



Health@Home Rehabilitation Guidelines Webinar Series

Session 3

Now More than Ever: Keeping Homes Safe and Dry
September 10, 2020



Connection Issues and Chats

Should you have any **technical** issues or concerns:

1. Use the Chat Box on the bottom right (or) make sure the "Chat" icon is lit blue on the top.
2. Submit your message to "Host and Presenters" so that all of us can see it.

For **Questions** related to the content:

1. Use the Q&A Panel (same area as the chat box)
2. Submit to all panel members and the host.



Agenda

1. Welcome and Logistics

- Lael Holton, AECOM

2. Health@Home Overview

- Michael Freedberg, U.S. Dept of Housing and Urban Development

3. Keep it Dry and Safe Overview

- Ellen Tohn, Tohn Environmental Strategies

4. Keep it Dry

- Armand Magnelli, Livable Housing

5. Keep it Safe

- Jonathan Wilson, The National Center for Healthy Housing

6. BONUS - Covid-19 Resources

- Maureen Mahle, Sustainable Housing Services, SWC

7. Questions



Presenters



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Steven Winter Associates, Inc

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Welcome

- Today is #3 in a four-part series: we hope you will stick with all four sessions!
- Participants who attend all four sessions will receive a **Health@Home Certificate of Completion**
- Importance of healthy housing has never been more clear:
 - Building more efficient homes, including passive house and zero-energy ready homes
 - Spending more time in our homes than ever due to COVID-19
 - Asthma and respiratory ailments impacted by indoor environment
- We need to be sure that when we rehab our homes, we maximize the indoor experience, minimize hazards



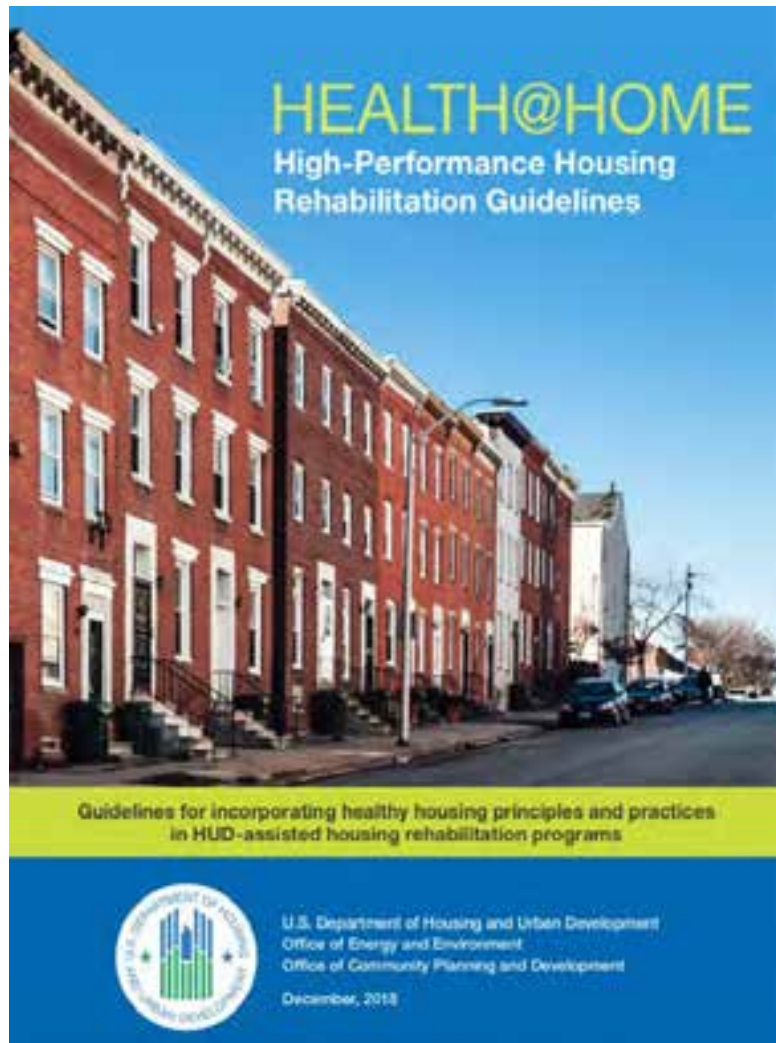
Health@Home – Training Series

<p>SESSION 1</p> <h2>Ventilation, Ventilation, Ventilation</h2> <p>June 18, 2020, 3:00–4:30 PM EDT</p> <p>Ensuring adequate ventilation is a central element of a healthy home, where indoor pollutants can be 7.5 times higher than outdoors. Increasing the supply of fresh air can help reduce exposure to indoor airborne allergens, mold, and other contaminants. This session focuses on helping residents reduce exposure to contaminants, allergens, and pests by making sure homes are easily cleaned (Healthy Housing Principles 4 and 5).</p> <p><i>Presenters: Jill Bryson, National Center for Healthy Housing, Nahr Price, Indoor Climate Research & Training Group, University of Illinois-Champaign, Ellen Toth, Toth Environmental Systems</i></p>	<p>SESSION 2</p> <h2>Freedom from Contaminants and Pests</h2> <p>July 23, 2020, 3:00–4:30 PM EDT</p> <p>This session addresses measures needed to address one or more of the contaminants that you may encounter during your rehab project, including radon, lead, formaldehyde, volatile organic compounds (VOCs) in paints and adhesives, asbestos, garage air pollutants, carbon monoxide (Principle 6), as well as pre-emptive pest control measures that can be undertaken during the rehab process (Healthy Housing Principles 2 and 3).</p> <p><i>Presenters: Ellen Toth, Toth Environmental Systems; Tami Proulx, SEGA Council of Governments; Susanah Pines, Stop Pests</i></p>
<p>SESSION 3</p> <h2>Mold and Moisture: Keeping a Home Dry and Safe</h2> <p>September 10, 2020, 3:00–4:00 PM EDT</p> <p>Moisture intrusion in buildings can increase respiratory risks like asthma and other health problems. Excess moisture also leads to structural deterioration (wood rot, drywall delamination, etc.), as well as the development of mold and other conditions that threaten our families. This session will help rehabilitation specialists control and address moisture in homes. We will also address and discuss ways to set up the house to improve home safety and minimize risk, especially for elderly occupants (Healthy Housing Principles 1 and 6).</p> <p><i>Presenters: Almond Maguire and Joyce Windham, Lindale Housing, Inc.; Jonathan Wilson, National Center for Healthy Housing</i></p>	<p>SESSION 4</p> <h2>Bringing it Home: The Energy Plus Health Equation, Maintenance, and Active Design</h2> <p>October 8, 2020, 3:00–4:00 PM EDT</p> <p>This session focuses on (1) the steps that practitioners can take to educate homeowners or residents on maintaining a healthy home after rehab is complete, including the development of homeowner/resident maintenance checklists and procedures; (2) ensuring efficient and reliable heating and cooling, through well-designed and well-maintained mechanical systems and a sound thermal envelope; and (3) opportunities to integrate Active Design features in your rehab project (Healthy Housing Principles 7, 8, and 9).</p> <p><i>Presenters: Ellen Toth, Toth Environmental Systems; Paul Francisco, University of Illinois-Champaign Urbana, Kristi Egger, Enterprise Community Partners</i></p>

Overview and Keep it Well Ventilated and Clean	June 18
Keep it Contaminant and Pest Free	July 23
Keep it Dry and Safe	Sept 10
The Energy + Health Equation, Maintenance and Active Design	October 8



Health@Home Guidelines



- Google HUD Exchange - Health@Home
<https://www.hudexchange.info/resources/health-at-home/introduction/>
- Rehab projects are an opportunity to address housing- based health issues
- Increased focus on indoor environment due to COVID-19



Context

- Focus is on moderate rehabilitation, home remodeling, or home repair programs
- Primarily single-family and low-rise multifamily housing
- For substantial or gut rehab consider a green building standard: Enterprise Green Communities, LEED, National Green Building Standard Earthcraft, Earth Advantage, Energy Star Indoor Airplus, WELL, or Fitwell
- For in-depth discussion, see EPA IAQ Protocols for Existing Buildings



Home Conditions Impact Health

Studies show home conditions contribute to health:

A few examples

- **Asthma:** 8% adults and children have asthma AND 20-40% of asthma attacks can be linked to home conditions
- **Radon:** 21,000 annual deaths estimated, over 7 million homes with suspected risks
- **Falls:** 1 in 4 older adults fall each year, over 50% of falls occur in the home



Guidelines Organized by Healthy Housing Principles



Crosswalk Between Principles and Building Components

Healthy Housing Principles Linked to Rehab Standards Organized by Building Component

- Site
- Roof/Exterior
- Foundation
- Insulation & Sealing
- Interior

- Electrical
- Plumbing
- Heating & Cooling
- Ventilation
- Appliances

Example: Keep It Dry

1 KEEP IT DRY

Moisture and mold are linked to increased risk of asthma and other respiratory ailments, as well as allergic reactions in some individuals. Excessive moisture can also contribute to pest problems and deterioration of lead-based paint.

