Passive Cooling:
Hillsborough City School District

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Agenda

- Background
- Possible Cooling Solutions
  - Options, Benefits, Costs
- Pilot project options at each campus

Background

- Facility Master Plan meetings
- Common issue with need to provide cooler classrooms
- Benefits of learning in thermal comfort

Methods to Cool Classrooms – Active Systems

- Several different types of ducted mechanical systems:
  - Individual package units
  - Multi-zone units
  - Split units
  - Displacement ventilation
- Variable flow refrigerant
- Many other options
- High costs to install, maintain, and operate
- Very few days in the school year when cooling is necessary

Methods to Cool Classrooms – Low Cost Solutions

- Ceiling fans
  - Typical residential types (lightweight and easy to install)
  - Large high displacement fans (Division of the State Architect (DSA) approval required)
- Exhaust fans
  - “Whole house fan” or high volume for night flushing
    - High volume, but loud
  - Ducted exhaust fans
    - Quieter fans lower volume

Methods to Cool Classrooms – Passive Solutions

- Passive solutions
  - Increased thermal insulation in ceiling and walls
  - Vent attics with gravity ventilators
  - Natural ventilation
  - High/low and cross ventilation
- Reduce solar heat gain
  - Tint recently installed helps reduce
  - Cool roofs
  - Shading

Crocker Middle School
Proposed Classroom Pilot Project

- Install additional insulation in attic
- Add gravity vents in attic
- Install 2 ceiling fans per classroom (4 classrooms total)
- Install ducted exhaust fans with remote fan unit at roof and relief air louvered vent.

North, South, & West Schools Proposed Classroom Pilot Projects

- Install 2 ceiling fans per classroom (4 classrooms at each site)
- Install ducted exhaust fans with remote fan unit at roof
- There is no attic, so we can't add insulation or exhaust fan

Summary of Recommendations

Site	Add Insulation	Gravity Vents	Ceiling Fans	Exhaust Fans
Crocker	✓	✓	✓	✓
North			✓	✓
South			✓	✓
West			✓	✓

Estimated Costs

- Costs per classroom (+/- 1000 SF):
  - Add insulation: $2,000 (Crocker only)
  - Add exhaust fan and vent: $2,500
  - Add gravity vent: $1,000
  - Add 2 ceiling fans: $2,500
    - $3,500 at South due to high ceilings

Proposed Pilot Project Budget

- Crocker Middle School
  - 4 Classrooms = $32,000
- North Elementary School
  - 4 Classrooms = $24,000
- South Elementary School
  - 4 Classrooms = $24,000
- West Elementary School
  - 4 Classrooms = $24,000

Management Expenses $10,000

Project Contingency $10,000

Total Cost $124,000

Questions?