Enterprise

2026 ENTERPRISE GREEN COMMUNITIES CRITERIA

20TH ANNIVERSARY EDITION

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Acknowledgments

The best parts of this document would not have been possible without insights and assistance from the following individuals and organizations. Thank you.

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Special thanks to our Partner Working Group, including invaluable input from many of our longtime partners at the city, state, and federal level.

And to the ever-growing network of affordable housing developers and project teams applying the Green Communities Criteria across the country, we applaud your commitment. This work is ever more important.

Thanks to all the Enterprise staff who provided valuable input to the 2026 Criteria. The Criteria development, review, and revision process was overseen by Enterprise's Building Resilient Futures team: Krista Egger, Ray Demers, Mary Ayala, Michelle Diller, Shelby O'Neill, Kiera Quigley, Shivali Gowda, Jackie Montesdeoca, Elizabeth Geisler, Naomi Wang, and Christopher Hauserman, as well as p.j. melton. Any errors in this document are the sole responsibility of Enterprise.

Design: Landesberg Design

Our success is rooted in our collaborative approach. ... It was through that collective endeavor that we earned our sector's trust and inspired a powerful wave of green building across the industry.

DEAR READER,

Progress has always moved at the speed of trust and innovation in our field. **Enterprise Green Communities** is a powerful case in point. When we launched the program 20 years ago, the notion that you could make housing both green and affordable was a bold proposition. Many contended it was not feasible—not then, not ever, not on any scale.

Two decades later, I am proud to say, we proved what is possible. Green Communities remains the only national green building standard created with and for the affordable housing sector. More than that, the program has allowed affordable housing to lead the building industry in raising the bar to create affordable homes that are not just energy efficient but also climate resilient and healthier for residents and the surrounding community.

Our success is rooted in our collaborative approach. It is the Enterprise way. We brought together residents and community leaders, building and climate experts, housing developers and practitioners, and public health professionals to identify and integrate the most advanced thinking, technology, materials, and practices. It was through that collective endeavor that we earned our sector's trust and inspired a powerful wave of green building across the industry.

Once again, the latest edition of Green Communities reflects the input of a myriad of thoughtful leaders in our field and beyond—with more than 1,000 comments received on our initial draft. As a result, this 20th anniversary edition of the criteria offers a roadmap for greening all affordable housing in the United States—and ensuring good homes are available for generations to come.

With your involvement, since 2004, we have accomplished so much together:

- More than 231,000 homes have been **certified** to the Green Communities Criteria.
- We have integrated green building standards into city, state, and federal **policies**. Today, 30 states nationwide—along with the District of Columbia, Puerto Rico, Chicago, and New York City—require or incentivize Enterprise Green Communities as part of their affordable housing financing programs, more so than any other green building program.
- We have leveraged **capital**, investing more than $3.9 billion in the development and preservation of green and affordable homes.
- We have addressed the false choice between "affordable" and "sustainable," through **research** into the incremental cost of green building.

It is thanks to the vision and diligence of so many leaders within and across Enterprise that we have reached these milestones. I want to especially acknowledge Krista Egger, Ray Demers, and Shelby O'Neill for their ongoing dedication to advancing and scaling Green Communities. Their expertise and their commitment to ensuring the criteria are accessible, achievable, and evolving are unmatched.

Our journey is far from over. We face unprecedented housing affordability challenges. But we have the knowledge, solutions, and determination to address them. Green Communities offers a pathway to ensure people of all ages can live in a healthy home with utility expenses that don't require families to make tough choices between paying their electric bill or buying groceries, and the security of knowing that if severe weather strikes, they will have a place to return home.

That is why I am so proud of our leadership on green building—and overjoyed to welcome you to the 2026 Enterprise Green Communities Criteria. Thank you for trusting us to launch the next generation of this important work.

Sincerely,

Shaun Donovan
Chief Executive Officer and President
Enterprise Community Partners

We face unprecedented housing affordability challenges. But we have the knowledge, solutions, and determination to address them.

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Introduction

OVER THE COURSE OF TWO DECADES, Enterprise Green Communities has transformed the quality of affordable housing in America, with residents and communities at the center, driving and inspiring our work.

That essential work continues. Once again, we've brought together a coalition of affordable housing residents and practitioners, sustainability experts, and advocates to recommit and define critical practices, materials, and methods. Our ultimate objective remains healthy, efficient, resilient, and environmentally responsible affordable homes. The criteria shared in this manual establish a proven and practical approach to bringing the benefits of green design and construction to the residents of affordable housing, while creating a pathway for developers that seek to improve upon the status quo in the areas of energy efficiency, resilience, and health and well-being.

As a community of affordable housing providers, we have an opportunity to afford residents greater choice and agency in the decisions that shape where they live, and to expand opportunities through access to transportation, quality food, critical services, and more. Green building practices leverage all of this. **Green Communities aligns affordable housing investment strategies with environmentally responsive building practices.**

2026 ENTERPRISE GREEN COMMUNITIES CRITERIA

We developed the 2026 Green Communities Criteria to translate the collective expertise of leading housing and green building practitioners into a clear, cost-effective framework for all affordable housing development types.

The 2026 Criteria are suitable for **new construction**, **substantial rehab**, and **moderate rehab** in multifamily and in single-family homes. We provide special considerations for developments located in rural, tribal, and small-town locations. Where relevant, exemptions based on project location or on development type are identified within each criterion.

Each criterion in this manual starts with a **Rationale** that describes the intended impact and value of implementing the strategy described. That's followed by a **Requirements** section that shares how an affordable housing team can achieve the intent of the criterion. Next, **Recommendations** offer suggestions that go beyond the requirement for teams interested in pursuing the criterion more intensively. Finally, each criterion includes a **Resources** section with links to information that may be of use to teams as they consider and implement each strategy.

CERTIFICATION

Green Communities Certification is available for any housing development in the United States that includes affordable dwelling units.

Certification involves a two-step online submission and review process: *prebuild* and *postbuild*. Project teams submit their prebuild application near the end of the design phase, prior to the start of construction. Postbuild applications are submitted shortly after the project has received its certificate of occupancy. Upon receipt of each application, the Green Communities team

conducts a thorough review of the materials and responds, clearly indicating whether the application was approved or needs further work. For projects that receive prebuild as well as postbuild approval, Green Communities certifies that the criteria were met in full and recognizes the project team for their accomplishment.

For the first time in our program, three levels of certification are available: **Green Communities Certification**, **Green Communities Certification Plus**, and **Green Communities Certification Plus Zero Emissions**. Green Communities projects that earn the "Plus" level of certification are highly efficient and all electric. Projects that achieve "Plus Zero Emissions" have advanced one step further, and all site energy is supplied by clean energy sources.

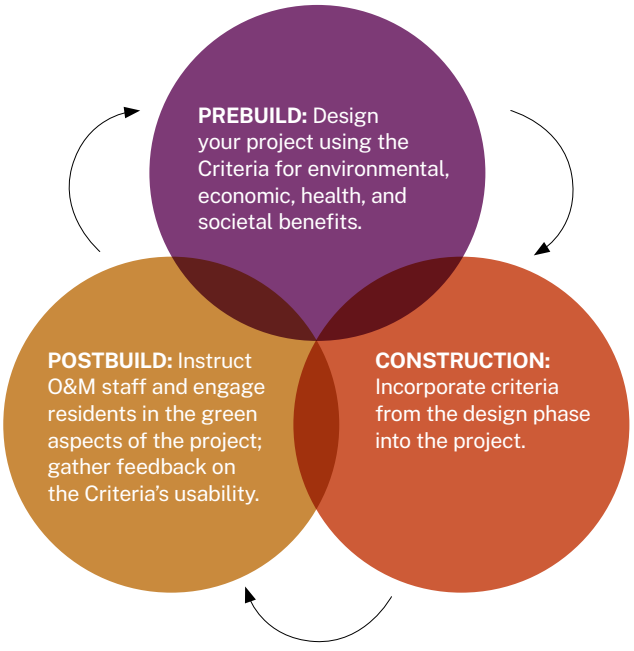
All projects must achieve compliance with the mandatory criteria measures applicable to their construction type. New construction projects earning at least 40 points from optional criteria, and substantial and moderate rehab projects achieving at least 35 points from optional criteria, will be recognized with Green Communities certification.

ONLINE RESOURCES

Enterprise provides tools and resources to assist with the design, development, and operations of affordable housing. Many are available in the Enterprise Learning Center: *www.enterprisecommunity.org/learning-center*.

For a full description of the Green Communities certification process, including required documentation for the prebuild and postbuild submissions, visit *www.greencommunitiesonline.org/*.

If you have questions about Green Communities certification, email *certification@enterprisecommunity.org*.



2026 Enterprise Green Communities Criteria Checklist

This checklist provides an overview of the technical requirements within the Enterprise Green Communities Criteria.

To achieve Enterprise Green Communities Certification, all projects must achieve compliance with the Criteria mandatory measures applicable to that construction type. **New Construction projects must also achieve at least 40 points from optional criteria, and Substantial and Moderate Rehab projects must also achieve at least 35 points from optional criteria.**

Green Communities projects that achieve Option 2 or 3 within Criterion 5.3 Advanced Building Performance as well as the all-electric option of either Criterion 5.4a or 5.4b All-Electric and Electric-Ready Design will earn Certification Plus.

Certification Plus projects that are also net-zero energy will earn Certification Plus Zero Emissions. Achieve Certification Plus and demonstrate through Criterion 5.7 Renewable Energy that all building site energy is supplied by clean energy sources.

A new visual component consisting of three icons is intended to highlight a criterion's association with the three themes of the 2026 Criteria:

- **Energy:** Reducing energy use, cost, and emissions
- **Health:** Enhancing the health and well-being of residents and communities
- **Resilience:** Preparing now for livability in light of future hazards and risks

Use the icons to navigate the goal setting and planning process for your project as they may help surface priorities, explore solutions, and encourage engagement across disciplines.

1. INTEGRATIVE DESIGN

1.1 Project Priorities Survey *Mandatory*

Complete the Project Priorities Survey, which can be found in *Appendix B*.

1.2 Charrettes and Collaborative Meetings *Mandatory*

Develop an integrative design process that moves the outputs of the Project Priorities Survey into action through at least one collaborative meeting.

1.3 Integrative Design Documentation *Mandatory*

Include 2026 Green Communities Criteria information in your contract documents and construction specifications (Division 1 Section 01 81 13 Sustainable Design Requirements or general notes to contractor) as necessary for the construction team to understand and properly implement the requirements. Identify the project team roles responsible for meeting these requirements.

1.4 Construction Management *Mandatory*

Create, implement, and document education plans for contractors/subcontractors to ensure that those working on the site fully understand their role in achieving the project objectives. Include the PPS (Criterion 1.1), a summary of the output from collaborative meetings (Criterion 1.2), and anticipated roles of each party in delivering the project goals and green criteria (Criterion 1.3).

1.5 Adaptive Planning for Resilient Communities *Optional: 2 points*

Develop a plan to address the priority hazards identified through the Project Priorities Survey (Criterion 1.1); specify and implement one or more related strategies. *[2 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

1.6 Design for Health and Well-Being: Health Action Plan *Optional: 13 or 16 points*

Follow Steps 1–6 of the Health Action Plan framework per the full criterion *[13 points with extra 3 points for Step 7]*. This includes: **1)** Commit to embedding health into the project life cycle; **2)** Partner with a project health professional; **3)** Collect and analyze community health data; **4)** Engage with community stakeholders to prioritize health data and strategies; **5)** Identify strategies to address those health issues; **6)** Create an implementation plan; and **7)** Create a monitoring plan.

☐ YES ☐ NO ☐ MAYBE POINTS _____

1.7 Inclusive Community Engagement *Optional: 8 points*

Integrate community and resident participation in development processes so that the built environment honors cultural identities, resident voices, and community histories.

Option 1: Complete a Cultural Resilience Assessment *[8 points]*

OR

Option 2: Convene a Cultural Advisory Group *[8 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

TOTAL OPTIONAL POINTS _____

2. LOCATION + NEIGHBORHOOD FABRIC

2.1 Ecological Conservation and Safer Sites *Mandatory*

All projects must:

- Prevent new development within the 100-year floodplain of a Special Flood Hazard Area (new construction) or maintain/improve floodplain resilience (rehabilitation).
- Conserve and protect floodplains and all aquatic ecosystems during construction and operation.
- Avoid development in habitats for plant and animal species identified as threatened or endangered.

Follow the relevant requirements if the site contains a floodplain, wetlands, or protected habitat.

2.2 Connections to Existing Development and Infrastructure *Mandatory for New Construction, except for projects defined as Rural/Tribal/Small Town*

Locate the project on a site that is within or contiguous to existing development. Provide pedestrian and/or bike infrastructure on the site to connect to existing and planned bike and pedestrian infrastructure. For sites larger than 5 acres, provide connections to the adjacent street network at least every 800 feet.

2.3 Compact Development *Mandatory for New Construction*

At a minimum, build to the net residential density of the census block group where the project is located. In Rural/Tribal/Small Town locations, build to a minimum net density of 5 homes per acre for single-family houses, 10 homes per acre for multifamily buildings with one or two stories, and 15 homes per acre for multifamily buildings greater than two stories.

2.4 Proximity to Services and Community Resources *Mandatory for New Construction*

Locate the project within a 0.5-mile walk distance of at least four, or a 1-mile walk distance of at least seven, services or resources. For projects that qualify as Rural/Tribal/Small Town, locate the project within 5 miles of at least four services or resources.

2.5 Access to Open Space *Optional: 2, 4, or 6 points*

Option 1: Proximity to public open space: Locate the project within a 0.25-mile walk distance of dedicated public open space that is a minimum of 0.75 acres and is open and accessible to all residents. A minimum of 80% of the public open space must be non-paved. *[4 points]*

OR

Option 2: On-site open space: Set aside a percentage *[20%: 2 points; 35%: 4 points; 45%: 6 points]* of the total project acreage as permanent open space accessible to all residents, at least 80% of which must be non-paved. For projects in urban or suburban settings, at least 20% of the permanent open space must include tree canopy or other shading.

☐ YES ☐ NO ☐ MAYBE POINTS _____

2.6 Transit, Mobility, and Walkability *Mandatory for New Construction, except for projects defined as Rural/Tribal/Small Town, Optional: 12 points maximum*

Mandatory: **New Construction projects NOT in Rural/Tribal/Small Town:** Locate projects within a 0.5-mile walk distance of transit services (bus, rail, and/or ferry) that, combined, provide at least 45 transit rides per weekday and include service on both Saturdays and Sundays. OR Implement any two strategies from the listed options for shared mobility initiatives, increased bikeability, and increased walkability.

Optional: **Rehabilitation Projects NOT in Rural/Tribal/Small Town:** Locate projects within a 0.5-mile walk distance of transit services (bus, rail, and/or ferry) that, combined, provide at least 45 transit rides per weekday and include service on both Saturdays and Sundays. *[6 points]*

Optional: **All Projects in Rural/Tribal/Small Town:** Any/all of the options here will earn 6 points. Projects within a 1-mile walk distance of public transit services (bus, rail, and/or ferry) that, combined, provide at least 45 or more transit rides per weekday and includes service on both Saturdays and Sundays, OR, Locate the project within 5 miles of one of the following transit options: **1)** vehicle-share program; **2)** dial-a-ride program; **3)** employer vanpool; **4)** park-and-ride; **5)** public–private regional transportation. *[6 points]*

Optional: **All projects:** Implement any two strategies from the three stategy lists provided—Shared mobility initiatives, Increased bikeability, and Increased walkability). *[1 point each for 6 points maximum]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

2.7 Access to Fresh, Local Foods *Optional: 6 or 8 points*

Provide residents and staff with access to fresh, local produce, either through **1)** proximity to a grocer *[6 points]*; **2)** proximity to a farmers' market *[6 points]*; **3)** neighborhood gardens *[6 points]*; **4)** community-supported agriculture *[6 points]* or **5)** on-site food pantry *[8 points]*.

☐ YES ☐ NO ☐ MAYBE POINTS _____

2.8 Community Space and Programs *Optional: 5 points*

Provide physical space for, or establish a formal partnership with, a community-serving organization through one of the following: rent incentive, local business, resident priority, local partnership.

☐ YES ☐ NO ☐ MAYBE POINTS _____

2.9 Access to Broadband *Mandatory, Optional: 6 points*

Mandatory: **Multifamily projects with shared common space for which 100/20 fixed broadband is available to the parcel:** Provide broadband internet access with at least a speed of 100/20 to at least one shared common space.

Mandatory: **Multifamily projects for which 100/20 fixed broadband is not available to the parcel:** Design and build or retrofit the property to incorporate broadband infrastructure so the property can be easily connected when broadband service comes to the parcel. Include a network of conduits throughout the building, extending from the expected communications access point to each network termination point in the building.

Optional: **All projects**: Provide broadband internet access with at least a speed of 100/20 to each common amenity space AND to each home in the property. *[6 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

2.10 Adaptive Reuse of Buildings *Optional: 6 points*

Rehabilitate and adapt an existing structure that was not previously used as housing. Design the project to adapt, renovate, or reuse at least 50% of the existing structure and envelope. *[6 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

TOTAL OPTIONAL POINTS _____

3. SITE DESIGN

3.1 Minimization of Disturbance During Staging and Construction *Mandatory*

For sites with an area of 1 acre or smaller, provide an erosion and sedimentation control plan following the outlined mitigation strategies. For sites larger than 1 acre, implement the 2022 U.S. EPA National Pollutant Discharge Elimination System Construction General Permit for Stormwater Discharges, or local requirements, whichever is more stringent.

3.2 Site Design for Ecosystem Services *Mandatory*

Create a site plan that reflects the following: For all disturbed areas during construction, plant, seed, or restore those areas to natural conditions. Select only native or climate-appropriate landscaping plantings. Do not introduce invasive or non-adapted plant species. Ensure that plants do not obstruct visibility of walkways or seating areas.

3.3 Exterior Lighting *Mandatory, Optional: 2 points*

Mandatory: All permanently installed exterior lighting features in the scope of work meet the listed requirements for BUG ratings, uplight controls, adaptive controls, and dimming as outlined. Emergency lighting is exempt.

Optional: All exterior lighting fixtures comply with DarkSky Luminaires Program Version 3.0 or Florida Fish and Wildlife Conservation Commission (FWC) Guidelines. *[2 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

3.4 Surface Stormwater Management *Mandatory, Optional: 10 points maximum*

Mandatory: **All New Construction projects and any Rehab projects if land disturbed is ≥ 5,000 ft²:** For sites measuring 1 acre or smaller, retain on-site precipitation equivalent to the 60th percentile precipitation event. For sites greater than 1 acre, retain to the 80th percentile precipitation event. Where not feasible due to geotechnical issues, soil conditions, or the size of the site, treat or retain the maximum volume possible.

Optional: **All projects:** Using low-impact development and green infrastructure strategies, retain precipitation volume from 85th percentile precipitation event *[6 points]*, 90th percentile precipitation event *[8 points]*, or 95th percentile precipitation event *[10 points]*.

☐ YES ☐ NO ☐ MAYBE POINTS _____

3.5 Outdoor Water Use: Efficient Irrigation *Mandatory, Optional: 2 or 3 points*

Mandatory: If the property includes landscaping, minimize the use of potable water for outdoor applications through:

Option 1: No irrigation OR **Option 2: Efficient irrigation** OR
Option 3: Smart controllers *[2 points]* OR **Option 4: Drip irrigation** *[3 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

3.6 Outdoor Water Use: Alternative Sources *Optional: 6 or 10 points*

Option 1: Nonpotable water sources for 25% of irrigation demand *[6 points]* OR **Option 2:** Nonpotable water sources for 100% of irrigation demand *[10 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

3.7 Traffic Safety and Mobility *Mandatory, Optional: 5 points maximum*

Mandatory: **New Construction and Substantial Rehabs:** Use the table provided to assess conditions of your project. If none of the conditions apply, no further action is required. If one or more of the conditions apply, implement all correlated requirements. *Optional:* For each additional condition addressed, earn 1 point *[5 points maximum]*.

Optional: **Moderate Rehabs:** Use the table provided to assess conditions of your project. If one or more of the conditions apply, earn 1 point for each condition addressed *[5 points maximum]*.

☐ YES ☐ NO ☐ MAYBE POINTS _____

3.8 Heat-Island Management *Mandatory, Optional: 4 or 8 points*

Mandatory: **New Construction and Substantial Rehabs:** Implement at least one of the two options provided.
Option 1: Roofing Materials AND/OR **Option 2: Paved Surfaces**

Optional: **Moderate Rehabs:** Implement one or both options. **Option 1: Roofing Materials** *[4 points]* AND/OR **Option 2: Paved Surfaces** *[4 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

3.9 Resilient Site Design: Wind *Optional: 2 to 16 points*

Obtain a FORTIFIED™ Designation [Roof: *8 points*; Silver: *10 points;* Gold: *12 points*; add *4 points* for Hail Supplement]; OR Implement at least two guidance items from any single "one-pager" from the HUD "Designing for Natural Hazards" series, Volume 1: Wind. *[2 points for each one-pager; maximum 8 points]*.

☐ YES ☐ NO ☐ MAYBE POINTS _____

3.10 Resilient Site Design: Flood *Optional: 6, 9, or 12 points*

Design the project according to one of the adaptive strategies:

Option 1: Design according to ASCE/SEI 24-24 A Standard for Floor-Resilient Design and Construction and ASCE/SEI 7-22 Supplement 2. *[12 points]*

OR

Option 2: Implement ALL of the following strategies from the U.S. Department of Housing and Urban Development's Designing for Natural Hazards—A Resilience Guide for Builders & Developers: Volume 2 Water. **1)** Wall Assembly: at least two guidance items; **2)** Utilities & Mechanical Equipment: at least two guidance items; **3)** Freeboard Elevation: at least one guidance item; AND **4)** Connectors & Fasteners: all guidance items. *[9 points]*

OR

Option 3: Conduct floodproofing of lower floors. Locate at least one exit door, all central space-heating and water-heating equipment, and service disconnects above the design flood elevation (DFE). On plan sets, identify water entry points in basements and foundations to ensure renovations do not compromise the integrity of floodproof construction elements. *[6 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

3.11 Resilient Site Design: Wildfire *Optional: 9 or 12 points*

Increase ignition resistance in one or more zones, which are defined by their proximity to each building on the site:

- Implement the series of strategies specified for Zone 0 (0 to 5 feet from each building) defensible space, roof assembly, eaves and soffits, and windows. *[9 points]*
- Also implement the series of strategies for Zone 1 (5 to 30 feet from each building) and Zone 2 (30 to 100 feet from each building) defensible space, vents, siding and cladding, decks, and balconies. *[3 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

TOTAL OPTIONAL POINTS _____

4. WATER

4.1 Water-Conserving Fixtures *Mandatory*

Reduce total indoor water consumption by at least 20% compared to the national baseline shown in *Table 4.1*. Any new toilet, showerhead, and/or lav faucet must be WaterSense certified. For all single-family homes and all dwelling units in buildings three stories or fewer, the supply pressure may not exceed 60 psi.

4.2 Advanced Water Conservation *Optional: 2–8 points*

Reduce total indoor water consumption by at least 30% compared to the national baseline shown in *Table 4.1*. Any new toilet, showerhead, and/or lavatory faucet must be WaterSense certified. *[2–8 points]*

OR

Meet one of the approved certification methods for WaterSense-labeled homes. *[8 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

4.3 Water Quality *Mandatory, Optional: 2–16 points*

Mandatory: **Substantial Rehabs of buildings built before 1986:** Replace all lead service lines. **For all Multifamily buildings with either a cooling towner, a centralized hot water system, or 10+ stories:** Develop and implement a *Legionella* water management program.

Optional: **All other Rehabs:** Replace all lead service lines. *[8 points]*

Optional: **All projects**: Test and remediate as indicated for lead, arsenic, nitrates, and coliform bacteria *[2 points each]*.

☐ YES ☐ NO ☐ MAYBE POINTS _____

4.4 Monitoring Water Consumption and Leaks *Optional: 2–18 points*

Conduct pressure-loss tests and visual inspections to determine whether there are leaks; fix any leaks found. Implement one or more of the following options:

Option 1: Leak detection with automatic shutoff *[6 points]*

AND/OR

Option 2: Pre-rehabilitation leak assessment *[6 points]*

AND/OR

Option 3: Advanced water metering *[2 points minimum, 1 point for each additional end use; 4 points max]*

If Option 3 is achieved in addition to another option: *2 additional points*.

☐ YES ☐ NO ☐ MAYBE POINTS _____

4.5 Efficient Plumbing Layout and Design *Optional: 2, 4, or 6 points*

Implement one of the following options. All recirculation systems must be demand-initiated:

Option 1: Performance design path: Design the building's distribution system using the 2023 IAPMO Water Demand Calculator. *[6 points]*

OR

Option 2: Certification design path: Certify the project to WaterSense Labeled Homes Version 2.0. *[4 points]*

OR

Option 3: Volumetric design path: Meet either a 0.5 gallon or 1.8 gallon storage limit as described. *[2 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

4.6 Indoor Water Efficiency: Nonpotable Water Reuse *Optional: 6–9 points*

Use independent piping for nonpotable water transmission utilizing rainwater and/or greywater to meet a portion of the project's nonpotable water needs: 10% reuse *[6 points]*; 20% reuse *[7 points]*; 30% reuse *[8 points]*; 40% reuse *[9 points]*.

☐ YES ☐ NO ☐ MAYBE POINTS _____

4.7 Access to Potable Water During Emergencies *Optional: 6 points*

Provide residents with ready access to potable water in the event of an emergency that disrupts normal access to potable water, including disruptions related to power outages that prevent pumping water to upper floors of multifamily buildings or pumping of water from on-site wells, per one of the three options listed.

TOTAL OPTIONAL POINTS _____

5. ENERGY

5.1 Energy Planning *Optional: 10 points*

Create a Zero Emissions Over Time plan demonstrating how the project will eliminate emissions from on-site fuel use (scope 1) and purchased energy (scope 2) emissions within 20 years of its certification to the 2026 Green Communities Criteria. *[10 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

5.2a Building Performance: New Construction *Mandatory*

Certify all buildings with residential units in the project through ENERGY STAR Multifamily New Construction (MFNC), ENERGY STAR Manufactured Homes, and/or ENERGY STAR Certified Homes, as relevant.

5.2b Building Performance: Rehabilitation *Mandatory*

Demonstrate energy efficiency through one of the following:

- ERI option: score of 80 or less for each dwelling unit, with exceptions for some rehabs built before 1980.
- ASHRAE option: projected energy performance of completed buildings to meet, at minimum, ASHRAE 90.1-2013 using an energy model developed by a qualified energy services provider according to Appendix G of 90.1-2016.
- Alternative pathways listed for Colorado and California

AND

Ensure proper HVAC sizing and performance, dwelling unit compartmentalization, insulation installation, lighting, and appliances as indicated.

5.3 Advanced Building Performance *Optional: 16 points maximum*

Options 2 and 3 are part of qualifying for Certification Plus.

Implement one of the following options. Projects in CZ 1A, 2A, 3A, and 4A following this criterion must also comply with *Criterion 7.8 Managing Moisture: Dehumidification*.

Option 1: Performance above mandatory requirement: Design and construct a building that is projected to be more energy efficient than required for the building type by the applicable mandatory building performance criterion (5.2a or 5.2b). Achieve an ERI of 5 lower than required by 5.2a or 5.2b OR 5% greater efficiency than required if following the ASHRAE path for 5.2a or 5.2b compliance. *[5–10 points]*

Additional 1 point for each additional 2-point decrease in ERI OR for each additional 1% greater efficiency if following the ASHRAE path.

OR

Option 2: Advanced building certification: Certify to DOE Efficient New Homes Program (formerly ZERH) *[12 points]*, ENERGY STAR NextGen *[12 points]*, Passive Housing International (PHI) certifications including Classic, Plus, Premium, LEB, and EnerPHit *[16 points]*, Phius certifications including CORE, ZERO, and REVIVE *[16 points]*.

OR

Option 3: Deep energy retrofit: Demonstrate significant savings via the ERI or ASHRAE pathway as compared to the requirements of 5.2b Building Performance: Rehabilitation. For Substantial Rehabs, either 1) ERI of 65 or less or 2) 15% greater efficiency than ASHRAE 90.1-2013 per Appendix G of 90.1-2016. For Moderate Rehabs, either 1) ERI of 75 or less or 2) 10% greater efficiency than ASHRAE 90.1-2013 per Appendix G of 90.1-2016. *[14 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

5.4a All-Electric and Electric-Ready Design: New Construction *Mandatory, Optional: 15 points*

Part of qualifying for Certification Plus

Mandatory: All cooking equipment is powered by electricity AND all dwelling-unit systems for space heating and water heating are either electric or electric ready as described.

