



Helen R. Walton
Children's Enrichment Center
and Early Childhood
Initiatives Center
**Healthy Construction Strategies
Supplement**

LTLARCHITECTS
Lewis.Tsurumaki.Lewis

Healthy
Materials
Lab

“Children are our first priority!”



Contents

Objectives	2
Building a Healthier Facility for Children	
Improving Health Conditions for Contractors	
Challenges	5
Informing Diverse Subcontractors and Coordinating the Team	
Critical Areas Affecting Children’s Health	
Preserving Indoor Air Quality	
The Dangers of Material Substitutions	
Protecting the Site from Contamination	
Elevated Risks at Closeout	
Strategies	12
Informing Your Team on Health Initiatives	
Attentiveness to Specifications and Prepared Collaboration	
Reducing the Risk of Contamination	
Modifying Sequencing and Scheduling Allowances for Ventilation	
Anticipating and Preparing for High-Risk Situations	
Ensuring Health Criteria are Fulfilled	
Improving Health Conditions for Workers and Children	
Resources	20
Guides for Healthier Construction Practices	
Information on Building Material Toxicity	
Healthy Precedent Projects	

OBJECTIVES

Building a Healthier Facility for Children

The construction team plays a pivotal role in establishing healthier conditions that will affect children throughout the life of the facility. These contributions include:

- Using healthier building materials
- Preserving indoor air quality
- Reducing the risk of potential exposures



Improving Health Conditions for Contractors

There is also an opportunity to improve contractors' health through the use of healthier materials and practices. While construction processes often yield a certain amount of dust and off-gassing by nature, with lower toxicity materials we can help reduce the potential for these activities to become harmful to workers. More information on these risks can be found in [OSHA's Health Workbook](#).

In general, the health initiatives designed to improve children's health at HWCEC-ECIC can be felt by all members of the team, particularly contractors, who have frequent interactions with these materials in their raw state.

reducing exposures to...



airborne dust particles



processing fumes



initial VOC off-gassing



CHALLENGES



Highest Priority Hazards - W.A.F.T.

The most hazardous materials to children's health are generally those with high VOC emissions that continue off-gassing into the building's occupancy, and those with surfaces in frequent contact with the body, increasing the likelihood for exposure. These materials often emit noxious smells, so you can use the following acronym to remember them.

