Healthy Housing Rehab Standards – for use in CDBG & HOME funded rehab

This document covers both CDBG and HOME assisted housing. However, there are differences between the two programs. HOME-assisted housing must meet all applicable State and local codes, ordinances, and requirements (current standards may be found at https://www.nashuanh.gov/275/Building-Safety-Department). Developers of HOME assisted housing must also refer to the **HOME Policies and Procedures (P&P)** to ensure the minimum standards are included in the scope of work. If discrepancies exist between the two documents, the most restrictive standard shall apply.

Note regarding major systems for HOME projects:

- Homeownership housing and homeowner rehabilitation: each of the major systems must have a remaining useful life of a minimum of five years. If they do not meet this standard, they must be repaired or replaced as part of the rehabilitation work.
- Rental housing projects of 26 or more units: the useful life of major systems must be determined through a capital needs assessment. If the useful life is shorter than the period of affordability, either the system must be replaced or rehabilitated as part of rehabilitation, or funds must be budgeted for replacement reserves.
- Disaster Mitigation: Where relevant, the housing must be constructed to mitigate the impact of potential disasters (e.g., earthquakes, hurricanes, flooding, and wildfires), in accordance with State and local codes, ordinances, or other State and local requirements, or such other requirements as HUD may establish
- Broadband: For a substantial rehabilitation project of a building with more than 4 rental units, any substantial rehabilitation (as defined in 24 CFR 5.100) must provide for installation of broadband infrastructure. Reference the P&P for exceptions and additional information.
- Accessibility: Please refer to the P&P for details on applicable accessibility requirements

The level of rehab for CDBG assisted housing is normally at a lesser scale than HOME, where spot rehab occurs. When that is the case, these standards shall be applied to the applicable type of rehab, versus a full-scale rehabilitation of the housing.

The format for this document includes the following categories of building components:

1. Contaminants and Other Hazards – Assessment and Clearance Testing
2. Site
3. Roofing, Gutters & Downspouts and Storm Water Management
4. Building Exterior (windows, Doors)
5. Foundations and Structure
6. Insulation, Air Sealing and Moisture Control
7. Interior
8. Electrical
9. Plumbing
10. Space Conditioning – Heating and Cooling
11. Ventilation
12. Appliances

Within each of the above-listed categories there are requirements for applicable components. The requirements for each component are divided into a "Repair Standard" and a "Replacement Standard." If the building component meets the Repair Standard as-is, then no change is required. The remaining life of existing components should be considered before attempting repairs.
If repairs cannot ensure the specified Minimum Remaining Life, replacement is an allowable expense, unless expressly stated otherwise. The City of Nashua has the option to choose between repairing and replacing a component, as long as the end product meets the applicable Repair Standard or Replacement Standard.

1. Contaminants and Other Hazards – Assessment and Clearance Testing

Life threatening deficiencies must be addressed immediately if the dwelling is occupied. Examples include, but are not limited to, lack of operable smoke and carbon monoxide detectors, leaking/faulty gas fired appliances, fire hazards, lack of plumbing, heating or sanitary facilities. This is not an exhaustive list; the City, in its sole discretion, may identify conditions determined to be and immediate threat to life and safety.

Key concepts and relationships

- The following contaminants and hazards must be addressed in all of the related component categories that follow; e.g., LBP requirements must be applied to all painted surfaces such as windows and doors, and Mold & Moisture requirements must be applied to all components subject to moisture problems.
- Some assessment must be completed by third-party certified testers when appropriate or required by regulation; e.g., EPA or state regulations may require the use of certified Asbestos Surveyors for Asbestos.

Lead Based Paint (LBP)	
Repair Standard	Minimum Remaining Life 5 yrs.
All work conducted in housing constructed prior to 1978 must comply with 24 CFR Part 35; a Risk Assessment per HUD regulations should be completed to identify all LBP Hazards. An alternative to the Risk Assessment is to assume all painted surfaces contain LBP and to address them as such. All LBP Hazards should be addressed per HUD regulations, and the property/unit must pass a dust clearance test per the HUD regulations. Lead-safe work practices must be followed for all work that disturbs LBP, and only certified lead abatement contractors used to perform work to address LBP hazards. See: www.hud.gov/program_offices/healthy_homes/lbp/hudguidelines	
Replacement Standard	
When stabilization of surfaces containing LBP is impractical, the most affordable solution for abatement of the component should be chosen. Walls containing LBP may be covered with drywall or gutted and replaced with drywall. Trim and other wood or metal components containing LBP may be removed and replaced with similar materials. Lead-safe work practices must be followed, and only certified abatement contractors used to perform the work. Clearance testing is required as outlined in the Repair Standard.	

Asbestos	

Repair Standard	Minimum Remaining Life NA
Building materials suspected to contain asbestos should be tested by a firm that is state approved for asbestos surveys. Non-friable asbestos materials, such as cementitious exterior wall shingles, may be left intact and painted if appropriate. Vinyl asbestos resilient floor tiles may be labeled as such and covered with underlayment and new resilient flooring.	
Replacement Standard	
Building materials suspected to contain asbestos should be tested by a firm that is state approved for asbestos surveys. Friable asbestos components such as boiler or pipe insulation, badly deteriorated cementitious shingles or deteriorated flooring should be removed and, if necessary, replaced with non-hazardous materials. Asbestos abatement should be performed by contractors with current state licenses for asbestos remediation. Clearance testing should be performed for all asbestos work, and the contractor must provide a manifest that proves the asbestos was disposed of properly.	

Carbon Monoxide	
Repair Standard	Minimum Remaining Life NA
Examine the chimney and flue of all atmospherically-vented combustion appliances for evidence of back-drafting (condensation, rust, appropriate slope on flue pipe). Implement combustion appliance zone (CAZ) testing by a qualified professional such as a Building Performance Institute, Inc. (BPI)- certified Building Analyst (BA), Home Energy Professional (HEP), Energy Auditor (EA), or Quality Control Inspector (QCI) whenever there is evidence or suspicion of a back-drafting combustion appliance. Repairs to flues of existing atmospherically vented combustion appliances with significant useful life remaining are an allowable expense. The cost of repairs to the flues/chimneys of such appliances that are at the end of their useful life should be compared to the cost of replacement with an appliance that is either power vented or possess sealed combustion and could avoid the use of a chimney.	
Replacement Standard	
Replacement of existing flues and chimneys (or chimney liners) should be compared to the cost of abandoning such flue/chimney combinations and the installation of new power vented or sealed combustion appliances that could avoid the use of a chimney.	

Mold & Moisture	
Repair Standard	Minimum Remaining Life NA
Any presence of mold is unacceptable and must be addressed, as well as remediation of moisture problems that precipitated the presence of mold. Repairs associated with both mold remediation and moisture management are allowable expenses. When there is a suspicion of high humidity levels, testing of relative humidity (RH) is recommended. RH persistently above 55 percent should be addressed by locating and resolving the source of moisture, e.g., repairs to roofing and storm water management systems.	
Replacement Standard	

All carpeting, drywall or other gypsum-based wall coverings or any other non-structural components with mold present should be removed and replaced. Installation of materials that are mold resistant, e.g., paperless drywall, should be considered. Wood components should be tested and documented to contain a moisture content of less than 15 percent prior to the installation of insulation or wall finishes in all wall cavities where mold was present.
When there is a suspicion of high humidity levels, testing of relative humidity (RH) is required. RH levels persistently above 55 percent should be addressed by locating and resolving the source of moisture, e.g., roofing, gutters and downspout placement, site grading, and appropriate ventilation. This is especially important relative to basement moisture.