1.1 PREVENTION: STORMWATER MANAGEMENT

Ensure that stormwater management is adequate for the building site and climate.

- Size *gutters and downspouts* appropriately, either by increasing the dimensions of gutters and downspouts to the next size when the system is inadequate, or by sizing them per the manufacturer's recommendations.

1.2 PREVENTION: LEAKS

Identify and repair all roof leaks, building envelope leaks, and plumbing leaks. Assess affected areas for structural issues, deterioration of components, and mold, and take appropriate actions to address the issues.

1.3 PREVENTION: SURFACES

In high-moisture areas such as kitchens, bathrooms, and laundry rooms, use cleanable, durable, moisture-resistant materials, such as waterproof shower surrounds constructed of fiberglass or ceramic tile flooring that is impervious to water and sealed to adjoining bathing fixtures, countertops, and sinks.

Ensure all countertop materials adjoining sinks are water tight and well-sealed to the sink bowl to prevent leaks into cabinetry.




Crosswalk between principles and standards

Clicking on the link.....

Principle 1: Keep it Dry

Principles (Section A)	Contaminants	Site	Roofing	Building Exterior	Foundations and Structure
A.1 Dry					
A.1.1 Stormwater Management		2.2 Grading	3.1 Flat and Low- Slope Roofing	4.3 Windows	5.2 Basement Floors
A.1.2 Leaks		2.3 Landscaping/ Trees and Shrubs	3.2 Pitched Roofs	4.2 Exterior Cladding; 4.3 Windows; 4.4 Ext Doors	5.3 Crawl Spaces
A.1.3 Surfaces		2.1 Paving/ Walkways; 2.2 Grading; 2.4 Lawn	3.3 Gutters and Down- spouts		5.4 Sump Pump Systems
A.1.3 Countertops	1.4 Mold/ Moisture; 1.7 VOCs				

... provides link to relevant standard

Replacement Standard	
Essential walks and driveways deemed beyond repair will be replaced with concrete per City specifications.	
	
2.2 GRADING	Key Principle: Dry
Repair Standard	Minimum Life: 5 years
All grading adjacent to the building and for a distance of at least 10 feet away from the building should slope away from the structure at a pitch of at least 1 inch per foot. All bare earth should be reseeded, or sod should be installed per the "Lawn" repair standard (Section 8.2.4).	
Replacement Standard	
NA	

Easy to navigate from principles to rehab standards or Scopes of Work.

Example: Site Standards

2 SITE

Key concepts and relationships

- Well-constructed and maintained paving ensures safe passageway from the street to the house or from the driveway to the house.
- Positive grading is the simplest and most sustainable way to prevent stormwater intrusion into the structure and future moisture issues.
- Trees and shrubbery that are located too close to the house aid pest entry, create safety issues for the structure, and promote moisture problems.
- Bare soil may be contaminated with lead-based paint, which poses a hazard for children at play outdoors, as well as for vegetable gardening. Additionally, humans and pets can create a lead-based paint hazard indoors by tracking that contaminated soil into the home.
- Bare soil also leads to erosion, adding to and or creating grading problems, stormwater management issues, and possibly moisture problems.
- Enhanced lighting can make exterior areas safer by reducing the potential for injury, and possibly reducing the likelihood of intruders.



- DRY
- CONTAMINANT FREE
- PEST FREE
- SAFE

2.1 PAVING AND WALKS

Key Principle: Safe

Repair Standard

Minimum Life: 10 years

Essential paving, such as front sidewalks and driveways, with minor defects should be repaired; repairs should match the surrounding pavement. Tripping hazards greater than $\frac{3}{4}$ inch must be addressed. Non-essential, highly deteriorated paving, such as sidewalks that are unnecessary, should be removed and appropriately landscaped.



Replacement Standard

Essential walks and driveways deemed beyond repair will be replaced with concrete per City specifications.



2.2 GRADING

Key Principle: Dry

Repair Standard

Minimum Life: 5 years

All grading adjacent to the building and for a distance of at least 10 feet away from the building should slope away from the structure at a pitch of at least 1 inch per foot. All bare earth should be reseeded, or sod should be installed per the "Lawn" repair standard (Section B.2.4).

Replacement Standard

NA



Today's Session

**Keep it Well
Ventilated**
Healthy Housing
Principle #4

Keep it Clean
Healthy Housing
Principle #5

Session 1

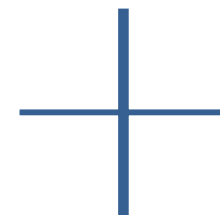
**Keep it
Contaminant Free**
Healthy Housing
Principle #2

Keep it Pest Free
Healthy Housing
Principle #3

Session 2

Keep it Dry
Healthy Housing
Principle #1

Keep it Safe
Healthy Housing
Principle #6



Bonus on
addressing
COVID-19
concerns in
rehabilitation



Keep it Dry

Homes with damp or moist conditions increase occupant risks of:

- Upper respiratory tract symptoms
- Coughing
- Wheezing
- Asthma symptoms
- Hypersensitivity pneumonitis





Keep it Dry



First, the Principles

A HEALTHY HOUSING PRINCIPLES

In this section, the HealthyHome guidelines are organized around the following eight Healthy Housing principles, developed by the NCHH with support from HUD and the Centers for Disease Control and Prevention (CDC), with the addition of a ninth principle aimed at promoting exercise and healthy living:

1. Keep It Dry
2. Keep It Contaminant Free
3. Keep It Safe
4. Keep It Well Ventilated
5. Keep It Clean
6. Keep It Well Insulated
7. Keep It Well Maintained
8. Keep It Thermally Controlled
9. Promote Healthy Living

1 KEEP IT DRY

Moisture and mold are linked to increased risk of asthma and other respiratory ailments, as well as allergic reactions in some individuals. Excessive moisture can also contribute to pest problems and deterioration of lead-based paint.

Moisture and mold are linked to increased risk of asthma and other respiratory ailments, as well as allergic reactions in some individuals. Excessive moisture can also contribute to pest problems and deterioration of lead-based paint.

L1 PREVENTION: STORMWATER MANAGEMENT

Ensure that stormwater management is adequate for the building site and climate.

- Size gutters and downspouts appropriately, either by increasing the dimensions of gutters and downspouts to the next size when the system is inadequate, or by sizing them per the manufacturer's recommendations.

1.1 Prevention: Stormwater Management

- Ensure that stormwater management is adequate for the building site and climate.
- Size gutters and downspouts appropriately, either by increasing the dimensions of gutters and downspouts to the next size when the system is inadequate, or by sizing them per the manufacturer's recommendations.
- Downspouts and grading must direct water away from the building to prohibit water infiltration into the structure.
- Sub-surface drainage systems are an approved remedy for moving stormwater away from the structure when sufficient grading is not feasible because of site conditions.

Next, The Rehab Standards

- This section arranges the standards by the category of Building Component.
- The Keep it Dry Principle covers the following components:
 - 2. Site (2.2 Grading)
 - 3. Roofing, Gutters and Downspouts, and Stormwater Management
 - 5. Foundations and Structure
 - 9. Plumbing
- We will also touch briefly on Mold under Section 1. Contaminants and Other Hazards



Stormwater Management Issues Related to Grading

Sometimes it's Obvious



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2 Site

Key concepts and relationships

- Well-constructed and maintained paving ensures safe passageway from the street to the house or from the driveway to the house.
- **Positive grading is the simplest and most sustainable way to prevent stormwater intrusion into the structure and future moisture issues.**
- Trees and shrubbery that are located too close to the house aid pest entry, create safety issues for the structure, and promote moisture problems.
- Bare soil may be contaminated with lead-based paint, which poses a hazard for children at play outdoors, as well as for vegetable gardening. Additionally, humans and pets can create a lead-based paint hazard indoors by tracking that contaminated soil into the home.