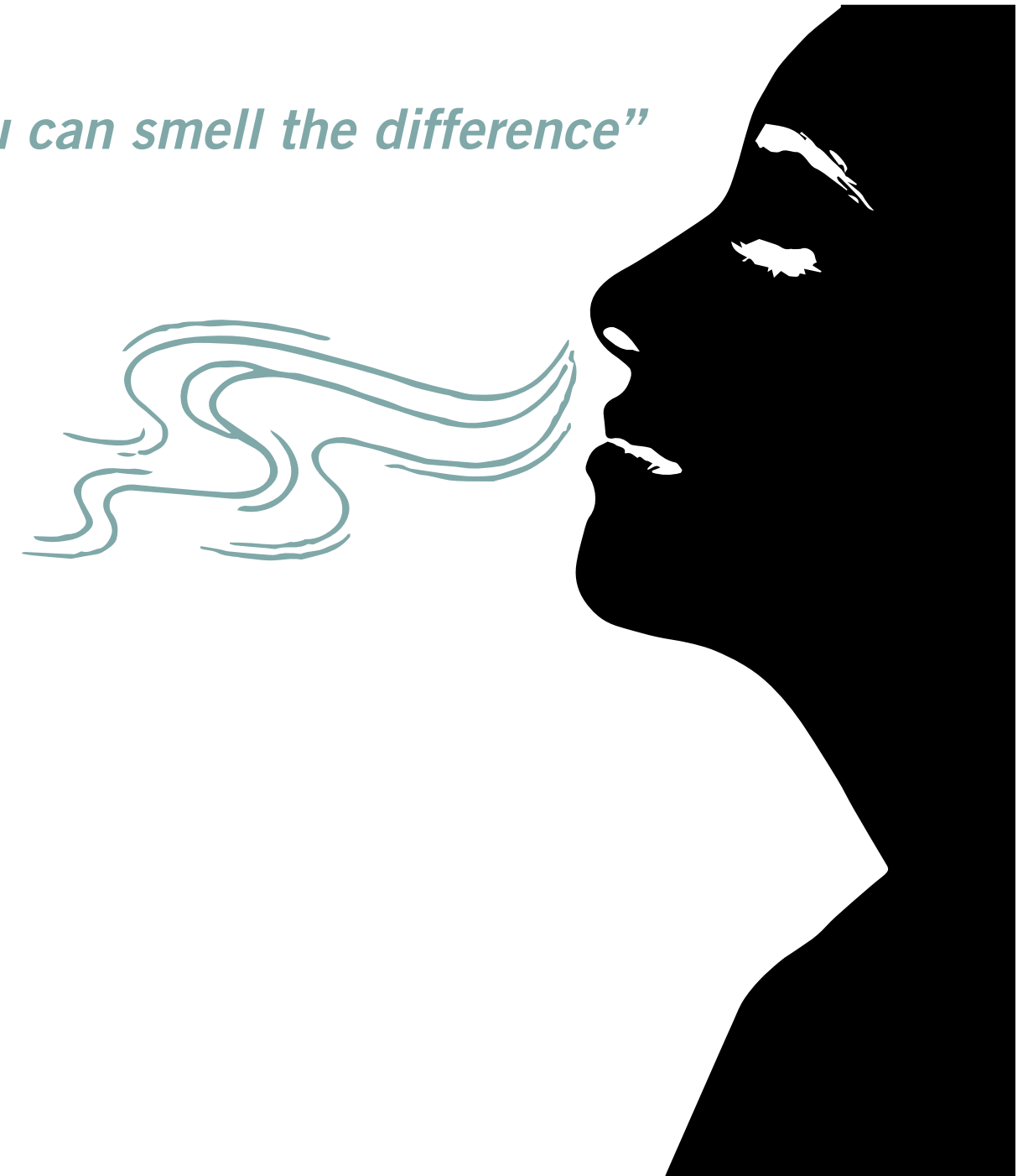
Wet-Applications  

Adhesives   

Finishes 

Touch-surfaces  

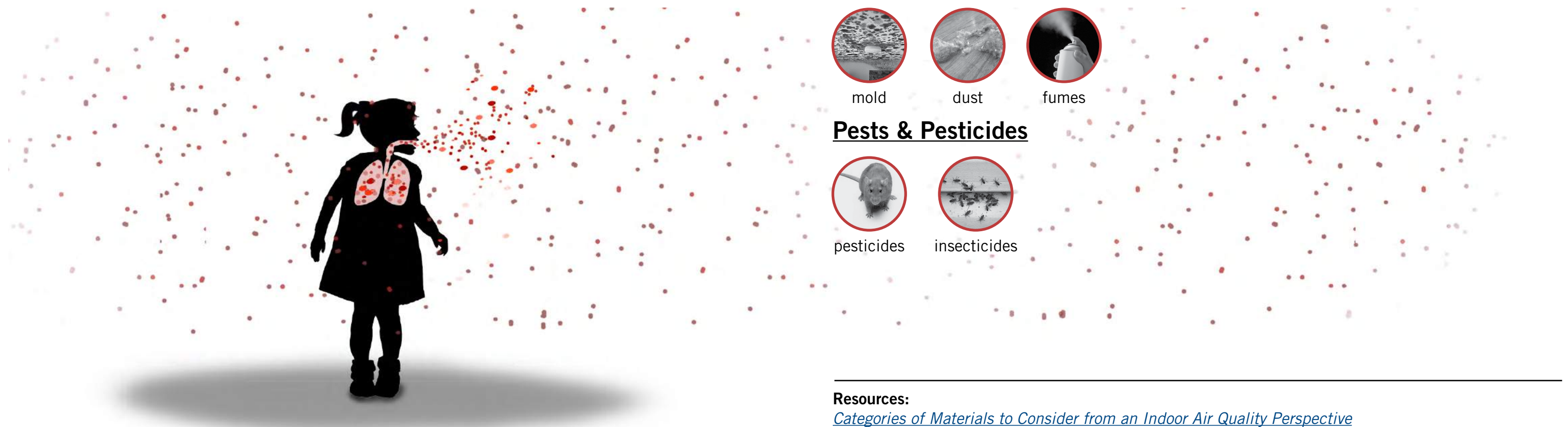
“you can smell the difference”



Preserving Indoor Air Quality

Indoor air quality is one of the greatest concerns in protecting children’s health, as airborne particles can easily be inhaled, presenting a greater risk for exposure. Airborne pollutants come in many forms, and may be introduced directly during processes of construction, or can be the result of harmful conditions that develop over time.

It can be helpful for contractors to develop an Indoor Air Quality Management Plan prior to construction. You can find examples of these in GreenGuard’s [IAQ Management Plan](#) or the EPA’s [Indoor Air Quality Guidelines](#).



Volatile Organic Compounds (VOCs)



Semi-Volatile Organic Compounds (SVOCs)



Air Pollutants



Pests & Pesticides



Resources:

[Categories of Materials to Consider from an Indoor Air Quality Perspective](#)

The Dangers of Material Substitutions

While substituting products for similar counterparts might seem harmless, doing so can lead to a variety of risks that may not be evident on the surface.

Misleading Certifications:

Many products have “green” labels on them that imply they are beneficial to health, but these may be indicators of more environmental properties, can be unverified for performance, or simply are not up to the standards and criteria of HWCEC-ECIC.

Specific Hazard Avoidance

We are also targeting specific issues that affect children the most, so while a product may in fact have valid health or environmental qualities, that doesn’t necessarily mean it has the properties we are addressing at HWCEC-ECIC.

Material Compatibility

The interaction of materials also poses potential dangers, as some chemicals may be relatively inert on their own, but in combination with certain reactants, may yield toxic gases or byproducts.

For these reasons, specification details are critically important, as information such as the product brand, installation methods, and even manufacturing location can greatly affect the health properties of materials.

1. [Zandur #20 Two-Part Epoxy \(Part A\) HPD](#)
2. [Zandur FloorScore and CHPS](#)

3. [Forbo Sustain Cradle to Cradle Certification](#)
4. [Forbo Sustain Recycled Content Certificate](#)

The Challenge of Comparing Products

Zandur #20 Two-Part Epoxy



- Health Product DECLARATION v1.0¹
- LEED Ingredient Disclosure Credit Eligible
- CHPS and FloorScore Compliant²

Forbo Sustain 885m



- Cradle to Cradle Certified Gold³
- LEED Low-Emitting Material Credit Eligible
- SCS Recycled Content Certified⁴

VS.

Both of these floor adhesives have several certifications. One is relatively healthy. The other’s main ingredient is BPA, a chemical known to disrupt the endocrine system, block hormone regulation⁵, and is associated with Autism⁶, ADHD⁷, and Obesity⁸.