Pest Infestations	
Repair Standard	Minimum Remaining Life NA
Identify existing pest infestations as part of the building analysis. Pest infestations that create a potential health hazard, or that are likely to impede an affordable housing rehabilitation effort, should be addressed using integrated pest management (IPM) strategies. Repairs that restrict the passage of pests into and throughout the building are an allowable expense.	
Replacement Standard	
When there is a pest infestation, and where building materials have deteriorated sufficiently to require replacement, using new components that are proven to be more pest resistant are an allowable expense.	

Radon	
Repair Standard	Minimum Remaining Life 5 yrs.
Housing in this program, with exposed dirt floors or significant cracking of concrete floors in basements and crawl spaces, should be subject to a short-term radon test in these instances: J At the inspection stage, prior to creation of a scope of work J Where rehabilitation activities could have affected indoor air pressure or air tightness J Post-installation of radon mitigation measures, retesting to ensure mitigation results in levels less than the EPA action level. If the result is a reading in excess of the EPA action level, consider a long term (minimum 90 days) test to confirm an increase before undertaking mitigation. Repairs to existing passive or active radon mitigation systems, or the conversion of a passive system to an active system are allowable program expenses when radon levels are at or above the EPA action level.	
Replacement Standard	
Follow the testing protocol outlined in the Repair Standard. If testing determines that radon levels are at or above EPA action level the installation of passive or active radon systems is an allowable expense.	

Volatile Organic Compounds (VOCs)	
Repair Standard	Minimum Remaining Life 10 yrs.
Materials used in repairs, should meet the following standards to minimize the presence of volatile organic compounds (VOC) and specifically formaldehyde: J All paints and primers must meet the most recent Green Seal G-11 Environmental Standard. Http://www.greenseal.org/certification/standards/paints_and_coatings.pdf	

) Adhesives must comply with Rule 1168 of the South Coast Air Quality Management District. http://www.aqmd.gov/rules/reg/reg11/r1168.pdf) All caulks and sealants, including floor finishes, must comply with Regulation 8, Rule 51, of the Bay Area Air Quality Management District.) All particleboard components should meet ANSI A208.1 for formaldehyde emission limits, or all exposed particleboard edges should be sealed with a low-VOC sealant or have a factory-applied, low-VOC sealant prior to installation. All composite wood must be compliant with TSCA Title VI or California 93120 Phase 2 requirements.
Replacement Standard
All new materials installed should meet the requirements outlined in the "Repair" section above.

Water Quality Testing: Lead and Other Contaminants	
Repair Standard	Minimum Remaining Life 5 yrs.
Testing for lead in drinking water using an EPA certified laboratory is an allowable expense if there is an occupant child with elevated lead blood levels. Lead water supply lines, AKA lead service lines (LSL): Inspect for lead supply lines. Check with the municipal water department for records. Test water in private wells: Test for presence of lead, total coliform bacteria, nitrates, total dissolved solids and pH levels. Use an EPA or state certified drinking water for private well water testing. Repairs to the domestic water supply system to address contaminants in water are an allowable expense.	
Replacement Standard	
Replacement of LSL is an allowable expense. Abandonment of a private well and connection to a municipal/local water system is an allowable expense. The addition of a filtration system that has been proven to address contaminants present in domestic water supplies is an allowable expense.	

Sewer System	
Repair Standard	Minimum Remaining Life 20 yrs.
The drain, waste and vent system must be leak-free and operating without restriction. All plumbing fixtures must be properly vented. If the sewer connection regularly backs-up, the use of a scope to visually examine the drain lines for blockage or deterioration is an allowable expense. Dye testing of septic systems is an allowable expense.	
Replacement Standard	
Replacement of any portion of the drain, waste, vent system should be done using either cast iron or an approved plastic piping, as allowed by code. If a septic system has been deemed unrepairable, connection to the municipal system should be required if available. Otherwise, replacement of the septic system is an allowable expense if within budget restraints.	

Job Site Cleaning	

Repair and Replacement Standard	Minimum Remaining Life NA
At a minimum, job sites should be cleaned at the end of each day with a vacuum. HEPA vacuums are preferred. Job site cleaning as defined should be a contractual requirement and clearly stated in the General Requirements of the Scope of Work.	

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 storm water intrusion to 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 LBP, which poses a hazard for children at play outdoors, and for vegetable gardening. Additionally, humans and/or pets are can create a LBP hazard indoors by tracking that contaminated soil into the home.
- Bare soil also leads to erosion, adding to and or creating grading problems, storm water 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.

2.1. Paving/Walkways

Paving & Walks	
Repair Standard	Minimum Remaining Life 10 yrs.
Essential paving, such as walkways and driveways with minor defects should be repaired; repairs to match the surrounding pavement. Tripping hazards greater than ¾ inch should be addressed. Non-essential, highly-deteriorated paving, such as walkways that are unnecessary, should be removed and appropriately landscaped.	
Replacement Standard	
Essential walkways and driveways deemed beyond repair should be replaced with concrete or asphalt per City specification.	

Outbuildings	
Repair Standard	Minimum Remaining Life 5 yrs.
Unsafe and blighted structures, including outbuildings, may be removed and not replaced. Detached garages should have operable and lockable doors and windows.	
Replacement Standard	
No outbuilding replacement is permitted in this program.	

Fencing	
Repair Standard	Minimum Remaining Life 3 yrs.
The repair or replacement of hazardous fencing must be appropriate for the neighborhood and meet the code requirements.	
Replacement Standard	Minimum Life 5 yrs.
Same as above.	

2.2. Grading

Grading	
Repair Standard	Minimum Remaining Life 5 yrs.
When there is an existing or predictable storm water problem, 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 to cover as per “Lawn” repair standard.	
Replacement Standard	
NA	

2.3. Landscaping

Trees and Shrubs	
Repair Standard	Minimum Remaining Life 5 yrs.
Trees and shrubs that are dead, dying, within 4 feet of the building foundation, damaging the foundation, or hazardous in any manner, should be removed. Removal should include cutting close to the ground, grinding of tree stumps to 6 inches below the finished grade, removing shrub roots, and installing topsoil and re-seeding. Final grading after removal of plant material must produce a positive grade that directs storm water away from the structure. See Pest Infestation in 1. Contaminants and Other Hazards.	
Replacement Standard	
Replacement trees and shrubs are not an allowable expense.	

2.4. Lawn

Lawn	
Repair Standard	Minimum Remaining Life 1 yrs.
Bare section of lawn should be reseeded, to address erosion issues, with State Extension Service-recommended, drought-resistant varieties. Soil treatments to address lead contamination are an allowable expense. See LBP in 1. Contaminants and Other Hazards.	
Replacement Standard	
Wholesale replacement of lawn grasses is not an allowable program expense, though over-seeding is permitted with state extension service-recommended, drought-resistant varieties.	

2.5. Exterior Lighting

Exterior Lighting	
Repair Standard	Minimum Remaining Life 5 yrs.
Existing exterior light fixtures should be operable on either dusk to dawn, motion detection or manual switching. Incandescent bulbs should be replaced when possible with LED bulbs for energy savings and longevity.	
Replacement Standard	
New exterior light fixtures that are flood lights with combined dusk to dawn and motion detecting switching are an allowable expense to adequately light the yard for safe entry by residents and intruder discouragement. ENERGY STAR certified fixtures are required.	

3. Roofing, Gutters & Downspouts and Storm Water Management

Key concepts and relationships

- Moisture problems resulting from roof leaks are common. 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. Replacement is often more cost effective when compared to the risk of damage when the roof is likely to fail within a few years.
- Reroofing over existing roofing is not advised.
- Gutters and downspouts are part of the roofing system and when designed and installed properly move storm water well away from the structure.
- The decking (sheathing), underlayment, flashing and drip edge are all important components of the roofing system and must be evaluated for condition and expected life.