Optional: The project is all electric apart from emergency backup power. *[15 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

5.4b All-Electric and Electric-Ready Design: Rehabilitation *Optional: 12–15 points*

Part of qualifying for Certification Plus

Option 1: All-electric or electric-ready dwelling units: All cooking equipment is powered by electricity AND all dwelling-unit systems for space heating and water heating are either electric or electric ready as described. *[12 points]*

OR

Option 2: All-electric property: The project is all electric apart from emergency backup power. *[15 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

5.5 Peak Demand Control *Optional: 8 points*

Manage the project's load profile through one of the following options:

Option 1: Hot-water thermal storage and control: Design or specify a hot-water system with sufficient capacity, storage, and control capability to meet hot-water demand from storage alone during the region's peak hours. *[8 points]*

OR

Option 2: Residential Demand Management: Adopt a voluntary or automatic control strategy for demand management of in-unit residential electrical loads. Provide evidence that 50% or more of residents are participating. *[8 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

5.6 Backup Power *Optional: 8 or 10 points*

Provide backup power to serve at least three critical loads for the project as described by the full criterion. The backup power may come through any one of the following three options:

Option 1: Islandable PV + battery storage: Islandable solar photovoltaic system with battery storage and system to switch to battery backup when the electrical grid goes down. *[10 points]*

OR

Option 2: Off-peak battery storage: Battery storage system capable of storing off-peak energy and a system to switch to battery backup when the electrical grid goes down. *[10 points]*

OR

Option 3: Generator: Generator(s) and appropriate exterior connections, available on as-needed basis. *[8 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

5.7 Renewable Energy *Optional: 7–11 points*

Install or procure photovoltaic (PV) panels or an electricity-generating renewable energy source from one of the following options. See full criterion for required amounts and sources.

Option 1: On-site and/or direct ownership of renewables: A) Purchase and install on-site PV *[10 points]* OR **B)** Install on-site PV *[8 points]* **C)** On-site geothermal *[10 points]* OR **D)** A or B with community solar. *[11 points]*

Option 2: Procurement of community renewable energy *[8 points]*

Option 3: Procurement of off-site renewable energy: Direct purchase *[7 points]* with potential to add *[1 point]* if time-matched or time-aligned and the potential to add *[1 point]* if from same e-grid region; OR Green-E certified RECs *[7 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

5.8 Electric Vehicle Charging *Mandatory, Optional: 4 points*

***Mandatory:* New Construction and Substantial Rehabs:** For projects that include parking, at least one parking space on the site must be wired and installed with Level 2 electric vehicle supply equipment (EVSE). In addition, for projects with 20 or more parking spaces, at least 10% of the total number of parking spaces must either be EV capable, EV ready, or have Level 2 EVSE installed. All spaces may utilize an Automatic Load Management System (ALMS) to reduce the maximum required electrical capacity to each space.

Note exceptions for meeting this requirement associated with additional transformers and/or electrical service upgrades.

***Optional:* All projects:** For projects with 40 or more parking spaces, install Level 2 EVSE in at least 5% of the total number of parking spaces on the site. *[4 points]*

OR

For projects with four or more parking spaces, provide Level 2 EV-capable or EV-ready spaces in more than 50% of the total number of spaces provided on site. *[4 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

5.9 Passive Survivability *Optional: 3 or 8 points*

Design according to one or both of the following options to better maintain thermal comfort during power outages:

Option 1: Passive cooling: Natural ventilation or shading *[3 points]*

AND/OR

Option 2: Thermal modeling pilot pathway: Demonstrate through thermal modeling that indoor conditions of every dwelling unit will never exceed a heat index of 90°F and will never drop below 50°F. *[8 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

TOTAL OPTIONAL POINTS _____

6. MATERIALS

6.1 Product Category Screening *Optional: 4 points*

During the concept or schematic design phase, perform a screening exercise—a high-level review of product categories—to understand the embodied carbon and material health implications of initial project product selections. Select three product categories from the list to screen for embodied carbon and three to screen for specific substances of concern for health.

☐ YES ☐ NO ☐ MAYBE POINTS _____

6.2 Reduction of Materials and Waste *Mandatory, Optional: 6 points maximum*

Mandatory: Review the waste-reduction strategies listed for **1)** design, **2)** construction waste management, and **3)** future waste reduction. For New Construction and Substantial Rehab projects, implement at least two listed strategies; for Moderate Rehabs, implement at least one strategy .

Optional: **All projects:** Select additional strategies *[2 points each, 6 points maximum]*.

☐ YES ☐ NO ☐ MAYBE POINTS _____

6.3 Reduction of Lead Hazards in Pre-1978 Buildings

Mandatory for Substantial Rehabs of buildings built before 1978

Option 1: Lead paint assessment and abatement: Conduct a risk assessment or inspection to identify lead paint hazards. Control identified lead paint hazards using lead abatement or interim controls, per EPA and state and/or local laws where applicable.

OR

Option 2: Lead paint hazard reduction: For HUD-funded projects, implement standard lead treatments defined by HUD.

6.4 Advanced Material Selection *Mandatory, Optional: 31 points maximum*

Use products that comply with the specifications listed within the full criterion.

Mandatory: Adhesives and sealants, wet-applied interior; Flooring; Insulation; Paints and coatings, wet applied inside the air barrier; Wall coverings; Composite wood.

Optional: Exterior wall cladding *[2 points]*; Concrete *[2 or 5 points]*; Flooring *[1–4 points]*; Gypsum *[2 points]*; Insulation *[3 or 5 points]*; Paints and coatings, wet-applied interior *[2 or 4 points]*; Steel *[3 or 4 points]*; Composite wood *[2 or 4 points]*; Noncomposite wood *[2 points]*, for a total of *31 points maximum*.

☐ YES ☐ NO ☐ MAYBE POINTS _____

6.5 Recycling Storage *Optional: 2 points*

For projects with municipal recycling infrastructure and/or haulers, provide separate bins for the collection of trash and recycling for each dwelling unit and all shared community rooms, *OR* provide an area for separate bins (trash and recycling) or separate trash chutes for each floor of a multifamily building.

For projects without said infrastructure, advocate to the local waste hauler or municipality for regular collection of recyclables. Commit to providing recycling bins if service becomes available.

☐ YES ☐ NO ☐ MAYBE POINTS _____

TOTAL OPTIONAL POINTS _____

7. HEALTHY LIVING ENVIRONMENT

7.1–7.13 | A SAFE PLACE TO CALL HOME

7.1 Clean Air: Radon Testing and Mitigation
Mandatory for New Construction and Substantial Rehabs

For New Construction projects in EPA Radon Zone 1, install passive radon-resistant features below the slab and a vertical vent pipe with junction box within 10 feet of an electrical outlet in case an active system should prove necessary in the future. For Substantial Rehab projects in EPA Radon Zone 1, test before and after the retrofit and mitigate, if needed, per the specified protocols.

7.2 Clean Air: Combustion Equipment
Mandatory for projects with combustion equipment in conditioned space

All projects: Install one hard-wired carbon monoxide (CO) alarm with battery backup function for each sleeping zone, placed per National Fire Protection Association (NFPA) 72. If installing new combustion appliances or equipment for space or water heating in conditioned space, install power-vented or direct-vented appliances.

Also, for rehab projects: If any combustion appliances or equipment for space or water heating are located in conditioned space and are not power-vented or direct-vented and are not scheduled for replacement in this retrofit, conduct combustion safety testing prior to and after the retrofit; report results as indicated.

7.3 Clean Air: Garage Isolation and Vehicle Pollution Management *Mandatory*

Provide a continuous air barrier between the conditioned space and any garage space to prevent the migration of any contaminants into the living space. **1)** Visually inspect common walls and ceilings between attached garages and living spaces to ensure that they are air-sealed before insulation is installed; AND **2)** Do not install ductwork or air-handling equipment for the conditioned space in a garage; AND **3)** Fix all connecting doors between conditioned space and garage with gaskets or make airtight; AND **4)** Install one hard-wired carbon monoxide (CO) alarm with battery backup function for each sleeping zone of the project, placed per National Fire Protection Association (NFPA) 72, unless the garage is mechanically ventilated or an open parking structure; AND **5)** Prohibit vehicles from idling for longer than two minutes on the site.

7.4 Clean Air: Smoke-Free Policy *Mandatory, Optional: 6 points*

Mandatory: Implement and enforce a smoke-free policy in all common areas and within a 25-foot perimeter (or to the lot line if less than 25 feet) around the exterior of all residential buildings. Lease language must prohibit smoking in these locations and provide a graduated enforcement policy. Make the smoke-free policy readily available and ensure staff training.

Optional: Expand the policy above to include all indoor spaces, including individual dwelling units in the property. *[6 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

7.5 Clean Air: Ventilation *Mandatory for New Construction and Substantial Rehabs, Optional for Moderate Rehabs*

For each dwelling unit, install the following:

- A local mechanical exhaust system in each kitchen per ASHRAE 62.2-2022 Sections 5 & 7. Review the full criterion for alternative strategies. *[4 points if Moderate Rehabs]*
- A local mechanical exhaust system in each bathroom per ASHRAE 62.2-2022 Sections 5 & 7. *[4 points if Moderate Rehabs]*
- A whole-house mechanical ventilation system per ASHRAE 62.2-2022 Sections 4 & 7, excluding section 4.2. *[4 points if Moderate Rehabs]*

For each mltifamily building of four or more stories, install a mechanical ventilation system for all hallways and common spaces per ASHRAE 62.1-2022 *[3 points if Moderate Rehab]*

For all mechanical ventilation systems, follow the installation guidance in the full criterion.

☐ YES ☐ NO ☐ MAYBE POINTS _____

7.6 Clean Air: Indoor Air Filtration *Mandatory for all properties with newly installed central HVAC systems in the scope of work*

Install MERV 13 or higher-rated filters for any newly installed central forced-air HVAC system.

7.7 Clean Air: Enhanced IAQ *Optional: 3 or 6 points*

Option 1: Management of construction pollution: In all dwelling units, seal all heating, cooling, and ventilation ducts and returns throughout construction to prevent construction debris from entering. Flush all dwelling units after completion of construction and prior to occupancy either **1)** for at least 48 hours (may be nonconsecutive) with all windows and interior doors open and all HVAC fans running, or **2)** with at least 14,000 CFM/sf of floor area. Replace all air handling equipment filters after flushing. *[3 points]*

OR

Option 2: Indoor AirPlus: Earn the EPA Indoor AirPlus label *[6 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

7.8 Managing Moisture: Dehumidification *Mandatory for properties in Climate Zones 1A, 2A, 3A and 4A following Criterion 5.3, Optional for all other properties: 7 points*

Option 1: Dedicated dehumidification system: Design, select, and install supplemental dehumidification equipment to keep relative humidity at or below 60%.

OR

Option 2: Dehumidification readiness: Equip all dwelling units with dedicated space, drains, and electrical hook-ups for permanent supplemental dehumidification systems to be installed if needed.

OR

Option 3: ERV or HRV: Ensure all dwelling units are served by an energy-recovery or heat-recovery ventilator designed to ensure that year-round interior relative humidity will not exceed 50% in the winter and 60% in the summer. *(Note: This option is not recommended for properties below the "Warm-Humid" line of the 2019 IECC Figure 301.1.)*

☐ YES ☐ NO ☐ MAYBE POINTS _____

7.9a Managing Moisture in the Building Enclosure: New Construction *Mandatory*

Wall and roof systems: Provide water drainage away from walls, windows, and roofs by implementing the list of techniques.

Foundations: Properly install foundation drainage, moisture barriers, and waterproofing materials to reduce the migration of moisture.

AND

Beneath concrete slabs: Install a capillary break as follows: 4-inch layer of ½-inch diameter or greater clean aggregate or install a 4-inch uniform layer of sand overlain with a layer or strips of geotextile drainage matting installed according to the manufacturer's instructions. Follow additional requirements about insulation and installation instructions as prescribed.

OR

Beneath crawl spaces without slabs: Install at least 8-mil cross-laminated polyethylene on the crawlspace floor, extended up at least 12 inches on piers and foundation walls, and with joints overlapping at least 12 inches. Follow additional requirements about insulation and installation instructions as prescribed.

7.9b Managing Moisture in the Building Enclosure: Rehabilitation *Mandatory*

Property Assessment
Assess the interior and exterior of all buildings undergoing a Substantial Rehab for evidence of moisture problems, using the list below.

Assess the interior and exterior of all building assemblies in the scope of work for buildings undergoing a Moderate Rehab for evidence of moisture problems, using the list below.

- Water stains or wet spots
- Musty odors
- Foundation cracks and evidence of seepage
- Roof leaks
- Plumbing leaks
- Condensation in attics, and in or around windows and doors
- Moisture damage near all envelope penetrations, including windows and doors; utility hookups; and mechanical, electrical, and plumbing systems

For all projects that have deficiencies in or include replacing particular assemblies listed above, provide water drainage away from walls, windows, and roofs by implementing the listed techniques.

7.10 Managing Moisture: Bath, Kitchen, and Laundry Assemblies *Mandatory for projects that include relevant spaces in the scope of work*

Use materials that have durable, cleanable surfaces throughout bathrooms, kitchens, and laundry rooms. Behind tub and shower enclosures, use moisture-resistant backing materials such as cement board, fiber-cement board, or equivalent.

7.11 Reducing Allergens and Disease Vectors: Integrated Pest Management *Mandatory*

Design for easy inspection of all pest-prone areas (interior and exterior), and engineer slabs and foundations to minimize pest entry.

7.12a Sensory and Rest Friendly: Noise Reduction, New Construction *Optional: 5, 8, or 13 points*

Manage noise in homes from outdoor and indoor noise sources by one or more of the following options:
Option 1: Outdoor noise abatement *[5 points]* OR **Option 2:** Indoor sources of noise *[8 points]*.

☐ YES ☐ NO ☐ MAYBE POINTS _____

7.12b Sensory and Rest Friendly: Noise Reduction, Rehabilitation *Optional: 8 points maximum*

Manage noise in homes from outdoor and/or indoor sources by one or more of the following options:

Option 1: Outdoor noise assessment and abatement plan *[3 points]*

Option 2: Outdoor noise abatement: Minimal *[3 points]* or advanced approach *[4 points]*

Option 3: Interior sources of noise: For bedroom party walls, use the guidance and verification methods in the ICC G2–2010 Guideline for Acoustics to mitigate the potential for sound leaks. Verify performance as acceptable/Grade B *[3 points]*; or preferred/Grade A *[4 points]*.

☐ YES ☐ NO ☐ MAYBE POINTS _____

7.13 Personal and Social Safety *Mandatory for multifamily New Construction and Substantial Rehabs*

Select and implement at least two of the listed strategies, which may apply to buildings, dwelling units, or outdoor common spaces.

7.14–7.16 | A WELCOMING COMMUNITY

7.14 Social Connection and Accessibility: Design for All Ages and Abilities *Mandatory*

Implement at least two of the listed strategies. For any strategy impacting dwelling units, include that strategy in at least 25% of the project's dwelling units. The strategies are listed by principle: Universal wayfinding and sensory sensitivity; Opportunities for social connection; Universal mobility and dexterity support; Universal fit.

7.15 Access to Nature and Biophilic Design *Optional: 3 or 6 points*

Provide meaningful and multisensory connections to nature, connecting residents and staff to a living landscape and the natural environment by including two or more of the listed strategies for all dwelling units. *[3 points for implementing two strategies of initial list]*

AND/OR

Implement three or more of the listed strategies for interior and exterior common spaces. *[3 points for implementing three strategies of second list]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

7.16 Healing-Centered and Culturally Responsive Design *Optional: 3 or 6 points*

Incorporate one or two of the listed strategies: Community-generated art; Storytelling through space; Cultural partnerships or programming. *[3 points each, maximum of 6 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

7.17–7.18 | WELL-BEING AND EMPOWERMENT

7.17 Active Design: Promoting Physical Activity *Optional: 5 points*

Option 1: Encourage everyday stair use: Provide a staircase that is accessible and visible from the main lobby and is visible within a 25-foot walking distance from any point in the lobby per the specifications listed. Place point-of-decision signage to encourage use. (Projects where stairs are the only means of travel between floors are ineligible.)

OR

Option 2: Provide activity spaces: Provide a dedicated on-site recreation space with exercise or play opportunities for adults and/or children that is open and accessible to all residents.

☐ YES ☐ NO ☐ MAYBE POINTS _____

7.18 Place-Based Wealth Building *Optional: 4 points*

Implement one of the following strategies to support resident economic empowerment and wealth-building:

Option 1: Homeownership or equity opportunities for residents: Offer residents a way to build equity through the housing development. *[4 points]*

OR

Option 2: Local hiring: Demonstrate that a local preference for construction employment and subcontractor hiring was part of your bidding process. *[4 points]*

OR

Option 3: Local employment: Demonstrate that you achieved at least 20% local employment for construction and subcontractor hiring. *[4 points]*

☐ YES ☐ NO ☐ MAYBE POINTS _____

TOTAL OPTIONAL POINTS _____

8.OPERATIONS, MAINTENANCE, AND RESIDENT ENGAGEMENT

8.1 Building Operations & Maintenance (O&M) Manual and Plan

Mandatory for all multifamily projects

Develop a manual with thorough building and site O&M guidance. The manual must, at minimum, provide information about specifications and maintenance schedules for the list of topics.

8.2 Emergency Management Manual *Mandatory for all multifamily projects*

Provide a manual on emergency operations for O&M personnel. The manual will address responses to various types of emergencies, leading with those that have the greatest probability of negatively affecting the project. The manual must include:

- A Building Readiness Report from the Enterprise Business Continuity Toolkit
- Communication plans and resources for staff and residents
- Contact information for property management, resident services, public utilities, and insurer(s)
- Building shutdown procedures
- A plan for regular testing of backup energy systems, if applicable

8.3 Resident Manual *Mandatory*

Provide a guide for homeowners and renters that explains the intent, benefits, use, and maintenance of their home's green features and practices. The materials should encourage green and healthy activities on each listed topic.

8.4 Walk-Throughs and Orientations to Property Operation *Mandatory*

Provide and document a comprehensive walk-through and orientation for all residents, property manager(s), and buildings operations staff.

8.5 Energy and Water Data Collection and Monitoring

Mandatory for all multifamily rental projects

Collect and annually report project energy- and water-performance data in an online utility benchmarking platform. Select one of the four data-reporting methods listed and grant Enterprise access for at least five years from time of construction completion.

TOTAL OPTIONAL POINTS FOR ALL CRITERIA _____

1 Integrative Design

Energy
Health
Resilience

A successful integrative design process engages people, identifies collective priorities, and ensures that economic, health, resilience, and environmental objectives are met.

1.1 Project Priorities Survey

Mandatory

RATIONALE

Integrative design is the holistic approach to predevelopment that prioritizes information gathering, understanding the staff and resident experience, identifying climate hazards, and setting objectives for building performance and resident health and comfort. It also lays the foundation for project coordination and buy-in from all development stakeholders. A successful integrative design process is often the determining factor in achieving a successful project.

The Project Priorities Survey (PPS) completed early in the process helps project teams seek out readily available information, ensuring teams gain an understanding of the context, place, and people they are serving. Once completed, the PPS will serve as a simple guide for understanding the issues your development must address in order to facilitate a well-informed integrative design process. It can also guide discussions around actionable items in the charrette and other collaborative predesign meetings for the project (*Criterion 1.2*).

Ultimately, the PPS helps shape priorities to drive project decisions and can be used to garner project support, demonstrate need, and develop documentation for funding applications.

REQUIREMENTS

Complete the Project Priorities Survey, which is *Appendix B*.

RECOMMENDATIONS

- Complete the Project Priorities Survey with as much of your development team as has been identified. Predesign coordination and goal-setting help ensure that all development team members align around specific development goals.
- The ideal time to complete the PPS should be determined by the design and development team. It should be completed early enough in the development process (during predesign or conceptual design) that the completed survey can positively influence design decisions as they are made.
- Engage relevant datasets and constructively challenge the assumptions of everyone on the development team to reach informed decisions.

- Qualitative data, especially from current or potential residents and staff, is also a critical source of information and can be used to broaden understanding of a project beyond what may be available from quantitative data about the project. *Criterion 1.7 Inclusive Community Engagement* is designed to support this type of data gathering, which can also lead to quicker approvals and other tangible benefits for developers, owners, residents, and communities.
- Consider engaging with a property insurance professional early in the design and planning process to understand how the overall project plan and resilience strategies may impact insurance premiums. Resilience assessments completed as part of the PPS can assist project teams in identifying relevant hazards, and insurance data can help teams prioritize adaptive strategies. *Criterion 1.5 Adaptive Planning for Resilient Communities* is designed to support this process as well.

RESOURCES

- University of Wisconsin Population Health Institute, County Health Rankings and Roadmaps. Assesses and ranks the population health of nearly all counties in the U.S. Allows users to view the rankings and to explore and download data, including statistics on length of life, self-reported general health, and a subset of health influences. *www.countyhealthrankings.org/health-data*
- U.S. Federal Emergency Management Agency (FEMA), National Risk Index. A dataset and online tool to help illustrate which communities are most at risk for each of 18 natural hazards. Designed and built by FEMA in close collaboration with academia, government agencies, and private industry sectors. *https://hazards.fema.gov/nri/*
- Enterprise Community Partners, Portfolio Protect. A tool to help owners, operators, and developers of affordable housing understand which properties are at highest risk from flooding, wildfire, earthquakes, and other natural hazards. *www.enterprisecommunity.org/impact-areas/resilience/portfolio-protect*
- Participate in Design (P!D). Outlines different principles of participatory design and offers methods and tools to guide the process. *https://participateindesign.org/about-pid-our-approach*
- Urban Institute, Housing Matters: Nine Critical Steps to Authentic Community Engagement. *https://howhousingmatters.org/articles/nine-critical-steps-authentic-community-engagement/*

1.2 *Mandatory* Charrettes and Collaborative Meetings

RATIONALE

Green design charrettes can be powerful opportunities within the integrative design process to educate and align stakeholders around attainable goals and objectives, tapping into the collective wisdom of the group. At this stage in predevelopment, teams can create an important moment to ensure that lessons learned from previous projects are woven into design decisions for the current moment.

REQUIREMENTS

Plan and convene an inclusive, integrative design process that works best for your project team and intentions. At minimum, facilitate one collaborative meeting to operationalize the findings from the Project Priorities Survey (*Criterion 1.1*) in the form of project design decisions.

The collaborative meeting may take any of the following forms:

- Green charrette
- Resident and staff engagement meeting
- Community stakeholder convening
- Preconstruction coordination or planning meeting

The collaborative meeting should result in:

- Meaningful engagement with residents and community members
- Identification of sustainability and resilience objectives for the project, and how these will be incorporated into the design
- Coordination of predevelopment work to be completed by the project team

RECOMMENDATIONS

- Use the Green Communities *Criteria Checklist* to document sustainability and resilience goals for the project.
- Throughout the integrative process, as decisions about sustainability strategies are being considered, place priority on multibenefit strategies that concurrently achieve goals for health and well-being, environmental resilience, and community and social resilience.
- As research progresses and decisions are made during predevelopment, assign responsibility within your design and development teams to create accountability:
  - » Track meeting minutes, attendees, topics discussed, and decisions made in an online database, spreadsheet, or file that is searchable.
  - » Include a training session for community members to be educated about the basics of green design, including its benefits and trade-offs, and be informed about the latest trends in green construction methods so that the public can provide detailed, constructive feedback to the design and development teams during engagement sessions.
- Prioritize holistic goal setting. The mission statement and research developed through the Project Priorities Survey required in Criterion 1.1 should be used to solidify project goals and strategies. Some questions to consider:
  - » How can the project leverage multibenefit strategies to holistically address climate and human resilience (see *Criterion 1.5*)?
  - » How does the project consider the synergies and overlaps between the eight categories of the Green Communities Criteria?
  - » Are both life-cycle costs and up-front costs being considered when making decisions about systems and materials?

  - » Have current or potential residents been involved throughout the predevelopment process? If so, how are their ideas and insights influencing project decisions? If not, how can they be included in future decisions?
- Operators of similar properties often have key insights that are helpful when making important decisions at the predevelopment stage. Consult operations and maintenance staff, if possible, on system selection, material selection, and climate concerns.
- Use data from previous projects as baselines to inform goals for the certifying project. For example, evaluate these datasets across your portfolio:
  - » Energy and water consumption
  - » Resident and community health needs
  - » Financial information, including pro forma assumptions and operating expense categories

RESOURCES

- Enterprise Community Partners, The Success of Charrettes: Evidence in Practice for Engaging in an Integrative Design Approach (2011). *www.greencommunitiesonline.org/sites/default/files/the_success_of_charrettes.pdf*
- Enterprise Community Partners, Green Charrette Tools. A series of tools and trainings that can help any project team develop and deliver a robust integrative design process. *www.greencommunitiesonline.org/resources#sec_374*
- Enterprise Community Partners, Aging in Place Prioritization Charrette Tool. This resource, with instructions, features a prioritization matrix to help collect, organize, and prioritize aging-in-place strategies. *www.greencommunitiesonline.org/sites/default/files/aging-in-place-prioritization-charrette-tool-for-editing.xlsx*
- Whole Building Design Guide. Describes the core elements of whole-building design, which includes a combination of the integrative design approach with an integrative team process. The site helps users identify design objectives and organize their processes to meet those objectives. *www.wbdg.org/whole-building-design*
- 7group and Bill Reed, The Integrative Design Guide to Green Building, Redefining the Practice of Sustainability. This 2009 book provides guidance to building professionals on incorporating integrative design into every phase of a project. *www.sevengroup.com/post/how-to-integrative-process*

1.3 *Mandatory* Integrative Design Documentation

RATIONALE

Establishing accountability among project team members to meet Green Communities Criteria through design and construction documentation equips project teams to successfully implement the Criteria on the job site during the construction phase.

REQUIREMENTS

Using the project goals generated as part of the charrettes and collaborative meetings process (*Criterion 1.2*), include in the project's contract documents the information necessary for the general contractor and trades to properly implement the strategies for meeting Green Communities Criteria.

Specifically:

- Include in the project's construction specifications, Division 1 Section 01 81 13 Sustainable Design Requirements, all Green Communities criteria the project is pursuing. If the project documents do not include construction specifications, detail this information in the general notes to the contractor in the construction documents. Ensure the notes are clear and visible.
- Document how and when specific Green Communities criteria will be completed during a certain construction phase or process. (For example, general contractors must track waste for the project throughout demolition and construction to achieve certain strategies under *Criterion 6.2 Reduction of Materials and Waste*, and all heating, cooling, and ventilation ducts in dwelling units must be sealed throughout construction to meet optional *Criterion 7.7 Clean Air: Enhanced IAQ*.
- Identify the project team roles responsible for meeting the requirements of each Green Communities criterion.

RECOMMENDATIONS

- Attach the project's completed Green Communities Checklist as an appendix to the specifications or the contract documents package.
- Plans and specifications should include a performance specification, examples of products that meet the specification, the metrics used to measure compliance, and how compliance will be confirmed.
- Architectural drawings should detail the air-sealing and compartmentalization approach for building and dwelling units. Drawings should indicate, for example, which materials make up the air-barrier and vapor-management layers and should clearly document expectations for the transition of those layers between materials on all six sides.

RESOURCES

- Enterprise Community Partners, Green Charrette Tools. A series of tools and trainings to help any project team develop and deliver a robust integrative design process. *www.greencommunitiesonline.org/resources#sec_374*
- U.S. Department of Energy, Building America's Climate-Specific Guidance (*www.energy.gov/eere/buildings/building-america-climate-specific-guidance*) and the Building America Solution Center (*https:/basc.pnnl.gov/*) provide access to expert information on hundreds of high-performance design and construction topics. They include contracting documents and specifications, installation guidance, CAD drawings, "right and wrong" photographs of installation practices, and training videos.

1.4 *Mandatory*
Construction Management

RATIONALE

Communication with and education of all contractors, subcontractors, and consultants are critical to ensure that the sustainability and resilience objectives and decisions made throughout the integrative design process are implemented on the jobsite during construction of the project.

REQUIREMENTS

Create, implement, and document education plans for the contractor, subcontractors, and consultants to ensure that those working on the jobsite fully understand their role in achieving the project objectives for Green Communities certification.