Can you tell which is the healthier one?

Given the difficulty of comparing products based on certifications or labels alone, any product that hasn’t been explicitly specified should first be submitted to architects for hazard screening and approval.

5. [Perkins + Will Precautionary List: BPA](#)
6. [Association between Autism + BPA Plasticizer](#)

7. [Hyperactivity in children linked to BPA](#)
8. [BPA Linked to Obesity in Children](#)



Substitutions Under Deadline

The demands of schedule can raise additional challenges to making a healthy building. Coordination is especially important at closeout when a larger number of trades, including finish trades, are working together. It's important to anticipate issues of schedule and coordination to ensure that necessary precautions are not overlooked or that unhealthy substitutions are made under time constraints.



Continued Off-Gassing into Building Occupancy

If materials are not allowed adequate time to cure before occupancy, they may still be at higher rates of off-gassing when children begin to come in contact with them. Indoor air quality can be improved with an HVAC Flush-Out, removing air pollutants that may have entered during construction, and a building Air-Out, or period of vacancy after construction is complete when materials and furnishings can safely finish airing out before the building is occupied.



High-Priority Areas of Exposure

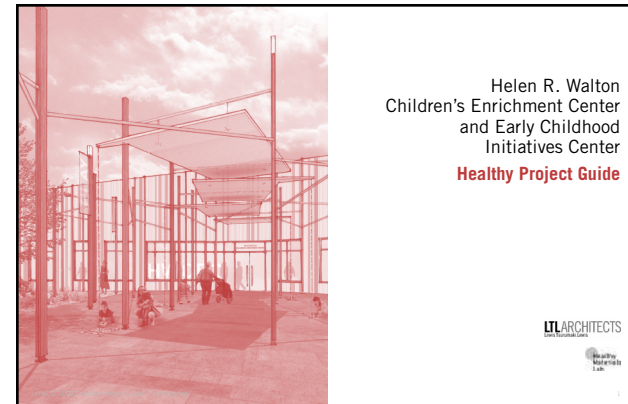
The last part of a construction project is the final finishes. These are the surfaces that children will have the greatest contact with when they use the facility. It is important that ample time is given to minimize any contamination or risk to children in this area of the project.

Strategies for Healthier Construction Practices

Pre-Construction Strategies: Informing Your Team on Health Initiatives

Overall Project Health Initiatives

The Healthier Project Guide can help inform your team of the major health concerns and objectives we are addressing at HWCEC-ECIC.



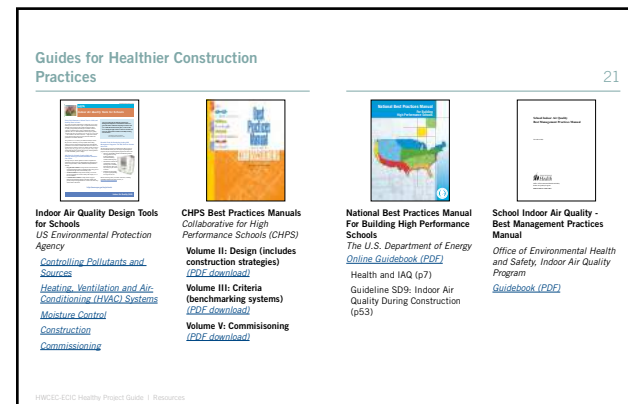
Construction-Related Health Goals

The Construction Supplement then outlines more targeted goals, highlighting the ways in which this project may differ from a contractor's typical methods of operation.