3.1. Low Slope Roofing

Flat and Low-Slope Roofing	
Repair Standard	Minimum Remaining Life 5 years
Built-up roofing that is leak-free should be re-coated and flashing and accessories repaired if such repairs can predictably ensure a minimum remaining life of at least 5 years. If repairs cannot ensure a Minimum Remaining Life of 5 years, replacement is an allowable expense. Inactive antennae and satellite dishes should be removed.	
Replacement Standard	
The most cost-effective roof of either modified bitumen, EPDM or TPO should be installed. Roof sheathing must be intact, structurally sound and provide an even plane for the new roof covering.	

3.2. Pitched Roofing

Pitched Roofs	
Repair Standard	Minimum Remaining Life 5 years
Missing and leaking shingles and flashing should be repaired on otherwise functional roofs. Slate, metal and tile roofs should be repaired when possible and when such repairs should ensure a minimum remaining life of 5 years. If repairs cannot ensure a Minimum Remaining Life of 5 years, replacement is an allowable expense. Inactive antennae and/or satellite dishes should be removed.	
Replacement Standard	
No more than 2 layers of roofing are permitted. Fiberglass, asphalt, three-tab, class A shingles with a prorated 25-year warranty with a continuous ridge vent should be installed over shingle-manufacturer approved underlayment with new drip edge at the entire perimeter. Roof sheathing must be intact, structurally sound and provide an even plane for the new roof covering.	

3.3. Gutters and Downspouts

Gutters and Downspouts	
Repair Standard	Minimum Remaining Life 5 years
Gutters and downspouts must be in good repair, leak free, and be appropriately sized to collect storm water from all roof surfaces. Splash blocks may be installed if, in combination with proper grading, they can predictably move water away from the foundation. The system must move all storm water 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.	
Replacement Standard	
Gutters and downspouts should be installed and collect storm water from all roof surfaces. Splash blocks may be installed if, in combination with proper grading, they can predictably move water away from the foundation. The system must move all storm water 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 that regrading.	

4. Building Exterior

Key concepts and relationships

- LBP is an important health concern on pre-1978 structures, see the reference to a Risk Assessment in LBP in 1. Contaminants and Other Hazards.
  - Integrated pest management (IPM) is a strategy that controls pest infestation with measures that minimize the use of pesticides that are potentially harmful to humans. IPM begins with eliminating pest access into the building.
  - Moisture control is a crucial role of the building envelope. The envelope must contain a water control layer that combines a continuous weather resistive barrier with window and door flashing to create a system that sheds water naturally, minimizing the need for sealants.
  - Older fiber cement shingles containing asbestos are safe if intact.
  - The lack of visible house numbers can seriously delay responders in an emergency.

Exterior House Numbers & Mailboxes	
Repair & Replacement Standard	Minimum Remaining Life 5 years
All houses should have contrasting 4” house numbers clearly displayed near the front door, and a standard size mailbox, preferably wall-hung, at the entrance.	

4.1. Cladding

Exterior Cladding	
Repair Standard	Minimum Remaining Life 10 years
Siding and trim should be intact, weatherproof, and free from potential pest entry points. See Pests in 1. Contaminants and Other Hazards. All penetrations through the cladding should be sealed to prevent pest entry using materials that are rodent proof, such as sheet metal or copper mesh to seal holes before applying caulk or foam. All exterior wood components should have a minimum of one continuous coat of paint, and no exterior painted surface should have any deteriorated paint. See LBP in 1. Contaminants and Other Hazards. Older fiber cement shingles may contain asbestos. See Asbestos in 1. Contaminants and Other Hazards. Siding containing asbestos may be maintained in place and painted if it is intact. Individual shingles may be replaced with non-asbestos shingles that match. Buildings designated as historic will conform with the SHPO programmatic agreement. New exterior wood should blend with existing and be spot-primed and top-coated in a lead-safe manner per HUD Lead-Based Paint regulations.	
Replacement Standard	
Buildings not designated as historic may have siding replaced with vinyl siding to match the existing configuration. Solid wood siding to match and fiber cement siding are approved alternatives. Buildings designated as historic will conform with the SHPO programmatic agreement. Soffit material should be vented/perforated if replaced.	

4.2. Windows

Windows	
Repair Standard	Minimum Remaining Life 10 years
All windows should operate, remain in an open position when placed there, have a screen to cover the open section, and lock when closed. See LBP in 1. Contaminants and Other Hazards.	
Replacement Standard	
Windows that are not repairable may be replaced and should meet the ENERGY STAR standard for this geographic region. www.energystar.gov/index.cfm?c=windows_doors.pr_anat_window Buildings designated as historic will conform with the programmatic agreement SHPO. Other new windows may be vinyl and double-glazed. New window installations should be properly flashed and connected shingle-style to other components of the weather resistive barrier.	

4.3. Exterior Doors

Exterior Doors	
Repair Standard	Minimum Remaining Life 10 years
Exterior doors should be structurally sound, weather-stripped, have door sweeps (using pest proof-materials in areas with rodent issues), and should operate smoothly. They should include a peephole, a single cylinder dead bolt, and must have an entrance lock set. See LBP in 1. Contaminants and Other Hazards.	
Replacement Standard	
Buildings designated as historic will conform with the SHPO programmatic agreement. Steel or fiberglass, six-panel doors may be installed on the front of the property for buildings that are not historically significant, and at entrances to historically designated properties not visible from the front street. Single cylinder dead bolt locks should be installed on all exterior doors and keyed to match. They should include a peephole and must have an entrance lock set. Lever style latches should be considered based on resident needs and needs of regular visitors. All new doors should be weather-stripped to be air tight and include door sweeps with pest-proof materials in areas with rodent issues. New door installations should be properly flashed and connected shingle-style to other components of the weather-resistive barrier.	

4.4. Porches

Exterior Porches	
Repair Standard	Minimum Remaining Life 10 years
Deteriorated concrete porches should be repaired when possible. Unsafe wood porch components should be repaired with readily available materials to conform closely to historically accurate porches in the neighborhood. Porch repairs should be structurally sound, with smooth and even decking surfaces. Deteriorated wood structural components should be replaced with preservative-treated wood. See LBP in 1. Contaminants and Other Hazards.	
Replacement Standard	
Porches on buildings designated as historic should meet the local jurisdiction's requirements for materials and configuration. Other porches should be rebuilt to conform closely to historically accurate porches in the neighborhood. Decks on non-historic porches should be replaced with 5/4-inch preservative-treated or synthetic decking. Replaced railings must meet code. Replaced wood structural components should be preservative-treated.	

4.5. Exterior Stairs and Ramps

Exterior Steps and Ramps	
Repair Standard	Minimum Remaining Life 10 years
Steps, stairways, and ramps should be structurally sound, reasonably level, with smooth and even surfaces. Repairs should match existing materials. If the potential for lead-based paint exists, see LBP in 1. Contaminants and Other Hazards.	
Replacement Standard	
On historic designated structures, new stairs should meet the local jurisdiction's requirements for materials and configuration. On other properties, stairs should match existing or match historically sensitive designs on similar buildings in the neighborhood. Preservative treated wood should be used for structural elements, and for treads and risers on wood stairs in the absence of historic requirements. Synthetic treads and risers are also permitted. Wood-framed, accessible ramps are an eligible expense based upon occupancy. Concrete is an approved material for steps and landings if it is cost effective compared to wood.	

4.6. Exterior Railings

Exterior Railings	
Repair Standard	Minimum Remaining Life 10 years
Existing handrails should be structurally sound. Guard rails are required on any accessible area with a walking surface over 30" above the adjacent ground level. Sound railings may be repaired if it is possible to maintain the existing style. On historic structures railing repairs will conform with the SHPO programmatic agreement. See LBP in 1. Contaminants and Other Hazards.	
Replacement Standard	
Handrails should be present on one side of all exterior steps or stairways with more than two risers and around porches or platforms over 30" above the adjacent ground level and must meet local codes. Handrails and guard rails should conform to the style of similar components in the neighborhood. On historically designated structures, new railings should meet the local jurisdiction's requirements for materials and configuration. On historic structures railing repairs will conform with the SHPO programmatic agreement. Installation of handrails on both sides of stairs is allowable based on the needs of the occupants.	