At minimum, the following information must be included in the education plan:

- The completed Project Priorities Survey (Criterion 1.1)
- A summary of outputs from the project's charrettes and collaborative meetings (Criterion 1.2)
- The anticipated roles of each party in delivering the project goals and implementing both mandatory and optional criteria (Criterion 1.3)

RECOMMENDATIONS

- Attach the education plan, along with the completed Project Priorities Survey (Criterion 1.1), to the agenda for the construction kickoff and ensure the priorities receive requisite attention.
- Include a progress update on achieving Green Communities criteria as a meeting agenda item during regular construction meetings.
- Include timeline estimates for performance testing and verification schedules in the overall construction schedule—and within Division 1 Section 01 81 13 Sustainable Design Requirements—to ensure advance coordination between installation contractors and testing and verification contractors.
- As the project moves from design into construction, review requirements for *Category 8: Operations, Maintenance, and Resident Engagement*. Begin populating the documents required under Category 8 with relevant information, such as equipment specifications and manufacturers' maintenance recommendations.
- Add self-verification requirements for the construction team to help ensure proper installation. Examples include testing of water fixtures, bath fans, and air sealing of air-handler closets.
- Review notes and deviations—including requests for information (RFI), approved submittals, and Architect's Supplemental Instructions (ASIs)—that must be included in construction documentation. Clearly identify throughout final documentation how and why design specifications changed. Include this in construction specifications in Division 1 Section 01 81 13 Sustainable Design Requirements.

RESOURCES

- Enterprise Community Partners, Green Charrette Tools. Contains a series of tools and trainings that can help any project team develop and deliver a robust integrative design process. *www.greencommunitiesonline.org/resources#sec_374*
- Project Priorities Survey, which is *Appendix B*
- Enterprise Community Partners *Criteria Checklist*

1.5 *Optional: 2 points* Adaptive Planning for Resilient Communities

RATIONALE

Assessing vulnerabilities to climate-related hazards and creating a plan to manage associated risks can ensure affordable housing developments continue functioning safely during disasters, and can help protect against ongoing changes to the climate and the environment that impact community health and safety. Performing this assessment during the integrative design process yields input from stakeholders and helps teams implement strategies to enhance resilience.

REQUIREMENTS

Develop a plan to address vulnerabilities discovered during the climate hazard and risk assessment. For each priority hazard identified for the project through the Project Priorities Survey (*Criterion 1.1*), specify one or more strategies to help the project (and/or the surrounding community, as applicable) adapt to, withstand, or recover from the associated risks. Integrate these strategies into the design and implement them during delivery of your project.

Note: Project teams should choose strategies appropriate for the unique context of the property, the identified hazards, and the associated risks. The adaptation plan may or may not leverage the 2026 Green Communities Criteria. Refer to Table 1.5 and the Resources section below for potential strategies to include.

RECOMMENDATIONS

- Hold a series of facilitated charrettes and community meetings focused explicitly on the issues identified during the risk assessment and how they apply to the project and the nearby community.
- Consider a four-part assessment encompassing social, physical, functional, and strategic risk factors of the property.
- For help getting started with your risk assessment, visit “Assess Your Risks” in Enterprise’s Climate Safe Housing Introduction (*www.climatesafehousing.org/introduction*), which includes sample questions to consider.
- Incorporate learnings from the hazard and risk assessments into subsequent phases of planning and design for the project to ensure risks can be effectively managed.
- Tap professional consultants—such as civil, environmental, or structural engineers—to help the team identify relevant hazards and make adaptation plans.

TABLE 1.5 | OPTIONAL RESILIENCE CRITERIA AND CORRESPONDING CLIMATE HAZARDS

HAZARD FROM FEMA'S NATIONAL RISK INDEX	OPTIONAL GREEN COMMUNITIES CRITERIA WITH POSITIVE INFLUENCE
Avalanche	—
Coastal flooding	3.10 Resilient Site Design: Flood
Cold wave	5.3 Advanced Building Performance 5.9 Passive Survivability
Drought	3.5 Outdoor Water Use: Efficient Irrigation 3.6 Outdoor Water Use: Alternative Sources 4.2 Advanced Water Conservation 4.4 Monitoring Water Consumption and Leaks 4.6 Indoor Water Efficiency: Nonpotable Water Reuse
Earthquake	—
Hail	3.9 Resilient Site Design: Wind
Heat Wave	2.5 Access to Open Space 3.8 Heat-Island Management 5.3 Advanced Building Performance 5.9 Passive Survivability
Hurricane	3.9 Resilient Site Design: Wind
Ice Storm	5.6 Backup Power 5.9 Passive Survivability
Landslide	—
Lightning	5.6 Backup Power
Rainwater Flooding	3.4 Surface Stormwater Management 3.10 Resilient Site Design: Flood
Riverine Flooding	3.10 Resilient Site Design: Flood
Strong Wind	3.9 Resilient Site Design: Wind
Tornado	3.9 Resilient Site Design: Wind
Tsunami	—
Volcanic Activity	—
Wildfire	3.11 Resilient Site Design: Wildfire
Winter Weather	3.9 Resilient Site Design: Wind 5.3 Advanced Building Performance 5.6 Backup Power 5.9 Passive Survivability

- Consider engaging with a property insurance professional early in the design and planning process to understand how the overall project plan and resilience strategies may impact insurance premiums. Resilience assessments completed as part of the PPS can assist project teams in identifying relevant hazards, and insurance data can help teams identify and prioritize adaptive strategies with multiple benefits.
- For rehabilitation projects, reach out to current staff to consider not only future conditions at the site but also which hazards have been problematic before.
- Craft strategies that are appropriate to the unique resident community at the property. For example, seniors-only buildings may have different needs from buildings that serve primarily families with children. Also, consider and prioritize social and cultural needs the property's residents identify.
- Residents tend to lean on their neighbors for support. Promote strong social resilience by creating a safe and comfortable centralized location (often called a resilience hub) where people can access resources (e.g., water, food, electrical outlets) and where building management can disseminate relevant emergency information after a disruption.
- Consider incorporating Enterprise's Climate Safe Housing strategies for multifamily buildings (*www.climatesafehousing.org/*), including specific guidance for property resilience during an emergency.

RESOURCES

- Enterprise Community Partners, Climate Safe Housing: Strategies for Multifamily Building Resilience. Provides practical guidance on designing and retrofitting buildings to adapt to and provide protection from climate risks and other potential hazards. *www.climatesafehousing.org/*
- U.S. Federal Emergency Management Agency (FEMA) hazard mitigation planning resources include a Mitigation Planning Handbook, guidelines for Sustainability in Mitigation Planning, Planning Advisory Service Reports, and examples of Mitigation Activities. *www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning*
- National Hazard Mitigation Association (NHMA). Promotes natural hazard risk reduction and climate adaptation through planning, adaptation, and mitigation. Includes steps to reduce the risks and consequences of natural hazards, with a special emphasis on protecting the most vulnerable populations in our communities. *http://nhma.info/*
- Urban Land Institute, CRE Guide to Natural Hazards and Property Insurance Underwriting. A resource for development teams challenged by increasing physical climate risk and rising insurance premiums to understand risk-reduction strategies and their implications for property insurance. *https://knowledge.uli.org/en/reports/research-reports/2025/cre-guide-to-natural-hazards-and-property-insurance-underwriting*
- The Federal Alliance for Safe Homes (FLASH), Prepare Your Home for Disasters. Search by address to find location-specific guidance on hazards, risks, adaptative planning, and recovery from natural and human-made disasters. *www.flash.org*
- American Institute of Architects, Climate Change Adaptation Design Resources. A hub connecting to predictive modeling tools, adaptive strategies for extreme heat and sea-level rise, and resources to guide managed retreat from vulnerable coastal areas. *www.aia.org/resource-center/climate-change-adaptation-design-resources*

- FEMA, Building Vulnerability Assessment Checklist. Though intended for school buildings, this checklist can help any project team examine design issues that may make critical systems vulnerable during an emergency. *https://msc.fema.gov/msccontent/fema428_apndx_f.pdf*
- Enterprise Community Partners, Multifamily Resilience Manual. *https://businesscontinuity.enterprisecommunity.org/sites/default/files/strategies-for-multifamily-building-resilience.pdf*
- D.C. Department of Energy & Environment, Climate Adaptation and Preparedness: Affordable Housing Resilience and Solar Assessment Tool. Scroll down to the Resilience Opportunity Assessment Tool, which helps multifamily property teams evaluate opportunities for resilience and the feasibility of solar photovoltaics.
- Enterprise Community Partners, Business Continuity Toolkit. *https://businesscontinuity.enterprisecommunity.org/*
- U.S. Department of Housing and Urban Development, Designing for Natural Hazards: A Resilience Guide for Builders & Developers. *www.huduser.gov/portal/publications/Designing-for-Natural-Hazards-Series.html*
- Insurance Institute of Home and Business Safety (IBHS), Financial Incentives. Insurance discounts and funding incentives for resilient homes. *https://fortifiedhome.org/incentives/*

1.6 Design for Health and Well-Being: Health Action Plan

Optional: 13 points for Steps 1–6; additional 3 points for Step 7

RATIONALE

Our social and physical environments account for 75% to 80% of our health outcomes. Housing conditions play a significant role in this context, given that people spend at least half of every day in their homes. Housing design, construction, and operation impact resident health—whether project decisions intentionally account for health or not. Thoughtful, informed decisions can make a profound difference by removing obstacles and increasing opportunities for health and well-being.

The Health Action Plan framework, originally developed as part of the 2015 Green Communities Criteria, provides affordable housing developers a process for integrating health into affordable housing design and development activities. This unique process pairs affordable housing developers with public health professionals to prioritize the health needs specific to their community through data analysis and community engagement, resulting in cost-effective strategies that amplify holistic project goals and improve factors that drive health and well-being for residents.

With a framework that draws from public health methods (including Health Impact Assessments, or HIAs), the Health Action Plan allows project teams to identify and address important health concerns and pursue evidence-based measures that support health and well-being.

REQUIREMENTS

Project teams will begin following the Health Action Plan process during predevelopment and will continue throughout design, construction, and operation. Steps 1 through 6 are required for compliance with this criterion *[13 points]*. Step 7 may not be feasible for all teams and is therefore available for an additional *3 points*. The process requires the project team to:

1. Commit to embedding health in project decisions
2. Partner with a public health professional
3. Collect and analyze community health data
4. Engage with community stakeholders to prioritize health data and strategies
5. Identify strategies to address priority health needs
6. Create an implementation plan

AND, optionally:

7. Create a monitoring plan

Specific requirements for each step are listed below.

Step 1. Commit to embedding health in project decisions

The first step to embarking on the Health Action Plan process is to commit to taking a health-informed approach to development. This commitment undergirds all subsequent actions and should be made early, ideally during schematic design. As part of this commitment:

- Assess where the project is in its life cycle to ensure that data collected and strategies selected can be integrated into design, construction, and operation
- Allocate time and funds to partner with a public health professional and engage community stakeholders
- Commit to integrating feasible strategies that can improve health outcomes

Step 2. Partner with a public health professional

Establish a formal partnership, to include a contract or memorandum of understanding, with a public health professional to support data collection and analysis (Step 3), community engagement (Step 4), identification of evidence-based strategies (Step 5) and a plan to implement these strategies (Step 6) to address the health needs that emerge from the Health Action Plan process. The public health professional must have expertise in:

- Accessing, analyzing, and disaggregating local public health data (including social, environmental, and economic factors contributing to health needs)
- Facilitating resident and community engagement to reveal community health priorities
- Identifying evidence-based strategies to promote health that can be used during design, construction, and operation (look for criteria tagged with a blue cross icon, indicating health as a leading theme for that criterion throughout all eight categories of the 2026 Green Communities Criteria)
- If pursuing Step 7, identifying methods and metrics for monitoring the impacts of built environment strategies on resident health

WHO QUALIFIES AS A PUBLIC HEALTH PROFESSIONAL?

Public health professionals may be 1) public health consultants, faculty, or graduate students of public health programs; 2) staff of public health institutes or departments and/or community-based public health organizations; 3) architects or green consultants with public health training (e.g., MPH); 4) and/or, potentially, individuals from other types of organizations, such as hospitals. A health professional's qualifications and capacity to remain engaged for the duration of the project are higher priorities than the person's organizational affiliations.

In addition to the public health professional on record for the project, project teams may have opportunity to incorporate the advice and expertise of other health professionals in the Health Action Plan during Step 4, stakeholder engagement, or the formation of an advisory board to provide review and input into this process.

See the *Resources* section for a Public Health Professional Scope of Work template and a list of prevetted public health professionals. Consider interviewing a few candidates before selecting the final public health professional for your project.

Step 3. **Collect and analyze publicly available community health data**

The public health professional, in partnership with the project team, will conduct research on resident health factors by accessing and analyzing publicly available data sources. These data sources will likely include relevant community health assessments and plans previously developed by local organizations or government agencies (e.g., nonprofit hospitals, public health departments). Access and analyze data that are as specific as possible to the location and demographic served by the project. Analyze the data to identify the project's potential connections to health and the baseline health conditions of the people who live at the property, are most likely to live there in the future, or are otherwise likely to have their health impacted by the project.

When possible, disaggregate the data by race, ethnicity, income, age, and/or gender. This disaggregation will reveal health disparities, a health difference linked closely to social, economic, and/or environmental disadvantages specific to the local community. Understanding health disparities, and why they are occurring, allows the project team to develop strategies aimed at closing gaps in health outcomes between different groups in the community.

Step 4. **Engage with community stakeholders to prioritize health data and strategies**

The public health professional and project team will engage community stakeholders to better understand and prioritize the health issues identified during Step 3, refining what they learned in the data-collection phase based on the lived experience and preferences of the impacted community. Use this information to inform potential types of design, construction, and/or operational solutions that could address priority health needs.

The project team at this phase of development will likely be unable to confirm the feasibility of specific interventions. Therefore, when soliciting feedback on potential solutions, the public health professional shall frame the conversation to identify preferences for types of interventions rather than naming specific supports or amenities. If obesity emerges as a top concern, rather than asking stakeholders whether they like soccer fields or exercise rooms better, ask whether

they would prefer more opportunities for physical activity, regular access to healthy food, or on-site classes supporting healthy lifestyle choices. These category-level preferences will then inform later decisions on specific interventions (e.g., soccer field vs. exercise room; food bank vs. on-site vegetable garden; cooking classes vs. yoga classes).

Community stakeholders may include community members who live in or may be served directly by the project; individuals who live, work, or learn in the neighborhood surrounding the project; those who provide services or programming in the building or in the neighborhood surrounding the project; and stakeholders with expertise in the health needs of community members (e.g., public health department, hospitals). When engaging stakeholders, consider the groups disproportionately impacted by health issues in the community to ensure that their voices are represented during this outreach.

Step 5. **Identify strategies to address priority health needs**

Given the data and feedback collected in Steps 3 and 4, the project team works closely with the public health professional to characterize how the project may impact—both positively and negatively—health outcomes for residents. They can then identify potential actions that could be implemented within the project's design, construction, or operation to enhance health-supportive features of the project and minimize potential health risks.

In identifying strategies, the project team and public health professional should also consider how to build in adaptability in addressing health needs as they change in response to external factors, such as aging, staff and resident turnover, economic cycles, and our changing climate.

Step 6. **Create an implementation plan**

Based on the list of potential interventions generated in Step 5, project teams, with guidance from the public health professional, shall select strategies to implement. In identifying these actions, prioritize those that are likely to have significant positive effects on health, are responsive to community concerns and preferences, and are feasible to implement given time and budget constraints. Teams should consider the extent to which the actions will address health priorities as well as the feasibility of implementation and maintenance in terms of cost, resources, technical constraints, etc. Note that actions may include design interventions as well as targeted programming for the property. Document all data sources for the strategies selected. Describe the implementation timeline for each strategy, including how and when they will be implemented, and by whom, throughout design, construction, and operation.

Step 7. **Create a monitoring plan**

Develop a monitoring plan to determine how the health-promoting strategies implemented in the project are impacting resident health and wellness over time. Tailor the monitoring plan to the goals and capacity of the project team and partners. Consider involving residents in the monitoring process, including through data collection and analysis. Share the monitoring results with residents.

TABLE 1.6a | SAMPLE DOCUMENTATION OF HEALTH ACTION PLAN, STEPS 1–6

PRIORITY HEALTH ISSUE AND POPULATION GROUP	POTENTIAL DESIGN, CONSTRUCTION, OR PROGRAMMING INTERVENTIONS	EXAMPLES OF STRATEGIES	WAS THIS STRATEGY SELECTED? (YES/NO)	IF SELECTED, INDICATE HOW THIS STRATEGY WILL BE IMPLEMENTED	RATIONALE FOR SELECTING OR REJECTING THE EXAMPLE STRATEGY
High incidence of childhood asthma	Eliminate or reduce use of materials with asthma triggers	No carpet	Yes	All floors will be hard-surface flooring	Research demonstrates the health benefits of carpet-free housing. There are also maintenance savings, which justifies the extra cost up front.
Above-average prevalence of childhood obesity	Prioritize features that promote physical activity	Street infrastructure improvements to safely accommodate users of all ages, abilities, and transportation modes	No	N/A	Our project team does not have the capacity to affect local transportation infrastructure.
Above-average prevalence of childhood obesity	Prioritize features that promote physical activity	Design of building perimeters to allow kids to run, ride bikes, and walk the full perimeter of the building	Yes	Landscaping will include trample-proof groundcover and concrete walks	This feature will provide a safe place on the property for the young people living in and visiting our development to run. This will keep kids close to the building, which will be considered safer by families since it is within the yard.

- **Define the goal of your monitoring plan.**
  - » Align the goal of the monitoring plan with the desired impact of the Health Action Plan for the project team and impacted residents. For instance, the goal of monitoring may be to determine whether the property improves or reduces the highest priority health issue for residents.
  - » Also consider secondary goals to serve other purposes important to the project team and impacted residents, such as informing grant funding, innovative partnerships with the health care sector, or future project design.
- **Select design, operational, and health performance metrics to track over time.**
  - » Include design and operation metrics for each of the health-promoting strategies selected as part of the Health Action Plan process
  - » Include health metrics to assess the property in general or for each health-promoting strategy
  - » Include additional types of metrics as needed

- **Determine strategies of measurement** (e.g., resident surveys, monthly reports on frequency of use, IAQ assessment checklist) for each metric that align with the project team's capacity and capabilities.
- **Determine the frequency of assessment for each metric.**
- **Define the staff, residents, or partners responsible for data collection, analysis, and dissemination.**

METRICS FOR MONITORING AND MANAGEMENT

Design metrics are used to determine whether and how well the selected health-promoting strategies were incorporated into the project design.

Operational metrics are used to determine the completeness and effectiveness of strategy implementation through operational practices.

Health metrics are used to determine the strategies' impacts on residents' health. Health metrics may include frequency of use, changes in behavior, resident perception, and, when possible, health outcomes (e.g., use of services or prevalence of symptoms).

RECOMMENDATIONS

Include the health metrics that make the most sense for the property. Rather than creating health metrics of your own, you may choose to implement the Healthy Housing Outcomes Survey located in the Resources section of this criterion. Otherwise, connect directly with the public health professional to select metrics that will illustrate impact appropriate to the time frame of the monitoring plan.

RESOURCES

Health Action Plan resources from Enterprise Community Partners:

- Health Action Plan resource page. An animated two-minute overview video about the Health Action Plan, a Scope of Work template for public health professionals, Health Action Plan evaluation case studies, and more. *www.enterprisecommunity.org/healthactionplan*
- Healthy Housing Outcomes Survey. Developed to enable affordable housing owners to measure changes in resident health outcomes most likely to be influenced by healthy housing development. *www.greencommunitiesonline.org/sites/default/files/updated_healthy_housing_survey.docx*
- Aging-in-Place Design Guidelines for Independent Living in Multifamily Buildings. *www.greencommunitiesonline.org/sites/default/files/aging_in_place_design_guidelines.pdf*

Neighborhood-and community-level health datasets (most relevant for Step 3):

- Most nonprofit hospitals are required to perform a community health needs assessment (CHNA) as part of federal regulations granting them tax-exempt status. As part of the data review, we encourage teams to pull CHNAs from local hospitals as an additional data resource.
- Centers for Disease Control and Prevention (CDC), Places: Local Data for Better Health. Data at the city and census-tract levels. *www.cdc.gov/places/index.html*

TABLE 1.6b | SAMPLE DOCUMENTATION OF HEALTH ACTION PLAN, STEP 7

INFORMATION IDENTIFIED IN STEPS 1-6		
POPULATION NEED	**SELECTED INTERVENTION(S)**	**SELECTED STRATEGY**
High incidence of childhood asthma	Eliminate or reduce use of potential asthmagens.	No carpet
Above-average prevalence of childhood obesity	Prioritize features that promote physical activity.	Design perimeter of building to allow kids to run, ride bikes, and walk the full perimeter of the building.
NEW COLUMNS ADDED IN STEP 7		
POTENTIAL PERFORMANCE METRICS	**RESPONSIBLE INDIVIDUAL(S) AND/OR ORGANIZATION(S)**	**FREQUENCY**
Design Metrics: No carpet is specified in the project plans and specs. All flooring materials specified are hard surfaces. **Operational Metrics:** Maintain flooring per manufacturer specifications. Measure indoor pollutant levels. **Health Metrics:** Survey residents about the number of times they or their child has used an emergency inhaler in the relevant time period.	**Design Metrics:** Architect to certify that no carpet was used in the project design or specifications. John Smith, ACME Inc., 123.456.7890 **Operational Metrics:** Property manager will engage an IAQ consultant to measure levels of mold spores, pollen, and dust in air. Jane Doe, Co. Inc., 234.456.5678 **Health Metrics:** Resident services team will survey residents. Residential Services Coordinator Beth Smith, 123.456.7890.	**Design Metrics:** Certify final plan set before construction starts. **Operational Metrics:** Monthly flooring maintenance; quarterly IAQ measurements **Health Metrics:** Annual survey
Design Metrics: Landscape architect to certify specified area located on drawings. **Operational Metrics:** Paths' safety, usability, and state of repair **Health Metrics:** Frequency of use and resident survey on child safety concerns and self-reported frequency of use	**Design Metrics:** Architect to certify that specs include appropriate lighting fixtures. John Smith, ACME Inc., 123.456.7890 **Operational Metrics:** Maintenance technician to monitor path for debris, snow, and disrepair. Jane Doe, Co. Inc., 234.456.5678 **Health Metrics:** Resident services team will survey residents. Residential Services Coordinator Beth Smith, 123.456.7890.	**Design Metrics:** Certify final plan set before construction starts. **Operational Metrics:** Weekly path monitoring and maintenance **Health Metrics:** Quarterly observation of use; annual survey

- CDC, Health Places. Resources for healthy community design and assessment. *www.cdc.gov/healthy-places/php/about/index.html*
- Institute for People, Place, and Possibility, Community Commons. An online platform with maps, tools, data, stories and other resources to support equitable community health and well-being. *www.communitycommons.org*
- University of Wisconsin Population Health Institute, County Health Rankings and Roadmaps. Assesses and ranks the population health of nearly all counties in the U.S. Allows users to view the rankings and to explore and download data, including statistics on length of life, self-reported general health, and a subset of health influences. *www.countyhealthrankings.org*
- University of Kansas, Center for Community Health and Development; 12 Best Change Processes. A toolkit supporting processes and activities known to promote community change and improvement. *https://ctb.ku.edu/en/best-change-processes*
- CDC, Environment Health Tracking Programs. Links to rigorously tracked health and environmental data from 32 states and one county. *www.cdc.gov/environmental-health-tracking/php/our-work/index.html*
- Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System. Searchable health data, including national and state disease rates, from CDC's annual state-by-state phone survey of self-reported health outcomes. *www.cdc.gov/brfss/*

Stakeholder engagement (most relevant for Step 4):

- Working Group of the 2010 HIA in the Americas Workshop, Guidance and Best Practices for Stakeholder Participation in Health Impact Assessments. *https://hiasociety.org/resources/Documents/guide-for-stakeholder-participation.pdf*
- Society of Practitioners of the Health Impact Assessment (SOPHIA). Stakeholder Engagement Tools and Materials. *https://hiasociety.org/Stakeholder-Engagement-Tools-&-Materials*

Healthy design references:

- Health Impact Project, HIAs and Other Resources to Advance Health-Informed Decisions. This toolkit offers a collection of health impact assessments, guides, and other research to support consideration of health when making decisions across sectors, such as housing, planning, and education. An accompanying data interactive allows users to explore data on completed and in-progress health impact assessments (HIAs) in the U.S. *www.pew.org/en/research-and-analysis/data-visualizations/2015/hia-map*
- Build Healthy Places Network, Jargon Buster. *www.buildhealthyplaces.org/tools-resources/jargon-buster/*
- Build Healthy Places Network, MeasureUp. Tools to help nonscientists measure and describe the health impacts of their programs.
- SOPHIA, Promoting Equity through the Practice of HIAs. Highlights strategies for, and examples of, promoting equitable decision-making and outcomes through HIAs. *https://hiasociety.org/resources/Documents/HIA-Promoting-Equity.pdf*
- Health in Partnership. A resource hub that includes an HIA Toolkit. *www.healthinpartnership.org/resources.*

- National Network of Public Health Institutes, Community Health Assessment and Community Health Improvement initiatives. Webinars, case studies, and other resources for assessing and improving community health. *https://nnphi.org/relatedarticle/community-health-assessment-cha-and-community-health-improvement-chip-initiatives/*
- CDC, Community Preventive Services Task Force: Improving Health and Safety in Communities. Shares evidence of community-programs and policies to improve health and prevent disease based on a scientific and systematic review process. *www.thecommunityguide.org/pages/cpstf-improving-health-and-safety-in-communities.html*

1.7 *Optional: 8 points*
Inclusive Community Engagement

RATIONALE

Project teams that have intentionally used an inclusive and culturally relevant development process have benefited from quicker approvals as well as lower holding costs, vacancy rates, resident turnover, and unit rollover costs for owners. These projects also benefit from an increased sense of shared ownership over public spaces, social accountability for upkeep and safety, and a sense of belonging for residents.

An inclusive process enables the project to better reflect community needs and can also:

- Increase the financial viability and sustainability of a project
- Build goodwill between community and developer, mitigating community objections and creating momentum for future development processes
- Reduce antagonism in the development process and streamline decision-making, which saves time and money and increases interest from potential occupants
- Shift the paradigm of inequity that has determined how investments are made in communities
- Reduce the risk of displacing residents and small businesses. By honoring cultural identities, resident voices, and community histories, project teams can more successfully prioritize community preferences and contribute to an increase in social cohesion, health, and equity for residents.

REQUIREMENTS

Complete a cultural resilience assessment per Option 1 or convene a cultural advisory group per Option 2.

Option 1: Cultural resilience assessment

Work with residents to identify community needs and assets. Complete the Cultural Resilience Assessment worksheet as you take the following actions and then share how these outputs impacted the project goals and strategies *[8 points]*:

- Listen to community-identified needs, assets, priorities, and insights as core inputs for the project mission.
- Ground-truth any existing data or plans with the community to gain more local insight and perspective from people's lived experience and knowledge.

- Identify factors in this project that may produce and perpetuate inequities. Determine what adverse impacts or unintended consequences could result from this project, which racial and/or ethnic groups could be negatively affected, and how adverse impacts could be prevented or minimized.

OR

Option 2: Cultural advisory group

Convene a cultural advisory group and consult with this group on a regular basis. The advisory group must include local artists and other culture bearers who can give input on a range of decisions and guide the design and development team in the community-planning process, helping ensure the creation of spaces that are unique, reflective of resident cultures, and representative of community values. *[8 points]*

As you convene stakeholders, complete the Cultural Advisory Group Charter template, which specifies how to:

- Define the group's purpose, responsibilities, expectations, and incentives for participation
- Create an open and welcoming process for inviting advisory group members that prioritizes a diverse range of interests, knowledge, and experience, including age, roles, and relationships to the expected resident community
- Determine the parameters, practices, and terms for the cultural advisory group members' roles and services

RECOMMENDATIONS

Discuss and identify long-term visionary goals, which are durable and inspiring and establish a process for ensuring that the advisory group's input translates into specific, actionable, and achievable goals and activities.

Treat residents as community experts:

- Invite interested residents to form an advisory group or community leadership committee to regularly advise the project team, share community perspectives and values, and liaise between developers and residents.
- Determine a form of compensation or stipend for community leadership roles.
- Consult with the property staff and resident services coordinators during early project goal setting.

Give each person a voice:

- Create an environment that invites participation from all people and elevates every voice.
- Conduct one-on-one interviews and small focus groups to encourage full participation. Use multiple forms of communication (e.g., verbal, written, drawn).
- Carve out staff time or hire a community outreach specialist with cultural competence to involve residents and facilitate meetings.
- Allow for adequate and sustained time spent in the community.

Go where the people are:

- Messaging about the project should come from a trusted community liaison (e.g., a community-based organization, block club, community group, cultural leader, local elected official, etc.).
- Use the preferred forms of messaging found in the community. Monitor the tone and content of public social media, if used to solicit participation.
- Get on the agenda of already-scheduled community meetings or co-host a cultural event with a trusted community leader or organization to talk about project ideas and collect initial feedback.
- Meet at a time and location that is convenient and accessible (this may include weekday evenings or weekends) and provide a meal and childcare.