2.2 Grading

Key Principles: Dry
Minimum Life: 5 Years

Repair Standard

All grading adjacent to the building and for a distance of at least 10 feet away from the building should slope away from the structure at a pitch of at least 1 inch per foot. All bare earth should be reseeded, or sod should be installed per the “Lawn” repair standard (Section B.2.4).

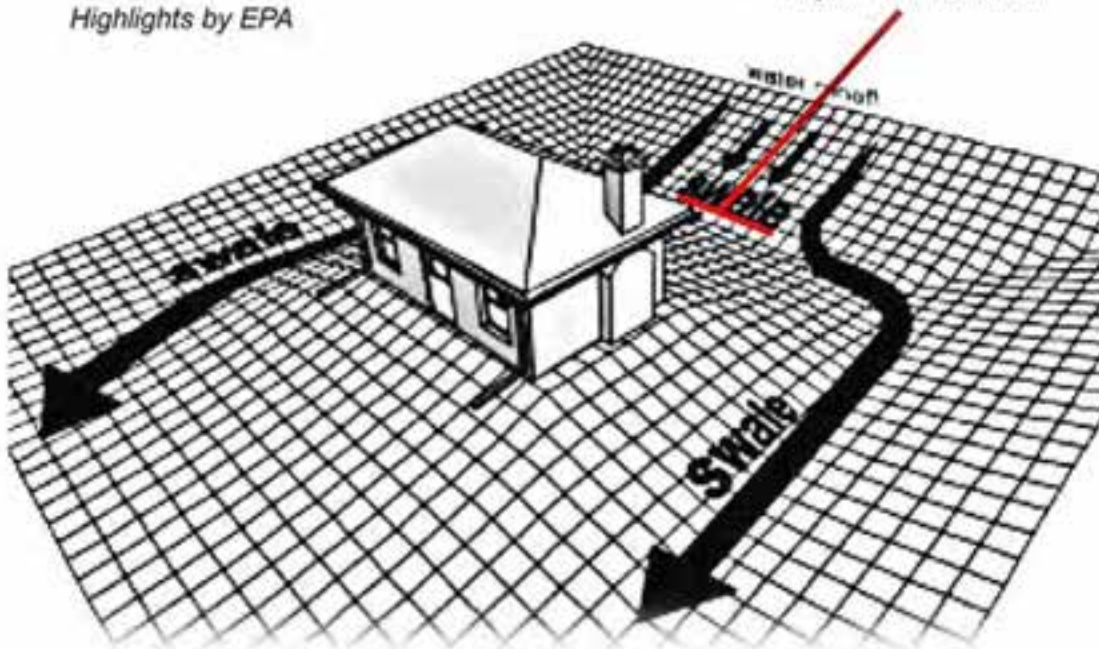
Replacement Standard

- NA

EPA Indoor airPLUS | MOISTURE CONTROL 1.1
www.epa.gov/indoorairplus

Highlights by EPA

Where setbacks limit space to less than 10 feet, provide swales or drains designed to carry water from foundation



BUILDING SITE DRAINAGE

EPA Illustration Depicting Swales

More Stormwater Management Issues

Gutters and Downspouts

Sometimes it's Obvious

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Sometimes it's Obvious



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Gutter section enlarged



Sometimes it's Obvious

Gutter section enlarged



What Were They Thinking?



Sometimes it's Less Obvious



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Rehab Standards:

3 - Roofing, Gutters and Downspouts, and Stormwater Management

Key concepts and relationships:

- Gutters and downspouts are part of the roofing system, and when designed and installed properly, move stormwater well away from the structure.

Rehab Standards:

3.3 - Gutters and Downspouts

Repair Standard (Abridged)
Years

Minimum Life: 5

- Gutters and downspouts must be in good repair, leak free.....
- The system must move all stormwater away from the building and prevent water from entering the structure.
- In addition to positive drainage away from the building, outlets should be a minimum of 3 feet away from the foundation whenever there is a history of water problems.

Rehab Standards:

3.3 - Gutters and Downspouts

Replacement Standard (Abridged)

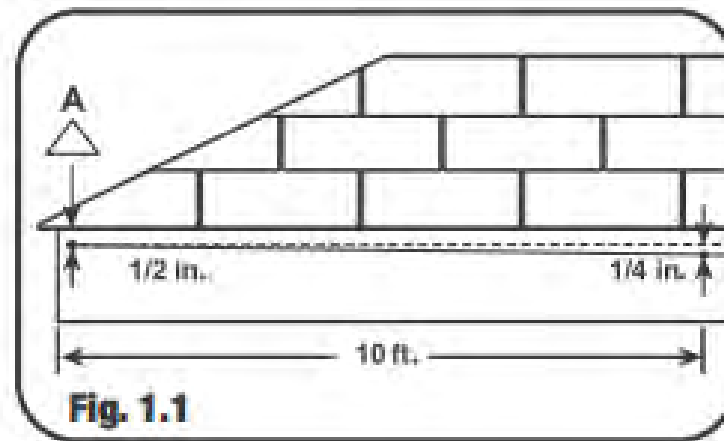
- The system must move all stormwater away from the building and prevent water from entering the structure.
- In addition to positive drainage away from the building, outlets should be a minimum of 3 feet away from the foundation whenever there is a history of water problems.
- Underground drain leaders connected to downspouts are an allowable expense when it is a more affordable solution than regrading.

Gutters & Downspouts

- The slope is important.
- Testing existing gutters and downspouts with water from a garden hose (with permission) will tell you if there are issues.

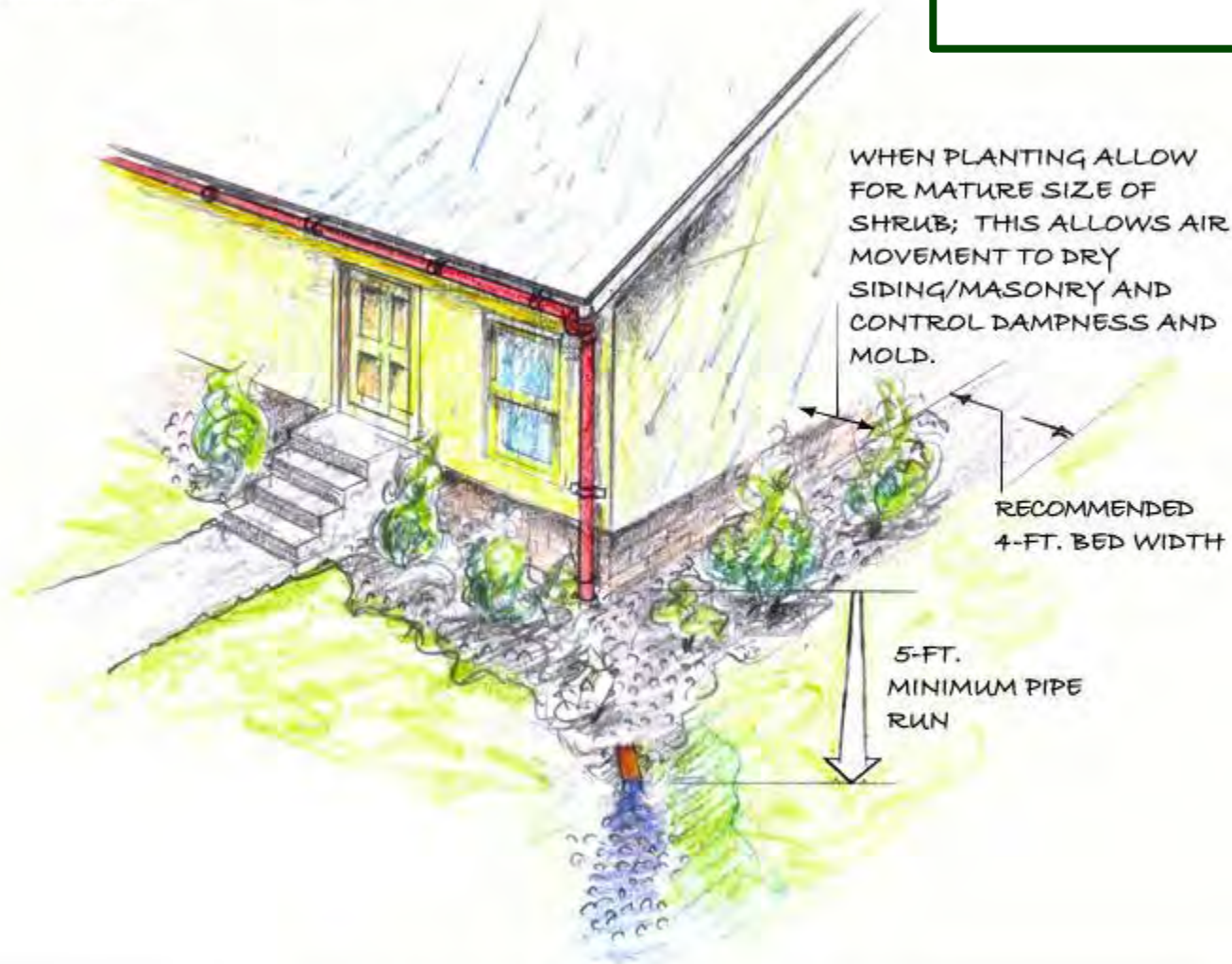
1 MEASURE:

REMOVE old gutters and inspect fascia board. REPLACE IF NEEDED. Tack a string to fascia board and level (A). Lower string approximately $\frac{1}{4}$ in. for every 10 ft. of gutter and retack string. This is sloped toward downspout. If your house has drip edge, slip gutter under drip edge. (Fig. 1.1)



From Amerimax Instructions

EPA's Recommendations



LATERAL DRAINAGE FROM GUTTERING

An Underground Drain Leader with a “Pop-Up Emitter”



Rebuilding Together AFFC Volunteers



Roof Leaks



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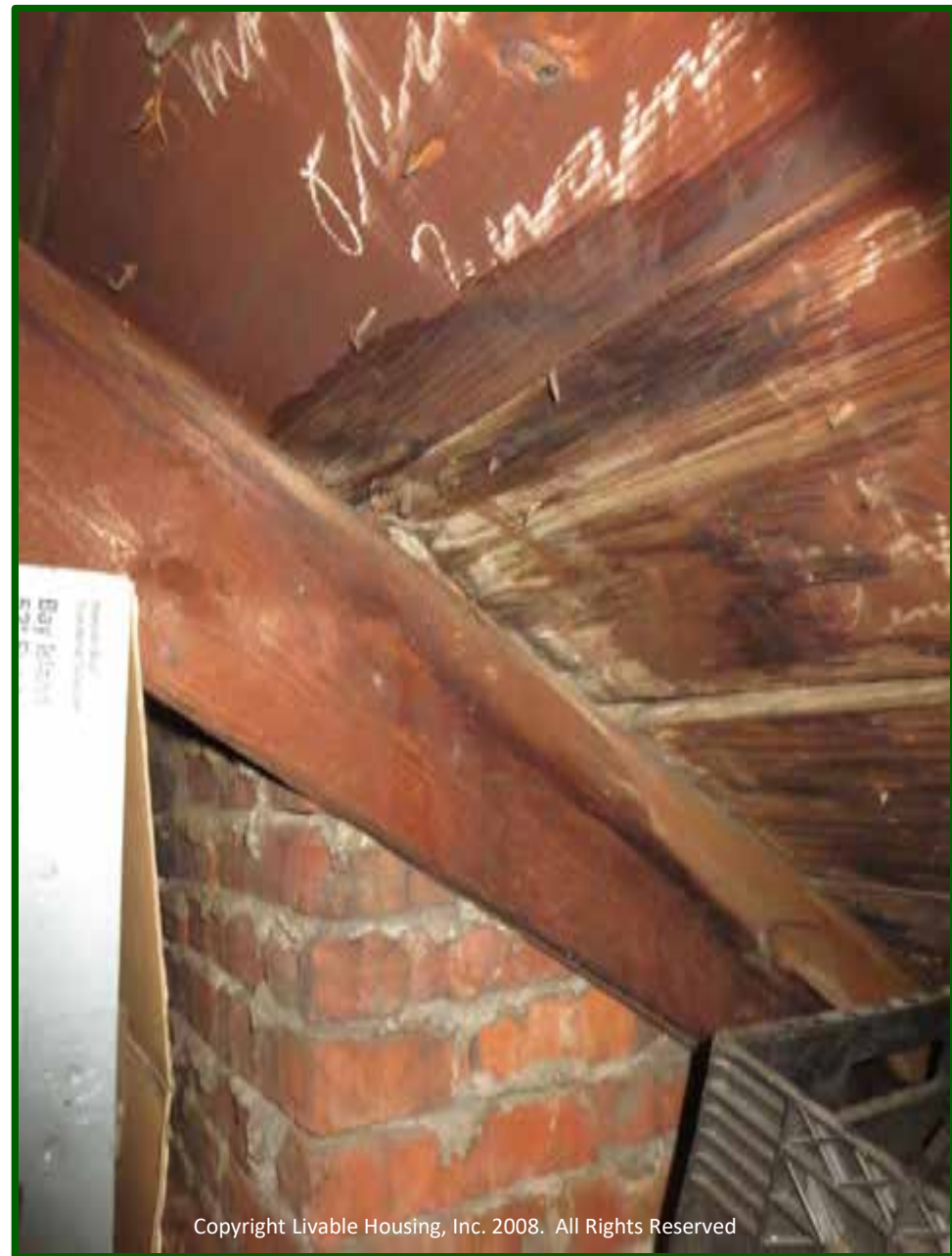
**Roof or
Plumbing
Leak?**

**Are these
Active
Leaks?**

**Repairs of
Old Leaks?**

**This is the attic
area directly over
the ceiling stain.**

**Roof or Plumbing
Leak?**



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This is the chimney from the previous slide, above the roof line.

Roof or Plumbing Leak?



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Moisture
Meter



How Wet Is It?

1.2 - Prevention: Leaks

- Identify and repair all roof leaks, building envelope leaks, and plumbing leaks. Assess affected areas for structural issues, deterioration of components, and mold, and take appropriate actions to address the issues.

Rehab Standards:

3 - Roofing, Gutters and Downspouts, and Stormwater Management

Key concepts and relationships (Abridged):

- Roofing that is watertight and has a reliable useful remaining life is crucial to the health of the occupants and the longevity of the structure.
- The remaining life of existing roofing should be considered before attempting repairs to existing roofing.

Pitched and Low Slope Roofing



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Plumbing Leaks

Sometimes it's Obvious



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Sometimes You must look harder.....



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Rehab Standards:

9 - Plumbing

Key concepts and relationships:

- Undetected or ignored plumbing leaks create significant structural damage, encourage pest infestations and can create mold.
- Water heaters can leak as well.