5. Foundations & Structure

Key concepts and relationships

- Foundations should be inspected for structural problems and for water and pest infiltration. Foundations must be free of open holes and cracks to prevent pest and water entry.
- Serious issues with the foundation that are beyond the capacity of staff to evaluate should be examined by a structural engineer.
- Foundation replacements are generally beyond the scope of housing rehabilitation efforts because of the cost.

5.1. Foundations

Foundations	
Repair Standard	Minimum Remaining Life 20 years
Foundations should be repaired to be sound, reasonably level, and free from movement. Damaged or deteriorated pargeting should be patched in kind. See Radon in 1. Contaminants and Other Hazards. Radon mitigations systems are an approved treatment. All penetrations through the foundation should be sealed to prevent pest entry using materials that are rodent proof, such as sheet metal or copper mesh to seal holes before applying caulk or foam. See Pests in 1. Contaminants and Other Hazards.	
Replacement Standard	
Foundation replacements are beyond the scope of the program.	

Basement Floors	
Repair Standard	Minimum Remaining Life 20 years
Basements should not have exposed dirt. Acceptable repairs include the installation of a plastic vapor barrier, sealed to the foundation and capped with a concrete slab a minimum of 2 inches thick. Concrete slabs in basements must be continuous, free of cracks and holes and sealed to the foundation to prevent moisture and soil gas (e.g., radon). Radon mitigation systems are an approved treatment. See Radon in 1. Contaminants and Other Hazards. All penetrations through the basement foundation should be sealed to prevent pest entry using materials that are rodent proof, such as sheet metal or copper mesh to seal holes before applying caulk or foam. See Pests in 1. Contaminants and Other Hazards.	
Replacement Standard	
The installation of new concrete slabs is an allowable expense, and new concrete slabs must have a continuous layer of plastic vapor barrier installed under the slab and sealed to the foundation.	

Crawl Spaces	
Repair Standard	Minimum Remaining Life 20 years
Crawl spaces should not have exposed dirt, acceptable repairs include the installation of a plastic vapor barrier, sealed to the foundation. Concrete slabs in crawl spaces must be continuous, free of cracks and holes and sealed to the foundation to prevent moisture and soil gas (e.g., radon) intrusion. See Radon in 1. Contaminants and Other Hazards. Radon mitigation systems are an approved treatment. All penetrations through the crawl space foundation should be sealed to prevent pest entry using materials that are rodent proof, such as sheet metal or copper mesh to seal holes before applying caulk or foam. See Pests in 1. Contaminants and Other Hazards.	
Replacement Standard	
Same requirement as the Repair Standard	

Sump Pump Systems	
Repair Standard	Minimum Remaining Life 20 years
Where there is a water intrusion problem, existing sump pumps must be operational and must discharge ground water to a location approved by the municipality, in a manner that prevents the discharge from reentering the structure. The sump should have an airtight cover to prevent soil gasses from entering the living space, installed in such a way that water can drain from above, such as with a ball valve, or other type of airtight drain mechanism in the cover. See Radon in 1. Contaminants and Other Hazards.	
Replacement Standard	
The installation of new sump pump systems is allowed only after all exterior storm water management options are exhausted and the water infiltration issue remains. New sump pumps must meet the requirements under the Repair Standard.	

5.2. Structural framing

Structural Walls	
Repair Standard	Minimum Remaining Life 15 years
Structural framing and masonry should be free from visible deterioration, rot, or serious insect damage (termites, carpenter ants, etc.), and be adequately sized for current loads. Prior to rehab, all sagging floor joists or rafters should be visually inspected, and structural damage and its cause should be corrected.	
Replacement Standard	
New structural walls should be minimum 2 x 4 at minimum and placed 16 inches apart on center. All exterior walls that are part of the building envelope (the air barrier and thermal barrier separating the conditioned space from the non-conditioned space) should be insulated with a minimum R-13 insulation and sheathed to code.	

Firewalls	
Repair Standard	Minimum Remaining Life 5 years
Party walls or walls adjacent to attached garages will be maintained per code requirements.	
Replacement Standard	
When frame walls and floors adjoining other dwellings are gutted, new wall finish installations will conform to local requirements for fire ratings.	

Additions	
Repair Standard	Minimum Remaining Life NA
NA	
Replacement Standard	Minimum Life NA
New additions are not an approved expense.	

Non-Conforming Units	
Repair Standard	Minimum Remaining Life NA
Non-conforming occupied units may be brought up to meet code occupancy requirements at the discretion of the program, in consultation with the Building, Code Enforcement and Planning Depts.	
Replacement Standard	Minimum Life NA
New additions are not an approved expense.	

6. Insulation, Air Sealing and Moisture Control

Key concepts and relationships

- Air sealing has many benefits for health, including fire stopping, moisture movement, pest control, thermal control, and contaminant control
- Inexpensive opportunities to insulate the building envelope regularly occur during rehabilitation.

6.1. Air sealing

Air Sealing	
Repair Standard	Minimum Remaining Life 10 years
All accessible holes, cracks and chases should be sealed to prevent pest entry and air leakage using caulks, spray foams and copper mesh or other pest resistant materials. See Pests in 1. Contaminants and Other Hazards.	
Replacement Standard	
All accessible holes, cracks and chases, including those exposed in the removal of finishes, should be sealed to prevent pest entry and air leakage using caulks, spray foams and copper mesh or other pest resistant materials.	

6.2. Insulation

Insulation	
Repair Standard	Minimum Remaining Life NA
If accessible, the benefit of adding attic insulation after air sealing should be considered for its cost/benefit by having an energy audit conducted by either a BPI- or Residential Energy Services Network (RESNET)-certified auditor. For substantial housing rehabilitation projects, insulation levels should be brought up to code where the building envelope is accessible.	
Replacement Standard	
The building envelope should have a continuous air barrier and a continuous thermal barrier that is in contact with the air barrier. Attic insulation must be a minimum of R38, with soffit baffles installed when there are soffit vents to maintain ventilation at the eves. All exterior walls opened during renovations should be insulated with un-faced fiberglass batts or damp spray cellulose to R13 for 2x4 framing, and R19 for 2x6 framing. Rim joists should be insulated to R19 with either foil-faced foam board approved for exposure to living space (e.g. Thermax) or class 1-rated spray foam. Crawl spaces should be addressed first per Section B5.3, after which insulation of the perimeter walls is an allowable expense, using either foil-faced foam board approved for exposure to living space (e.g., Thermax) or class 1-rated spray foam.	

Roof Ventilation	
Repair Standard	Minimum Remaining Life 5 years
Shingled roofs should have a combination of operable ridge vents and soffit vents with balanced free space ventilation between soffit and ridge vents. 1 SF of free space ventilation is recommended for every 300 SF of attic space.	
Replacement Standard	
Same as above.	

7. Interiors

7.1. Interiors – Smoke, Fire and Carbon Monoxide (CO) Alarms

Key concepts and relationships

- Smoke, Fire and CO Alarms are essential warning systems.
- There are many options to consider, including:
  - Hard wired installation versus battery operated models
  - Hard wired installations with or without battery back-up
  - Whether or not to interconnect smoke/fire alarms, and if hard-wired interconnection or wireless interconnection is appropriate.
  - CO detectors come with a digital read-out or may simply sound an alarm at a given level. The digital readout gives better information about low levels of CO.
- Reference documents: See the Home Safety section of the EPA Healthy Indoor Environment Protocols for Home Energy Upgrades document.