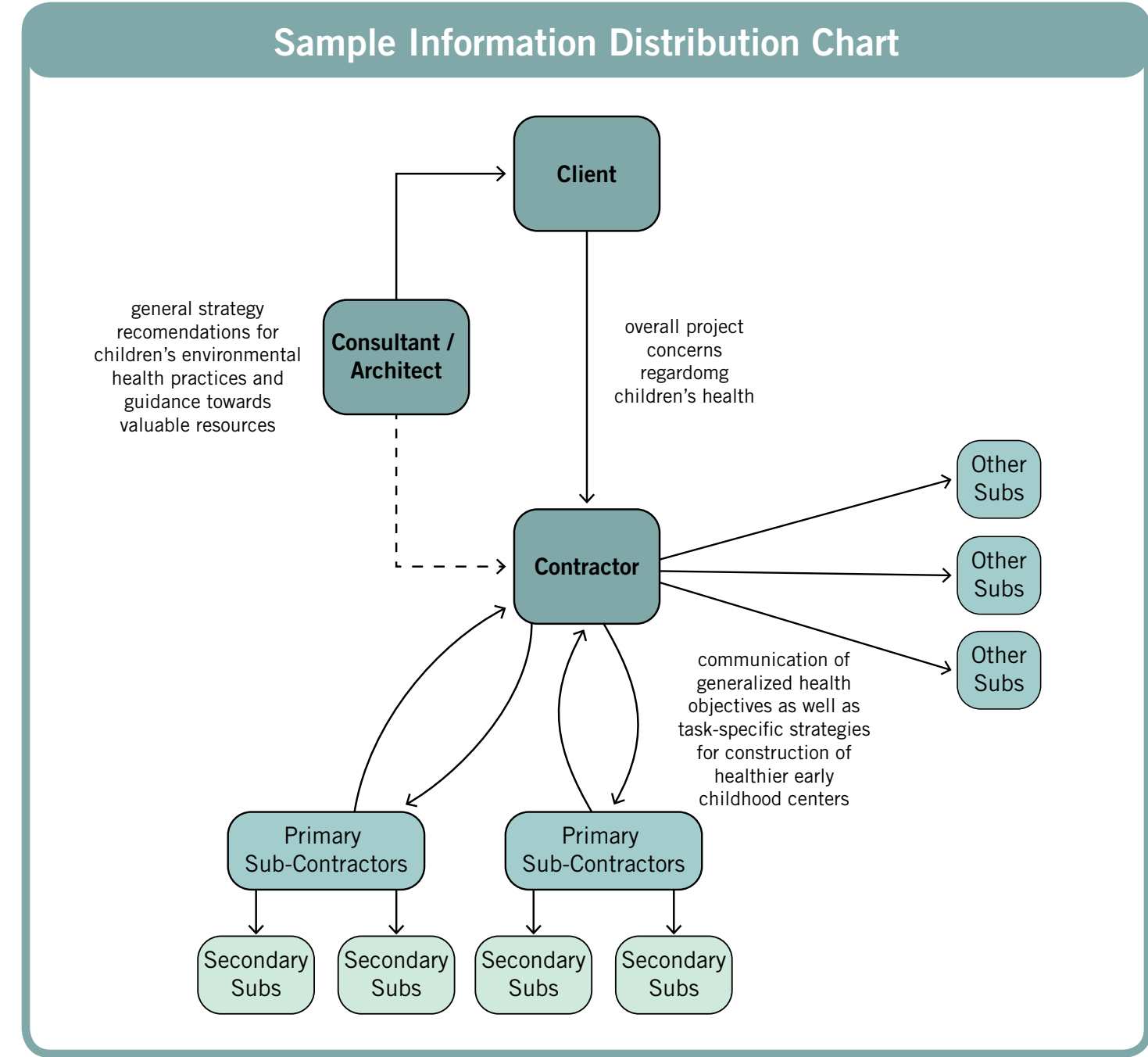


Resources for Specific Strategies

The Resources Section of this supplement then has links to sources where subs can find trade-specific guides for best practices in the construction of healthier early childhood facilities.



Sample Information Distribution Chart



Pre-Construction Strategies:

Attentiveness to Specifications and Prepared Collaboration

The specification for this project will outline the best and healthiest materials, taking into consideration cost, availability, and installation. Where possible, the specification will avoid single-source specification to ensure competition and effective pricing. Any substitutions not addressed in the specification will need to be reviewed by the design team prior to installation so that we can ensure the long-term health of the children of HWCEC-ECIC.

During construction, a regular component of the weekly construction meeting is recommended to be set to address material health and review installation, substitutions, and coordination of trades. This will ensure that the project is approached as a team effort with the focus on the health of the children kept as a priority, while maintaining budget and schedule.

**attentiveness, flexibility,
and collaboration...**



**...because children's
health is the first priority**

Construction Strategies: Indoor Air and Moisture Management

Seal Unnecessary Openings

Seal all unnecessary openings in walls, floors and ceilings that separate conditioned space from unconditioned space (likely around pipes, conduit, and beams) to help reduce the potential for air, rodent, or pest infiltration.

Moisture & Humidity Control

Regulate moisture content at air intake to reduce condensation and dehumidify indoor air throughout the duration of construction, particularly after wet trades like plaster and paint, and during summer months when humidity is highest in Arkansas.

Encapsulating Materials

Contain construction activities within air-sealed zones to reduce the potential for air pollutants to contaminate duct-work or other materials.

Protecting HVAC & Duct-Work

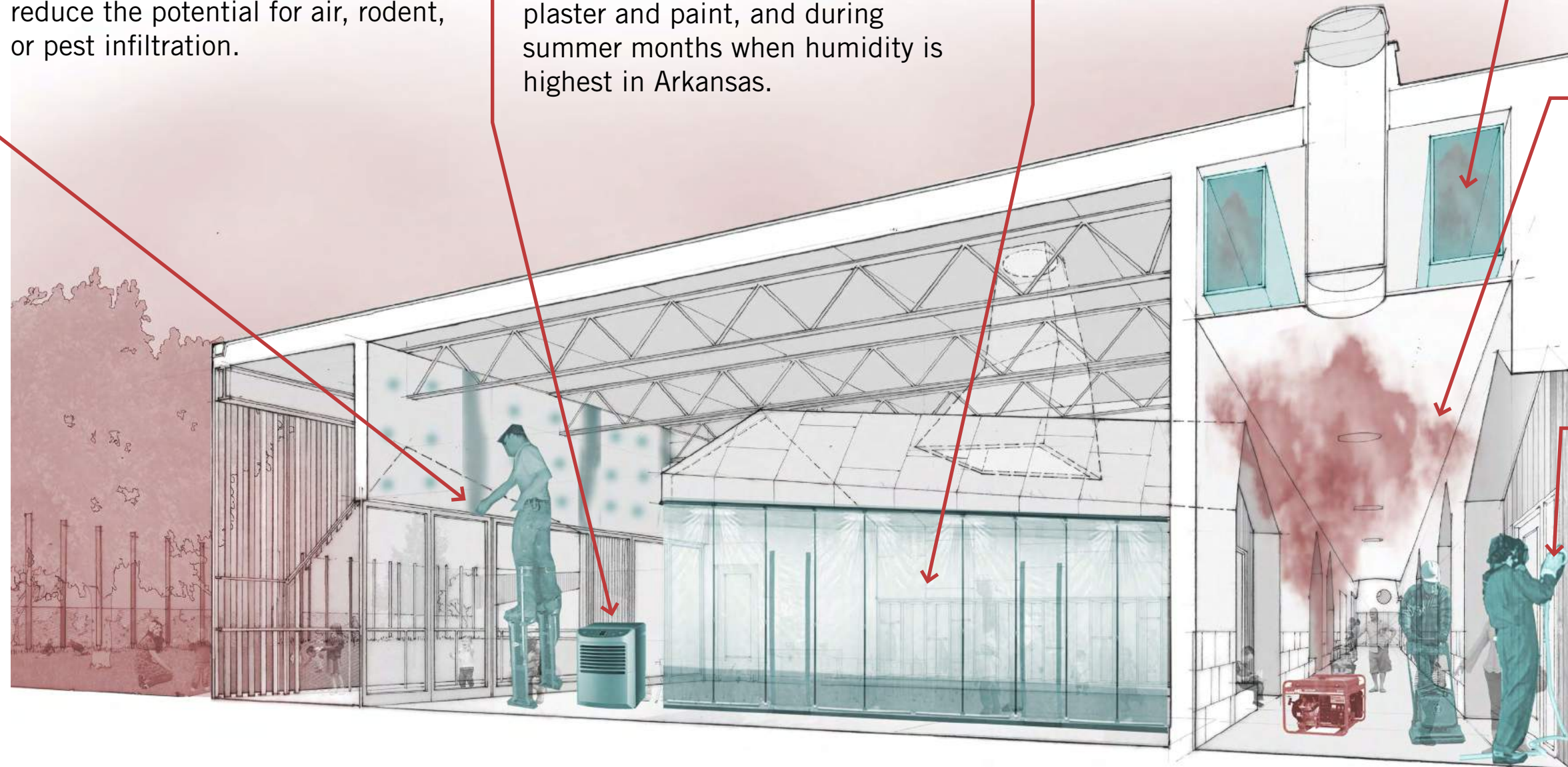
Temporarily seal all air vents and open duct-work to reduce the risk of duct-work and air handling units from being contaminated with construction dust and debris.