RESOURCES

- PolicyLink; Creating Change through Arts, Culture, and Equitable Development: A Policy and Practice Primer. Practices for developing equity-focused policies and strategies for cultural initiatives in communities. *www.policylink.org/resources-tools/arts-culture-equitable-development*
- Enterprise Community Partners, Design Matters Toolkit. Supports adoption of three core practices for achieving people-focused design. *www.enterprisecommunity.org/learning-center/resources/design-matters-toolkit*
- *IDEO.org*, The Field Guide to Human-Centered Design. Includes design methods and case studies for human-centered design. *www.designkit.org/resources/1.html*
- Enterprise Community Partners, Made to Last: A Field Guide to Community Resilience. Highlights five diverse community development organizations leveraging culture and creativity to strengthen community resilience. *www.greencommunitiesonline.org/sites/default/files/made-to-last.pdf*
- National Endowment for the Arts, How to Do Creative Placemaking. Case studies and essays on how arts organizations and artists can play an essential role in communities. *www.arts.gov/publications/how-do-creative-placemaking*
- LISC: Authentic Community Engagement: A More Effective Strategy. Distinguishes among types of community engagement and shares best practices, effective principles, and solutions for overcoming obstacles. *www.lisc.org/media/filer_public/d2/ea/d2ea81ee-0d8b-45e1-be55-0c1f17684e88/authentic_community_engagement_smart_suite_2016.pdf*
- Strive Together, Ten Principles of Authentic Community Engagement. *www.strivetogether.org/wp-content/uploads/2017/03/10_principles_community_engagement_2.pdf*
- Urban Institute, Housing Matters: Nine Critical Steps to Authentic Community Engagement. *https://howhousingmatters.org/articles/nine-critical-steps-authentic-community-engagement/*
- Urban Institute, Trauma-Informed Community-Building and Engagement. Trauma-informed approaches to community engagement with accountability, including background on trauma and community healing, strategies and practices for trauma-informed resident engagement, and two case studies. *www.urban.org/research/publication/trauma-informed-community-building-and-engagement*

- Participate in Design (P!D). Outlines different principles of participatory design and offers methods and tools to guide the process. *https://participateindesign.org/about-pid-our-approach*
- Enterprise Community Partners, Participatory Design Toolkit. Developed by a designer working in a community development organization, this toolkit offers strategies to engage and involve the community in design projects. It is packed with activities, tips, and techniques to foster dialogue and create informed design goals. *www.enterprisecommunity.org/sites/default/files/2021-12/Participatory-Design-Toolkit.pdf*

"We all stick together. It's unbelievable. I didn't think anything like this existed."

Mildred Miller, Woodring Resident

2 Location + Neighborhood Fabric

Locating the project in a neighborhood with existing infrastructure, transportation, and services enhances livability, leads to more responsible and resource-efficient development of land, saves energy, and increases the vitality of the community.

2.1 Ecological Conservation and Safer Sites

Mandatory

RATIONALE

Protecting fragile and scarce environmental resources is essential to maintaining and restoring valuable ecosystems. Identifying sensitive lands and preventing or limiting development in these areas decreases the negative impact that development can have on sensitive ecosystems. Locations can feature an array of hazards that can diminish the durability of housing developments and increase the potential for disruption or harm to residents. Developers have an opportunity to consider both a property's exposure to environmental hazards and the risk of extreme or disruptive events that could put structures and residents at risk.

REQUIREMENTS

Avoid developing on sites that contain the critical landscapes and ecosystems classified below. Identify opportunities to protect and restore damaged ecosystems as part of the development process.

1. Protect floodplain functions

Protect floodplain functions (e.g., water storage, habitat, water quality) by avoiding new development within the 100-year floodplain of a Special Flood Hazard Area (SFHA). To determine whether the property is in an SFHA, refer to the FEMA Flood Map Service Center or to a local or state agency.

New Construction

Do not develop on a site that contains any SFHA, as identified by FEMA on the Flood Map Service Center or by a local or state entity.

Rehabilitation

Maintain or improve floodplain resilience of the existing development:

- Substantial rehabilitation projects located within the SFHA, as identified by FEMA on the Flood Map Service Center or by a local or state entity, are required to meet ASCE 24-24, A Standard for Flood-Resistant Design and Construction.

- Ensure that any development or redevelopment activities within the floodplain will mitigate prior degradation and enhance existing floodplain conditions (e.g., maintain or increase floodplain storage and improve water quality).
- Do not raise topographical elevations in floodplains.

2. Protect aquatic ecosystems

Aquatic ecosystems include wetlands and deepwater habitats and are classified as:

- Marine (tidal wetlands, shorelines, mudflats, reefs)
- Estuarine (bays, lagoons, marshes)
- Riverine (streams, rivers, associated floodplains, and their riparian buffer)
- Lacustrine (lakes, ponds, associated shorelines, and their riparian buffer)
- Palustrine (nontidal wetlands, seeps, springs, vernal pools, seasonal wetlands)

Identification and delineation of aquatic ecosystems is conducted by the U.S. Army Corps of Engineers. Other boundaries of aquatic ecosystems are defined by the ordinary high-water mark (OHWM).

New Construction
Do not build within 100 feet of wetlands or deepwater habitats, or within the distance recommended by applicable state or local protocols, whichever is more stringent.

Rehabilitation
Maintain or improve existing aquatic ecosystems. Do not extend the building, built structures, roads, or parking areas into aquatic ecosystems beyond where they already exist.

3. Conserve habitat for threatened or endangered species

As part of the predevelopment design process, identify whether the site includes habitat for any plant or animal species appearing on U.S. federal or state lists as threatened or endangered. If the site hosts any threatened or endangered plant or animal species, conduct a habitat assessment for each identified species.

Sites that feature habitats for any species appearing on federal or state lists as threatened or endangered must:

- Not extend the building, built structures, roads, or parking areas into habitats for threatened or endangered plant or animal species
- Minimize disturbance to habitats for threatened or endangered plant or animal species during construction
- Follow the guidance of responsible state or local agencies on how best to remediate harms if construction activities inadvertently disrupt the habitat of threatened or endangered animals or plants

RECOMMENDATIONS

When project teams are considering sites for development, in addition to the above requirements, review the following:

- Use *Criterion 2.1 Ecological Conservation and Safer Sites* to avoid hazards and conserve critical ecosystems after completing the resilience assessment exercise as part of *Criterion 1.1 Project Priorities Survey*. This exercise supports project teams in understanding project climate hazards, which developers should consider when making location decisions, and which project teams should respond to with essential and appropriate resilience strategies during planning, design, and development.
- Project teams developing properties that include floodplains are encouraged to incorporate applicable resilient floodproofing and construction strategies within Option 2 and Option 3 of *Criterion 3.10 Resilient Site Design: Flood.*
- Avoid locations that are projected in local or state plans to experience sea-level rise. This includes sites projected to be within the boundaries of 2080 sea-level rise and/or high-tide flooding, according to the National Oceanic and Atmospheric Administration's Sea Level Rise Viewer (*https://coast.noaa.gov/slr/*).
- Avoid a location with steep or unstable soils. Building on steep or unstable soils increases the risk of long-term structural problems that may result in costly maintenance and repairs. Avoid locations that have slopes greater than 15%, those with type B or C soil per the U.S. Department of Agriculture Natural Resources Conservation Service, and those known to experience subsidence or slope failure.
- Avoid developing in areas at high risk of wildfire. Wildfires can destroy or damage property, expose residents to poor air quality, and threaten human life. Even highly urbanized areas can experience major wildfires or conflagrations. Refer to *Criterion 3.11 Resilient Site Design: Wildfire* for additional guidance on wildfire risk and adaptation strategies.
- Many states have specific protocols for evaluating sites for endangered animals and plants. Consult state or local codes or other requirements when evaluating the wildlife on your site.

RESOURCES

- U.S. Department of Homeland Security, FEMA Flood Map Service Center. *https://msc.fema.gov/portal/home*
- American Society of Civil Engineers, Flood Resistant Design and Construction, ASCE/SEI 24-24. Minimum requirements for design and construction of structures in flood-hazard areas. *https://ascelibrary.org/doi/book/10.1061/9780784485781*
- American Society of Civil Engineers, Supplement 2 of ASCE/SEI 7-22: Minimum Design Loads and Associated Criteria for Buildings and Other Structures (free download). *https://ascelibrary.org/doi/epdf/10.1061/9780784415788.sup2*
- Louisiana State University, LSU AgCenter Elevation Calculator Tool for ASCE/SEI 24-24 (free calculator). *https://floodelev.lsuagcenter.com/*
- U.S. Army Corps of Engineers, Regional Supplements to Corps Delineation Manual. *www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/reg_supp/*

- Federal Geographic Data Committee, Classification of Wetlands and Deepwater Habitats of the United States. *www.fgdc.gov/standards/projects/wetlands/nwcs-2013*
- Federal Energy Regulatory Commission, Wetland and Waterbody Construction and Mitigation Procedures. *www.ferc.gov/sites/default/files/2020-04/wetland-pocket-guide.pdf*
- U.S. Department of Agriculture; Wetland Restoration, Enhancement, and Management (2021). *https://directives.nrcs.usda.gov/sites/default/files2/1712930908/31787.pdf*
- U.S. Fish and Wildlife Service; Endangered Species. Overview of the federal government's work of listing, classifying, and protecting endangered plants and animals. *www.fws.gov/program/endangered-species*
- U.S. Fish & Wildlife Service, Threatened and Endangered Species with Critical Habitat. An interactive online map of critical habitat for threatened and endangered species. *www.arcgis.com/home/item.html?id=9d8de5e265ad4fe09893cf75b8dbfb77*
- National Oceanic and Atmospheric Administration, Sea Level Rise Viewer. *https://coast.noaa.gov/slr/*
- U.S. Forest Service, Wildfire Risk to Communities Tool. This tool provides resources to help communities understand their risk of wildfire. *https://wildfirerisk.org*

2.2 Connections to Existing Development and Infrastructure

Mandatory for New Construction, except for projects defined as Rural/Tribal/Small Town

RATIONALE

Locating a project within an existing neighborhood and in proximity to existing infrastructure results in more resource-efficient development of land, conserves energy, and adds to the vitality of the overall community. Connections to pedestrian and cycling infrastructure encourage active transportation, which can improve health by increasing daily physical activity and can also provide access to services and jobs.

REQUIREMENTS

- Locate the project on a site that is within or contiguous to existing development. At least 25% of the site perimeter must border currently developed land and have access to existing road, water, and sewer infrastructure.
- Connect the project to the existing pedestrian network by creating new pathways or roads with sidewalks, or by providing sidewalks on existing streets, to link the project to transit stops, public or civic spaces, open spaces, and adjacent development.
- For sites larger than 5 acres, provide connections to the adjacent street network at least every 800 linear feet along the site perimeter.
- Tie all existing and planned bike paths and lanes on the development site to existing bike paths or lanes that are safe, accessible, and clearly identified.

RECOMMENDATIONS

- Provide enhanced pedestrian crossings at intersections by using elements such as curb extensions, medians, crosswalk count-down clocks, daylighting, detectable warning strips, street treatments (e.g., differently colored or textured pavement in crosswalks), or sidewalk expansion. On streets with large blocks, consider mid-block pedestrian crossings.
- Design engaging and safe sidewalk experiences appropriate for expected pedestrian flows and uses. Include benches and shade trees for rest and shade.
- See other criteria in Category 2: Location + Neighborhood Fabric for additional considerations and strategies for transit, shared mobility, biking, and walking.

RESOURCES

- Community Preventive Services Task Force, The Community Guide: What Works to Promote Health. *www.thecommunityguide.org/*
- Community Preventive Services Task Force, Physical Activity: Built Environment Approaches Combining Transportation System Interventions with Land Use and Environmental Design. *www.thecommunityguide.org/findings/physical-activity-built-environment-approaches.html*
- NYC Department of Health and Mental Hygiene, Active Design: Shaping the Sidewalk Experience (2013). *www.nyc.gov/assets/doh/downloads/pdf/environmental/sidewalks-experience.pdf*
- NYC Department of Health and Mental Hygiene, Active Design: Promoting Safety (2013). *www.nyc.gov/assets/doh/downloads/pdf/environmental/promoting-safety.pdf*
- Smart Growth America, National Complete Streets Coalition. *www.smartgrowthamerica.org/complete-streets*

2.3 *Mandatory for New Construction*
Compact Development

RATIONALE

Compact development results in more resource-efficient development of land, conserves energy, supports demand for transit and neighborhood retail, and promotes community cohesion. Compact development also correlates with walking, biking, and increased physical activity overall.

REQUIREMENTS

At a minimum, build to the net residential density (dwelling units per acre) of the census block group where the project is located. Find the density of your census block group by typing your project address into the Center for Neighborhood Technology "Residential Density of a Location" calculator found at *http://apps.cnt.org/residential-density*.

In Rural/Tribal/Small Town locations, build to a minimum net density of:

- Five dwelling units per acre for single-family homes
- Ten dwelling units per acre for one-and two-story multifamily buildings
- Fifteen dwelling units per acre for multifamily buildings higher than two stories

Notes:

- Net density calculations do not include land that is set aside for future building phases or development. For multiphase projects, the project net density should include only the portion of the parcel that is being used for that phase.
- Any acreage maintained as permanently protected open space per *Criterion 2.5 Access to Open Space* may be deducted from total project acreage to determine project density.

RECOMMENDATIONS

- Reduce building footprints and preserve green space, especially for new construction, by building "up" rather than "out" whenever possible.
- Move surface parking underground or into a parking structure when feasible.

RESOURCES

- Congress for the New Urbanism. This nonprofit organization provides tools and resources for promoting walkable, neighborhood-based development as an alternative to sprawl. *www.cnu.org*
- Smart Growth America. This website outlines smart-growth principles, provides a guide through smart-growth terms and technical concepts, and hosts a searchable catalogue of reports, websites, tools, and case studies. *https://smartgrowthamerica.org/*
- Urban Land Institute. This nonprofit organization promotes the responsible use of land to enhance the total environment. ULI's online bookstore includes numerous publications regarding compact and higher-density development. *www.uli.org*

2.4 *Mandatory for New Construction*
Proximity to Services and Community Resources

RATIONALE

Locating housing in proximity to neighborhood services, including community centers, health services, and retail, reduces the need to travel. This in turn can reduce vehicle miles traveled and greenhouse gas emissions, lowering monthly living costs and encouraging active travel like walking or biking. Additionally, proximity and access to active recreation facilities, such as parks, playgrounds, and other exercise amenities, are associated with increased physical activity and mental well-being, contributing to a healthy lifestyle. Residents who can access services within close, safe, and accessible proximity can often use these same support systems during natural disasters.

REQUIREMENTS

- Demonstrate that your project is within a 0.5-mile walk distance of at least four, or a 1-mile walk distance of at least seven of the services and resources identified below.
- For projects that qualify as Rural/Tribal/Small Town, locate your project within 5 miles of at least four services or resources.
- Each service or resource type may not be counted more than twice. For example, if there are five banks within the required distance, only two may be counted.

TABLE 2.4 | SERVICES AND COMMUNITY RESOURCES

HEALTH & WELL-BEING	FOOD ACCESS	EDUCATION & CULTURE	CIVIC & COMMUNITY FACILITIES	RETAIL	SERVICES	RESILIENCE
• Pharmacy • Sport court, field, or track • Public park • Public pool or splash pad • Skating rink • Gym, health club, or exercise studio • Medical clinic or office that treats patients	• Farmers' market • Full-service grocery store • Other food store with fresh produce • Café, diner, or other restaurant • Food pantry	• Public library • Place of worship • Cultural arts facility (e.g., museum, performing arts space, concert venue) • Educational facility, including K–12 school, university, adult education center, vocational school, or community college	• Senior center • Community center or recreation center • Police or fire station • Emergency shelter	• Hardware store • Clothing store or department store that sells clothes • Convenience store	• Hair care • Social services center • Bank (with teller hours) • Laundromat or dry cleaner • Child care center (licensed) • Adult or senior care center (licensed) • Post office	• Resilience hub • Storm shelter • Cooling center • Heating center

RECOMMENDATIONS

- In conversations with existing or potential residents, and using other assessment tools, identify the most-needed services and community resources in your area.
- Make the pedestrian experience safe and comfortable. See *Criterion 2.6 Transit, Mobility, and Walkability* for techniques to make pedestrian paths more comfortable and accessible.
- City, municipal, and county governments (e.g., a local planning department or health department) can serve as resources to better understand community amenities.

RESOURCES

- Walk Score. Free online tool for finding out how pedestrian-friendly a neighborhood is. *www.walkscore.com/*
- Google Maps. A function to demonstrate walk distance. On Google Maps, go to "Directions" and select "Walk Directions" to obtain this information. *www.google.com/maps*
- Safe Routes Partnership. This network of more than 300 nonprofit organizations, government agencies, schools, and professionals works to advance the Safe Routes to School movement in the United States. Safe routes can provide a variety of important benefits to children and their communities, including increasing physical activity, reducing traffic congestion, improving air quality, and enhancing neighborhood safety. *www.saferoutespartnership.org/home*
- The National Association of Area Agencies of Aging (n4a). This resource can be used to find aging-in-place service providers in your area. *www.n4a.org/*
- U.S. Administration on Aging, Eldercare Locator. This resource can be used to find home- and community-based service providers in your area. *https://eldercare.acl.gov/home*

2.5 Access to Open Space

Optional: 2, 4, or 6 points

RATIONALE

Open space is more than just a land asset for development; it is an amenity that attracts and welcomes the broader community. Safe access to green space and other natural resources improves quality of life and can contribute to better mental and physical health. Spending time in open space often involves opportunities for physical activity as well as social interaction and connection, and some types of open space may contribute to reducing the heat-island effect by reducing the developed area of a site. Green space that includes shade can provide refuge during periods of extreme heat, which can be life-threatening.

REQUIREMENTS

Option 1: Proximity to public open space

Locate the project within a 0.25-mile walk distance of dedicated public open space that is a minimum of 0.75 acres and is open and accessible to all residents. A minimum of 80% of the public open space must be nonpaved. *[4 points]*

OR

Option 2: On-site open space

Set aside a percentage of the total project acreage as permanent outdoor space that is open and accessible to all residents. A minimum of 80% of the open space must be nonpaved. For projects in urban or suburban settings, 20% of the permanent open space must include tree canopy or other shading.

PERCENTAGE OF OPEN SPACE SET ASIDE	NUMBER OF OPTIONAL POINTS
20%	2 points
35%	4 points
45% + submitted written statement of preservation/conservation policy for set-aside land (for 15 years)	6 points

Notes for both Option 1 and Option 2:

- When calculating open space, deduct buildings, private outdoor areas, streets, roadways, and vehicle parking from the total site area.
- Occupiable areas of green roofs can be used in open-space calculations if the roof area is accessible to all residents.
- Land that is set aside for future development cannot be included as open space in calculations.

RECOMMENDATIONS

- Consider the security and maintenance needs of all open spaces included on the site.
- Design building massings to enhance nearby parks, plazas, and open spaces.

- Ensure open spaces are safe and are designed to promote active use by residents. Features like active bike and walking trails and paths, lighting, seating options, native plantings, and recreation facilities help make open spaces a community amenity.
- Design open spaces to align with the cultural preferences of the local population and to accommodate people of all ages.

RESOURCES

- U.S. Environmental Protection Agency, Smart Growth. Tools and technical assistance to support smart-growth plans and priorities. *www.epa.gov/smartgrowth*
- The Trust for Public Land. This national nonprofit helps communities create parks and protect public land as a matter of health, equity, and justice. *www.tpl.org/*
- The Trust for Public Land, ParkScore Index. A scoring system that ranks 100 U.S. cities based on equity, access, investment, amenities, and acreage. *www.tpl.org/parkscore*

Mandatory for New Construction, except for projects defined as Rural/Tribal/Small Town; Optional for all projects: 12 points maximum

2.6 Transit, Mobility, and Walkability

RATIONALE

A range of mobility options contributes to accessible, healthy, and green communities. Projects located near transit reduce a resident's need to own or rely upon a car, thereby eliminating or lowering the costs of auto ownership and reducing related emissions. Locating near high-frequency transit typically allows residents to access employment centers and provides opportunities for increased physical activity. Linked bicycle facilities increase the area served by public transit. Safe and accessible walking and biking connections can reduce social isolation and increase equity by making it easy for residents to access community amenities, including transit. Research shows that people who live in low-income communities and in communities of color often do not have access to these benefits. This has led to lower levels of physical activity, higher rates of chronic diseases, and less access to employment opportunities. Increasing access to complete sidewalks, protected bike lanes, and dedicated bike paths linked to community amenities reduces inequities created by the built environment.

REQUIREMENTS

New Construction projects NOT in Rural/Tribal/Small Town locations

Mandatory

Locate projects within a 0.5-mile walk distance of public transit services (bus, rail, and/or ferry) that, combined, provide at least 45 transit rides per weekday and include service on both Saturdays and Sundays.

OR

Demonstrate any two alternative-transit strategies from any of the three strategies lists below—Shared mobility initiatives, Increased bikeability, or Increased walkability.

Rehabilitation projects NOT in Rural/Tribal/Small Town locations

Optional
Locate projects within a 0.5-mile walk distance of public transit services (bus, rail, and/or ferry) that, combined, provide at least 45 transit rides per weekday and include service on both Saturdays and Sundays. *[6 points]*

All projects in Rural/Tribal/Small Town locations

Optional
Any/all of the options here will earn 6 points. Locate projects within a 1-mile walk distance of public transit services (bus, rail, and/or ferry) that, combined, provide at least 45 transit rides per weekday and include service on both Saturdays and Sundays.

OR

Locate the project within 5 miles of one of the following transit options: 1) vehicle-share program, 2) dial-a-ride program, 3) employer vanpool, 4) park-and-ride, 5) public–private regional transportation. *[6 points]*

Note for all locations:
A "ride" is an opportunity to take a transportation line or route from a stop. For example, suppose your site has one bus stop with service from two bus routes. Route 1 runs service every 30 minutes Monday through Friday from 6 a.m. to 9 p.m. Route 2 runs service every hour during the same time range. Your project would have:

Route 1: 15 hours x 2 stops per hour = 30 "rides"
+ Route 2: 15 hours x 1 stop per hour = 15 "rides"
Total: 45 rides / workday

All projects

Optional
Project teams may select additional strategies from the list below for 1 point per strategy, up to *6 maximum points*.

Shared mobility initiatives *[1 point each]*

- Provide residents with discounted transportation passes for a period of at least 12 months.
- Provide residents with free transportation passes for a period of at least 12 months.
- Include vehicle-share and/or vanpool parking on the property.
- Provide all eligible residents with discounted vehicle-share memberships for a period of at least 12 months.
- Provide a minimum of 50% of eligible residents with free vehicle-share memberships for a period of at least 12 months.

Increased bikeability *[1 point each]*

- Locate the project along dedicated bike trails or lanes (Class I, II, or IV) that lead to high-quality transit services (100 or more trips per day) within 3 miles.
- Provide outdoor short-term bicycle storage or racks and one bike-repair station accessible for visitors and residents.
- Provide secure, lockable, sheltered, and accessible long-term bicycle storage for at least 25% of building residents. Post signage directing residents to bicycle parking areas and programs.
- Provide bicycles and equipment (e.g., helmets, locks, tire pumps, maintenance equipment) for resident use.
- Promote use of and access to one or more bicycle-share or micromobility (e.g., scooter) programs within 0.5-mile of the building. Bicycles and micromobility options must be accessible to occupants at all hours. Maps to the nearest bike station and other access information should be posted in a visible location within a common area in the building and must be included in the materials provided in compliance with *Criterion 8.3 Resident Manual*.
- Provide residents with discounted bicycle-share or micromobility memberships for a period of at least 12 months.
- Provide residents with free bicycle-share or micromobility memberships for a period of at least 12 months.

Increased walkability *[1 point each]*

- Include public wayfinding signage that promotes walkability and access to services.
- Include at least two site-improvement features adjacent to sidewalk(s) within the development (e.g., street trees, seating, trash receptacles, or bike-maintenance stations) to create an active streetscape that encourages walking and biking.
- Include at least two of these features within the development to increase pedestrian activity and comfort:
  - » Curb extensions
  - » Sidewalk(s) widened beyond what is required by code or local regulation
  - » An unpaved buffer separation, barrier, or curb edge to physically separate sidewalks from roadways
  - » Visual appearance of sidewalks where they cross driveways and alley access-ways, using a scoring pattern or special paving
  - » Clearly defined and marked crosswalks at all intersections

RECOMMENDATIONS

- Consider using technology like TransitScreen in common areas to provide real-time transportation information to residents and staff. *http:/transitscreen.com*.
- Provide bicycle trail and route maps, or information for residents about where to get them. Many cities and counties have such maps for free download on their websites.

- When considering enhancing access to alternative modes of transportation, gather community input to learn what people in the area would see as benefiting their community.
- Encourage safety when considering opportunities for biking, walking, driving, and parking. Consider promoting designs that encourage slow-speed, low-volume roadways, thereby enhancing pedestrians' and bikers' safety.
- Consider offering a trial subscription or membership for residents to try a local vehicle-share or bike-share service. Contact the provider of these services to see if they would like to offer a discount or credit to encourage use.
- For ease of use, consider incorporating bicycle storage on the ground floor with direct roll-in access that is separate and distinct from automobile access. Push-button doors make roll-in access even more convenient for riders, especially during inclement conditions.
- Provide bicycle storage for staff as well as residents.
- To encourage pedestrian activity, minimize vehicular curb cuts on streets with heavy foot traffic by constructing curb extensions along sections of the sidewalk that tend to attract greater pedestrian congestion and sections that are close to pedestrian crossings.

RESOURCES

- Google Maps offers a function to demonstrate walk distances and to identify bicycle trail and route maps. On Google Maps, go to "Directions" and select "Walking" or "Cycling," as applicable, to obtain this information. *www.google.com/maps*
- Victoria Transportation Policy Institute. This independent research organization provides consulting and publicly available research about solutions to emerging transportation strategies, such as transportation demand management. *www.vtpi.org*
- National Center for Mobility Management, Profiles of Innovative Rural Vanpool Programs. This resource describes several exceptional vanpool programs around the country. *www.ccam-tac.org/mobility-management-resource-center/*
- National Association of City Transportation Officials, Bike Lanes. *https://nacto.org/publication/urban-bikeway-design-guide/*
- Robert Wood Johnson Foundation, Active Living Research. *https://activelivingresearch.org/*
- Transportation for America, The Scenic Route: A Primer on Creative Placemaking in Transportation. *www.americansforthearts.org/sites/default/files/Creative-Placemaking-Web.pdf*
- Community Preventive Services Task Force, The Community Guide: What Works to Promote Health. *www.thecommunityguide.org/*
- Community Preventive Services Task Force, The Community Guide: Street-Scale Urban Design Land Use Policies. *www.thecommunityguide.org/media/pdf/PA-Street-Scale-Archive.pdf*
- Association of Pedestrian and Bicycle Professionals, Bicycle Parking Guidance. *www.fcgov.com/bicycling/pdf/apbp-2010-bicycleparkingguidelines2.pdf*

2.7 Access to Fresh, Local Foods

Optional: 6 or 8 points

RATIONALE

Access to fresh produce offers healthy food options for residents and contributes to community well-being and other outcomes, particularly for children. Yet millions of Americans have limited access to healthy, affordable food due to a combination of low income and lack of a nearby market or grocery store. In addition to promoting resident health, purchasing fresh produce directly from farmers supports local food systems and encourages local economic development by increasing the value returned to locally productive community gardens and food retail.

REQUIREMENTS

Option 1: Proximity to grocer offering fresh produce

Locate the project within a 0.5-mile walk distance of at least one grocery store that sells fresh produce year-round and accepts Supplemental Nutrition Assistance Program (SNAP) benefits. *[6 points]*

Projects that qualify as Rural/Tribal/Small Town may demonstrate the above within 10 miles.