CO Alarms	
Repair Standard	Minimum Remaining Life 2 yrs.
Operable CO alarms, with a sensor expiration date no shorter than 2 years in the future, must be located outside every bedroom, at every level, and near the garage entry if there is an attached garage. If battery-operated alarms do not have operable batteries installed, install new alkaline batteries. See CO in 1. Contaminants and Other Hazards. Where feasible, meeting the replacement standard is highly recommended.	
Replacement Standard	
Install CO alarms outside every bedroom, at every level and near the garage entry if there is an attached garage. Battery-operated CO alarms should have permanently installed 10-year lithium batteries and sensors rated for 10 years. It is recommended that CO alarms have a digital display and provide peak level readings.	

Smoke/Fire Alarms	
Repair Standard	Minimum Remaining Life 2 yrs.
Operable, hard-wired smoke/fire alarms, with battery backup, and with a sensor expiration date no shorter than 2 years in the future, must be located in every bedroom, outside every sleeping area, and at every level.	
Replacement Standard	
Same as above. Multifamily dwellings must have hard-wired and interconnected alarms per code. Both hard-wired and wireless interconnected functionality are acceptable.	

7.2. Interiors - Doors

Interior Doors	
Repair Standard	Minimum Remaining Life 5 years
Baths and occupied bedrooms should have operating doors, free from friction contact with door jambs and security lock sets. See LBP in 1. Contaminants and Other Hazards.	
Replacement Standard	
Replacement doors may be hollow-core, pressed-wood product consistent with the style of existing doors, including security lock sets for bathrooms and bedrooms and passage locksets for closets and other doors. Lever style handles should be considered based on resident needs and needs of regular visitors.	

7.3. Interiors – Stairs

Key concepts and relationships

Inadequately lighted, slippery staircases with insufficient handrails are responsible for many unnecessary injuries, especially among young children and older adults.

- Lighting is critically important in staircases. See the Lighting standard under the Electrical section. The ability to easily find and operate light switches is essential for navigating staircases, thus the requirement for lighted switches in the Lighting section.
- Stair tread surfaces are often hazardous because of smooth treads and slippery or worn carpeting.
- Functional and secure handrails are an important component for every staircase. For some occupants, handrails on both sides of the stairs are significantly safer.
- Application of Universal Design principles to staircases, so that visitors to the property are safe, is an allowable program expense.

Stairs - Handrails	
Repair Standard	Minimum Remaining Life 10 yrs.
All interior staircases should have a minimum of one full length handrail on one side of the stairs, firmly secured to the structure's framing, with handrail returns at both ends. The handrail should be smooth through its entire length with a diameter of 1¼ to 1½ inches and a minimum 1 ½-inch space between the wall and the handrail. The top of the handrail should be between 34 and 38 inches from the nosing of the stair tread, although it is an allowable program expense to adjust the height of the handrail to suit the occupant(s).	
Replacement Standard	
All "Repair Standard" requirements apply. A second handrail is an allowable expense based on the needs of the occupant(s).	

Stairs – Treads and Risers	
Repair Standard	Minimum Remaining Life 15 yrs.
All interior staircases should have treads and risers that are solid and secure, are not slippery and do not have coverings that present a tripping hazard. Worn carpet should be removed and replaced with slip-resistant rubber stair treads or recoated with a non-slip finish.	
Replacement Standard	
Broken treads and/or risers should be replaced in kind. As in the "Repair Standard," treatment of the tread surface to minimize the risk of slipping or tripping is required. Reinforcement of the staircase stringers with additional framing is an allowable expense when the expected life of the existing stair system is reduced by inadequate or damaged stringers. Total replacement of the staircase is an allowable expense if it is the most cost-effective solution.	

7.4. Kitchen Cabinets and Countertop

Key concepts and relationships

- The clutter of kitchens with insufficient storage attracts pests by providing harborage. Providing adequate storage creates the opportunity to reduce clutter.
- Food prep and clean-up requires smooth cleanable work surfaces to minimize the potential for food-borne illness.
- Adequate kitchen storage and workspace encourages home cooking and potentially healthier eating habits.

Kitchen Cabinets and Countertop	
Repair Standard	Minimum Remaining Life 5 years
Kitchens should have a minimum of 8 feet of countertop with base cabinets (dishwasher included if present) and wall cabinets. Existing cabinets with hardwood doors and face frames may be repaired if in good condition. All cabinets should be sound and cleanable. Repairs should use low or no VOC adhesives and coatings. See VOC in 1. Contaminants and Other Hazards. All penetrations in new cabinets for mechanical system components, such as plumbing or electrical, should be sealed to adjoining building components to prevent pest entry. Kick plates should be sealed to prevent pest entry from underneath or from adjacent cabinets. See Pests in 1. Contaminants and Other Hazards.	
Replacement Standard	
New cabinets should have hardwood doors and face frames. There should be a minimum of 8 lineal feet of countertop that includes a back-splash, with corresponding base cabinets and wall cabinets, and a dishwasher. Corners in countertop designs are permitted if factory assembled. A drawer base (12 inches or 15 inches) should be included in new cabinetry. A plastic laminate panel to match the countertop, or a stainless-steel panel, should be installed as a base-cabinet to wall-cabinet backsplash behind the range and extending 6 inches past the range on both sides, or if the range is in a corner, along the side wall and trimmed with chrome metal edging. All penetrations in new cabinets for mechanical system components, such as plumbing or electrical, should be sealed to adjoining building components to prevent pest entry. Kick plates should be sealed to prevent pest entry from underneath or from adjacent cabinets. See Pests in 1. Contaminants and Other Hazards.	

7.5. Flooring

Key concepts and relationships

- Flooring has significant potential to collect dirt and contaminants. Flooring should therefore be cleanable, and smooth flooring is highly recommended over carpet.
- In wet areas, such as bathrooms and kitchens, flooring must be water- and slip- resistant as well as easily cleanable, and the substrate must be smooth and consistent.
- Continuous and well-sealed concrete basement floors can reduce moisture and soil gas (radon) infiltration into the living space.
- New flooring and adhesives used in flooring installations should be low VOC.

Flooring	
Repair Standard	Minimum Remaining Life 3 years
Kitchen and Bathrooms: Bathroom, kitchen, and other water-susceptible floor areas should be water- and slip-resistant, such as solid vinyl plank, solid vinyl tile, sheet vinyl or ceramic tile. It should be free from defects, and tripping and slip hazards. In rooms other than kitchens and baths, damaged wood flooring should be repaired. Other Areas: When existing deteriorated carpet is installed over hardwood floors, the carpet may be removed, and when the budget allows, the hardwood should be refinished. (See Finishes below.) Adhesives used for repairs should be low VOC and compliant with South Coast Air Quality Management District (SCAQMD) Rule 1168 thresholds. See basement floors requirements.	
Replacement Standard	
Kitchens and Bathrooms: New bathroom flooring should be slip-resistant resilient sheet goods or ceramic tile over an approved underlayment. New kitchen flooring should be solid vinyl plank, solid vinyl tile, resilient sheet goods, resilient tile, or ceramic tile over an approved underlayment. In both kitchens and baths where resilient flooring is installed over a wood floor system, the substrate must be extremely smooth and consistent or ¼-inch minimum flooring underlayment must be installed as a substrate. Other Areas: Whenever possible, rooms other than kitchens and baths with existing wood flooring should be maintained as wood floors and refinished. (See Finishes for wood floor coatings below.) For rooms other than kitchens or baths without usable wood floors, use smooth, cleanable flooring that limits VOC off gassing, does not contain phthalates, and is certified for wearability, e.g., laminate flooring with a North America Laminate Flooring Association (NALFA) certification (nalfa.com) or a European Abrasion Criteria (AC) scale rating of 4 or better. Products that meet the Scientific Certification System's FloorScore certification are highly encouraged. Carpet and associated products that are Carpet and Rug Institute's Green Label-certified are an allowable expense, except in areas prone to moisture: building entryways, laundry rooms, bathrooms, kitchens, kitchenettes, utility rooms, or any rooms with on-grade or below-grade concrete slabs. See Volatile Organic Compounds in 1. Contaminants and Other Hazards.	