Reduce Equipment Exhaust

Engines, generators, and heaters that run on gasoline, diesel, kerosene, or other fossil fuels should not be operated indoors due to their production of combustion fumes.

Reduce Dust from Sanding

Use vacuum assisted sanders that collect construction dust directly from tools, or wet sanders that deter dust from becoming airborne.



References:

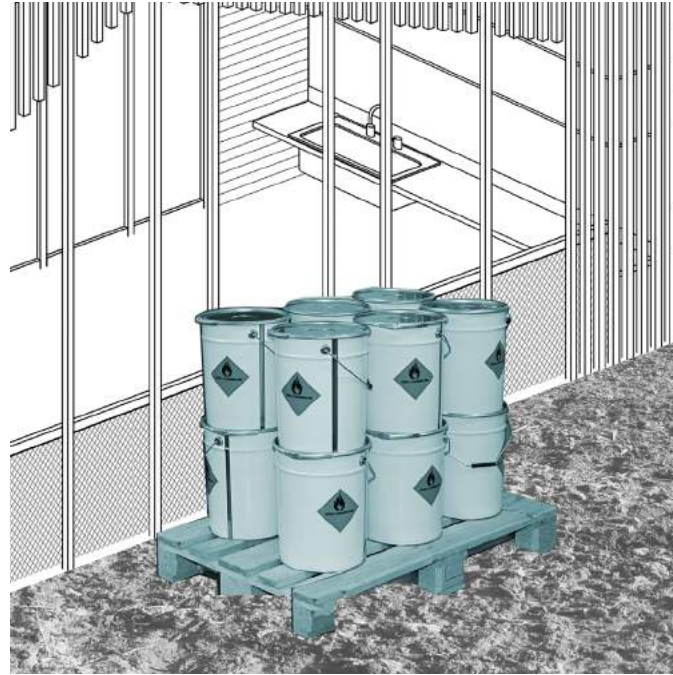
[EPA's Guide for IAQ Management During Construction & Planning](#)

Construction Strategies: Reducing the Risks of Material Contaminations



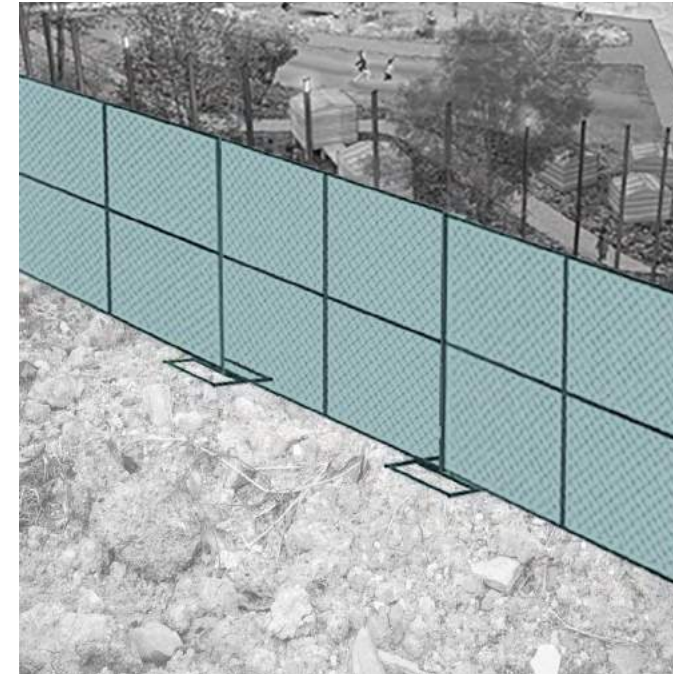
Keep Building Materials Dry

Building materials, especially those with moisture absorbing properties like wood, insulation, paper and fabric, should be kept dry to prevent the growth of mold and bacteria. For a full guide to moisture control strategies, visit the EPA's [Moisture Control Guidance for Design, Construction and Maintenance \(PDF\)](#)



Liquid Materials Storage

To reduce the possibility of spills during storage, transfer, or mixing, store all odorous or toxic liquids outside the building and protect against freezing.