OR

Option 2: Proximity to farmers' market

Locate the project within a 0.5-mile walk distance of an existing or planned farmers' market that will operate at least once a week for at least five months of the year, or for a length of time proportional to the growing season for the project's vicinity. A planned farmers' market must have firm commitments from vendors that the market will meet all the above requirements and be in full operation by the time there is 50% occupancy of the project's dwelling units. *[6 points]*

OR

Option 3: Neighborhood farms and gardens

Provide permanent, on-site food-growing space comprising at least 10 square feet per dwelling unit for at least 25% of the dwelling units. Provide watering systems, secure storage space for tools, and safe access for residents to the gardening spaces. Ensure that the gardens are established and maintained to minimize pests without the use of unnecessary pesticides. Ensure that the food-growing space is managed by an entity that includes residents in its decision-making, such as a resident council or a homeowners' association. *[6 points]*

OR

Option 4: Community-supported agriculture

Offer a specified location within the project boundaries for delivery of fresh food to residents, staff, and surrounding community members, as appropriate, through community-supported agriculture or another food-share program. Shares must be delivered to the specified delivery point on a regular schedule at least twice a month for at least four months of the year. *[6 points]*

OR

Option 5: On-site food pantry with fresh produce

Partner with a food pantry provider to increase access to healthy foods on the property. The food must include fresh produce, and there must be a signed partnership agreement. The project must include permanent space for the food pantry. Consider the potential need for a walk-in cooler and freezer as well as space for dry goods. *[8 points]*

RECOMMENDATIONS

- For projects pursuing Option 3, consider allocating additional square footage to support areas for community gardening (e.g., pathways, sheds, storage areas) and bringing in an individual or a group (e.g., a master gardener or a garden club) to work with residents to establish the garden and maintain productivity. Seek out local agriculture nonprofits in your area for support.
- Grow and/or plant foods that have cultural connections for residents—either familiar or traditional foods—and allow residents to decide what to grow. Plantings may also include food-bearing shade trees and ornamental shrubs.
- Encourage fresh food providers, including those who organize farmers' markets and run food cooperatives (co-ops), to accept Supplemental Nutrition Assistance Program (SNAP) benefits via Electronic Benefit Transfer (EBT).
- Consider incorporating cooking classes for residents into your resident engagement program (see *Criterion 2.8 Community Space and Programs*). Cooking classes are a fun and creative way to incentivize healthy food options, raise awareness and understanding of cultural diversity in a place, and build community and social cohesion within a development.

RESOURCES

- U.S. Department of Agriculture, Food Access Research Atlas. This interactive map provides food-access data by income within a census tract, which can be downloaded for community planning or research. *www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas*
- Gus Schumacher Nutrition Incentive Program (GusNIP). A public–private partnership offering nutrition incentive grants, produce prescription grants, and other programs to increase access to fresh produce.
- Fair Food Network, Double Up Food Bucks. This program matches benefits to double the purchasing power of SNAP recipients when they buy fruits and vegetables. *https://doubleupamerica.org/*

Resources linking real estate development, financing, and fresh food:

- Equitable Food Oriented Development. *https://efod.org/about/*
- America's Healthy Food Financing Initiative. *www.investinginfood.com/*, *www.reinvestment.com/insights/national-healthy-food-financing-initiative/*

Resources to locate food distribution near a property:

- USDA Local Food Directories. *www.usdalocalfoodportal.com/*
- Local Harvest. *www.localharvest.org/csa/*
- USDA Food Access Research Atlas. *www.ers.usda.gov/data-products/food-access-research-atlas*

2.8 Community Space and Programs

Optional: 5 points

RATIONALE

Housing can offer opportunities to enhance the lives of residents when it includes physical space to accommodate learning, job skill development, and other empowering social interactions. In some cases, small-business-focused economic development can help prevent displacement of locally owned businesses and retain employment opportunities. By forming partnerships with local businesses and community organizations, housing can also be a platform for bringing health, education, and economic mobility programs directly to residents. These partnerships enhance resident engagement, increase access to resources, and foster a more vibrant and supportive community.

REQUIREMENTS

Provide physical space for, or establish a formal partnership with, a local business, nonprofit, or other organization that offers community recreation activities, services, skill development, or education in response to resident and community needs and preferences. The lease or partnership agreement must include a minimum 12-month commitment and one or more of the following:

- **Rent incentive:** Provide a reduced-cost space for job skill development, educational institutions and/or public education.
- **Local business:** Provide space specifically to local and small businesses or nonprofits to support local economic development. Local and small businesses must meet prevailing national definitions (e.g., no national chains, even if they are locally owned franchises or registered B Corporations).
- **Resident priority:** Provide space for a child care or health care facility with priority access for residents.
- **Local partnerships:** Establish a formal partnership with nonprofits, small or local businesses, service or education providers, child care operators, or health care operators that deliver programming within 0.5 miles of the project to provide:
  - » Health and wellness (nutrition, cooking, screenings, child care, or health care)
  - » Educational empowerment and digital inclusion (before-or after-school programs, educational institutions, trainings)
  - » Economic empowerment (financial literacy, coaching, job training, entrepreneurship support, small business or nonprofit development)

Partnership must be demonstrated through a contract that includes an outline of the community program or services to be delivered and evidence of accessible hours for residents. *[5 points]*

RECOMMENDATIONS

- If providing physical space for business, nonprofits, and/or skill and workforce education, prioritize leasing to tenants that would become neighborhood assets. For instance, if your project has access to bike routes or trails, leasing space to a bicycle workshop or co-op would be one way to promote bicycle use and provide a valuable amenity to residents and the community at large. Innovative bike programming may teach people how to ride bicycles, mentor people about using bicycles safely for everyday needs (e.g., winter biking), let people check out bicycles, teach bicycle maintenance, and more.
- Ensure commercial and/or educational spaces have doors or direct access to the street at grade. At minimum, commercial and educational space should have visual connections to the outdoors.
- Engage with residents early through surveys, focus groups, or conversation to identify priority programs.
- Partner to deliver programs efficiently and avoid service duplication with local community-based organizations that are familiar with the needs in the community.
- Increase participation and uptake with culturally relevant programs that respond to local and resident cultures.
- Design flexible community space that can support a range of programs, with attention to storage, privacy, or access needs that may be required to deliver the programming.
- Track participation, satisfaction, and outcomes to improve programs and demonstrate to partners, residents, and funders the impact of partnerships and programs.
- Plan for long-term sustainability by diversifying partners, budgeting for services, and assigning ongoing staff support for coordination.

RESOURCES

- Build Healthy Places Network. This coalition provides tools, explainers, market analysis, and other resources for advancing community development. Case studies highlight successful health and economic partnerships in affordable housing. The group also trains and partners with local organizations and government agencies to build community power, including neighborhood revitalization efforts. *https://buildhealthyplaces.org/*
- Stewards of Affordable Housing for the Future; Healthy, Thriving Residents. This website includes tools, resources, and a framework to support residents' health and well-being through service-enriched housing and other initiatives. *https://sahfnet.org/our-work/healthy-thriving-residents*
- NeighborWorks America. Resources recognizing the importance of housing as a key partner in health. *www.neighborworks.org/Community/Health*

2.9 Access to Broadband

Mandatory for all multifamily properties; Optional for all properties: 6 points

RATIONALE

Providing adequate, reliable internet connectivity is critical to ensuring residents have access to educational programs, telemedicine, and job opportunities. In communities that don't yet have broadband service, building owners have the opportunity to build pathways for future installation of broadband.

REQUIREMENTS

Determine whether broadband internet service is available to your project and follow the guidance below. To determine service availability, consult the Federal Communications Commission National Broadband Map for 100/20 fixed broadband: *https://broadbandmap.fcc.gov/home*

Multifamily projects for which 100/20 fixed broadband is available to the parcel

Mandatory

Provide broadband internet access with at least a speed of 100 megabits per second for downloading and 20 megabits per second for uploading (100/20) to one shared common space at the property. Not applicable for properties without shared common spaces.

Multifamily projects for which 100/20 fixed broadband is not available to the parcel

Mandatory

Design and build or retrofit the property to incorporate broadband infrastructure so the property can be easily connected when broadband service comes to the parcel. Include a network of conduits throughout the building, extending from the expected communications access point to each network termination point in the building. Internet service and its ongoing service fee are not required.

Network termination points must include:

- Conduit from the property line (expected broadband access point) to the utility room
- Conduit from the utility room through risers and/or other infrastructure that leads to the expected network termination points, to at least:
  - » One common space for Moderate Rehab projects with shared common spaces
  - » The expected network termination points in each dwelling unit and each common space for Substantial Rehab and New Construction projects

All projects

Optional

Provide broadband internet access with at least a speed of 100 megabits per second for downloading and 20 megabits per second for uploading (100/20) to each common amenity space AND to each residential unit in the property. *[6 points]*

RECOMMENDATIONS

- Provide digital-skills training for the property's residents, either directly or through partnerships with local anchor and/or civic institutions.
- Locate within 0.5 mile of schools and libraries, as these are often the first facilities in a community to receive broadband access through the E-Rate program described below.

Installation tips:

- Broadband conduit would follow the same path as telephone and cable TV conduit.
- If broadband is provided elsewhere in your community, consult with local service providers to determine more precise specifications for the type of cable preferred, to help ensure that your property can connect in the future.
- Fiber connections and equipment are typically located in a dedicated electrical or telecom closet, often on a low floor in the building with access to riser spaces. In areas that are prone to flooding, the electrical and/or telecom closet may be located elsewhere.
- Power and HVAC services will be helpful if the service provider plans to install active electronics in the closet.
- In occupied buildings undergoing rehabilitation, conduit placement can be challenging. However, there are many alternative ways of making pathways for broadband infrastructure, including placing cables above drop ceilings or moldings, mounting small cables on wall surfaces, or running cables up the outsides of buildings into individual units. Fiber-optic cables can be very small, and in many cases the visual impact can be minimal.

RESOURCES

- Federal Communications Commission, National Broadband Map. Enter your property address to determine availability of service. *https://broadbandmap.fcc.gov/home*
- Public Library Association, Digital Literacy. *www.ala.org/pla/initiatives/digitalliteracy*
- Federal Communications Commission, E-Rate. This program helps schools and libraries obtain affordable broadband. *www.fcc.gov/consumers/guides/universal-service-program-schools-and-libraries-e-rate*
- U.S. Department of Housing and Urban Development, Broadband Technology 101: A Guide for HUD-Assisted Communities. This overview and decision guide offers technological solutions for connectivity and provides highlights from real projects. *https://files.hudexchange.info/resources/documents/Broadband-Technology-101-A-Guide-for-HUD-Assisted-Communities.pdf*
- Next Century Cities, Become Broadband Ready. A toolkit of best practices for bringing fast, affordable, reliable broadband to communities. *https://nextcenturycities.org/broadband-toolkit/*
- Broadband Communities, Making a Building Fiber-Ready. Guidelines to help building owners provide spaces, pathways, and cables that service providers can use to deliver fiber-optic services. *https://bbcmag.com/making-a-building-fiber-ready-3/*

- Next Century Cities, Webinar: Connecting Residents in Low-Income Housing. *https://youtu.be/r3CZBIFHszU?si=8b9a1oGWHHPIu2jz*
- City of Austin, Texas; Telecommunications and Regulatory Affairs, Digital Inclusion Strategy. *www.austintexas.gov/digitalinclusion*
- City of Kansas City, Missouri; Digital Equity Strategic Plan. *www.kcmo.gov/city-hall/departments/city-manager-s-office/digital-equity-strategic-plan*
- National Digital Inclusion Alliance, Digital Inclusion Resources. *www.digitalinclusion.org/resources/*
- National Digital Inclusion Alliance, The Digital Inclusion Coalition Guidebook. *www.digitalinclusion.org/blog/ndia-publishes-new-digital-inclusion-coalition-guidebook/*
- U.S. Department of Commerce, National Telecommunications and Information Administration; Five Digital Inclusion Trends in the United States. *www.ntia.gov/blog/2018/five-digital-inclusion-trends-united-states*
- Everyone On, Offer Locator Tool to search for low-cost internet offers by ZIP code. *www.everyoneon.org/lowcost-offers*

2.10 Adaptive Reuse of Buildings

Optional: 6 points

RATIONALE

The reuse of existing structures reduces landfill waste, the need for new materials, and pressure to develop undeveloped land. Adaptive reuse techniques extend the useful life of existing structures. Preserving and adapting existing buildings can also help reinforce a community's unique sense of history by retaining known built forms.

REQUIREMENTS

Rehabilitate and adapt an existing structure that was not previously used as housing. Design the project to adapt, renovate, or reuse at least 50% of the existing structure and envelope, including exterior skin and framing but excluding window assemblies and nonstructural roofing.

Projects with multiple buildings are eligible for optional points as long as one of the buildings is being renovated and adaptively reused for residential purposes.

RESOURCES

- National Trust for Historic Preservation, Preservation Leadership Forum; Untapped Potential: Strategies for Revitalization and Reuse. *https://cdn.savingplaces.org/2023/07/20/15/05/56/177/ULI_NationalReport_Web_10.24.2017.pdf*
- National Trust for Historic Preservation, Building Reuse: A Proven Climate and Economic Strategy. *https://cdn.savingplaces.org/2023/05/24/09/53/59/180/AIA%20NTHP%20Building%20Reuse%20Resource%20FINAL.pdf*

- The Brookings Institution, A community guide to office-to-residential conversion. *www.brookings.edu/articles/a-community-guide-to-office-to-residential-conversion-part-1-economics/*
- Center for Community Progress. Information, resources, tools, and assistance to support revitalization of vacant properties. *www.communityprogress.org*

> "It's exciting to have the security to go forward. I just want to keep trying everything I can."
>
> Karen Deane, Cadence Resident

3 Site Design

A healthy, thriving site protects people and infrastructure from pollutants, reduces negative project impacts, and boosts community well-being and resilience by leveraging ecosystem services for social, economic, and environmental benefits.

3.1 Minimization of Disturbance During Staging and Construction

Mandatory

RATIONALE

Controlling erosion and sedimentation during construction reduces pollution of storm sewer systems and local waterways from sediment, chemicals, and construction debris that may be transported by stormwater. Compacted soils absorb less water, resist plant root penetration, and lack the porosity needed for adequate aeration. Protecting healthy soils during construction and then remediating any compaction can minimize the adverse effects of construction activities and keep productive soils on the site.

REQUIREMENTS

All projects on sites of 1 acre or smaller

Mandatory

Provide and implement an erosion and sedimentation control plan that includes the following mitigation strategies:

- Stockpile and protect high-quality site soils to be reused.
- Control the path and velocity of runoff with silt fencing or comparable measures.
- Protect ecologically sensitive areas, such as on-site storm sewer inlets, watercourses, and water bodies, by applying straw bales, silt fencing, silt sacks, rock filters, or comparable measures.
- Provide swales to divert surface water from hillsides.
- Identify and protect healthy trees with a diameter at breast height greater than 5 inches during construction. Install tree-protection fencing outside the critical root zone. Do not preserve invasive species or trees that present a hazard.
- If soil in a sloped area is disturbed during construction, use tiers, erosion blankets (geotextile mats), compost blankets, filter socks and berms, or an equivalent approach to keep soil stabilized. The maximum gradient should be consistent with existing natural conditions in the surrounding area. In hot, arid climates, use lesser gradients on south- and west-facing slopes to improve landscape reestablishment and ongoing viability.

All projects on sites larger than 1 acre

Mandatory

Implement the 2022 U.S. Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit for Stormwater Discharges or local requirements—whichever is more stringent.

RECOMMENDATIONS

- Create and implement an erosion, sedimentation, and pollutant control plan (commonly referred to as a stormwater pollution prevention plan, or SWPPP) or an erosion and sedimentation control plan (ESC), for all construction activities associated with the project. Create the plan to conform with the EPA's Construction General Permit or with local erosion- and sedimentation-control standards and codes—whichever is more stringent. Include best management practices and describe how these practices accomplish the following objectives:
  - » Prevent loss of soil during construction from stormwater runoff or wind erosion. Strategies should include protecting topsoil by stockpiling or covering it for reuse.
  - » Reduce the frequency and severity of sediment discharges into storm conveyances, receiving waters, or other public infrastructure components or systems.
  - » Avoid polluting the air with dust or other particulate matter.
  - » Prevent runoff and infiltration of other pollutants from construction sites (e.g., thermal pollution, concrete wash, fuels, solvents, hazardous chemical runoff, high-or low-pH discharges, pavement sealants) and ensure proper disposal of all construction-related materials.
  - » Protect existing soils (prevent compaction; implement mitigation/restoration).
- Protect existing trees and other vegetation, except invasive species, which should be removed if possible. Note that it may be preferable to retain established trees for shading even if they are non-native.
- Before disturbing the site, consult a landscape architect, civil engineer, or state university cooperative extension about the quality of soils on the site. Determine which are suitable for reuse and protect these soils throughout construction.
- Support a net-zero-waste site and minimize downcycling of materials by reusing, recycling, or otherwise diverting construction and demolition materials to avoid disposal in landfills and combustion in incinerators.

RESOURCES

Guidance on pollution discharges:

- U.S. Environmental Protection Agency resources:
  - » National Pollutant Discharge Elimination System (NPDES). *www.epa.gov/npdes*
  - » 2022 NPDES permit. *www.epa.gov/npdes/2022-construction-general-permit-cgp*
  - » Stormwater Discharge from Construction Activities. *www.epa.gov/npdes/stormwater-discharges-construction-activities*
- Find erosion and sedimentation control professionals in your state through the International Registry of Certified Professionals in Environmental Specialties. *https://envirocert.org/directory/*

Guidance for protecting trees during construction:

- NC State Extension, Construction and Tree Protection. *https://content.ces.ncsu.edu/construction-and-tree-protection*
- Purdue University, Construction and Trees: Guidelines for Protection. *www.extension.purdue.edu/extmedia/FNR/FNR-463-W.pdf*

3.2 *Mandatory* Site Design for Ecosystem Services

RATIONALE

Natural elements in the built environment can protect and improve a community's quality of life and resilience. A well-integrated site design protects, preserves, and can even restore natural elements to benefit the greater ecosystem, the local community, and residents' well-being. Thoughtful site design can also provide ecosystem services—benefits that humans obtain from natural systems.

For example, soils and vegetation provide services by absorbing and treating stormwater to reduce erosion, flooding risk, and downstream pollution. Trees can provide shade, protect buildings from wind, improve air quality, and remove carbon dioxide from the atmosphere.

Living landscapes provide more effective ecosystem services and are less likely to cause unintended harm when they incorporate native and adapted species. Native plants provide value in connecting people to place, and they are typically more resistant to naturally occurring diseases and to insects, drought, and fire. Selecting native and adapted plantings can also reduce or eliminate the need for fertilizers, pesticides, and irrigation.

REQUIREMENTS

Design your property to protect and enhance the local ecosystem by creating a site plan that demonstrates how all disturbed areas will be addressed, including, as applicable, a grading plan and a landscape/planting plan. Ensure the site plan reflects the following, at minimum:

- For all areas disturbed during construction that remain undeveloped, plant, seed, or restore to natural conditions as appropriate for the location.
- For all landscape plantings—including trees, shrubs, and herbaceous plants—select only species that are native or climate-appropriate (adapted) to the region and are appropriate to the site's soil and microclimate. Do not introduce any invasive or nonadapted plant species.
- To promote a safe and secure environment, ensure that the expected heights of plants adjacent to pedestrian walkways and seating areas do not obstruct visibility into or out of the corridor.

Develop a site-specific operation and maintenance plan and include the site plan in *Criterion 8.1 Building Operations & Maintenance Manual and Plan*.

RECOMMENDATIONS

- Consult a landscape architect or a local arborist early in the integrative design process to develop your landscaping, open space, and/or shading plans and to identify appropriate locations and plantings for these features.
- Avoid steep slopes and avoid sloping land toward buildings.
- Provide appealing environments along paths of travel with visually interesting landscaping (e.g., a variety of colors, textures, and flowering times).
- Existing invasives should be removed if possible. Note that it may be preferable to retain established trees for shading even if they are non-native. When removing invasive species, be careful that your removal and transfer of invasive plant material limit site disruption and do not compact soil or disperse seed stock. Consult your local cooperative extension office for best practices and plant lists.
- Evaluate the future climate-appropriateness of plantings, particularly long-lived trees. Look beyond your current zone and consider planting species that are appropriate for a zone slightly warmer than your current one (provided they are not invasive species).
- Incorporate plantings to attract and sustain pollinators.
- Promote native, regionally appropriate grass species when possible; they are less resource intensive regarding irrigation, fertilization, and mowing requirements. An appropriate level of mowing or grazing can increase carbon sequestration by native grasses.
- Develop a soil-management plan to identify, protect, and reuse high-quality site soils; identify disturbed soils; and outline a soil-restoration process. Provide adequate horticultural soil volume for new tree plantings. Reference the ANSI A300 standards developed and managed by the Tree Care Industry Association for more details.
- Strive to use minimal and low-toxicity fertilizers, pesticides, herbicides (including pre-emergent), and fungicides.
- Consider implementing site features to mitigate routine wind if on-site prevailing wind direction and average speed are such that outdoor activity and/or resident safety may be impacted. Strategies include fenestrated panels, some fencing types, and/or landscape placement that dissipates energy rather than accelerating wind speed around solid objects, which may create eddies and impede outdoor activity.
- Consider the proximity of plantings to your building regarding fire protection. Reducing or eliminating flammable material in a defined perimeter around your structure can be an effective mitigation technique against fire originating outside the site. Plants have varying levels of flammability; consult your local extension office to identify native plants in your region with low flammability potential. Also review the wildfire mitigation strategies outlined in *Criterion 3.11 Resilient Site Design: Wildfire*.

RESOURCES

- ReScape California. This California nonprofit educates about and advocates for a regenerative, whole-systems approach to landscaping that works in harmony with the natural environment. Find ReScape-qualified professionals, tools, and the ReScape Rating System for multifamily landscapes that have an irrigated area of 2,500 square feet or more. *www.rescapeca.org/rated-landscapes*
- Lady Bird Johnson Wildflower Center, Native Plant Information Network. This site includes a database of native wildflowers, plants, and landscapes throughout North America. The website also includes a National Suppliers Directory. *www.wildflower.org/explore/*
- North American Native Plant Society. Includes a database of plant societies by state. *https://nanps.org/native-plant-societies/*
- American Forests, Tree Equity Score National Explorer. Search for an address on this interactive map to learn how much tree canopy exists in the neighborhood and explore related equity data. *www.treeequityscore.org/map*
- Arbor Day Foundation, Future Hardiness Zone Map. An interactive mapping tool forecasting changes in plant hardiness zones. *www.arborday.org/perspectives/planting-future-proof-trees-warmer-world*
- Climate Central, Warming Planting Zones. An analysis of how planting zones have already shifted and how they are projected to shift by mid-century. Includes a downloadable map, infographic, and video. *www.climatecentral.org/climate-matters/warming-planting-zones-2025*
- Northeast Organic Farming Association (NOFA) of Connecticut, NOFA Standards for Organic Land Care. These standards were developed to promote a sustainable ecological landscaping system that promotes and enhances biodiversity, biological cycles, and soil biological activity. *https://nofa.organiclandcare.net/about-organic-land-care/the-standards/*
- Seattle Public Utilities; Lawns, Plants, and Trees. Seattle maintains many helpful resources concerning sustainable, natural care of plants and lawns, including information on plant selection, installation, and maintenance. *www.seattle.gov/utilities/protecting-our-environment/sustainability-tips/landscaping/for-professionals/lawns-plants-and-trees*
- U.S. Department of Agriculture (USDA), National Invasive Species Information Center. A reference gateway to invasive species information that draws from federal, state, local, and international sources. *www.invasivespeciesinfo.gov/*
- USDA, Agricultural Cooperative Extension System. Lists of local drought-tolerant plants may be available from local USDA Agricultural Cooperative Extension System offices, as well as through numerous online resources. *www.nifa.usda.gov/about-nifa/what-we-do/extension/cooperative-extension-system*
- U.S. Forest Service, Celebrating Wildflowers. This site has extensive information on native gardening, selecting appropriate native plants, and avoiding invasive plant species. It also includes basic instructions for restoration and native landscaping projects. *www.fs.usda.gov/managing-land/wildflowers*
- Utah State University, Topsoil Quality Guidelines for Landscaping. *https://extension.usu.edu/yardandgarden/research/topsoil-quality-guidelines-for-landscaping*

3.3 *Mandatory for all projects with exterior lighting in the scope of work; Optional: 2 points*

Exterior Lighting

RATIONALE

Exterior lighting provides human safety and comfort as well as productive use for more hours of the day. Site lighting can support safety, security, ease of identification, aesthetics, and accessible wayfinding.

However, poor exterior lighting design is inefficient, wasting energy and creating unwanted light. Light pollution from artificial light at night can disrupt sleep patterns and be detrimental to residents' health; it also may negatively affect migratory bird navigation, seasonal rhythms of flora and fauna, and human circadian rhythms.

REQUIREMENTS

All projects with exterior lighting in the scope of work

Mandatory

All permanently installed exterior lighting fixtures, with the exception of emergency lighting, must meet the following requirements or local requirements—whichever is more stringent.

Lighting Zone and BUG Rating

- Determine the site's lighting zone (LZ) per your local jurisdiction or using the IDA/IES Model Lighting Ordinance (MLO) 2011 with User's Guide Table C.
- Choose luminaires with Backlight, Uplight, and Glare (BUG) ratings appropriate for the site's LZ. BUG ratings are published in manufacturer photometric data.

Uplight Control

- Fixtures shall have Zero Uplight (U0), be "fully shielded," and/or be shielded above by architectural features, emitting no light above the horizontal plane.
- Fixtures shall have no sag or drop lenses, side light panels, or uplight panels.

Adaptive Controls

- Install photo or motion sensors, integrative PV cells, or astronomic time-clock operation that limit lighting when there is adequate daylight.

Dimming

- All light fixtures shall be dimmable to 10% or less of their full light output to support adaptive controls, support wildlife-friendly lighting, and promote energy savings.

Optional

Optimize all exterior lighting fixtures by complying with one of the following *[2 points]*:

- DarkSky Luminaires Program Version 3.0
- Florida Fish and Wildlife Conservation Commission (FWC) Guidelines

RECOMMENDATIONS

- Design in accordance with DarkSky International's Five Principles of Responsible Outdoor Lighting:
  - » Useful
  - » Targeted
  - » Low-level
  - » Controlled
  - » Warm-colored
- Photometric plans can be used for evaluating exterior light levels and correctly sizing the number of fixtures appropriate to the project.
- Consider outdoor lighting levels that are appropriate to the context of the project. Urban areas typically have existing exterior lighting, so the contribution of artificial light from housing may have less impact on the light levels and ecosystems in the area compared to housing in rural areas. The presence of local animal species with certain sensitivities to light may also impact appropriate light levels.
- Design outdoor lighting to eliminate light trespass (when light from the project site spills onto other properties) and to minimize impact on nocturnal environments.
- BUG ratings are published in manufacturer photometric data per IES TM-15 and will be shown on product cut sheets or illustrated on the project lighting schedule.
- Consider incorporating daylight-responsive lighting control systems.
- Employ warm-toned (3000K and lower) white light sources, amber light sources, or filtered LED light sources.
- Coastal areas along the Atlantic and Gulf Coasts are home to at-risk sea turtle populations. Properties in this region must light in accordance with local wildlife lighting ordinances. This is crucial because when turtles hatch, they seek the brightest spot on the horizon, which is generally not the ocean when they emerge. Projects should light in accordance with specific wildlife lighting recommendations and should focus on maximizing downward and motion-sensor security lighting as those are critical elements for eliminating bright spots.

RESOURCES

- DarkSky International, Five Principles for Responsible Outdoor Lighting. *https://darksky.org/resources/guides-and-how-tos/lighting-principles/*
- DarkSky International, Guidelines for Good Exterior Lighting. *www.darkskysociety.org/handouts/LightingPlanGuidelines.pdf*
- DarkSky Approved Luminaires Program. How to comply with DarkSky Luminaires Program Version 3.0. *https://drive.google.com/file/d/1rUPOlqStmSRJYrsggQsAvXL1z61fSqJq/view*
- Illuminating Engineering Society and DarkSky International, Joint IDA – IES Model Lighting Ordinance (MLO) with User's Guide. Explains the use of lighting zones as well as the Backlight–Uplight–Glare (BUG) rating system for exterior luminaires. *https://darksky.org/app/uploads/bsk-pdf-manager/16_MLO_FINAL_JUNE2011.PDF*
- Florida standards for wildlife certified lighting. *https://myfwc.com/conservation/you-conserve/lighting/criteria/*

Mandatory for New Construction; Mandatory for Rehabilitation if land disturbed is ≥5,000 ft²; Optional for all projects: 10 points maximum

3.4 Surface Stormwater Management

RATIONALE

Reducing or eliminating stormwater runoff through design and management techniques increases on-site filtration, reduces total suspended solids and other pollutants entering storm sewer systems and waterways, and decreases soil erosion.

From a resilience standpoint, minimizing stormwater runoff and storm sewer flows helps reduce both localized and downstream flooding—an important concern as storm intensity and frequency are increasing in many areas. Water storage and nutrient collection contribute to healthier ecological communities within the landscape and may reduce irrigation needs.

Appropriate stormwater management also helps protect buildings from dampness and mold, which in turn protects residents' health. Pair the requirements of this criterion with best practices for moisture management in the building enclosure, found in *Category 7*.