7.6. Finishes

Key concepts and relationships

- For the purposes of this standard, the term "finishes" should refer to the coatings on walls, ceilings, floors and other building components.
- Wall and ceiling finishes should be low- or no- VOC and in high use or wet areas, a satin or semi-gloss finish is recommended for cleanability and water resistance.
- Finishes for wood floors should be low-or no- VOC and should be catalytic (two component) for wearability. Single component, water-based finishes are not approved for refinishing wood floors because of their poor abrasion resistance.
- The interior wall and ceiling finishes are required to be intact and continuous for lead-based paint compliance, pest management and air infiltration. Air infiltration can affect energy efficiency, comfort and the spread of contaminants.
- Kitchen countertops must be intact, structurally sound and cleanable for safe food prep.

Interior Walls and Ceilings	
Repair Standard	Minimum Remaining Life 3 years
Wall and ceiling surfaces should be sound (secure), continuous and free from cracks and holes that would allow the movement of pests or air infiltration. Cracks and holes should be patched with materials that match the surrounding surfaces and resist rodent intrusion. See Pests in 1. Contaminants and Other Hazards. If wall finishes are removed in staircases or in bathrooms, install blocking to support grab bars and handrails wherever they might be required.	
Replacement Standard	
When necessary, plaster should be replaced by ½-inch gypsum board. Fire-rated assemblies should be specified on a project-by-project basis as required by local codes. When framing is exposed in staircases and bathrooms, install blocking for grab bars that would align with ADA requirements for grab bar and handrail installations.	

Finishes	
Repair Standard	Minimum Remaining Life 5 yrs.
All interior coating finishes should be intact, cleanable and free from hazards. See LBP in 1. Contaminants and Other Hazards.	
Replacement Standard	
New paint coatings should be low VOC. See VOC in 1. Contaminants and Other Hazards. New coatings in high-wear and wet areas should be satin or semi-gloss for wear resistance and cleanability.	

7.7. Closets

Key concepts and relationships

- Closets are necessary for the storage of clothes and other personal belongings; however, they should be kept neat and clean to avoid clutter and reduce the safety concerns of falling objects.

Closets	
Repair Standard	Minimum Remaining Life 5 years
Existing closets with a minimum depth of 2 feet should be maintained in good repair and have a shelf and clothes rod.	
Replacement Standard	
New closets may be created if there is a significant lack of storage space and the budget permits. New closets should have a depth of 2 feet and include a shelf and clothes rod. Wire shelving systems with a single shelf and clothes rod are an approved option.	

7.8. Fire Safety Egress

Fire Safety - Egress	
Repair Standard	Minimum Remaining Life NA
Multifamily structures must have 2 means of egress from each unit.	
Replacement Standard	
Egress windows are required in all new sleeping and living areas unless other secondary means of escape requirements are met. The minimum dimensions for egress window clear openings are 20 inches wide by 24 inches tall, with a clear opening of 5.7 square feet. No bedrooms should be created in attics or basements unless Life Safety Code egress requirements are met.	

7.9. Grab Bars

Grab Bars	
Repair Standard	Minimum Remaining Life 10 years
Existing grab bars should be secured or reinstalled to ensure that they are capable of supporting the occupants during use.	
Replacement Standard	
The installation of grab bars is an eligible expense based on the needs of the occupancy or the needs of those who regularly visit. New installations should conform to ADA guidelines and be capable of supporting the occupants. Attachment to framing or solid blocking is preferred. Hollow wall fasteners are an approved alternative to fastening to solid wood, but they must be designed for grab bar installations and have the appropriate load ratings.	

8. Electrical

8.1. Electrical Service

Key concepts and relationships

- The ever-increasing number of electrical devices, and the negligible cost difference with electrical services with less capacity, supports the installation of 200 AMP services as a standard approach.
- Providing electrical panels with the capacity for expanding the number of circuits over time is prudent.
- Inadequate electrical services and distribution leads to the excessive and often inappropriate use of extension cords.

Service and Panel	
Repair Standard	Minimum Remaining Life 10 years
Distribution panels should have a main disconnect, a minimum of 10 circuit-breaker-protected circuits, a 100-AMP minimum capacity, and be adequate to safely supply existing and proposed devices. If a working central air conditioning system is present, the minimum service should be 150 AMP.	
Replacement Standard	
Inadequate panels should be replaced with a 200-AMP service with a main disconnect panel containing a minimum of 30 circuit breaker positions.	

8.2. Electrical Distribution

Key concepts and relationships

- Electrical circuits in wet or damp areas must be Ground Fault Circuit Interrupter (GFC)I-protected.
- Arc fault protection protects against fires created by faulty extension cords and poor connections between sockets and plugs.
- Adequate lighting can reduce injuries from tripping and falling. The ability to easily locate a light switch, controlling a functioning light fixture, while moving from one room to another can reduce the risks for injury.
- Special accommodations may be appropriate for occupants with reduced vision.

Interior Electric Distribution	
Repair Standard	Minimum Remaining Life 7 years
Exposed knob and tube wiring should be replaced. Aluminum wiring should be carefully inspected, and either damaged wiring should be replaced in its entirety, or Underwriters Laboratories (UL)-approved connectors should be installed at each electrical device to eliminate aluminum wire-to-device connections. Every room should have a minimum of two duplex receptacles, placed on separate walls, and one light fixture or receptacle switched at each room entrance. Where the source wiring circuit is accessible (e.g., first floor above basements, in gutted rooms, etc.), receptacles should be grounded. All switch, receptacle, and junction boxes shall have appropriate cover plates. Wiring should be free from hazards, and all circuits should be properly protected at the panel. Floor receptacles should be removed, and a metal cover plate installed. Exposed, UL-approved electrical raceway is allowed. Bedroom receptacles should be protected by an arc fault breaker. There must be one electrical receptacle at the service panel. Basements should have a minimum of three keyless bare bulb fixtures switched at the top of the stairs.	
Replacement Standard	
Whenever wall finishes are removed in a room, that room should be rewired to the latest version of the National Electric Code (NEC).	

Ground Fault Circuit Interrupters	
Repair Standard	Minimum Remaining Life 5 years
Non-functioning GFCIs, kitchen counter, bath and laundry receptacles within 6 feet of a sink shall be replaced with a GFCI-protected receptacle or protected by a GFCI device.	
Replacement Standard	
Kitchen counter, bath, and laundry receptacles should be replaced with a GFCI-protected receptacle or protected by a GFCI device.	

Kitchen Electric Receptacles	
Repair Standard	Minimum Remaining Life 5 years
Existing receptacles, fixtures and switches should be safe and grounded.	
Replacement Standard	
Permanently installed or proposed stoves, refrigerators, freezers, dishwashers, disposals, washers and dryers must have separate circuits sized to NEC standards. Two separate 20-amp counter circuits are required in each kitchen area.	

Lighting	
Repair Standard	Minimum Remaining Life 7 years
All light fixtures and their controlling switches in rooms, hallways, stairs, and other passageways, should be in working condition and provide adequate lighting for safe movement between living spaces. In the common spaces of multifamily buildings, switches should be installed and available at every entry to a space to control the lighting; or the lights must always be on. Switched receptacles are an approved option for bedrooms. Attics, basements, and crawl spaces must have switched utility light fixtures providing adequate light to safely enter and exit those spaces. Fluorescent light ballasts must be labeled “No PCBs” or be labeled as electronic. For any ballasts without such labeling, contact the manufacturer to determine whether the ballasts contain PCBs or assume that they contain PCBs and replace them with new lighting fixtures. If the manufacturer is not sure whether the ballasts contain PCBs, assume that they do and replace with new lighting fixtures. See EPA Guidance: EPA PCB-Containing Light Ballasts. Dispose of PCB-containing ballasts per EPA regulations.	
Replacement Standard	
All requirements of the Repair Standard apply. Attics, basements and crawl spaces must have utility fixtures switched at each entry to those spaces. All new light fixtures in living space should be ENERGY STAR labeled. New switches should be lighted for easy identification in the dark.	