Rehab Standards: 9 - Plumbing

Plumbing Standards related to Keep it Dry:

9.1 Drain, Waste and Vent Lines.

9.2 Water Supply.

9.3 Plumbing Fixtures.

9.4 Water Heaters.

Basements and Crawl Spaces

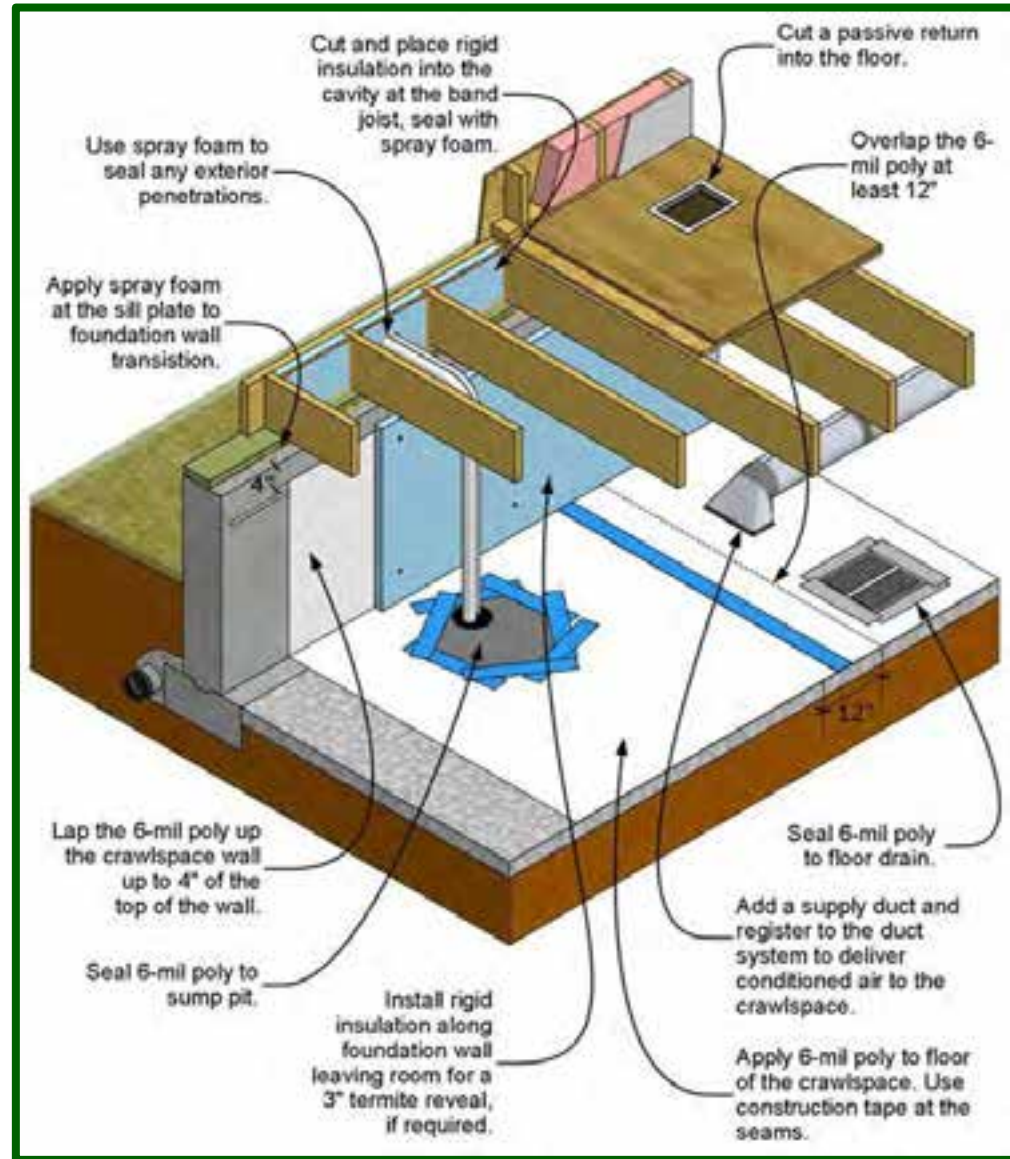
Crawl Spaces & Basements can be huge sources of moisture!



Rehab Standards for Basements and Crawl Spaces (Abridged)

- No Dirt Floors.
- A plastic vapor barrier works well.
- Repairing concrete floors is sensible and affordable.
- New concrete slabs in basements must have a vapor barrier.

Crawl Space Illustration from the Building America Program



1.3 - Prevention: Surfaces

- In high-moisture areas such as kitchens, bathrooms, and laundry rooms, use cleanable, durable, moisture-resistant materials, such as waterproof shower surrounds constructed of fiberglass or ceramic tile flooring that is impervious to water and sealed to adjoining bathing fixtures, countertops, and sinks.

1.4 - Mold

Address any instances of suspected mold per EPA guidelines for threshold levels and treatment. Identify and cure the moisture problem that created it. Clean up all existing mold (active or inactive) per the New York City Health Department Guidelines on Assessment and Remediation of Fungi in Indoor Environments, and/or the NCHH's Field Guide for Cleanup of Flooded Homes.

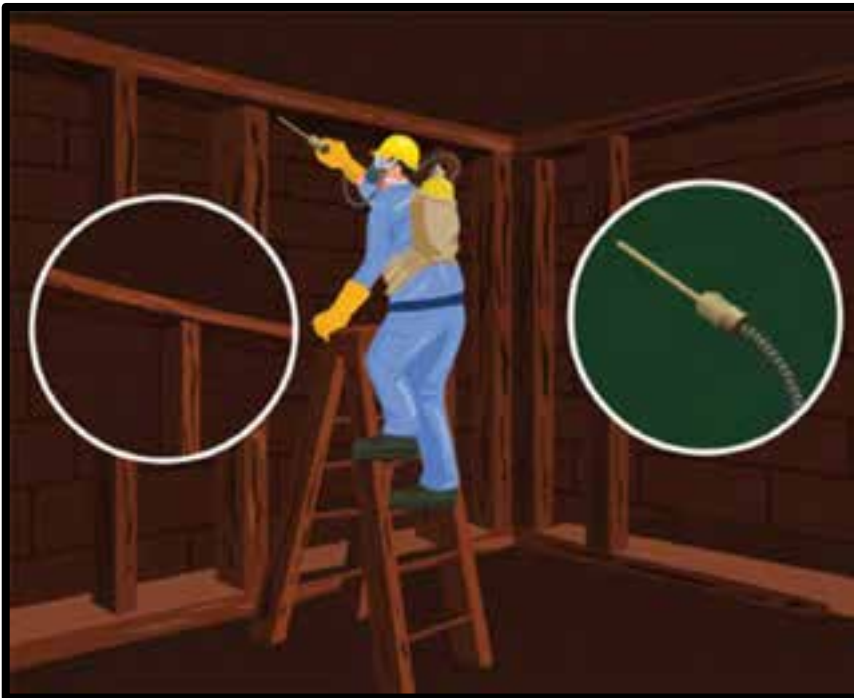
Moisture & Mold

- Mold is a contaminant.
- All mold problems are moisture problems.
- Solve the moisture issue, and solve the mold issue.
- Keep it Ventilated helps to Keep it Dry.
- Keep it Dry and Keep it Clean help to Keep it Contaminant-free.

Best Practices for Mold Cleanup

1. **Inspect:** Determine the source of the moisture problem, and if it is active.
2. **Define the Solution:** Identifying the problem is insufficient, a long-lasting solution is required.
3. **Protect:** Be aware of all the potential hazards, workers and occupants must be protected.
4. **Replace or Clean:** Place a high priority on removing mold damaged components or cleaning, using simple and thorough cleaning methods. Soap and water is usually sufficient.
5. **Treat:** Chemical treatments are recommended under some circumstances, borate treatments are safe, affordable and long-lasting.
6. **Dry:** Drying out the building sufficiently, before closing in walls and ceilings with new finishes, minimizes the potential for mold growth in the future.