REQUIREMENTS

Note for rehabilitation projects: The square footage of any existing hardscape that is resurfaced (new material laid on top of old without disturbing or exposing earth) is not counted toward the 5,000-square-foot disturbance threshold that triggers mandatory compliance with this criterion.

Projects on sites smaller than 1 acre

Mandatory

Use low-impact development and green infrastructure to the extent possible to retain on the site the precipitation volume from the 60th percentile precipitation event, as defined by the U.S. Environmental Protection Agency in the Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act, or historical rainfall data (previous 20 to 30 years) for the project's region.

Projects on sites that are 1 acre or more

Mandatory

Using low-impact development and green infrastructure to the extent possible, retain on the site the precipitation volume from the 80th percentile precipitation event, as defined by the U.S. Environmental Protection Agency in the Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act, or historical rainfall data (previous 20 to 30 years) for the project's region.

Note for all projects subject to mandatory requirements:
On sites for which retaining the required percentile precipitation event is not feasible due to geotechnical issues (e.g., high groundwater elevations, bedrock, soil contamination, underground utilities, underground transportation networks), soil conditions (e.g., clay soils), or the size of the site (e.g., zero lot line), the project must treat the required percentile precipitation event and retain the maximum possible up to the required percentile precipitation event.

Optional
Using low-impact development and green infrastructure strategies, design to retain precipitation volume for the following percentile precipitation events:

- 85th percentile precipitation event *[6 points]*
- 90th percentile precipitation event *[8 points]*
- 95th percentile precipitation event *[10 points]*

Precipitation events meeting 85th, 90th, and 95th percentiles are defined by the U.S. Environmental Protection Agency in the Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act. Historical rainfall data (previous 20 to 30 years) for the project's region may also be used.

Note: Some local regulations may require retaining precipitation to a defined volume storm (1, 1.25, 2.5 inches, etc.). That volume can be calculated to determine the corresponding percentile precipitation event for your location.

RECOMMENDATIONS

- Evaluate the discharge volumes and rates to ensure they do not increase the natural rate of erosion in receiving waterways and do not negatively affect a receiving waterway's ecological flows or natural groundwater replenishment rates and volumes.
- Implement stormwater management strategies to reduce precipitation runoff volumes, peak flows, and pollutant discharges, in accordance with the design storm requirements.
- Design systems for rainwater capture and use, where allowed, to maintain the ecological flows of receiving waters and historical groundwater recharge rates.
- Consider designing the stormwater management system for future conditions; historical events may not be the best predictor for rainfall patterns in the future, which are changing rapidly and resulting in more localized flooding in some areas. NOAA Atlas 15 (*https://water.noaa.gov/about/atlas15*) includes future rainfall projections through 2100 to assist in designing stormwater management systems for future conditions.
- Maximize on-site stormwater retention through a combination of low-impact development (LID) and green infrastructure (GI) strategies. Typical approaches include:
  - » Bioretention systems (e.g. rain gardens, bioswales) to filter and absorb runoff
  - » Vegetated swales and filter strips (disconnected downspouts can be directed into these as well)
  - » Roofs (green/blue/blue-green/purple) to capture and evaporate rainfall (green roofs are also a strategy to reduce heat-island effect)
  - » Rainwater capture (e.g., cisterns, rain barrels) to store runoff for irrigation (see also *Criterion 3.6 Outdoor Water Use: Alternative Sources*)
  - » Permeable pavements and/or pavers
- Improve the water-retention capacity of the soil by increasing organic matter content through the addition of compost or other organic soils, in accordance with the properties of your native soils for the area.

- Consider use of porous, semi-permeable, or permeable materials for areas that traditionally use impermeable materials—including roofs, driveways, sidewalks, parking lots, and streets. Porous and semi-permeable materials include pervious interlocking concrete paving blocks, concrete grid pavers, perforated brick pavers, porous asphalt, and compacted gravel. Green roofs and planted surfaces in low-foot-traffic areas and along paved area perimeters can also reduce stormwater runoff and provide a measure of treatment.
- Provide a visual reminder that storm sewer inlets connect to area waterways and groundwater storage. Use a plaque, a tile, or a painted or precast message, such as "No Dumping. Drains to [name of water source]."

RESOURCES

- Low Impact Development Center. This nonprofit national research organization focuses on sustainable stormwater management solutions for both urban and developing areas. *https://lowimpactdevelopment.org/*

U.S. Environmental Protection Agency (EPA) guidance and tools:

- Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects. *www.epa.gov/sites/default/files/2015-08/documents/epa_swm_guidance.pdf*
- Low Impact Development. Includes a set of shareable "LID barrier buster" fact sheets along with dozens of other resources for understanding, promoting, and implementing low-impact development strategies. *www.epa.gov/nps/nonpoint-source-urban-areas#LID*
- Green Infrastructure. Resource gateway connecting to a trove of GI support, from introductory information to technical guidance on designing and green infrastructure for resilience and regulatory compliance. *www.epa.gov/green-infrastructure*
- Bioretention Design Handbook. A comprehensive illustrated guide for both design and post-construction to help designers, planners, and facility operators improve the functionality and management of bioretention systems. *www.epa.gov/system/files/documents/2023-11/bioretentiondesignhandbook_plainnov2023.pdf*
- Green Streets Handbook. *www.epa.gov/sites/default/files/2021-04/documents/green_streets_design_manual_feb_2021_web_res_small_508.pdf*, *www.epa.gov/sites/default/files/2015-08/documents/epa_swm_guidance.pdf*
- Impervious Surface Growth Model. This spreadsheet tool can help project teams assess impervious surface impacts of proposed development scenarios. *www.epa.gov/smartgrowth/impervious-surface-growth-model*

Calculators and other resources on stormwater management and flood resilience:

- National Weather Prediction Service, NOAA Atlas 15. Future rainfall projections through 2100. *https://water.noaa.gov/about/atlas15*
- U.S. Green Building Council, LEED v4.1 Rainfall Events Calculator. A starting point for stormwater calculations. *www.usgbc.org/resources/leed-v41-rainfall-events-calculator*
- Extension Foundation, Find Extension in Your State. Several states and regions have areal-specific guidance. Consult your local extension office. *https://extension.org/find-cooperative-extension-in-your-state/*

3.5 Outdoor Water Use: Efficient Irrigation

Mandatory for all projects that include landscaping; Optional: 3 points maximum

RATIONALE

For multifamily property owners, water use is one of the largest operating expenses. Minimizing potable water used outdoors by using efficient irrigation strategies and installing supportive technology is an important water-conservation strategy. Outdoor water efficiency can be increased substantially through the use of drip or subsurface drip irrigation rather than conventional spray irrigation, while leak-detection systems and commissioned equipment reduce wasted water.

REQUIREMENTS

Mandatory for all projects with landscaping

Option 1: No irrigation

No irrigation system is installed (temporary or permanent).

OR

Option 2: Efficient irrigation

An efficient irrigation system is installed. Efficient irrigation design shall include the following:

- Comply with all local watering restrictions.
- Establish irrigation zones:
  - » Design irrigation zones to respond to weather considerations (temperatures, precipitation, wind), solar exposure, reflected light and heat from adjacent buildings or hardscape, soil type, topography and slope, and plant material.
  - » Group plantings with similar water needs into "hydrozones."
  - » Establish irrigation volume and frequency per zone to be appropriate for the climate, soil type, and plants.
  - » Design the irrigation system to target each planting area with no overspray of impervious surfaces or adjacent planted areas.
  - » Prevent runoff of irrigation water from the site.
- Install automated irrigation controllers that respond to weather data or soil moisture. The controllers must be certified to meet WaterSense specifications.

Develop and implement an operation and maintenance plan, including an inspection schedule appropriate for the project's watering season, to ensure the continued integrity of the irrigation system. Include the plan in materials developed for mandatory *Criterion 8.1 Building Operations & Maintenance Manual and Plan*.

Optional

Option 3: Smart controllers

All of the requirements for Option 2: Efficient Irrigation and smart irrigation controllers programmed and commissioned by a Certified Irrigation Auditor. *[2 points]*

Option 4: Drip irrigation

All of the requirements for Option 2: Efficient Irrigation and drip irrigation systems for all landscape beds and grassed areas. *[3 points]*

RECOMMENDATIONS

Follow best management practices from the Irrigation Association, which include:

- Use nonpotable rather than potable water sources for exterior watering needs (see *Criterion 3.6 Outdoor Water Use: Alternative Sources*).
- Design systems to operate within manufacturers' recommended operating pressure.
- Use matched-precipitation-rate sprinklers (+/–5%) within a zone.
- Size the zone-control valve such that flow through the valve is within the manufacturer's stated flow range and pressure loss does not exceed 10% of static pressure.
- Install valves, whether above grade or below grade, in a valve box large enough to access and service. The valve box location should consider the safety and aesthetics of the site as well as the long-term durability of the valve box.
- Install water-wise landscapes with native plants for the applicable region of the project.
- Use drip irrigation for plant beds, shrubs, trees, and narrow landscaped strips, where it is particularly effective due to its high water efficiency and targeted application. Spray irrigation can lose 30% to 50% of water to wind, evaporation, and runoff. Drip irrigation delivers water directly to the soil surface or root zone and typically uses 20% to 50% less water than conventional pop-up sprinkler systems.
- Consider installing leak-detection systems for exterior water use; analysis of leaks may help prevent water waste, site damage, and higher utility bills by identifying and addressing system failures such as broken pipes, stuck valves, or malfunctioning emitters.
- Consider engaging a qualified professional to commission a site's irrigation controllers. They will ensure the system is properly programmed and calibrated to respond to site-specific conditions by preventing over- and under-watering to maintain healthy landscapes.

RESOURCES

- U.S. Environmental Protection Agency (EPA), WaterSense. This site provides information on the EPA WaterSense labeling program for water-efficient products, including irrigation controllers, plus tips and recommendations for water-efficient irrigation. Follow the link to Weather- or Sensor-Based Irrigation Control Technologies for related information on high-efficiency irrigation controllers. *www.epa.gov/watersense/*
- EPA, Irrigation with a Pro. Search by ZIP code for a certified irrigation professional. *www.epa.gov/watersense/irrigation-pro*
- EPA, Water-Smart Landscape Design. This manual provides a step-by-step process for reducing water consumption through creative landscaping techniques. *www.epa.gov/watersense/water-smart-landscape-design*
- Alliance for Water Efficiency, Landscapes + Irrigation. Webinars, white papers, and other resources to help project teams conserve water, increase resilience, and provide other benefits through location-specific landscaping strategies. *https://allianceforwaterefficiency.org/resource-category/landscapes-irrigation/*

- Irrigation Association resources:
  - » Landscape Irrigation Best Management Practices. *www.irrigation.org/IA/Advocacy/Standards-Best-Practices/Landscape-Irrigation-BMPs/IA/Advocacy/Landscape-Irrigation-BMPs.aspx*
  - » Irrigation Audit Guidelines. *www.irrigation.org/IA/resources/Technical-resources/Irrigation-Auditing/Audit-Guidelines/IA/resources/Audit-Guidelines.aspx*
- National Institute of Food and Agriculture, Land-Grant University Website Directory. Locate land-grant colleges and universities and the scientists, educators, and extension staff who work there. *www.nifa.usda.gov/grants/land-grant-university-website-directory?state=All&type=Extension*
- American Society of Landscape Architects (ASLA). The national professional association representing landscape architects. Their site provides information about members, products, services, publications, and events. *www.asla.org/*
- California Department of Water Resources, Model Water Efficient Landscape Ordinance. *https://water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Model-Water-Efficient-Landscape-Ordinance*

3.6 Outdoor Water Use: Alternative Sources

Optional: 6 or 10 points

RATIONALE

Using sources other than potable water where it is safe and appropriate to do so can reduce property operating expenses and preserve water—a precious resource—for potable needs. Using nonpotable water sources also enhances site resilience, particularly in drought-prone or water-scare regions. One way of achieving this is through the use of nonpotable water for site irrigation.

Consider the assessments completed as part of *Criterion 1.1 Project Priority Survey*. If the assessment found drought to be a significant hazard for your property, consider implementing this criterion.

REQUIREMENTS

Option 1: Nonpotable water sources for 25% of demand

Use rainwater harvesting, reclaimed water, or greywater to offset 25% or more of total design irrigation water demand. *[6 points]*

Option 2: Nonpotable water sources for 100% of demand

Eliminate use of potable water for irrigation. If using rainwater for irrigation, that system shall be designed by a professional certified by the American Rainwater Catchment Systems Association or equivalent. *[10 points]*

Alternatives to potable water include: 1) Captured rainwater collected from the roof or site; 2) Recycled greywater; 3) Air-conditioning condensate; and 4) Reclaimed water supplied from a municipal source

RECOMMENDATIONS

- Rainwater can be harvested from impervious surfaces, such as roofs, and carried via gutters and downspouts to rain barrels or cisterns. Rainwater that has not been treated to potable standards is not suitable for human consumption.
- For any alternative water source not treated to potable standards, proper signage should be displayed on the structure to caution users that the water source is nonpotable.

RESOURCES

- U.S. Department of Energy, Alternative Water Sources. Technical resources and tools focused on alternative water. *www.energy.gov/femp/alternative-water-sources*
- University of Florida IFAS Extension, Saving & Using Rainwater. Guidance on capturing rainwater in rain barrels and cisterns and using for irrigation and other outdoor applications. *https://sfyl.ifas.ufl.edu/lawn-and-garden/saving-and-using-rainwater/*

3.7 Traffic Safety and Mobility

Mandatory for New Construction and Substantial Rehabs; Optional: 5 points maximum

RATIONALE

Pedestrian deaths reached a 40-year high in 2022, rising more than 60% in urban areas and 40% in rural areas since 2013. Residents—especially families with children, older adults, and people with disabilities—cite traffic safety as a top concern. More than one in four U.S. adults now lives with a sensory, cognitive, or mobility disability, and traffic safety risks disproportionately harm people experiencing poverty or housing instability, those with disabilities, young children, older adults, and Black and Indigenous people.

Traffic safety risks arise where paths for people walking or rolling intersect with paths for vehicles. Visibility, lighting, site and parking design, circulation, and curb management all matter.

Effective, proven measures can reduce conflicts and should be applied to project sites, parking areas, and circulation routes, as well as adjacent sidewalks, trails, and streets.

REQUIREMENTS

New Construction and Substantial Rehabs

Mandatory

Complete the assessment in *Table 3.7* to determine which conditions apply to your project. If none of them apply, no further action is required. If one or more conditions apply, address at least one of the conditions by implementing the correlated requirements listed below the table. Prioritize conditions based on the level of potential risk to the expected resident population, taking into account any relevant resident health factors identified in the Project Priorities Survey.

Optional

Earn 1 point for each additional condition you address, up to a *maximum of 5 points*.

Moderate Rehabs

Optional

Complete the assessment in Table 3.7 to determine which conditions apply to your project. If one or more conditions apply, implement the correlated requirements below listed below the table. Prioritize conditions based on the level of potential risk to the expected resident population, taking into account any relevant resident health factors identified in the Project Priorities Survey. Earn 1 point for each condition you address, up to a *maximum of 5 points*.

TABLE 3.7 | ASSESSMENT OF TRAFFIC SAFETY CONDITIONS

CONDITION	YES	NO
1. Pick-up/drop-off: One or more multifamily buildings with on-site space for a pick-up/drop-off area		
2. Curbless street: One or more shared streets with continuous surfaces that lack a curb or raised sidewalk		
3. Crossed paths: Walking/rolling paths or sidewalks that cross vehicular driveways		
4. Roadway: One or more roadways,whether on the site or adjacent to the site,) within the developer's site control		
5. Roadway-adjacent sidewalk (New Construction only): One or more sidewalks within the site that are adjacent to roadways on the property that do not include on-street parking		
6. Hazard-adjacent play space: Playground or outdoor recreation space adjacent to a road, railroad, stream, or other external hazard		

Note: If none of the conditions in Table 3.7 apply to the project, no points may be earned.

1. Pick-up/drop-off

- Locate a designated on-site pick-up/drop-off area for residents that is either along an on-site driveway or curb or at the edge of an adjacent public street **AND**
- Include a smooth, universally accessible sidewalk or path from the pick-up/drop-off area to the building entry and to the public street, along with exterior signage indicating the location and designated use of the pick-up/drop-off area. These paths must include curb ramps at any crossings and entries and must provide ADA-compliant turning radii at landings **AND**
- Create an interior or exterior waiting area that includes seating and lighting at the building entrance. If the area is outdoors, provide cover to protect people from the elements.

2. Curbless street

Where there is any shared curbless street with a continuous surface, or in a condition where there is no curb or raised sidewalk, use contrasting textures, paving patterns, tactile strips, planters, fenceposts, and/or bollards to differentiate and delineate pedestrian-only space from shared-use areas and to discourage high-speed vehicular movement.

3. Crossed paths

In all places where walking/rolling paths or sidewalks cross vehicular driveways, service access, or loading zones, complete all of the following:

- Provide signage indicating that vehicles should yield to people walking or rolling **AND**

- Where bike lanes cross pedestrian paths, provide a pavement marking and/or a sign indicating that cyclists must yield to pedestrians **AND**
- Use pavement markings to indicate a mixing zone at the edge of a) any intersection between a driveway and a sidewalk or bike path and b) any intersection between a bike lane and a pedestrian path **AND**
- At intersections between sidewalks, paths, and driveways or streets, review the design for clear sight distances and visibility triangles. Within a sight triangle, any object at a height above the elevation of the adjacent roadways that would obstruct a driver's view (such as landscaping or utility boxes) should be removed or lowered.

4. Roadway

For all roadways that are on the site or adjacent to the site and are under the developer's control, create crossing paths with auditory crossing signals, adequate crossing times, clear signage, visible access ramps, median refuge islands as applicable, and connections to walking, cycling, and public transit routes.

5. Roadway-adjacent sidewalk

For all property sidewalks adjacent to vehicular roadways that do not include on-street parking, create a pedestrian buffer zone of street trees and/or landscape between the sidewalk and the roadway to help reduce vehicle speed and enhance safety.

6. Hazard-adjacent play space

If any playground or outdoor recreation space is located adjacent to a road, railroad, stream, or other external hazard, enclose the area with a secure, child-safe gate or fence that ensures visibility while preventing unintended access to those hazards. Provide an accessible sidewalk or path from the building to the outdoor recreation space.

RECOMMENDATIONS

Traffic safety and site design measures will vary depending on the specific project site conditions, adjacencies, and whether the project is sited in a rural, suburban, or urban location. Traffic calming and increased safety can be achieved with a wide range of material and design choices.

- Projects that anticipate high use of a sidewalk or path leading to a pickup/drop-off area should consider a minimum 8-foot width for the walkway. Consider creating a minimum 5-foot separation (e.g., a planted area or other buffer) from roads or streets as well as a minimum 2-foot separation from any driveways or parking areas (to reduce the risk of "dooring" injuries). At locations with frequent pick-ups/drop-offs or other waiting areas, provide shade and other weather protection in "furnishing zones" to support comfort and well-being. A furnishing zone is an area set aside for relevant amenities, such as benches, that is clear of the pedestrian circulation zone. These can be created under building canopies or awnings or by using independent shade structures within the streetscape, such as bus-stop shelters. Consider adding a tactile warning strip to separate furnishing zones from circulation zones.
- Create logical circulation patterns and navigability throughout the project site and with adjacent context in mind, with particular focus on the paths from dwelling units to pickup/drop-off areas, transit, and any frequently used areas. Identify any designated commercial or transit loading spaces along the curb adjacent to the property as well as any pedestrian,

walking, rolling, and vehicular circulation paths from the building to loading, pickup/drop-off, or parking areas, both on the site and on the edge of the site where adjacent to a street or roadway. Add signage and/or demarcate with visual and tactile cues.

- Support time-based, flexible curb management to accommodate new mobility options, deliveries, freight, and emergency access where appropriate alongside accessible pick-up/drop-off for residential buildings, businesses, and community services.
- Consider providing a library of shared mobility equipment on the ground floor that serves people of all ages and abilities, such as powered wheelchairs and mobility scooters, adaptive cycling and trikes, strollers, and grocery carts.
- Along sidewalks or paths, consider including continuous pathways, signage, art, lighting, and multisensory features to promote navigability. Include shading to support outdoor thermal comfort.
- Where possible in mixing zones, include medians to separate conflicting traffic. To encourage careful driving, consider including roundabouts at intersections or bicycle-friendly speed reducers, such as raised intersections or speed tables.

RESOURCES

- Federal Highway Administration (FHWA), Small Town and Rural Urban Design Guide. A design resource and idea book for small towns and rural communities to support safe, comfortable, and active travel for people of all ages and abilities. Solutions include mixed-zone strategies as well as visually separated and physically separated infrastructure ideas. *https://ruraldesignguide.com/*
- FHWA, Small Town and Rural Multimodal Networks. Applies existing national design guidelines on multimodal transportation to rural settings and highlights small-town and rural case studies. *www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/*
- NACTO, Urban Street Design Guide. *https://nacto.org/publication/urban-street-design-guide/* See also the organization's Urban Bikeway Design Guide. *https://nacto.org/publication/urban-bikeway-design-guide/*
- Institute of Transportation Engineers, Designing Walkable Urban Thoroughfares: A Context Sensitive Approach. A free download for improving mobility choices and community character through walkability. *https://ecommerce.ite.org/imis/ItemDetail?iProductCode=RP-036A-E*
- Global Designing Cities Initiative, Global Street Design Guide. Expert technical details to inform street design that prioritizes pedestrians, cyclists, and transit riders. Available as an online resource or a PDF download. *https://globaldesigningcities.org/publication/global-street-design-guide/*
- Smart Growth America, Dangerous by Design 2024. Analyzes which cities are most deadly to pedestrians and the patterns that have made them that way. The page has additional resources, including an interactive map, tables of state and metro data with rankings, and breakdowns of pedestrian deaths by race and income. *www.smartgrowthamerica.org/knowledge-hub/resources/dangerous-by-design-2024/*
- American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets, 7th Edition. Commonly referred to as the Green Book, this framework for geometric design has become more flexible, multimodal, and performance-based over time. *https://store.transportation.org/Item/CollectionDetail?ID=180*

Mandatory for New Construction and Substantial Rehabs;
Optional for all projects: 8 points maximum

3.8 Heat-Island Management

RATIONALE

Heat islands have higher temperatures than surrounding areas due to a relatively high concentration of roads, buildings, and other hard surfaces that absorb, rather than reflect, heat. Because these areas absorb more solar energy than reflective materials, water, trees, or other vegetation, heat islands increase local air temperatures.

High temperatures in heat islands can increase the need for mechanical cooling, creating a feedback loop, as most types of cooling equipment eject heat into outdoor air. As average outdoor temperatures become hotter, heat-island locations can increase the risk of heat stress for people as well as ecosystems.

Strategically placed trees and other landscaping can provide shade that cools pavement and provides outdoor space for residents to enjoy. Urban street trees and bioswales can result in a 49°F cooler surface temperature.

Thoughtful selection of roofing and paving products, including light-colored, high-albedo materials, can also decrease temperatures, improving both thermal comfort and energy performance. Shifting from dark, impervious surfaces to light, pervious ones for streets and sidewalks—and from dark asphalt to light concrete for parking lots—can result in a 15°F cooler surface temperature.

Mitigating the heat-island effect can also enhance resilience in the event of power outages, when air conditioning cannot operate.

REQUIREMENTS

New Construction and Substantial Rehabs

Mandatory
Implement Option 1 **OR** Option 2 below.

Optional
Implement Option 1 **AND** Option 2. *[4 points]*

Moderate Rehabs

Optional
Implement Option 1 *[4 points]* **AND/OR** Implement Option 2 *[4 points]*

Option 1: Roofing materials

Cover at least 70% of usable roof area with one or more strategies:

- Vegetated roof
- Roofing materials with a minimum three-year-aged solar reflectance index (SRI) meeting the requirements of Table 3.8 and certified by a third party such as the Cool Roof Rating Council
- Photovoltaic (PV) panels

Note: Rooftop PV alone does not meet the requirements of Option 1. Other strategies must be added to meet the 70% threshold.

TABLE 3.8 | REQUIREMENTS FOR AGED SRI VALUE BY CLIMATE ZONE AND ROOF SLOPE

U.S. CLIMATE ZONE	ROOF SLOPE	MINIMUM 3-YEAR-AGED SRI
1 through 6	≤ 2:12	64
1 through 3	> 2:12	16
4 through 6	> 2:12	32

Option 2: Paved surfaces

For at least 50% of ground-level paved areas:

- Provide shading through vegetation, tree canopy (assuming a 10-year canopy width), and/or shade structures

AND/OR

- Use light-colored, high-albedo materials with an initial minimum solar reflectance of 0.33 and/or an open-grid pavement system

RECOMMENDATIONS

- Limit paved areas on the site to those needed to meet code and regulatory requirements, to provide equitable access to both indoor and outdoor spaces, and for applicable recreation spaces (e.g., a basketball court).
- Where hard surfaces are needed, in addition to selecting high-albedo materials, use permeable pavers wherever technically and economically feasible. Permeable pavers allow for stormwater infiltration and can contribute toward meeting *Criterion 3.4 Surface Stormwater Management*.
- Consider cool-pavement technologies for asphalt, such as asphalt emulsion seal coats, acrylic coatings, asphalt rejuvenators with added titanium dioxide, or emerging technologies to achieve a solar reflectance (SR) of 0.33 to 0.4 (the typical SR of asphalt is 0.1).
- Combine shade with splash pads for enhanced cooling, especially for children.
- Employ shade canopies in parking areas to cover both asphalt and cars.
- Leverage other criteria in Category 3 to provide multiple social, economic, and environmental benefits on the site. Several landscaping strategies encouraged in *Criterion 3.2 Site Design for Ecosystem Services* and low-impact-development techniques from *Criterion 3.4 Surface Stormwater Management* can also reduce the risk of heat islands.
- Plan outdoor paths and respite areas to take advantage of large shade trees, protecting them (including their root zones) during construction.
- Consider wildfire risk when siting tree canopy to help maintain defensible space. See *Criterion 3.11 Resilient Site Design: Wildfire*.

- Consider local air quality, stormwater runoff patterns, and your location's Tree Equity Score when selecting heat-island-mitigation strategies.
- Design buildings with exterior walls that have high thermal mass to help regulate temperature swings, and use deep overhangs and windows set back for shading. Orient buildings to minimize broad roof and wall exposure to the south and southwest.

RESOURCES

- Carnegie Mellon University Center for Building Performance and Diagnostics, Smart Surfaces Guidebook. Strategies for reducing heat islands, reducing flood risk, saving money, and making communities more livable. *https://smartsurfacescoalition.org/analysis/2022/8/9/smart-surfaces-guidebook*
- U.S. Environmental Protection Agency, Heat Island Reduction Solutions. Includes strategies for increasing vegetation, creating cool roofs and green roofs, using cool pavement, adapting to heat, and following smart-growth principles. *www.epa.gov/heatislands/heat-island-reduction-solutions*
- U.S. Department of Housing and Urban Development, Extreme Heat Quick Guide. Provides necessary steps to evaluate a community's vulnerability to extreme heat, plan for heat waves, and implement local resilience strategies. *https://eelp.law.harvard.edu/wp-content/uploads/2025/01/Extreme-Heat-Quick-Guide.pdf*
- American Forests, Tree Equity Score National Explorer. Search for an address on this interactive map to learn how much tree canopy exists in the neighborhood and explore related equity data. *www.treeequityscore.org/map*
- U.S. Department of Energy, Design for Extreme Heat. Basic concepts and strategies for designing homes to be safer during extreme heat events. *https://basc.pnnl.gov/information/design-extreme-heat*

3.9 Resilient Site Design: Wind

Optional: 2 to 16 points

RATIONALE

Catastrophic weather-driven damage constituted 46% of all homeowners' property claims in 2023. That year, 62% of wind and 71% of hail claims were catastrophic.

Wind-resilient building design—including structural reinforcement, durable material selection, and proven construction techniques—can protect residents and help keep homes livable after a storm. Wind-resilient design can also lessen property damage, potentially reducing long-term recovery costs and insurance claims.

Projects certified to FORTIFIED™ standards from the Insurance Institute for Home & Business Safety (IBHS) are designed and constructed to be more resilient to hurricanes, extreme wind, hail, and tornados. The "Designing for Natural Hazards" series from the U.S. Department of Housing and Urban Development (HUD) aims to help builders and developers improve residential resilience and promote community-wide resilience.

Consider the assessment completed as part of *Criterion 1.1 Project Priorities Survey*. If the assessment found hurricane, extreme wind, hail, or tornado to be a significant hazard for this project, implementing this criterion is highly recommended.

REQUIREMENTS

Option 1: FORTIFIED designation

Obtain one of the following FORTIFIED designations, as applicable, for your building type. Both new construction and retrofit projects are eligible for this designation.

