
- Ventilation
- Heating
- Doors
- Windows
- Floors
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- Ceilings
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- Site Improvements
Department of Physical Facilities

Are We Destined to Repeat History?

Piping
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Walls
Ceilings
Site Improvements

Air Conditioning

Power
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Lighting
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Elevators
Technology

ADA
Security
Department of Physical Facilities

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