Best Practices for Mold Cleanup

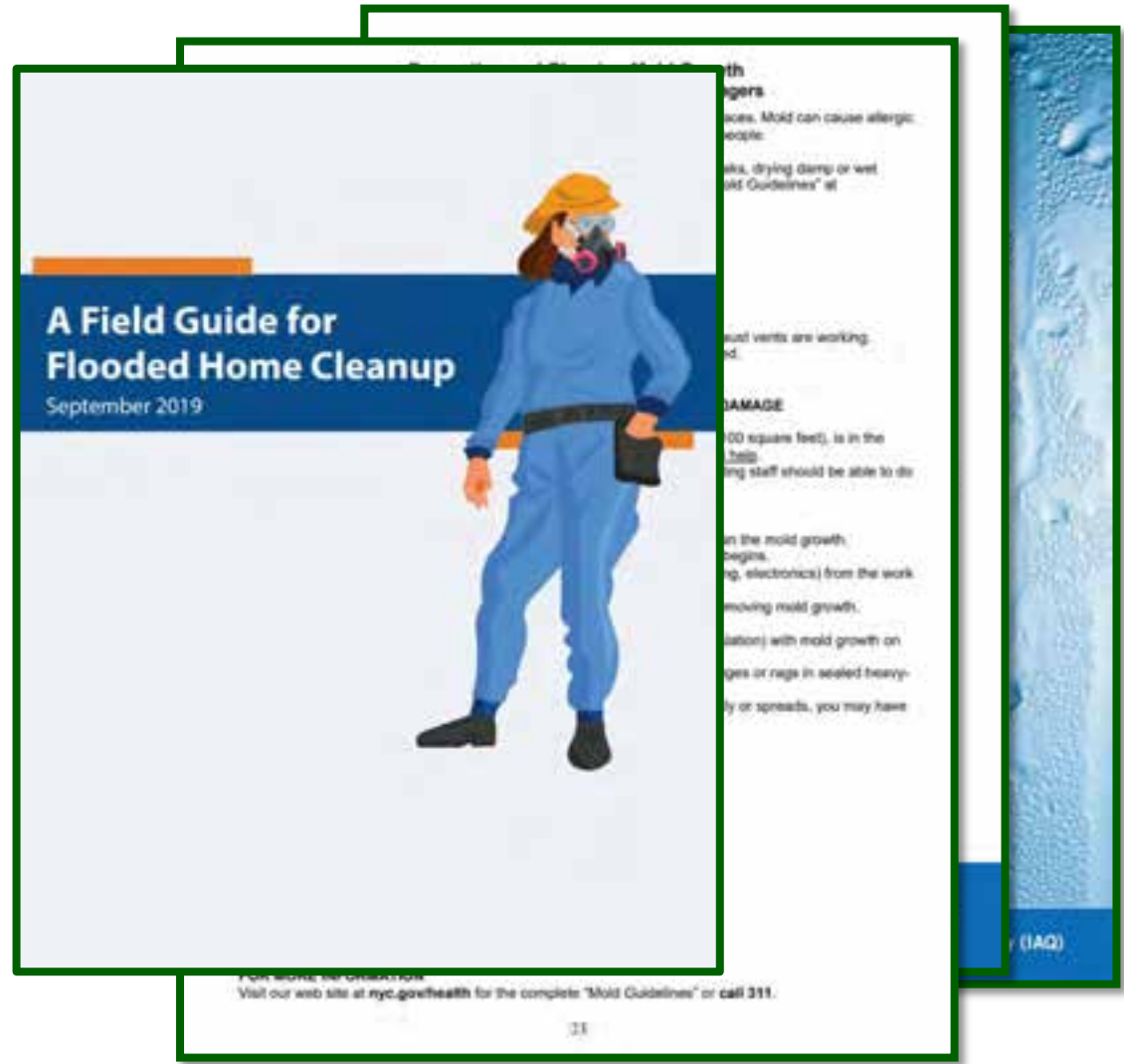


Moisture
Meter



Resources

- EPA Brief Guide to Mold and Moisture
- Mold Remediation in Schools and Commercial Buildings
- Guidelines on Assessment and Remediation of Fungi in Indoor Environment
- A Field Guide for Flooded Home Cleanup



Keep it Safe

Falls, poisonings, fires, and burns are the most common causes of home injuries and deaths. Children and older adults at higher risk.

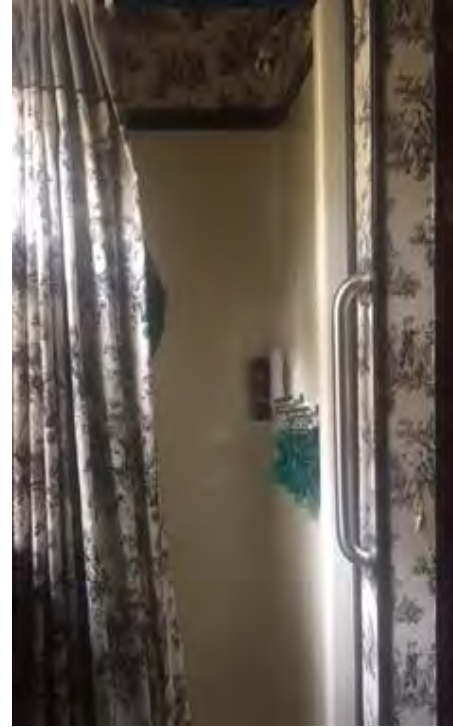
More than **1 in 4 Americans older than 65-years-old** fall each year

CT study of seniors with prior fall risk supplementing weatherization with injury prevention repairs and OT visit:

- **Reduced falls:** 94% (baseline) to 9% (6 mo. post work)
- **Fewer falls with calls for assistance:** 24% (baseline) to 3% (6 mo. post work)



Injury prevention repairs



Handrails outside and inside

Grab bars, raised toilet seats, lighting



Tips on Keeping it Safe

HUD Health@Home Webinar: Now More than Ever: Keeping Homes Safe and Dry

September 10, 2020

KEEP IT SAFE

Falls,
poisonings,
fires and burns
are the most
common
causes of
home injuries
and deaths

Recommended Actions

- Reduce Trip and Fall Hazards
- Provide Adequate Lighting and Controls
- Universal Design and Visibility
- Smoke Alarms
- Carbon Monoxide Alarms

Falls



- Annually, **2.8 million children** visit the **emergency department** for injuries from a fall
- Falls are the **leading cause of nonfatal injuries** for children **less than age 16**
- **50% of injuries** to children **under the age of 1** are due to falls
- More than **1 in 4** people **older than 65** falls each year
- More than **300,000 people** **experience hip fractures** annually; 95% of hip fractures are caused by falls

Source: US Centers for Disease Control

SOLUTIONS: Reduce Trip and Fall Hazards



Recommended Actions:

- Install handrails on both sides of staircases
- Install slip proof covers in stair treads
- Install grab bars in bathrooms with proper backing



Photo Credit: Rebuilding Together

For relevant Health@Home guidelines, see Rehab Standards: 2.1 (Paving); 4.6/7 (Ext Steps, Railings); 5.1/2 (Foundations, Basement Floors) and 7.4 (Stairs)

SOLUTIONS: Improve Lighting



Recommended Actions:

- Add lighted switches for residents with low vision
- Add light switches so they are controllable at all entrances
- Lighting should be sufficient to navigate through rooms and stairs

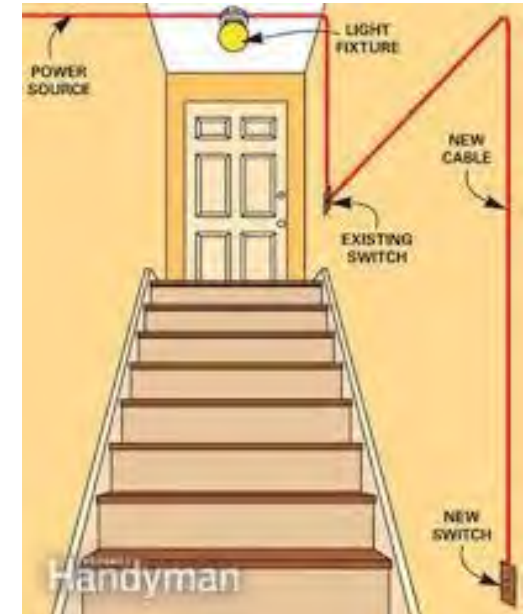


Illustration Credit: FamilyHandyman.com

For relevant Health@Home guidelines, see Rehab Standards: 2.5 (Ext Lighting); 4.6 (Ext Steps); and 8.5 (Lighting)

SOLUTIONS: Adopt Universal Design

Recommended Actions:

- Consider universal design principles in all rehabilitation projects
- Use the Aging in Place Design Guidelines (Enterprise Community Partners) as a resource

<https://www.enterprisecommunity.org/download?fid=6623&nid=3496>



Four Key Challenges for Rehab

1. Vertical Circulation Barriers
 - Steps/Stairs



Provide handrails on both sides of ramps.