- FORTIFIED Multifamily or Home (single-family) Roof™ *[8 points]*
- FORTIFIED Multifamily or Home (single-family) Silver™ *[10 points]*
- FORTIFIED Multifamily or Home (single-family) Gold™ *[12 points]*
- *One* of the certifications above **AND** FORTIFIED Multifamily or Home (single-family) Hail Supplement *[4 points]*

OR

Option 2: HUD one-pagers for wind

Implement at least two guidance items from any single "one-pager" from the HUD "Designing for Natural Hazards" series, Volume 1: Wind. Volume 1 includes one-pagers covering the following topics:

- Openings—Shutters
- Roof Deck & Underlayment
- High-Wind Roof Covering
- Continuous Load Path
- Garage Doors
- Wall System
- Soffit
- Pressurization Design
- Chimney
- Roof-mounted Equipment (includes solar arrays)

2 points will be awarded for each one-pager from which the property has implemented at least two guidance items. *[8 points maximum]*

RECOMMENDATIONS

- Earning a FORTIFIED designation has provided a pathway to reduced insurance premiums in some states. See IBHS incentive sheets by state for more information.
- IBHS highly recommends completing the Hail Supplement for FORTIFIED Multifamily and FORTIFIED Home for properties in high-risk regions for hailstorms.
- For FORTIFIED Multifamily, start the designation process by applying on the program website. When completing the online application, IBHS recommends submitting architectural, structural, and electrical drawings. All other documentation will be requested later in the process.
- For FORTIFIED Home, start the designation by hiring a certified FORTIFIED Evaluator and certified FORTIFIED contractor, which can be found through the FORTIFIED Directory.

RESOURCES

- FORTIFIED resources:
  - » For building professionals, information on becoming a FORTIFIED Trained Service Provider. *https://fortifiedhome.org/building-professionals/*
  - » FORTIFIED Multifamily Program. Overview of the multifamily certification levels. *https://fortifiedhome.org/multifamily-levels/*
  - » FORTIFIED Home. Overview of the available options for single-family homes. *https://fortifiedhome.org/solutions/*
  - » FORTIFIED Roof. Describes the roof certification program. *https://fortifiedhome.org/roof/*
  - » FORTIFIED Hail Supplement Form allows users to apply for the optional hail supplement.
    - – Multifamily: *https://fortifiedhome.org/wp-content/uploads/FORTIFIED-Multifamily-Wind-Hail-Supplement-Form.pdf*
    - – Single family: *https://fortifiedhome.org/wp-content/uploads/FORTIFIED-Commercial-2025-Wind-Hail-Supplement-Form-v2.pdf*
  - » IBHS incentive sheets for insurance discounts. *https://fortifiedhome.org/incentives/*
- U.S. Department of Housing and Urban Development, Designing for Natural Hazards: A Resilience Guide for Builders & Developers. Volume 1 focuses on wind. *www.huduser.gov/portal/publications/Designing-for-Natural-Hazards-Series.html*

3.10 Resilient Site Design: Flood

Optional: 6, 9, or 12 points

RATIONALE

Adaptive strategies to reduce flood-related risks can strengthen the resilience of both sites and buildings and can reduce the risk of insurance loss. These strategies can also enhance community resilience and enable the return of residents to livable homes after a flood.

Consider the assessment completed as part of *Criterion 1.1 Project Priorities Survey*. If the assessment found flooding to be a moderate or high risk for your property, implementing this criterion is highly recommended.

REQUIREMENTS

Projects located in Special Flood Hazard Areas (SHFA) are not eligible for points from this criterion. Per *Criterion 2.1 Ecological Conservation and Safer Sites*, new construction may not be built in SFHA, and rehabilitation projects in SFHA must adhere to ASCE 24-24, which meets or exceeds the requirements of *Criterion 3.10 Resilient Site Design: Flood*.

Properties that have experienced repetitive loss (RL) or severe repetitive loss (SRL) from floods are not eligible for points from this criterion.

Option 1: ASCE 24-24 compliance *[12 points]*

Note: The ASCE standard defines the flood hazard area to include both the 100-year and the 500-year floodplains. The design elevation requirements are tied to the flood design class of the structure, which will be the 500-year event for most Green Communities applicants. Coastal floodplain calculations factor in sea-level change based on historic trends. Dry floodproofing requirements include the use of ANSI/FM 2510-certified products.

Design the project in compliance with ASCE/SEI 24-24 A Standard for Flood-Resistant Design and Construction and ASCE/SEI 7-22 Supplement 2, including the following steps:

- Determine the site's base flood elevation (BFE) and design flood elevation (DFE) using the FEMA Flood Map Service Center or a community flood elevation ordinance, whichever is more conservative.
- Use the Louisiana State University Ag Center's ASCE Elevation Calculation Tool to determine the minimum required elevation in accordance with ASCE/SEI 24-24.
- Elevate the lowest floor of all buildings to at least DFE+freeboard, as required by ASCE/SEI 24-24, for the occupancy category.

OR

Option 2: HUD one-pagers for water *[9 points]*

Incorporate each of the following resilient construction strategies from the U.S. Department of Housing and Urban Development's "Designing for Natural Hazards" series, Volume 2: Water:

- Wall Assembly one-pager: Implement at least two guidance items.
- Utilities & Mechanical Equipment one-pager: Implement at least two guidance items.
- Freeboard Elevation one-pager: Implement at least one guidance item.
- Connectors & Fasteners one-pager: Implement all guidance items.

OR

Option 3: Floodproofing of critical services *[6 points]*

- Conduct floodproofing, including perimeter floodproofing (e.g., barriers or shields), of lower floors.
- Design and install all building electrical and mechanical systems in such a way that, in the case of a flood, their operation will not be grossly affected.
- Locate all of the following above the design flood elevation (DFE):
  - At least one exit door **AND**
  - All central space-heating and water-heating equipment **AND**
  - The service disconnect, which must be at a readily accessible location above the DFE
- On plan sets, identify water entry points in basements and at foundation walls. Demarcate all penetrations, wall assemblies, doors, and other openings to ensure that future renovations do not compromise the integrity of floodproof construction.

RECOMMENDATIONS

- Include all applicable inspection and maintenance information in the materials developed per *Criterion 8.1 Building Operations & Maintenance Manual and Plan*.
- Include flood-emergency operation plans in the materials developed per *Criterion 8.2 Emergency Management Manual*.

RESOURCES

Technical guidance and standards for flood adaptation:

- FEMA Flood Map Service Center. *https://msc.fema.gov/portal/home*
- ASCE/SEI 24-24 Flood Resistant Design and Construction. *https://ascelibrary.org/doi/book/10.1061/9780784485781*
- Louisiana State University AgCenter, Elevation Calculator Tool for ASCE/SEI 24-24. A free web-based calculator for determining the minimum required design elevation. *https://floodelev.lsuagcenter.com/*
- American Society of Civil Engineers, Supplement 2 of ASCE/SEI 7-22: Minimum Design Loads and Associated Criteria for Buildings and Other Structures. A free resource to guide flood-resistant design. *https://ascelibrary.org/doi/epdf/10.1061/9780784415788.sup2*
- U.S. Federal Emergency Management Agency (FEMA), Building Designer's Guide to Calculating Flood Loads Using ASCE 7-22 Supplement 2 (FEMA P-2345/April 2024). *www.fema.gov/sites/default/files/documents/fema_p-2345-building-designers-guide-to-calculating-flood-loads.pdf*
- FEMA, Building Science Resource Library. Hazard-specific guidance that focuses on creating hazard-resistant communities. *www.fema.gov/emergency-managers/risk-management/building-science/publications*
- U.S. Department of Housing and Urban Development, Designing for Natural Hazards: A Resilience Guide for Builders & Developers. Volume 2 focuses on water. *www.huduser.gov/portal/publications/Designing-for-Natural-Hazards-Series.html*
- Urban Green, Report of the NYC Building Resiliency Task Force. *www.urbangreencouncil.org/wp-content/uploads/2022/11/2013_brtf_summaryreport_0.pdf*
- Enterprise Community Partners, Strategies for Multifamily Building Resilience. Includes more than a dozen strategies, including floodproofing strategies, and specific guidance for building property resilience. *https://businesscontinuity.enterprisecommunity.org/sites/default/files/strategies-for-multifamily-building-resilience.pdf*

Future flood projection resources:

- First Street Foundation, Flood Factor tool. *https://firststreet.org/*
- Climate Central, Coastal Risk Screening Tool. An interactive map showing areas threatened by sea level rise and coastal flooding. *https://coastal.climatecentral.org/*
- Climate Central, Surging Seas. Sea-level-rise analysis. *https://sealevel.climatecentral.org/*
- NOAA Office for Coastal Management, Sea Level Rise Viewer. Visualize community-level impacts from coastal flooding or sea-level rise, up to 10 feet above average high tides. *https://coast.noaa.gov/digitalcoast/tools/slr.html*

- NOAA Office for Coastal Management, Coastal Flood Exposure Mapper. *https://coast.noaa.gov/digitalcoast/tools/flood-exposure.html*
- U.S. Geological Survey, Flood Inundation Mapper. *https://fim.wim.usgs.gov/fim/*

3.11 Resilient Site Design: Wildfire

Optional: 9 or 12 points

RATIONALE

Wildfires are becoming increasingly prevalent in many regions across the country. By creating a defensible space around each building and using ignition-resistant materials, project teams may reduce the risk of damage from wildfire.

REQUIREMENTS

Note: This criterion references three home ignition zones, defined by their proximity to each building on the site:

- Zone 0, immediate: 0 to 5 feet from each building
- Zone 1, intermediate: 5 to 30 feet from each building
- Zone 2, extended: 30 to 100 feet from each building

Implement all of the following strategies *[9 points]*:

- **Defensible space:** Within Zone 0, create a noncombustible zone by removing and prohibiting vegetation, combustible fencing, or any other flammable item. Consider utilizing noncombustible landscaping materials such as gravel, concrete, or pavers.
- **Roof assembly:** Install a Class A fire-rated roof. Roofs are highly vulnerable to embers; Class A materials such as metal, clay tiles, and asphalt shingles with fire-resistant coatings help protect against ignition from flying embers.
- **Eaves and soffits:** Use noncombustible materials and construct closed eaves and soffits to prevent hot gases and embers from getting under the roofing deck and entering the structure.
- **Windows:** Install dual-or triple-pane windows and/or tempered glass windows. Multi-pane windows with at least one tempered-glass pane are less likely to break from radiant heat. Intact windows help protect the interior of a building from embers and flames.

For additional points, also implement each of these strategies *[3 points]*:

- **Defensible space:** Within Zone 1, manage vegetation to reduce the fuel source for wildfire. Use only fire-resistant landscaping and space shrubs out from one another. Regularly trim trees and remove dead plants.
- **Defensible space:** Within Zone 2, manage vegetation to reduce fuel loads by mowing grass to a low height and creating both horizontal and vertical spacing between trees and shrubs.
- **Vents:** Cover all vents with 1/8-inch metal mesh to prevent embers from entering attics or crawl spaces.

- **Siding and cladding:** Use ignition-resistant siding and cladding materials, such as fiber cement, stucco, brick, or steel.
- **Decks and balconies:** Build all decks and balconies with noncombustible materials, such as treated lumber, fire-rated composites, or concrete. Enclose the under-deck area with metal screening.

Note: Consider the assessment completed as part of the *Criterion 1.1 Project Priorities Survey*. If the assessment found wildfire to be a significant hazard for this project, we highly recommend completing this criterion.

RECOMMENDATIONS

- To understand the risks in the project's jurisdiction, utilize the U.S. Forest Service website *https://wildfirerisk.org*. It shows maps of the risk to homes, risk-reduction zones, wildfire likelihood, and vulnerable populations in the area. You can use this to have context for your property's wildfire risk prior to consulting with the local fire department to determine whether the property is in the wildland–urban interface (WUI).
- Consult with the local fire department regarding specific guidance for vegetation clearance and strategies for operation and maintenance of the defensible zone. In addition, consult the nearest cooperative extension office to identify native plants in the region with low flammability potential.
- Refer to NFPA 1140 Chapter 25, IWUI code Chapter 5, and/or local codes for detailed guidance above and beyond these criterion requirements.
- Use noncombustible driveways, walkways, and hardscaped outdoor areas as firebreaks.
- Consider installing exterior sprinkler systems on the roof or perimeter to wet the building's exterior during an event, which can reduce the likelihood that embers or radiant heat will ignite the site or buildings.
- Follow wildfire management practices in the National Wildfire Coordinating Group (NWCG) Standards for Mitigation 2023 or a local equivalent, which has recommendations for housing design within the WUI, vegetation management, debris disposal, and fire safety for equipment.
- Refer to the Insurance Institute for Home & Business Safety (IBHS) "Wildfire Prepared Home" standard for single-family detached homes for best practices. Consider certification to this standard if available for the project location.

RESOURCES

Risk identification maps:

- International Code Council, WUI Code Adoption Map. ICC's adoption map supports location-specific searches filtered by code, including the WUI code. *www.iccsafe.org/adoptions/code-adoption-map/IBC*
- U.S. Forest Service, Wildfire Risk to Communities. This federally supported website has interactive maps, charts, and other resources to help users understand, explore, and reduce wildfire risk. *https://wildfirerisk.org/*

- U.S. Federal Emergency Management Agency (FEMA), National Risk Index Map. An interactive tool for exploring natural hazard risk data, including wildfire risk, across the United States. *https://hazards.fema.gov/nri/map*
- First Street. This organization develops risk methodologies and offers free and paid resources that quantify and communicate risk at a granular level. *https://firststreet.org/*

Wildfire adaptation guides, standards, and codes:

- Standard for Wildland Fire Protection, NFPA 1140. *www.nfpa.org/codes-and-standards/nfpa-1140-standard-development/1140*
- International Code Council, 2024 International WUI Code. *https://codes.iccsafe.org/content/IWUIC2024V2.0/index*
- National Wildlife Coordinating Group, NWCG Standards for Mitigation in the Wildland Urban Interface: *https://fs-prod-nwcg.s3.us-gov-west-1.amazonaws.com/s3fs-public/publication/pms052.pdf*
- Firewise, Safer from the Start. *www.firewise.net/wp-content/uploads/2012/05/Safer-From-the-Start.pdf*
- Insurance Institute for Home & Business Safety, Wildfire Prepared Home.
  - » Overview of the standard and how to get certified. *https://wildfireprepared.org/*
  - » Technical Standard. *https://wildfireprepared.org/wp-content/uploads/WFPH-Technical-Standard.pdf*
  - » How-To Prepare My Home Checklist. *https://wildfireprepared.org/wp-content/uploads/WPH-How-To-Prepare-My-Home-Checklist.pdf*
- CAL FIRE, Fire-smart landscaping. Tips on how to create defensible space with appropriate plantings, spacing, and maintenance. *https://readyforwildfire.org/prepare-for-wildfire/fire-smart-landscaping/*
- U.S. Department of Housing and Urban Development, Designing for Natural Hazards: A Resilience Guide for Builders & Developers. Volume 3 covers wildfire. *www.huduser.gov/portal/publications/Designing-for-Natural-Hazards-Series.html*
- FEMA, Home Builder's Guide to Construction in Wildfire Zones. Fact sheets referenced in the HUD resilience guide. *https://defensiblespace.org/wp-content/uploads/2021/01/FEMA_2008_P-737-Home-Builders-Guide-to-Construction-in-Wildfire-Zones.pdf*

"This is where my fresh start starts."

Shannon Abdallah, Fabrica Lofts Resident

4 Water

Energy
Health
Resilience

Water quality and conservation are key to healthy, efficient housing. Testing and remediation protect health. Reducing potable water use, managing leaks, and performing regular maintenance save money, conserve water, and reduce the risk of property damage.

4.1 *Mandatory* Water-Conserving Fixtures

RATIONALE

Water conservation translates into direct utility savings for residents and building owners as well as lowers costs associated with water systems and infrastructure. Maintaining appropriate service pressure also saves water, conserves energy, minimizes the risk of leaks, and helps ensure proper operation of fixtures and appliances.

As drought becomes more common, conserving water will likely become critical in many communities that historically have not prioritized water efficiency.

REQUIREMENTS

Reduce total indoor water consumption by at least 20% compared to the baseline shown in Table 4.1. Projects receiving points under either option of *Criterion 4.2 Advanced Water Conservation* do not need to demonstrate compliance with this requirement as it will be met by right.

In addition to the project's total indoor water consumption meeting the minimum 20% improvement threshold, any newly installed toilets, showerheads, and lavatory faucets in the project must be WaterSense certified.

The Green Communities Water Calculator is available to calculate and compare your project's indoor water consumption to the baseline water-consumption table below. When making your comparison, assume that the baseline project has the same types of fixtures and equipment as your certifying project. For instance, if your project does not include dishwashers, do not include dishwasher water consumption in your baseline project calculation.

TABLE 4.1 | BASELINE INDOOR WATER CONSUMPTION PER PERSON PER DAY

FIXTURE	BASELINE FLUSH OR FLOW RATE	ESTIMATED FIXTURE USAGE	ESTIMATED WATER USAGE
Shower (per compartment)	2.5 gpm	6.15 minutes	15.4 gallons
Lavatory, kitchen faucet	2.2 gpm	5.0 minutes	11 gallons
Toilet	1.6 gpf	5.05 flushes	8 gallons
Clothes Washer	6.5 IWF* top loading and 4.7 IWF front loading	0.3 cycles @ 3.5 ft3	6.825 gallons top loading; 4.935 gallons front loading
Dishwasher	5.0 gpc standard and 3.5 gpc small	0.1 cycles	0.5 gallons standard and 0.4 gallons small

*IWF = integrated water factor

AND

For all single-family homes and all dwelling units in buildings that are three stories or fewer, service pressure may not exceed 60 PSI and should be controlled by a pressure regulator if necessary. Piping for fire sprinkler systems (including hybrid systems) is excluded from this requirement and should comply with state and local codes and regulations as well as manufacturer specifications.

RECOMMENDATIONS

- Certain existing fixtures, such as bathroom faucets, may not need to be replaced to meet requirements. They can instead be retrofitted with accessories (e.g., aerators) to reduce water flow to the requisite level. WaterSense-labeled accessories are available and recommended.
- WaterSense-certified toilets are available in several levels of efficiency and operation types. Toilet flush categories that qualify for WaterSense include high efficiency (1.28 gallons per flush or less) and ultra-high efficiency (1.1 gallons per flush or less). Different flush mechanisms include dual flush, gravity flush, and pressure-assisted flush.
- Factors to consider when making equipment selections include:
  - The level of water-use reduction you are targeting
  - Cost and availability
  - The functionality of your existing pipe network
  - The needs of the resident population
  - Whether you intend to use nonpotable water for toilet flushing (see *Criterion 4.6 Indoor Water Efficiency: Nonpotable Water Reuse*)
- For projects serving primarily older adults, consider using single-flush toilets that meet the required flow rates rather than dual-flush toilets. Feedback from past Green Communities project teams suggests that these populations may be unfamiliar with the dual-flush technology, which may lead to difficulty in operating the toilets and could impact water performance.

- Dual-flush toilets have an average flow rate calculated and provided by the manufacturer. If you cannot locate this information, use a 2:1 ratio for low-volume flush to high-volume flush to determine the average flow rate. For example, with a dual-flush toilet that has a 0.8 low-volume flush and a 1.6 high-volume flush, the calculation to determine the average would be:

$$\frac{(0.8 \text{ gpf} \times 2) + (1.6 \text{ gpf} \times 1)}{3} = 1.067 \text{ gpf}$$

RESOURCES

- U.S. Environmental Protection Agency (EPA), WaterSense. EPA's WaterSense program certifies toilets that achieve both water efficiency and operational effectiveness. Products and services that have earned the WaterSense label have been certified to be at least 20% more efficient than the baseline without sacrificing performance. Poor performance can lead to the need for multiple flushes, creating higher-than-anticipated water consumption. Similar performance criteria are included for the coverage and force of showerhead sprays. Lead-free certification is also required for plumbing fixtures that earn the WaterSense label. *www.epa.gov/watersense.*
- EPA, WaterSense Technical Resource Manual for WaterSense Labeled Homes. *www.epa.gov/watersense/homes-technical-reference-manual*
- Maximum Performance (MaP™) Testing. The MaP testing protocol simulates real-world use over a range of loads. The website provides performance information on nearly 500 toilet models. *www.map-testing.com*
- Two performance-based water-modeling tools: HERSH2O (*www.resnet.us/about/hersh2o/*) and the Water Efficiency Rating Score (WERS) (*www.wers.us/*)

4.2 Advanced Water Conservation

Optional: 8 points maximum

RATIONALE

In addition to driving greater utility savings, advanced water conservation helps conserve energy used for water heating.

As drought becomes more common, higher levels of water efficiency will likely become critical in many communities. Consider the assessment completed as part of *Criterion 1.1 Project Priorities Survey*. If the assessment found drought to be a significant hazard for this project, advanced water conservation is highly recommended.

REQUIREMENTS

Option 1: Performance above the mandatory requirement

- Reduce total indoor water consumption by at least 30% compared to the baseline shown in Table 4.1 above. Points are awarded according to the percentage reduction against the baseline, as shown in Table 4.2.

AND

- Ensure that any toilets, showerheads, and/or lavatory faucets newly installed in the certifying project are WaterSense certified. The Green Communities Water Calculator is available to calculate and compare your project's indoor water consumption to the values in Table 4.1. When making your comparison, assume that the baseline project has the same types of fixtures as your certifying project. For instance, if your project does not include dishwashers, do not include dishwasher water consumption in your baseline project calculation. *[2–8 points]*

TABLE 4.2 | POINTS EARNED BY PERCENTAGE REDUCTION AGAINST NATIONAL BASELINE

PERCENTAGE OF REDUCTION IN TOTAL INDOOR WATER CONSUMPTION	NUMBER OF OPTIONAL POINTS
30%	2 points
40%	4 points
50%	6 points
60%	8 points

Option 2: Whole-home water certification

Meet the efficiency requirements for WaterSense-labeled homes via an EPA-approved certification method (*www.epa.gov/watersense/homes-certification#approvedhcos*). *[8 points]*

Examples include:

- CHEERS WaterSense rating with a score of 70 or lower
- Water Efficiency Rating Score (WERS) with WaterSense baselines and a score of 66 or lower
- NGBS Certified Water Rating Index (WRI) with a score of 64 or lower
- HERSH2O rating with a score of 70 or lower

RECOMMENDATIONS

See *Recommendations* for *Criterion 4.1 Water-Conserving Fixtures*.

RESOURCES

See *Resources* for *Criterion 4.1 Water-Conserving Fixtures*. Additional resources include:

- U.S. Environmental Protection Agency (EPA), WaterSense Homes Certification. This page explains the requirements for achieving third-party certification to the WaterSense standard. *www.epa.gov/watersense/homes-certification*
- CHEERS, EPA WaterSense certification for California homes. A basic introduction to attaining CHEERS certification as a pathway to WaterSense labeling for homes. *www.cheers.org/watersense/*
- Water Efficiency Rating Score (WERS). Introductory materials and a knowledge base on WERS and WaterSense. *www.wers.us/*
- National Green Building Standard, Water Rating Index (WRI) Certification. A fact sheet on the WRI certification program. *www.ngbs.com/documents/NGBS-Green-WRI-Overview.pdf*
- RESNET, Water Efficiency Rating System HERSH2O. Introductory materials about attaining WaterSense labeling through RESNET. *www.resnet.us/about/hersh2o/*

4.3 Water Quality

Mandatory; Optional: 2–16 points

RATIONALE

Exposure to hazardous contaminants and harmful pathogens in drinking water can lead to serious health impacts, especially for young children, people who are pregnant or nursing, and people with weakened immune systems.

Lead can contaminate drinking water when aging service lines and plumbing materials corrode, and its ingestion is associated with developmental delays, neurological damage, and other serious health issues.

In multifamily buildings, particularly those with centralized hot-water systems or cooling towers, stagnant or poorly managed water systems can allow growth of *Legionella* bacteria, which is the primary cause of Legionnaires' disease.

To support equitable access to safe, contaminant-free water in affordable housing, project teams should replace lead service lines, proactively manage microbial growth in plumbing and mechanical systems, and remediate other potential hazards.

REQUIREMENTS

1. Lead service lines

Substantial Rehabs of buildings constructed before 1986
Mandatory: Replace all lead service lines.

Substantial Rehabs of buildings constructed in 1986 or later; all Moderate Rehabs
Optional: Replace all lead service lines. *[8 points]*

All projects replacing lead service lines
Replacements (whether on public or private property) are to extend from the water main to the building's main interior shut-off valve. Replace the line before or while replacing the associated water heater(s). Document all completed replacements via inspection reports, photographs, or confirmation from the licensed plumber or utility responsible for the replacement. Testing alone is not a substitute for replacing lead service lines.

2. *Legionella* water-management program

All projects that include a centralized hot-water system, a cooling tower, or a building that is 10 or more stories in height

Mandatory: Develop and implement a *Legionella* water-management program in accordance with the U.S. Centers for Disease Control and Prevention's report "Developing a Water Management Program to Reduce *Legionella* Growth & Spread in Buildings." The Green Communities Water-Management Program template, which is based on the CDC toolkit, can assist you in developing your program.

The program must include:

- Identification and mapping of water-system components
- Analysis of potential hazard points for *Legionella* growth

- Control measures (e.g., temperature management, disinfection)
- Ongoing monitoring and verification of control measures
- Documentation of corrective actions and annual reviews

Provide a copy of the water-management program and an associated implementation plan.

3. Water testing and remediation

All projects

Optional
Conduct water testing at representative fixtures and take the prescribed corrective action(s) if results indicate elevated levels of contaminants listed below. For testing bottles and instructions, locate an EPA-approved lab through your state laboratory certification officer online (*www.epa.gov/dwlabcert/contact-information-certification-programs-and-certified-laboratories-drinking-water#state-labs*) or by calling the Safe Drinking Water Hotline (1-800-426-4791).

Two points are available for each of the four sections below *[2 points each for Lead, Arsenic, Nitrates, and Coliform bacteria]*:

Lead: Lead testing is required of all projects seeking to earn points through water testing and remediation.

Test water from dwelling-unit faucets for the presence of lead. If results are above 0, install NSF/ANSI 58 or NSF/ANSI 53 filters in all units and replace the filters over time per the manufacturer's instructions. If lead results are ≥5 parts per billion, replace all fixtures with fixtures certified to be free of lead contamination. Compliant options include WaterSense-certified fixtures (lead-free verification is part of the certification) and NSF 61-certified fixtures (certified to the lead-free standard).

Arsenic: Arsenic testing is required of all projects served by private wells seeking to earn points through water testing and remediation. Projects on a public water supply may choose whether or not to incorporate this part in their project; it is highly recommended for all buildings constructed before 2014.

Test water from dwelling-unit faucets for the presence of arsenic. If results are above 0.01 mg/L, follow remediation guidance from your local health department.

Nitrates: Testing for nitrates is required of all projects served by private wells seeking to earn points through water testing and remediation. Projects on a public water supply may choose whether or not to incorporate this part in their project; it is highly recommended for all buildings constructed before 2014.

Test water from dwelling-unit faucets for the presence of nitrates.

If results are above 50 mg/L for nitrates **OR** above 11 mg/L for nitrogen, install an ion-exchange or reverse-osmosis water-treatment system and test annually to make sure the problem is controlled. If results are above 0.01 mg/L, follow remediation guidance from your local health department.

Coliform bacteria: Coliform bacteria testing is required of all projects served by private wells seeking to earn points through Water testing and remediation. Projects on a public water supply may choose whether or not to incorporate this part in their project; it is highly recommended for all buildings constructed before 2014.

Test water from dwelling-unit faucets for the presence of coliform bacteria to indicate whether *E. coli* is present.

If coliform bacteria level is above 0 CFU/100 mL total coliforms (including *E. coli*), notify all residents not to drink water unless it is boiled for at least one minute at a rolling boil—longer if at high altitudes.

For private wells, disinfect the well according to procedures recommended by your local health department. Monitor your water periodically after disinfection to make certain that the problem does not recur. If the contamination is a recurring problem, investigate the feasibility of drilling a new well or install a point-of-entry disinfection unit, which can use chlorine, ultraviolet light, or ozone.

For public water supplies, notify your public water utility of results and follow remediation guidance from your local health department.