Protect Site & Playscapes

Protect playscapes, garden areas, and outdoor programs from construction dust and debris, which have potential to contaminate soil and water systems with long-term health affects.



Clean Spills Immediately

If solvents, cleaners, gasoline, or other odorous or potentially toxic liquids are spilled onto the floor, they should be cleaned up immediately. If a spill occurs on an easily replaced building material, it may be safest to discard it and replace it with new material.

Construction Strategies: Modifying Sequencing and Scheduling Allowances for Ventilation

The potential for exposure can also be reduced through adjustments to the typical construction schedule. These can include allowing time for ventilation of high off-gassing materials, and modifying the sequence of certain installations to reduce the risks of contamination to particular materials.

Installation Sequencing

Absorbative materials (*Type II*), which are more fibrous or porous in nature, should be installed after materials with high off-gassing potential (*Type I*) have been given adequate time to dry. This reduces the risk that Type II materials absorb contaminants, which could then be released later in the building's occupancy.¹

Spot-Ventilation

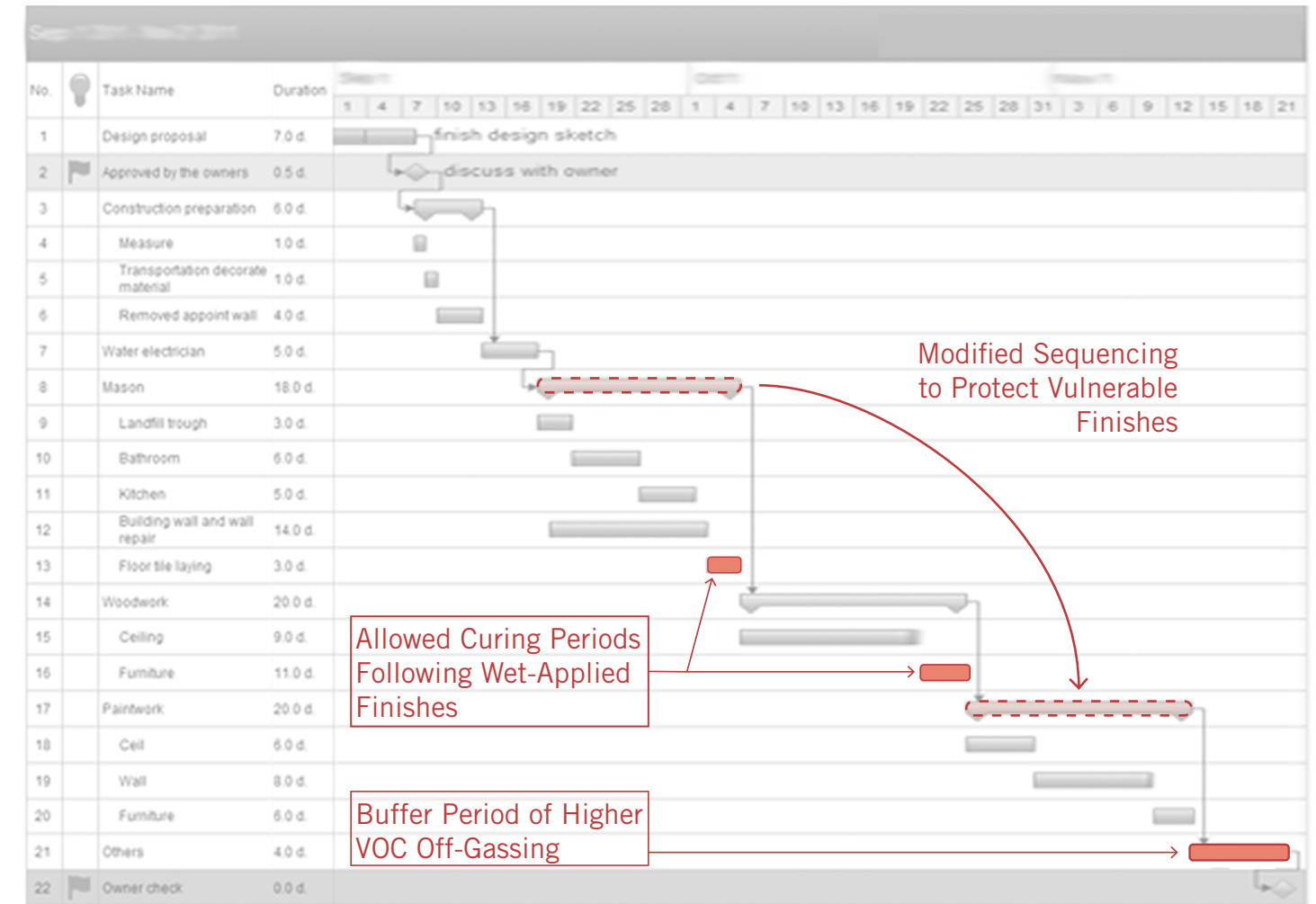
During installation of carpet, paints, furnishings and other VOC-emitting products, provide supplemental (spot) ventilation after work is completed. The EPA has recommendations for the duration of ventilation periods [here](#).