9. Plumbing

9.1. Drain/Waste/Vent System

Key concepts and relationships

- Drain lines must be properly vented to operate correctly. The presence of plumbing vents should be confirmed during the property inspection, along with physical testing of plumbing fixtures to confirm that they operate correctly.
- Undetected or ignored plumbing leaks create significant structural damage over time. Such leaks also encourage some types of pest infiltration and can contribute to mold growth. Inspections should include the interiors of cabinetry with plumbing and all plumbing in basements and crawl spaces.

Drain, Waste, Vent Lines	
Repair Standard	Minimum Remaining Life 5 years
Waste and vent lines must function without losing the trap seal.	
Replacement Standard	
When walls are removed exposing vent and waste lines, those lines should be reworked to meet the current plumbing code.	

9.2. Domestic Water Supply

Key concepts and relationships

- The purity of the domestic water supply is to a large degree reliant on the building's piping and fixtures.
- Testing of well water on a regular interval is highly recommended.
- Shutoff valves at the main supply and at each fixture are important when a serious leak occurs but also for regular maintenance.
- See info on Lead Service Lines (LSL).

Water Supply	
Repair Standard	Minimum Remaining Life 10 years
The main shut off valve must be operable and completely stop the flow of water to the house. All fixtures must be leak-free and deliver sufficient cold water and, where applicable, hot water. See Water Quality Testing in 1. Contaminants and Other Hazards.	
Replacement Standard	
The main shut off valve must be operable and completely stop the flow of water to the house, and should be replaced if it does not. Lead and galvanized pipe that is part of the water service or the distribution system should be replaced with copper. All fixtures and shutoff valves should be certified "lead-free." One freeze-protected exterior hose bib is required. Copper or cross-linked polyethylene (PEX) water piping is approved for domestic water supply. Lead Service Lines (LSL) are approved for full replacement. See Water Quality Testing in 1. Contaminants and Other Hazards.	

9.3. Plumbing Fixtures

Key concepts and relationships

- Adequate washing facilities are crucial to safe food prep, food clean-up and personal hygiene.
- Leaking plumbing fixtures create moisture problems and the potential for mold, building decay and pest infestation.
- When replacing plumbing fixtures for leaks or other functional problems, consider the benefits of low-flow plumbing fixtures.
- Toilets that do not perform well (inadequate flushing) create a health hazard. The MAP website provides a quantitative assessment of the functionality of toilets.

Plumbing Fixtures	
Repair Standard	Minimum Remaining Life 3 years
Every dwelling unit must have a minimum of one single bowl sink with hot and cold running water in the kitchen, appropriate for washing dishes, and at least one bathroom containing a bathroom sink, a shower and/or tub unit and a toilet. Both sink and tub/shower must have hot and cold running water. All fixtures and faucets must have working, drip-free components. Single lever handled faucets and comfort height commodes should be considered based upon occupancy.	
Replacement Standard	
Minimum requirements for new fixtures include: single-lever, metal faucets and shower diverters with 15-year, drip-free warranty and maximum 2.0 gallon-per-minute (GPM) flow; white ceramic low-flow toilets (1.28 GPF), freestanding sinks or sinks with vanities, and fiberglass tubs with shower surrounds. Walk-in showers are allowable depending on occupancy. Single-lever handled faucets and comfort height toilet should be considered based upon occupancy. Toilets with greater that a 1.6 GPF rating should be replaced with EPA Water Sense-certified toilet using a maximum 1.28 GPF model. When installing new tubs/showers use durable substrates under ceramic tile, or fiberglass tub/shower kits that are water-tight. Install water resistant drywall, or water impervious surfaces directly adjoining the tub/shower. New commodes must score a minimum of 1,000 on the MaP performance test. https://www.map-testing.com/	

9.4. Domestic Water Heating

Key concepts and relationships

- Hot water is crucial to safe food prep, food clean-up, laundering clothes & bedding (dust mites), and personal hygiene.
- Water temperature should be tested to be under 125 degrees at the point of delivery to avoid scalding.
- Water heaters that leak, show signs of back-drafting combustion gases, or are clearly at the end of their useful life are potential health risks and should be considered for replacement if repairs should not successfully address the health risks.
- When replacing a water heater for reasons of health risks, consider that gas-fired water heaters cost less to operate compared to standard electric water heaters, with approximately $250 to $275 in savings per year.

Water Heaters	
Repair Standard	Minimum Remaining Life 5 years
Each housing unit must have a working water heater with a minimum expected remaining life of 5 years; if it is gas-fired it should have a minimum capacity of 40 gallons, if electric, 50 gallons. Gas-fired water heaters must be free of evidence of back-drafting, such as corrosion or water stains at the top of the heater. If there is any suspicion of back-drafting, a BPI-approved Combustion Zone Test (CAZ Test) must be performed by a qualified professional such as a BPI-certified Building Analyst (BA), HEP Energy Auditor (EA), or Quality Control Inspector (QCI). See CO in 1. Contaminants and Other Hazards.	
Replacement Standard	
If a water heater warrants replacement, the new water heaters may be gas-fired, electric or an electric heat pump, whichever is determined as the most practical combination of being economical to operate while minimizing the risk of combustion gases back drafting. Minimum capacity should be 40-gallons, with a 6-year warranty. High-efficiency, power-vented or sealed combustion models are required if the flue is in poor condition or there is suspicion of previous back-drafting of the water heater that cannot be addressed with improved natural venting. See CO in 1. Contaminants and Other Hazards.	

10. Space Conditioning – Heating and Cooling

Key concepts and relationships

- Consistent and appropriate temperatures can help to reduce some chronic health risks.
- Climate is a key factor in defining standards for heating and cooling equipment, and this template should be adjusted to suit your climate.
- All-electric heat pumps may make sense in warmer climates.
- Gas-fired units may be more affordable to operate in colder climates where natural gas service is available.
- An energy audit by either a BPI- or RESNET-certified auditor, or a manual J calculation by the heating, ventilation, and air conditioning (HVAC) contractor, detailing the building's heating and cooling loads based on the building envelope and climate, with estimated utility costs comparing the fuel options, are the preferred methods for choosing the efficiency rating of mechanical equipment.
- Air conditioning may not be an appropriate requirement in colder climates, but necessary in others. Excessive heat can make some chronic health conditions worse and can result in heat-related illness or death. Running an air conditioning system can also help reduce high humidity levels.
- Distribution systems can significantly affect the effectiveness and efficiency of an HVAC system. Leaky ductwork, especial return ductwork, can introduce contaminants into the living space in addition to reducing efficiency and balanced delivery of conditioned air.

10.1. Heating Equipment

Heating System	
Repair Standard	Minimum Remaining Life 10 years
Workable existing heating systems should be inspected and serviced to operate in a safe manner. Filters on forced air systems must have an airtight housing and a minimum of Minimum Efficiency Reporting Value (MERV) 8 filter, taking into account manufacturer's recommendations. Providing spare furnace filters is an allowable expense. See Asbestos in 1. Contaminants and Other Hazards.	
Replacement Standard	
If the heating system warrants replacement, new gas-fired heating systems should be rated at 92 percent Annual Fuel Utilization Efficiency (AFUE) or better. New oil-fired furnaces should be rated at 83 percent AFUE or better. New oil-fired boilers should be rated at 85 percent AFUE or better. New heat pumps should be rated at ≥16 Seasonal Energy Efficiency Ratio (SEER). New units should be sized using the Air Conditioning Contractors of America (ACCA) Manual J load calculation and ACCA Manual S for equipment selection. If new ductwork is to be installed, ACCA Manual D should be used for ductwork design. Heat pumps are an approved option when both heating and air conditioning are required and if they are comparable or better than other alternatives in terms of cost to operate. Thermostats should be programmable and accompanied by appropriate resident education to ensure their proper use. When electric resistance heating systems are replaced, soffits for ductwork and/or new distribution pipes for hot water heating systems should be provided. Up to 4 lineal feet of resistance electric heating strips per 1,000 square feet of floor area may be retained or installed in areas that are not cost effective to heat via ductwork or hot water distribution systems. New furnaces should have a minimum MERV 8 filter and an airtight filter housing that allows easy access and replacement of filters. Consider using thicker pleated filters to increase the interval between the replacement of filters.	