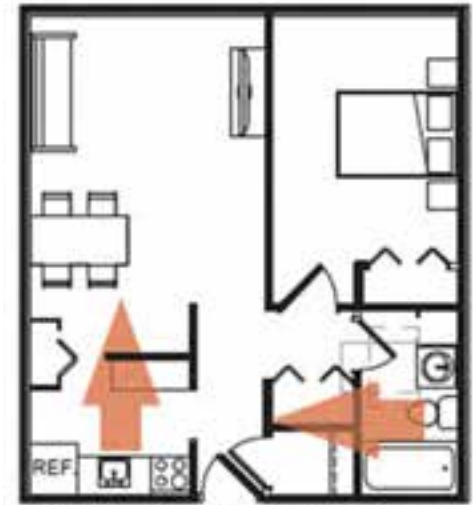
Four Key Challenges for Rehab

2. Horizontal Circulation Barriers

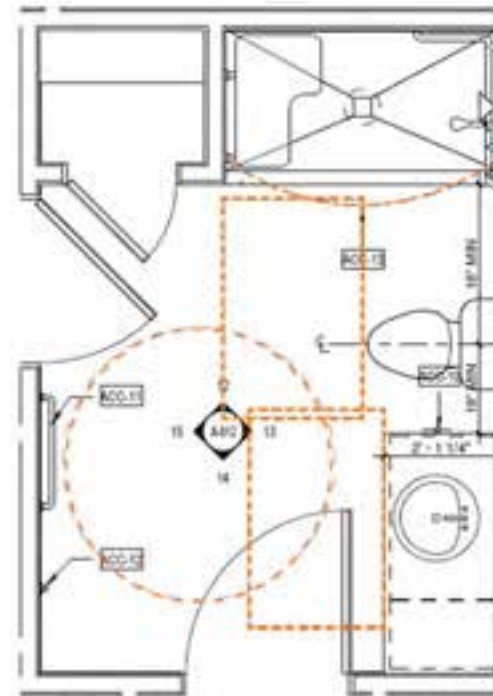
- Doorways, Room Size, Islands

3. Infrastructure within Walls

- If a wall must move, what else must move?



Moving interior walls within a unit can provide extra space for clearances in the kitchen and bathroom.



Four Key Challenges for Rehab

4. Cabinetry

- Access to contents as well as access to sinks/appliance



Smoke Alarms Save Lives

Annually, there are over 2,500 civilian deaths in US home fires



12.3

Deaths per 1,000 home fires **without** working smoke alarms

5.9

Deaths per 1,000 home fires **with** working smoke alarms

Source: National Fire Protection Association, 2019

Smoke Alarms Must Work to Save Lives



From 2012-2016, smoke alarms were:

Present:	Sounded:
74%	53% of the fires
home fires	(71% of time)

Leading causes of failures to alarm:

43% missing/disconnected batteries

25% dead batteries

Source: National Fire Protection Association, 2019

SOLUTIONS:

- Some communities require **hard-wired smoke alarms** for certain properties – CHECK YOUR STATE AND LOCAL CODES
- If battery-powered alarms are allowed, install alarms that have **10-year batteries that are sealed within the alarm**
- Some states and localities now require this type of alarm



For relevant Health@Home guidelines, see Rehab Standards: 7.1 (Smoke, Fire alarms)

Not All Fires and Sensors are the Same

Smoldering Fires

Needs Photoelectric Sensor



Flaming fires

Detected with Ionization Sensor



SOLUTIONS:

- CHECK YOUR STATE AND LOCAL CODES if they have sensor requirements (e.g., photoelectric required)
- Best option:
 - ❖ **Install dual sensor smoke alarms**
 - ❖ **(w/sealed 10-year battery)**
- Similar in price to photoelectric only



Carbon Monoxide: Silent Killer

1 dead, 2 hospitalized from suspected carbon monoxide poisoning

Carbon Monoxide (CO) is an odorless gas that is generated by incomplete combustion of fossil fuels.

Nearly 400 people die annually of unintentional, non-fire related CO poisoning in all locations

Source: US Centers for Disease Control, 2018

Carbon Monoxide: Risks at home

Within homes (excluding fires), the main causes of CO deaths:

- Portable generators: 40%
- Heating sources: 30% (e.g., furnaces, space heaters)
- Stoves/grills: 11% (e.g., charcoal grills)
- Gas tools/appliances: 11% (e.g., water heaters)

CO from vehicles in attached garages is another source.

Source: Consumer Product Safety Commission, 2019

SOLUTIONS:

- CHECK YOUR STATE AND LOCAL CODES if they have CO detector requirements for existing properties
- Best options:
 - ❖ **Install CO detectors with a sealed 10-year battery in all recommended locations of dwelling**
 - ❖ **Purchase CO detectors with digital display and peak level readings**
- Location matters – dual smoke/CO alarms are available but separate CO detectors are recommended



For relevant Health@Home guidelines, see Rehab Standards: 7.1 (CO alarms)

Questions?

Jonathan Wilson
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National Center for
HEALTHY HOUSING

Preventing the Spread of COVID-19 in Homes

A Supplement to the Health@Home
Rehabilitation Guidelines



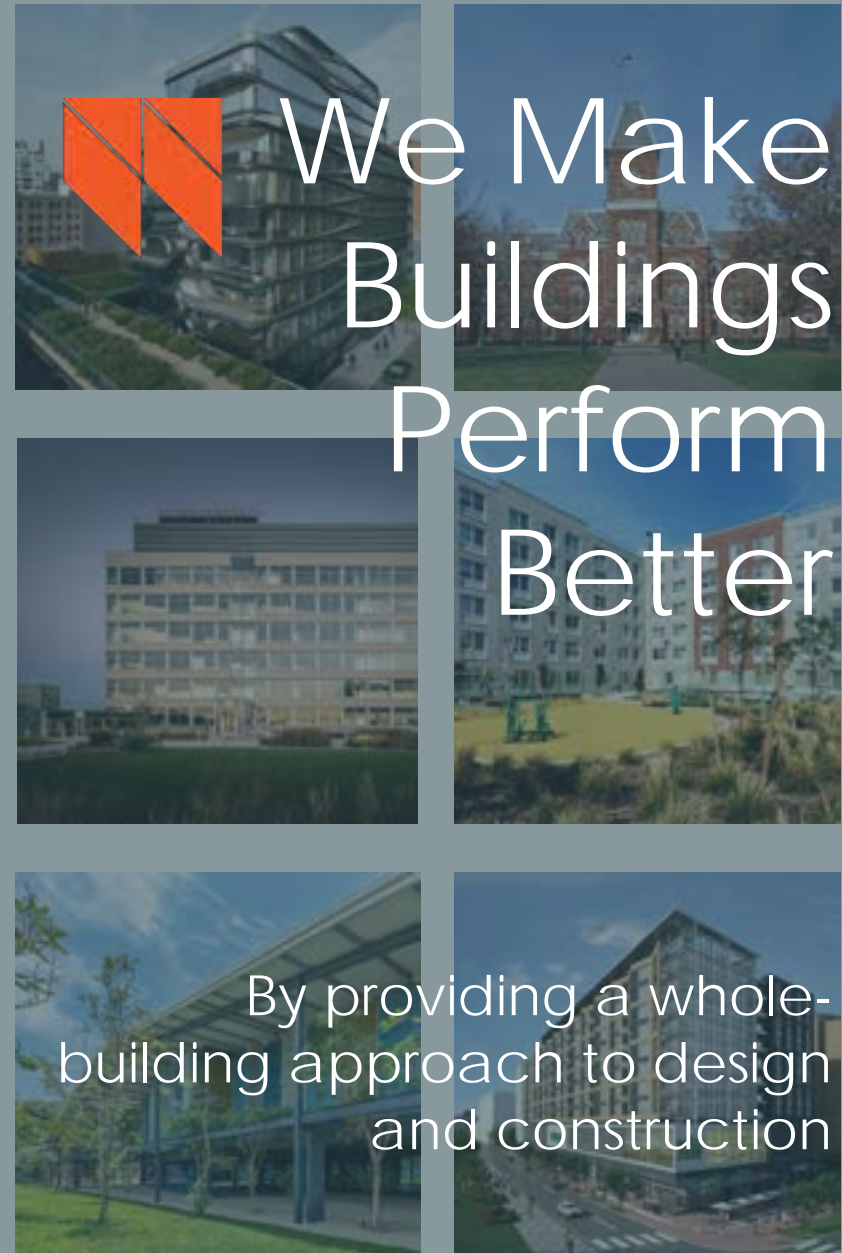
Since 1972, Steven Winter Associates, Inc. has been providing research, consulting, and advisory services to improve the built environment for private and public sector clients.