Air-Out

Before the building is turned over, allow time for products and furnishings to air out in a well ventilated space so that potential pollutants can freely be emitted. This includes opening drawers and cabinets, unrolling carpet and wall coverings, and turning on electrical appliances.²

Flush-Out

Flush out is when large amounts of outdoor air are forced through a recently completed building so that the majority of pollutant emissions from building materials, finishes, and furnishings can be removed from the building before occupancy.²



Critical trades should be brought into the discussion of sequencing in advance in order to ensure all teams are aware of the project initiatives and their own team's role in the process. This proactive planning can be key to the ongoing coordination of health objectives and ultimate performance of the project.

1. [Installation Sequencing Recommendations](#)
2. [Air-Out and Flush-Out Periods](#)

Closeout Strategies:

Anticipating and Preparing for High Risk Situations

Extra precautions should be taken during high risk periods to reduce the likelihood of potential contaminations.



Advanced Coordination

Coordinate the construction team ahead of time, making sure everyone is informed of the project's goals, strategies, and each team member's role in promoting a healthier environment for the children of HWCEC-ECIC.



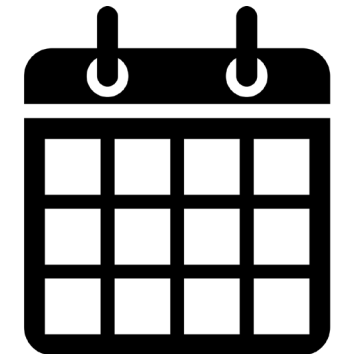
Material Availability

Anticipate material quantities, especially for those critical items where there are limited acceptable options and few substitutions.



Final Clean-Up

At the completion of construction, conduct a full building clean to remove any dust or particulates that may have been left behind. Make sure the cleaning staff is aware of project health initiatives, and that they are using the recommended products.



Scheduling for Ventilation

Make sure to incorporate time allowances for [Air-Out](#) and [Flush-Out](#) in the construction schedule. Recommended durations and protocols for these periods can be found in the EPA's [IAQ Guidebook](#).

Closeout Strategies:

Verifying Performance at the End of Construction

At the end of the project, attention should be paid toward making certain the building is as safe and healthy as possible. This may include tests to ensure safe indoor air and water quality, in addition to the more standard responsibilities associated with close-out and commissioning.

Areas of high contact for children should be looked at closely. This may include making certain interior finishes are complete and that materials and soils for the playscapes are safe for contact with children.



Measuring Indoor Air Quality



Particulate & Dust Monitoring



Evaluating Soil



Documenting Performance

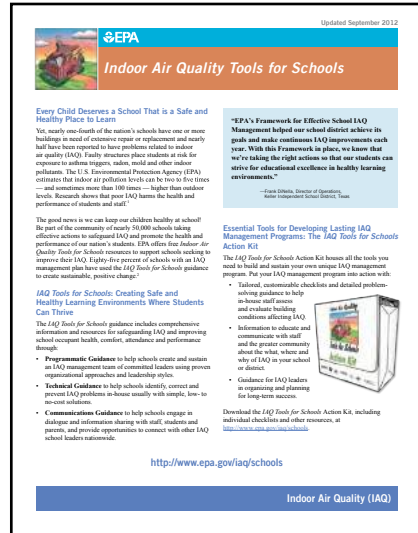
- CHPS Best Practices: Volume V - Commissioning ([PDF download](#))
- EPA's [IAQ Management During Construction](#) and [IAQ Commissioning Checklist](#)
- Buildings, Benchmarks & Beyond - [Performance Management Guidelines](#)

Overall Strategies: Collective Strength in a Shared Objective



Resources

Guides for Healthier Construction Practices



Indoor Air Quality Design Tools for Schools

US Environmental Protection Agency

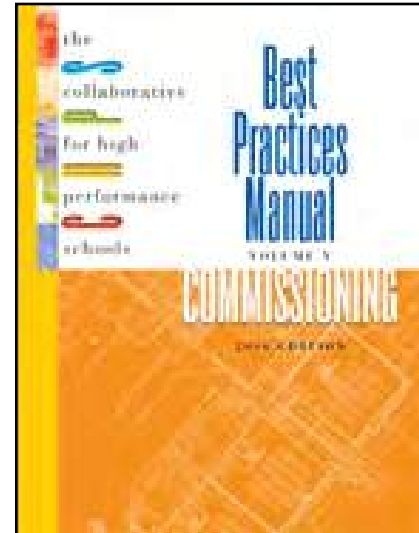
[Controlling Pollutants and Sources](#)

[Heating, Ventilation and Air-Conditioning \(HVAC\) Systems](#)

[Moisture Control](#)

[Construction](#)

[Commissioning](#)

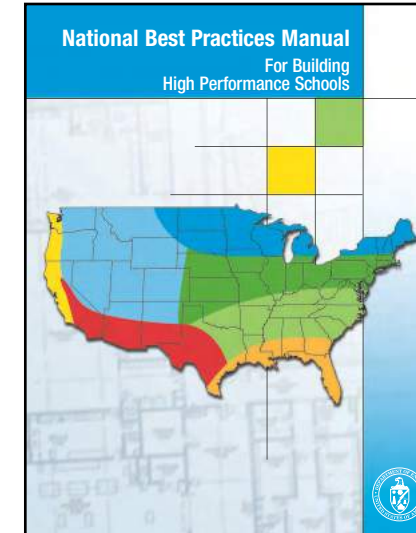


CHPS Best Practices Manuals Collaborative for High Performance Schools (CHPS)