10.2. Air Conditioning Equipment

Air Conditioning	
Repair Standard	Minimum Remaining Life – 10 years
Existing central air conditioning should be inspected, serviced and refurbished to operate safely. The repair or replacement of window-mounted air conditioners in not an allowable expense.	
Replacement Standard	
Non-functioning, non-repairable central air conditioners should be removed and drained of all CFCs. If the air conditioning system warrants replacement, the new system should have an efficiency rating of at least 16 SEER. New units should be sized using the ACCA Manual J load calculation and ACCA Manual S for equipment selection. If new ductwork is to be installed, ACCA Manual D should be used for ductwork design. See the reference to heat pumps under Section 10.1.	

10.3. Distribution System

Distribution System	
Repair Standard	Minimum Remaining Life 5 years
Duct work and radiator piping should be well-supported, insulated in unconditioned space and adequate to maintain 68⎡F measured 36 inches off the floor when the outside temperature is the average yearly minimum, in all habitable and essential rooms. All duct work should be sealed at all seams with mastic (not tape) and pressure tested to eliminate leakage. Ductwork in unconditioned spaces should be insulated to R-8. For more detailed specifications, please refer to the Standard Work Specification for duct sealing: https://sws.nrel.gov/spec/316024	
Replacement Standard	
All duct work should be insulated to R-8, sealed at all seams with mastic (not tape), pressure tested to eliminate leakage, and run in concealed space. For more detailed specifications, please refer to the Standard Work Specification for duct sealing: https://sws.nrel.gov/spec/316024	

10.4. Flues and Exhaust for Combustion Systems

Flues and Combustion Exhaust	
Repair Standard	Minimum Remaining Life NA
Unused masonry chimneys should be either completely removed or removed to below the roofline wherever roofing is replaced. Chimneys that are removed to below the roofline should be sealed with a permanent cap that is air and pest proof. Holes in ceilings and walls resulting from chimneys that have been removed should be patched in kind. Unsound chimneys should be repaired or removed. When unlined chimneys must be used for combustion exhaust, they should be lined. Unused metal flues should be completely removed, and the resulting holes in ceiling and wall finishes should be patched in kind. See CO in 1. Contaminants and Other Hazards.	
Replacement Standard	
The creation of new flues is not recommended in this program. The use of high-efficiency closed combustion appliances is recommended to avoid the need for new flues. Replacement furnace flues, when required, should be metal double- or triple-walled as recommended by the furnace manufacturer. See CO in 1. Contaminants and Other Hazards.	

11. Ventilation

Key concepts and relationships

- Mechanical ventilation for bathrooms reduces contaminants, moisture levels (high Relative Humidity – RH), and the potential for mold in almost every climate.
- Running the bathroom fan for an extended time after a shower has proven to significantly improve moisture levels. A 20-minute delay is recommended using an 80-cubic-foot-per-minute (CFM) fan.
- Good ductwork design is crucial for exhaust fan performance. Smooth metal ductwork is more than 10 times as effective at moving air compared to typically installed flexible ductwork of the same diameter.

- Mechanical kitchen ventilation, for both gas and electric stoves, significantly reduces moisture and harmful particulate levels produced from cooking.
- Outlets for exhaust fans must be pest-proof, using either screens, flappers, or a combination of both.

11.1. Bath Ventilation

Bath Ventilation	
Repair Standard	Minimum Remaining Life 5 years
Existing bathrooms should have an operable exhaust fan, with functioning ductwork exhausted to the exterior, (not the attic or crawl space) and rated at a minimum of 50 CFM airflow. A switching system that maximizes the potential for occupant use should be installed, such as having the fan switched with the lights on a time delay setting of 20 minutes, or switched by a humidistat. Optionally, a 20 CFM continuously running fan with functional ductwork to the exterior is acceptable. Replacing flexible ductwork with smooth metal ducts is an allowable expense.	
Replacement Standard	
The installation of an exhaust fan is recommended in full bathrooms. New fans must be ducted to the outside with insulated, smooth metal duct and must be rated at a minimum 80 CFM. Switching by one of the following methods is recommended: a switch at the entrance with an adjustable time-delay function that runs the fan for an additional period after the fan is switched off, either built into the switch or built into the fan; or a motion detector with an adjustable time-delay function that runs the fan for an additional period after the motion detector ceases to sense motion; or by a humidistat. Half bathrooms should be mechanically vented to the exterior with a minimum 50 CFM fan (time delay not required). Insulated ductwork (to at least R8) is required for all exhaust fans whose ducting runs through unconditioned space. Outlets for exhaust ductwork should prevent pest entry and back-drafting of outside air. See Pests in 1. Contaminants and Other Hazards. See Whole House Ventilation in 11.4.	

11.2. Kitchen Ventilation

Kitchen Ventilation	
Repair Standard	Minimum Remaining Life 5 years
Existing mechanical ventilation systems are eligible for repairs.	
Replacement Standard	
Kitchens should have mechanical ventilation in the form of a kitchen range hood sized for the cooktop of the cooking appliance. Installation of kitchen ventilation is an allowable expense, should operate at a maximum loudness of 3 sones, and produce a minimum of 100 CFM after accounting for ducting losses. All ductwork should be heavy-gauge galvanized metal and be air tight with mastic-sealed seams (no duct tape). It is preferred that mechanical ventilation exit at side walls and not at the soffit to minimize the potential for ice damming. Outlets for exhaust ductwork should prevent pest entry and back drafting of outside air. See Pests in 1. Contaminants and Other Hazards.	

11.3. Clothes Dryers

Clothes Dryers Exhaust	
Repair Standard	Minimum Remaining Life 5 years
All clothes dryers must be vented to the exterior with smooth metal ductwork and an outlet that seals against air and pest infiltration when the dryer is not operating, without the use of screening. (e.g. utilizing a positively sealing flap on the exterior.)	
Replacement Standard	
New dryer ductwork should be smooth metal, either galvanized steel or aluminum, with foil ductwork tape sealing the seams (not duct tape), and exhausted to the exterior with the shortest possible run. It should have an outlet that seals against air and pest infiltration when the dryer is not operating, without the use of screening. (e.g., utilizing a positively-sealing flap on the exterior). Ductwork installation in unconditioned space should be insulated to a minimum R6.	

11.4. Whole House Ventilation

Whole House Ventilation	
Repair Standard	Minimum Remaining Life 5 years
Repairs to existing whole house ventilation systems are an allowable expense.	
Replacement Standard	
Projects that require gut rehabilitation or substantial rehabilitation that includes significant air sealing and insulation work, should meet the most recent ASHRAE 62.2 standard for whole house ventilation. [Not Applicable to larger multi-family housing, where ASHRAE 62.1 2016 is relevant.]	

12. Appliances

<u>Key concepts and relationships</u>
Appliances can create safety risks if they tip over.

Kitchen Appliances	
Repair Standard	Minimum Remaining Life 3 years
Freestanding ranges should have anti-tipping protection installed. Minor repairs to kitchen appliances are an allowable expense.	
Replacement Standard	
The replacement of inoperable ranges and refrigerators with ENERGY STAR Certified models is an allowable expense.	