Our services include:

- Energy Conservation and Management
- Sustainability Consulting
- Green Building Certification
- Accessibility Consulting

We have over 125 staff across four office locations:
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How SARS-CoV-2 Spreads... & Prevention

- Large respiratory droplets at close range, person-to-person
 - Small aerosol droplets that stay airborne longer
 - Contact transfer from touching a surface with viable virus, then touching mouth, nose, or eyes
- Personal Protective Equipment (PPE), social distance
 - PPE, ventilation, filtration, cleaning & disinfection
 - Hand hygiene, cleaning & disinfection, no-touch solutions

Guidelines to Stop the Spread in Homes

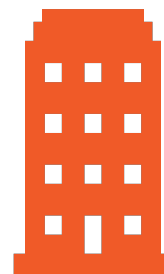
1. Provide Physical Protection
2. Promote Social Distancing
3. Address HVAC Systems
4. Clean & Disinfect



Building Upgrades



Operations & Maintenance



Multifamily Buildings



Single family Homes

1. PROVIDE PHYSICAL PROTECTION

Building Upgrades



- Install **hand hygiene options** at all entrances, elevator lobbies, communal rooms, and outside public bathrooms



- Install **physical barriers** to maintain distance



- **Air seal** dwelling units from adjacent spaces/homes
- Install **low-or-no-touch** entry, circulation, and common area options



1. PROVIDE PHYSICAL PROTECTION

Operations & Maintenance



- Provide and wear **masks and PPE**
- Manage **sound interference**
- Designate **space to separate** “clean” and “exposed” personal items
- Facilitate use of **toilet seat lids**
- Set up a temporary **Isolation Space** in households with an infected member



2. PROMOTE SOCIAL DISTANCING

Building Upgrades



- Map the “occupant experience” and plan occupancy accordingly



- Facilitate safe usage of additional entries, exits, and stairwells



- Accommodate outdoor gathering and recreation



2. PROMOTE SOCIAL DISTANCING

Operations & Maintenance



- Limit occupancy in elevators, community rooms, & public restrooms



- Develop clear rules and signage regarding maximum occupancy and movement



3. ADDRESS HVAC SYSTEMS

Building Upgrades

- Upgrade **fresh air ventilation** systems
 - at or above ASHRAE 62.2/62.1 – 2013
 - maintain normal temp and humidity
 - exhaust-only (OK)
 - economizers or fresh air ducts to return side AHU with controlled intake dampers (Good)
 - Energy/Heat Recovery Ventilation (Best?)



3. ADDRESS HVAC SYSTEMS

Building Upgrades 🚧 Continued



- Install or repair **exhaust fans** in kitchens and bathrooms, testing for **flow rates**.
 - at or above ASHRAE 62.2 – 2013 flow rates
 - Avoid combination microwave/range hoods rated by HVI for performance



3. ADDRESS HVAC SYSTEMS

Building Upgrades Continued

- Use **air filters or air cleaners** capable of removing small particles (2.5 microns).
 - Filters MERV 13 or higher; HEPA rated filters
 - Add to existing Air Handlers & ERVs if units can handle the increase in static pressure (or increase filter slot size)
 - Add stand-alone filters/cleaners for nonducted systems, or where systems can't handle MERV 13
 - Ensure a tight fit to avoid filter slot bypasses
 - Prioritize deeper filters & pleated media



3. ADDRESS HVAC SYSTEMS

Building Upgrades Continued

- Use or add Ultraviolet Germicidal Irradiation
 - Disinfect coils, or pans, or ductwork itself
 - Disinfection rates depend upon light strength and exposure time; air may move too quickly to be disinfected in ductwork
- Avoid air purification strategies that are not thoroughly vetted to avoid pollutants like ozone.
 - CARB's *Air Cleaners & Ozone Generating Products*
 - ASHRAE *Position Document on Filtration and Air Cleaning*



3. ADDRESS HVAC SYSTEMS

Operations & Maintenance



- Maintain normal temperature and humidity settings



- Increase fresh air ventilation



- Utilize existing fans for exhaust and room air motion



- Change air filters frequently



- Provide separate heating, cooling, and ventilation systems for temporary Isolation Spaces



4. CLEAN & DISINFECT










Building Upgrades



- Design for **cleanable surfaces**, especially at entries and circulation spaces
 - Avoid carpeting, porous surfaces, and finishes with many different joints/seams
- Minimize use of **antimicrobial** products and finishes
 - Unproven against SARS-CoV-2.
 - Proven links to treatment-resistant illnesses



4. CLEAN (remove) & DISINFECT (kill) Operations & Maintenance

- Develop a protocol that meets or exceeds joint requirements for CDC and EPA for facilities 
- Use disinfectants from **EPA List N** for effectiveness against SARS-CoV-2 
- Clean and Disinfect **high-touch surfaces** and **high-use shared spaces** at least daily 
- Apply special protocols to clean spaces known or suspected **infected person** has occupied 
- Maintain water in **plumbing traps** 

Recap of Single Family Upgrades



- Accommodate outdoor gathering and recreation
- Upgrade fresh air ventilation systems
- Install or repair local exhaust fans, testing for operation
- Use air filters or air cleaners rated MERV 13+ or HEPA
- Ensure good filter design and installation, if integrated
- Avoid air purification strategies not thoroughly vetted as they may produce harmful ozone or free radicals
- Choose cleanable surfaces, especially in bathrooms, kitchens, and entryways
- Minimize use of antimicrobial products and finishes



Key Takeaways

to prevent the
spread of
COVID-19 in
homes

1. Increase ventilation!
2. Use filtration!
3. Prioritize cleanable surfaces & use EPA List N disinfectants!

Resources for Preventing the Spread of COVID-19 in Homes

- EPA's [Guide to Air Cleaners in the Home](#)
- EPA's [Indoor Air Quality Website](#)
- CARB's [Air Cleaners & Ozone Generating Products](#)
- ASHRAE COVID-19 Resources: [Residential](#) and [Multifamily](#)
- [ASHRAE Position Document on Filtration and Air Cleaning](#)
- CDC and EPA [Reopening Guidance for Cleaning and Disinfecting Public Spaces, Workplaces, Business, Schools, and Homes](#) and [Cleaning and Disinfecting Your Facility](#).
- Disinfectants: [EPA List N](#) plus EPA Safer Choice Standard, EPA Design for the Environment, Green Seal standards, or UL Ecologo

Thank you!
Any Questions?



Maureen Mahle
mmahle@swinter.com

Questions?

For any questions, please type them into the “Q&A” box in the lower right

We will answer as many as we have time to answer



Technical Assistance Available

- On-call TA is available to incorporate Health@Home standards into current rehab standards
- Limited to 3-5 HUD grant recipients/partners
- Please submit TA Request to energyaction@hud.gov by September 30



Health@Home Website and Resources

A recording of this webinar (and all other presentations) will be available on the Health@Home series website:

<https://www.hudexchange.info/news/health-at-home-webinar-series/>

Certificates of Completion available to those who attend all trainings, including archived trainings. In order to receive credit for off-line viewings, please email us at the address shown below, no later than November 15, 2020.

Main Health@Home website on HUD Exchange:

<https://www.hudexchange.info/resources/health-at-home/introduction/>

For questions or information contact:

Lael Holton at communitycompasstraining@aecom.com



Next Session – Bringing it Home

SESSION

4

Bringing it Home: The Energy Plus Health Equation, Maintenance, and Active Design

October 8, 2020, 3:00–4:00 PM EDT

This session focuses on (1) the steps that practitioners can take to educate homeowners or residents on maintaining a healthy home after rehab is complete, including the development of homeowner/resident maintenance checklists and procedures; (2) ensuring efficient and reliable heating and cooling, through well-designed and well-maintained mechanical systems and a sound thermal envelope; and (3) opportunities to integrate Active Design features in your rehab project (Healthy Housing Principles 7, 8, and 9).

Presenters: Ellen Tohn, Tohn Environmental Strategies; Paul Francisco, University of Illinois Champaign Urbana; Krista Egger, Enterprise Community Partners