Volume II: Design (includes construction strategies)
[\(PDF download\)](#)

Volume III: Criteria (benchmarking systems)
[\(PDF download\)](#)

Volume V: Commisisoning
[\(PDF download\)](#)

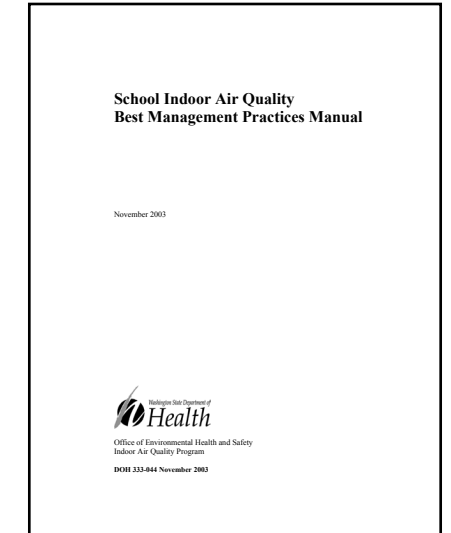


National Best Practices Manual For Building High Performance Schools

The U.S. Department of Energy
[Online Guidebook \(PDF\)](#)

Health and IAQ (p7)

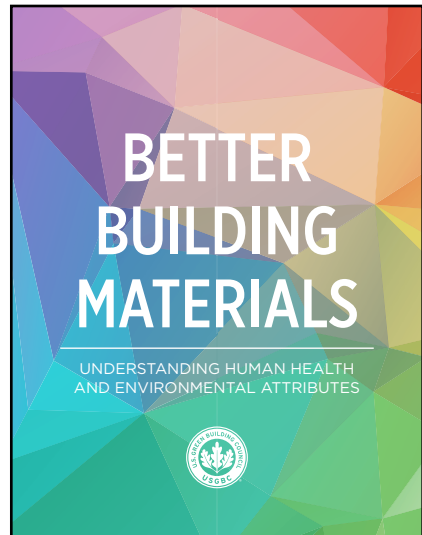
Guideline SD9: Indoor Air Quality During Construction (p53)



School Indoor Air Quality - Best Management Practices Manual

Office of Environmental Health and Safety, Indoor Air Quality Program

[Guidebook \(PDF\)](#)

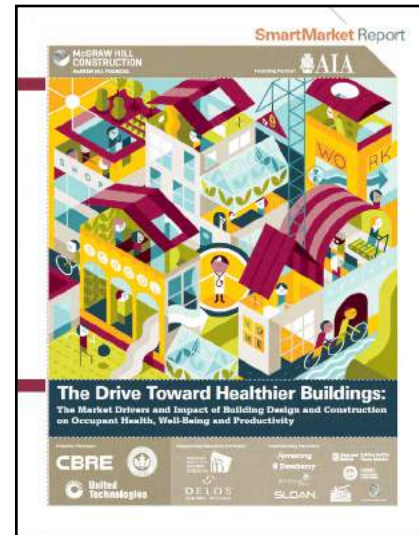


Better Building Materials: Understanding Human Health and Environmental Attributes

*U.S. Green Building Council
(USGBC)*

Provides detailed information on the health impacts of building materials, common hazards, and basic recommendations for alternatives. See chapter 2.3

[*Better Building Materials PDF*](#)



The Drive Toward Healthier Buildings

*McGraw Hill Construction,
SmartMarket Report*

Construction Industry and HR
Executive insights on building's
impact on health and well-
being.

[*The Drive Toward Healthier
Buildings - PDF*](#)



UniverCity Childcare Centre

Location: Burnaby, British Columbia
Program: Childcare, 3-5 years old
Owner: Simon Fraser University
Architect: Hughes Condon Marler Architects
Contractor: Ledcor
Completed: 2012

Comprehensive health and material initiatives including: contractor prepared a detailed indoor air quality plan which prescribed strict practices to maximize air quality throughout, and strong attention to detail in the selection of materials and finishes to ensure that any risk of off-gassing or chemical exposure was eliminated.

[UniverCity Childcare Centre LBC Info](#)



The Rose

Location: Minneapolis, MN
Program: Mixed Income Housing
Developers: Aeon, Hope Community
Architect: Meyer, Scherer & Rockcastle
Contractor: Weis Builders
Completed: 2015

Materials chosen for lower off-gassing and toxicity, including paints, flooring, countertops, and trim, while maintaining construction costs comparable to average affordable housing projects.

[The Rose, Urban Land Institute Report](#)

[New Minneapolis apartments fuse energy efficiency with style, affordability](#)



The Bullitt Center

Location: Seattle, WA
Program: Commercial Office Building
Owner: Bullitt Foundation
Developers: Point32
Architect: Miller Hull Partnership
Contractor: Schuchart
Completed: 2013

The building does not contain “Red List” hazardous materials, including PVC, cadmium, lead, mercury and hormone-mimicking substances, all of which are commonly found in building components.

[Bullitt Center Website](#)

[Bullitt Center Media Kit](#)

[Bullitt Center As-Built Product List](#)



Salinas Gateway Senior Apartments

Location: Salinas, CA
Program: Affordable Housing
Developers: First Community Housing
Architect: OJK Architects & Planners
Contractor: L&D Construction, Inc.
Completed: 2013

Uses materials which are locally sourced, high in recycled content, non-toxic paints, coatings and materials free of VOCs and phthalates.

[Salinas Gateway Website](#)