RECOMMENDATIONS

- Conduct comprehensive water testing early in the process. Even if not mandated, it is advisable to conduct testing for lead, nitrates, arsenic, and coliform bacteria during predevelopment due diligence or at the onset of rehabilitation planning. The early identification of contamination can facilitate cost-effective interventions and ensure the safety of residents.
- Install point-of-use filters. In instances where full replacement of lead service lines is not feasible—such as when facing jurisdictional limitations or partial ownership of service lines—it is recommended to install point-of-use water filters at kitchen taps that are certified to NSF/ANSI 53 along with a claim of lead reduction. In addition to that certification and lead-reduction claim, it is recommended that you also look for filters that are tested against NSF/ANSI Standard 42 for particulate reduction (Class I). Effectively reducing lead levels is particularly vital in buildings occupied by young children or people who are pregnant or nursing.
- Upgrade plumbing materials. During substantial rehabilitation or renovation projects, it is crucial to replace galvanized steel pipes and lead solder joints with corrosion-resistant materials, such as PEX or copper, certified to NSF/ANSI 61. This upgrade minimizes the potential for leaching of lead and other contaminants.
- Maintain optimal water-heater temperatures. It is essential to keep hot-water storage temperatures at or above 140°F (60°C), using mixing valves at points of use to mitigate the risk of scalding. This practice aligns with CDC guidelines to inhibit the growth of *Legionella*. The incorporation of thermostatic mixing valves will facilitate the safe delivery of water at recommended temperatures.
- Implement water-conservation measures carefully. When retrofitting low-flow fixtures, it is important to evaluate their impact on water age and stagnation within piping systems, particularly in multifamily buildings, since longer stagnation times can elevate the risk of bacterial growth. It is advisable to consider pipe-loop flushing protocols or smart recirculation systems as strategies to mitigate these risks.

- Train maintenance staff. Providing training on the optimal implementation of water-management systems is vital. This training should include monitoring temperatures, implementing flushing protocols, and recognizing conditions conducive to the growth of *Legionella*. Staff education plays a critical role in ensuring the ongoing effectiveness of the program. Communicate the critical need for this training and what it should include in materials completed for *Criterion 8.1 Building Operations & Maintenance Manual and Plan*.
- Communicate with residents. It is imperative to clearly communicate water-quality measures to residents through the Resident Manual and/or during move-in orientations. This communication should encompass guidelines on periodic fixture flushing, particularly for apartments that have been unoccupied for extended periods, as well as instructions for the cleaning of aerators. Incorporate this into the Resident Manual completed in *Criterion 8.3 Resident Manual*.

RESOURCES

Information and support on overall water quality:

- U.S. Environmental Protection Agency (EPA), National Primary Drinking Water Regulations. High-level summaries of EPA regulations on microorganisms, industrial chemicals, and other contaminants in drinking water. *www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations*
- EPA, Lead and Copper Rule. Summary, history, and resources for implementing EPA drinking water regulations. *www.epa.gov/dwreginfo/lead-and-copper-rule*
- Purdue University, Center for Plumbing Safety. Provides information for consumers as well as for the building construction, plumbing, water utility, education, and public health sectors. *https://engineering.purdue.edu/PlumbingSafety*
- Rural Community Assistance Corporation (RCAC). Supports rural communities through financing, training, and technical assistance on water infrastructure, including compliance with the Safe Drinking Water Act and the Clean Water Act. *www.rcac.org/*

Research and resources on lead in drinking water:

- American Association for the Advancement of Science, Lead in U.S. Drinking Water. Excellent overview of the lead problem, its health effects, and relevant rules, regulations, and resources. *www.sciline.org/evidence-blog/lead-drinking-water*
- Centers for Disease Control and Prevention, Childhood Lead Poisoning Prevention. *www.cdc.gov/nceh/lead/*
- Lead Service Line Replacement Collaborative. A joint effort of 27 national public health, water utility, environmental, labor, consumer, housing, and state and local governmental organizations to accelerate full removal of the lead pipes providing drinking water to American homes. The online toolkit can help communities develop and implement removal programs for lead service lines. *www.lslr-collaborative.org/*
- Journal of the American Water Works Association, National Survey of Lead Service Line Occurrence. *https://awwa.onlinelibrary.wiley.com/doi/abs/10.5942/jawwa.2016.108.0086*

- NSF International, Certified Product Listings for Lead Reduction. This page lists all NSF-certified filters designed to reduce the presence of lead in drinking water. *http://info.nsf.org/Certified/DWTU/listings_leadreduction.asp?ProductFunction=053%7cLead+Reduction&ProductFunction=058%7cLead+Reduction&ProductType=&submit2=Search*
- EPA, Consumer Tool for Identifying Point-of-Use and Pitcher Filters Certified to Reduce Lead in Drinking Water. *www.epa.gov/water-research/consumer-tool-identifying-point-use-and-pitcher-filters-certified-reduce-lead*

Information and tools for managing *Legionella* and other bacterial growth:

- Centers for Disease Control and Prevention, Developing a Water Management Program to Reduce *Legionella* Growth & Spread in Buildings. A 2021 toolkit for managing *Legionella* in plumbing and HVAC systems. *www.cdc.gov/control-legionella/media/pdfs/toolkit.pdf*
- Centers for Disease Control and Prevention, Investigating Legionnaires' Disease. *www.cdc.gov/investigate-legionella/php/resources/environmental.html*
- ANSI/ASHRAE Standard 188-2021, Legionellosis: Risk Management for Building Water Systems. *www.ashrae.org/technical-resources/bookstore/ansi-ashrae-standard-188-2021-legionellosis-risk-management-for-building-water-systems*
- ASHRAE, Guideline 12-2023: Managing the Risk of Legionellosis Associated with Building Water Systems: *https://store.accuristech.com/standards/guideline-12-2023-managing-the-risk-of-legionellosis-associated-with-building-water-systems?product_id=2568228#jumps*

Resources on water-quality testing and remediation:

- EPA, Point-of-Use Reverse Osmosis Systems. The WaterSense program certifies point-of-use filtration systems using reverse osmosis to ensure they use 2.3 gallons of water or less for every gallon of treated water they produce. *www.epa.gov/watersense/point-use-reverse-osmosis-systems*
- Michigan State University Extension Service, Testing drinking water for lead in homes. *www.canr.msu.edu/news/testing_drinking_water_for_lead_in_homes*

4.4 Monitoring Water Consumption and Leaks

Optional: 2–18 points

RATIONALE

Effective monitoring of water consumption and prompt leak detection are crucial for achieving water conservation and resilience goals. Undetected leaks lead to wasted water, increased utility costs, mold growth, and potential structural damage. Preventing this is especially critical in affordable housing, where repair resources may be limited. Providing real-time or near-real-time data on water use enables property owners, operators, and residents to identify unusual patterns, encouraging proactive maintenance and reducing long-term costs.

Integrating leak-detection and -monitoring systems aligns with best practices in water resilience. Furthermore, accurate monitoring promotes equity by ensuring that residents are not unfairly burdened with costs due to undetected leaks and by enabling fair distribution of water expenses in multifamily buildings.

REQUIREMENTS

Perform initial pressure-loss testing and visual inspections to identify and repair existing leaks before project completion. Ensure that all systems comply with applicable state and local codes.

Option 1: Leak detection with automatic shutoff *[6 points]*

All projects

Install an advanced water-monitoring and leak-detection system capable of detecting abnormal water use and automatically shutting off the water supply to limit damage. The system must provide real-time or near-real-time notifications to building management or a designated maintenance contact.

AND/OR

Option 2: Pre-rehabilitation leak assessment *[6 points]*

Rehabilitation

Complete a pre-construction leak assessment and address urgent leaks prior to demolition or system isolation.

Prior to construction start (or permit close-out for early-start scopes), complete all of the following:

- Obtain at least 12 weeks of domestic water-meter data (15–60 min or monthly if interval is unavailable) and produce a preconstruction baseline identifying abnormal base load or night flow.
- Inspect 100% of common areas and a representative sample of dwelling units (at least 20% or 10 units, whichever is greater) for:
  - Toilet leaks (dye/tab test or continuous-run check)
  - Dripping faucets/showerheads and stuck mixing valves
  - Visible leaks at hose bibbs, clothes washers, ice makers, and water-heater relief valves
- Perform at least one of the following. Choose based on building type:
  - Pressure decay or districted shut-off testing on domestic mains/risers to isolate zones with losses **OR**
  - Acoustic/ultrasonic survey of mains/risers/recirculation loops **OR**
  - Thermal scan of domestic hot water recirculation to identify unintended cross-flows or failed check valves.
- For buildings with central domestic hot water (DHW) recirculation or cooling towers, verify:
  - DHW return temperature and pump schedule **AND**
  - Makeup-water meter function and recent trends for towers/boilers
- Submit a baseline chart or summary, an audit checklist, photos of representative issues, description of test method used and test results, and a corrective-action log with status (fixed, deferred, or in scope).

During construction, if domestic hot water remains active, the project team shall maintain temporary leak monitoring (interval meter, smart valve, or daily reads) and weekly walk-downs of wet rooms and mechanical spaces. Record and address new leaks discovered during selective demolition.

AND/OR

Option 3: Advanced water metering *[2–4 points]*

Install remote-readable meters that provide alerts and data logging at ≤5-minute intervals to separately monitor consumption for the list of water uses below. Ensure the alerts and readings from these devices are accessible to building management and that an operation and management protocol is in place to respond to meter alerts. Separately meter the end uses listed for either of these *[2 points]*:

- Each cold-water branch off the apartment line serving individual dwelling units
- Each cold-water riser and domestic hot water cold-water feed for all buildings in the project

And separately meter these end uses if they exist on the property, earning *1 point* for each category, up to a total of *4 points*. The categories:

- Common laundry facilities
- All toilets (both in dwelling units and in common areas)
- Boiler makeup water
- Outdoor water consumption
- Water consumption in any nonresidential spaces within buildings

Note: Projects achieving Option 3 along with Option 1 and/or Option 2 will receive *2 additional points*.

RECOMMENDATIONS

- Integrate leak-detection and advanced-metering systems into the building management system to centralize monitoring, enable automated alerts, and support proactive maintenance planning.
- If a project has no vertical risers (e.g., garden-style multifamily with horizontal mains, townhomes, or single-family homes), leak-detection monitoring can be installed at horizontal mains/branches or via distributed dwelling-unit-level monitoring. Best practices include devices with data logging (≤5-minute intervals), programming to provide alerts to building staff, and development of an O&M response protocol.
  - » For horizontal mains/branch monitoring (no risers present), install continuous leak/flow monitoring and pressure or acoustic leak detection on the primary horizontal cold- and hot-water mains or recirculation loop(s) that together serve ≥70% of dwelling units by count. Appropriate devices include in-line flow meters, noninvasive ultrasonic meters, smart valves with flow/pressure sensing, or networked acoustic leak sensors.

    - » For distributed dwelling-unit-level monitoring (individual water heaters or all lateral plumbing), install a network of smart leak/flow sensors at unit entries, water heater cold inlets/hot outlets, or other strategic points covering ≥70% of units. Alternatively, install temperature + flow sensing on each DHW recirculation loop segment (if present), capturing return temperature and unexpected flow signatures indicative of leaks.
- For substantial rehabs in buildings with known histories of plumbing failures or outdated piping, prioritize installing leak-detection and -monitoring systems.
- Where possible, select systems that are compatible with ENERGY STAR Portfolio Manager or similar benchmarking platforms to support long-term tracking, reporting, and sustainability certifications.
- Encourage water conservation by providing residents with educational materials or digital dashboards that raise awareness of individual and building-level water use. Include in *Criterion 8.3 Resident Manual*.
- When feasible, coordinate leak-detection systems with water-quality monitoring (e.g., sensors to detect conditions favorable to *Legionella* growth) to enhance both water efficiency and occupant health protections.
- Engage plumbing contractors early in the process to optimize placement of meters and sensors, reducing installation costs and minimizing disruptions during construction or rehabilitation.
- Product innovations continue to evolve, with new monitoring and metering technologies available regularly. Explore product options during integrative design and discuss with the certification team before or during prebuild review.
- For substantial or moderate rehabs, after construction but within the first 30 to 60 days after stabilized occupancy, compile a 30-day consumption snapshot (interval if available) and a brief comparison to the preconstruction baseline, highlighting any anomalies and planned follow-ups (e.g., targeted submetering, fixture replacements, DHW recirculation balancing/controls, resident education). Keep a concise one-page trend summary for ongoing facility tracking.

RESOURCES

- Pacific Northwest National Laboratory, Water Metering Best Practices. *www.pnnl.gov/projects/femp-metering-best-practices/water-metering*
- Alliance for Water Efficiency, Metering + Data. Resources for metering and tracking water use. *https://allianceforwaterefficiency.org/resource-category/metering-data/*
- California Water Efficiency Partnership, Submetering of Multi-Family Residential Properties. *https://calwep.org/submetering-of-multi-family-residential-properties-2005/*
- U.S. Environmental Protection Agency, WaterSense labeled New Homes. *www.epa.gov/watersense/new_homes/*

4.5 Efficient Plumbing Layout and Design

Optional: 2, 4, or 6 points

RATIONALE

Efficiently designed systems for hot-water delivery reduce the amount of time it takes hot water to reach a fixture, saving both water and energy. Approximately 10% to 15% of the energy associated with typical hot-water delivery systems is wasted in distribution losses as people wait for hot water to arrive at the point of use.

In addition, oversized distribution systems increase the age of water (time in between treatment and use) within a building. This exposes water to opportunistic pathogens, such as *Legionella*, that can colonize systems as residual chlorine dissipates.

REQUIREMENTS

Meet one of the following options.

Regardless of the option chosen, recirculation systems must be demand-initiated by motion or user-initiated by push button for projects with individual water heaters. Systems that are activated based solely on a time and/or temperature sensor do not meet this requirement.

Option 1: Performance design path

Design the building's distribution system using the IAPMO Water Demand Calculator via 2023 WE-Stand Chapter 5 or 224 UPC Appendix M to ensure that pipe diameter is appropriately sized for the predicted demand. *[6 points]*

OR

Option 2: Certification design path

Certify the project to WaterSense Labeled Homes Version 2.0. *[4 points]*

OR

Option 3: Volumetric design path

Meet one of the two strategies listed below. Townhomes pursuing Strategy A or Strategy B may follow either multifamily or single-family requirements for that strategy *[2 points]*:

Strategy A: 0.5-gallon storage limit

- Store no more than 0.5 gallons of water in any piping/manifold between the fixture and the hot-water source (i.e., the water heater or, if present, the recirculation line/riser pipe).
- To account for the additional water that must be removed from the system before hot water can be delivered, no more than 0.6 gallons of water shall be collected from the fixture before a 10°F rise in temperature is observed.
- For multifamily properties, this is applicable for plumbing systems in dwelling units and for central hot-water distribution systems for which the hot-water source is the hot loop.

OR

Strategy B: 1.8-gallon storage limit

- Store no more than 1.8 gallons of water in any piping/manifold between the fixture and the hot-water source (i.e., the water heater or, if present, the recirculation line/riser pipe).
  - » For single-family homes, the storage volume is measured between the hot-water source and the farthest fixture.
  - » For multifamily properties, this storage requirement is applicable for plumbing systems in dwelling units and for central hot-water-distribution systems.
- Install water heater(s) with a Uniform Energy Factor (UEF) ≥ 0.87 for gas (generally tankless will meet this) or UEF ≥ 2.2 for electric.
- Use WaterSense-labeled fixtures for all dwelling-unit showerheads, bath faucets, and aerators.
- Multifamily properties must also ensure that recirculating central hot-water-distribution systems meet or exceed pipe insulation thickness criteria, as shown in Table 4.5.

TABLE 4.5 | REQUIRED INSULATION THICKNESS FOR HOT-WATER DISTRIBUTION SYSTEMS

NOMINAL PIPE OR TUBE SIZE (INCHES)	INSULATION THICKNESS (INCHES)
< 1.5	1.5 (or R-10 minimum)
≥ 1.5	2.0 (or R-12 minimum)

RECOMMENDATIONS

- Effective and efficient distribution of hot water requires a whole-system approach and can be challenging to many builders. Considering the hot-water delivery system early in the design phase and then carefully following a plumbing design can help deliver superior homes and reduce installation costs.
- A hot-water distribution system with less stored water in its piping will waste less water and energy. Factors like the pipe diameter, the piping material, and the length of piping between the water heater and each fixture can all have a great cumulative impact on efficiency.
- Insulating hot-water pipes can improve the efficiency of a hot-water distribution system. Insulation reduces the rate of heat loss and can deliver water that is 2°F to 4°F hotter than uninsulated pipes can; insulation also maximizes consecutive-use efficiencies. Pipe sleeves made with polyethylene or neoprene foam with thicknesses of either ½ or ¾ inch are the most commonly used insulation. The inside diameter of the pipe sleeve should match the diameter of the pipe for a close fit. Secure insulation closely to the pipe every one or two feet with tape, wire, or cable ties. Insulation should be used along the entire length of hot-water pipes, including elbows and joints, but should be kept 6 inches away from the flue of gas water heaters. Insulation performs better with an R-value of 3 or greater.
- For single-family homes and individual dwelling units, consider central core plumbing and/or multiple stacked central core plumbing layouts, locating the water heater very close to hot-water fixtures.

- For single-family homes and multifamily dwelling units, try to minimize the area of the hot-water system within the footprint of the home. WE-Stand 2023 limits the area of the hot-water system to 60% of the total floor area.
- Plumbing layouts should have no dead legs. These would be particularly problematic in larger multifamily buildings because they can lead to stagnation and can significantly increase the age of water, elevating the risk of microbial growth.

RESOURCES

- U.S. Environmental Protection Agency (EPA), Hot Water Volume Tool. This editable spreadsheet allows project teams to design their plumbing system with a variety of materials to minimize waste in delivery of hot water. *www.epa.gov/sites/default/files/2017-02/ws-homes-hot-water-volume-tool.xlsm*
- International Association of Plumbing and Mechanical Officials, Water Demand Calculator. Use this tool to meet the requirements of Option 1: Performance design path. *https://iapmo.org/we-stand/water-demand-calculator*
- Plumbing Systems & Design, Hot-Water Distribution Systems Part 1, Gary Klein, Mar/Apr 2004. Describes research that was groundbreaking at the time and brought attention to major water and energy waste in U.S. homes. *www.buildingincalifornia.com/wp-content/uploads/2014/03/Hot-Water-Distribution-Systems_Klein.pdf*
- EPA, WaterSense Labeled New Homes—Hot Water Delivery Systems. Design solutions and products to support more efficient delivery of hot water in homes. *www.epa.gov/watersense/watersense-labeled-homes-hot-water*
- EPA, WaterSense Specification for Homes Version 2.0. *www.epa.gov/sites/default/files/2021-02/documents/watersense_final_homes_specification_v2.0.pdf*
- U.S. Department of Energy, DOE Efficient New Homes Multifamily National Program Requirements, Version 2, Revision 2. *www.energy.gov/sites/default/files/2025-09/DOE%20Efficient%20New%20Homes%20Multifamily%20Version%202%20%28Rev.%202%29%20National%20Program%20Requirements_0.pdf*
- U.S. Department of Energy, DOE Efficient New Homes Single Family National Program Requirements Version 2, Revision 3. *www.energy.gov/sites/default/files/2025-09/DOE%20Efficient%20New%20Homes%20Single%20Family%20Version%202%20%28Rev.%203%29%20National%20Program%20Requirements.pdf*

4.6 Indoor Water Efficiency: Nonpotable Water Reuse

Optional: 6–9 points

RATIONALE

Using nonpotable water sources like rainwater and greywater for indoor residential uses, such as toilet flushing, reduces strain on potable water supplies. This strategy supports maintaining long-term potable water availability, lowers utility costs, and promotes resilience in water-scarce regions.

Consider the assessment completed as part of *Criterion 1.1 Project Priorities Survey*. If the assessment found drought to be a significant hazard for this project, implementing this criterion is highly recommended.

REQUIREMENTS

Use rainwater and/or greywater to meet a portion of the project's indoor water needs. Use independent piping (a.k.a. "purple pipe") for nonpotable water transmission and in compliance with all local building and health codes. Install backflow preventers or other methods to ensure cross-connection protection at any junctions between potable and nonpotable systems.

TABLE 4.6 | POINTS EARNED FOR NONPOTABLE WATER USE BY PERCENTAGE REDUCTION AGAINST THE BASELINE

TOTAL POTABLE WATER NEEDS SUPPLIED BY NONPOTABLE SOURCES (RAINWATER AND/OR GREYWATER)	NUMBER OF OPTIONAL POINTS
10%	6 points
20%	7 points
30%	8 points
40%	9 points

RECOMMENDATIONS

- Use of nonpotable water indoors is subject to state and local regulations and requirements; in some jurisdictions, these systems may not be allowed. Check with local building code officials for requirements.
- Use the design water-use calculations from the Green Communities Water Calculator (see *Criterion 4.1 Water-Conserving Fixtures*) as the baseline to determine the percentage reduction of potable water use you may be able to achieve.
- Proper signage should be displayed in relevant areas to caution users that the water source is nonpotable.
- Packaged greywater systems are commercially available to recycle water within a residential unit. In a bathroom, shower, or sink, drainage can be treated and routed to the toilet. If laundry is in a common area in the building, the laundry wastewater could be used to flush toilets or urinals in common areas.
- Consult local codes and regulations to determine whether indoor use of nonpotable rainwater captured in rain barrels or cisterns is permitted at the location. If permitted, systems using rainwater for indoor nonpotable use should be designed by a professional certified by the American Rainwater Catchment Systems Association (ARCSA) or equivalent.
- Rainwater may also be an option to reduce potable use outdoors; see *Criterion 3.6 Outdoor Water Use: Alternative Sources*.

RESOURCES

- International Code Council, CSA B805/ICC 805:2022, Rainwater Harvesting Systems. This standard applies to the design, installation, and operation of rainwater harvesting systems for nonpotable and potable applications. *https://shop.iccsafe.org/csa-b805-22-icc-805-2022-rainwater-harvesting-systems.html*
- San Francisco Public Utilities Commission, The San Francisco Rainwater Harvesting Manual. Offers design and operations guidance for nonpotable residential uses. *www.sfpuc.gov/sites/default/files/learning/RWH_Manual_Final-APR2018.pdf*
- Texas Living Waters, Ensuring One Water Works for All: Opportunities for Realizing Water Reuse in Affordable Housing. A nationwide study of the economic and social benefits of on-site water reuse in multifamily affordable housing. *https://texaslivingwaters.org/deeper-dive/reuse-in-affordable-housing/*
- American Rainwater Catchment Systems Association (ARCSA), Resources. Rainwater harvesting resources, including videos, a system-sizing calculator, and professional listings. *https://arcsainternational.org/resources*
- International Living Future Institute, Achieving Water Independence in Buildings. This downloadable publication explains water reuse systems and regulatory barriers and provides information for those wishing to explore the possibilities of water reuse in buildings and to reform limiting regulations. *https://living-future.org/wp-content/uploads/2022/05/Achieving_Water_Independence_in_Buildings.pdf*

4.7 Access to Potable Water During Emergencies

Optional: 6 points

RATIONALE

During utility outages, access to water for drinking and sanitation needs is often one of the greatest challenges. During a power failure, residential buildings using electric pumps lose their supply of potable water.

REQUIREMENTS

Provide the ability for all residents to access potable water if a weather emergency or other event disrupts normal access. Choose one of the following options:

Option 1: Pressurized water supply

In buildings with service lines that are pressurized by the public supply, provide residents with access to fixtures at locations where containers can be filled with potable water and brought to apartments, utilizing only the available pressure from the public water main. Ensure that common access points are located above the design flood elevation (DFE), are ADA accessible, are not restrooms, and can be accessed safely and easily in times of power loss (e.g., in common rooms on lower floors).

The source of potable water can be in a common space, including a community room within a multifamily building or a stand-alone clubhouse on a development campus, provided it satisfies all requirements above in providing potable water access for all residents during a power loss.

Details for how to safely access the space and collect water during a power loss must be included in materials developed to meet the requirements of *Criterion 8.2 Emergency Management Manual*.

OR

Option 2: On-site water storage

Provide stored potable water in a suitable, conditioned, well-maintained space that is located above the design flood elevation (DFE), is ADA accessible, and can be used during times of emergency. Store a total of 10 gallons per resident per day for a minimum of four days. Note potability requirements, including acceptable duration of storage, as well as size and weight considerations for the storage area.

OR

Option 3: On-site well

Provide a drilled well with a means of pumping water when the electric grid is down (e.g., a hand pump, a portable generator serving the pump, or a gravity-flow spring).

RECOMMENDATIONS

- In many cities, pressure typically brings water up to the fourth floor of taller buildings, with pumps used to deliver water to higher floors. If the power grid fails and backup generators are not connected to water pumps, or if generators also fail, residents should have access to a place in a common room to fill containers with potable water. This could be a centrally accessible corridor or utility closet. Specifics will vary by project.
- To ensure all residents can access potable water, develop a distribution plan that designates members of the building management team to facilitate transport of water to residential dwelling units throughout the property from the pressurized fixture locations (e.g., common spaces on lower floors) or the designated water-storage location.
- Consider pairing *Criterion 5.6 Backup Power* with *Criterion 4.7 Access to Potable Water During Emergencies* by designating pumps as a critical load and ensuring adequate emergency power to supply potable water to community rooms or other easily accessible spaces.
- Install redundant pumps with stored battery power to enable water to be distributed in taller buildings during a power outage.
- For properties that use rooftop tanks to maintain pressure, it may be possible to use these tanks as a source during emergencies, with proper controls and access.
- Harvested rainwater or pumped water can be stored on top of buildings, in utility space in buildings, or in separate water tanks. Any stored water intended for potable use, including harvested rainwater, must meet potable-water-storage requirements. Consult local building code officials to determine whether locally stored pumped water or rainwater is permissible as a source of potable water and, if so, what the requirements are.
- In rural or suburban areas that rely on on-site water (e.g., a domestic well) rather than municipal water, advanced modern hand pumps can provide a resilient water supply.

RESOURCES

- Urban Green Council, NYC Building Resiliency Task Force Report. Recommendations to improve building resilience and maximize preparedness for emergencies in New York City. *www.urbangreencouncil.org/building-resiliency-task-force/*
- Enterprise Community Partners, Climate Safe Housing: Strategies for Multifamily Building Resilience. Includes more than a dozen strategies and specific guidance for building property resilience in the event of an emergency, including access to potable water. *www.climatesafehousing.org/access-potable-water*

> "There is nothing better than talking to a family who no longer has to 'eat cheap' during utility bill week."
>
> Dana L. Bourland, Co-founder and President of Soils and Vessels; author of *Gray to Green: a Call to Action on the Housing and Climate Crises*

5 Energy

Manage how energy is used in a building to ensure the property will be efficient, affordable, healthy, and resilient. Start by investing in a foundation of energy efficiency and then consider how to optimize economics, emissions, and resilience.

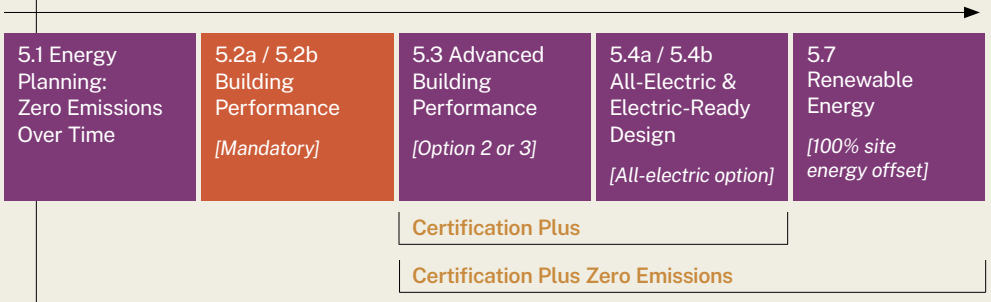
Certification Plus

Green Communities projects that are highly efficient and all electric will be recognized with a higher tier of certification: Certification Plus. This certification level distinguishes projects that are designed to be among the best energy performers as part of a holistic approach to green building. Properties that earn Certification Plus are designed to future-proof their communities for energy affordability and offer associated health and resilience benefits. Achieve Option 2 or 3 of *Criterion 5.3 Advanced Building Performance* as well as the all-electric option of either *Criterion 5.4a* or *Criterion 5.4b All-Electric and Electric-Ready Design* to earn Certification Plus.

Certification Plus Zero Emissions

Certification Plus projects that are also net-zero energy will earn Zero Emissions. These Green Communities projects are highly efficient, all electric, and powered solely by clean energy sources. Achieve Certification Plus and demonstrate through *Criterion 5.7 Renewable Energy* that all building site energy is supplied by clean energy sources.

PATHWAYS FOR ACHIEVING HIGHER TIERS OF CERTIFICATION



5.1 Energy Planning

Optional: 10 points

RATIONALE

Certification to the Green Communities Criteria is just one stop along the continuum of a project's life cycle. The purpose of energy planning is to consider short-and long-term design and asset management, better prepare for equipment replacement, respond to real-world conditions, and decarbonize cost-effectively. The Zero Over Time (ZOT) plan developed as part of Criterion 5.1 Energy Planning will demonstrate how the project reaches zero greenhouse gas emissions over a period of time. The ZOT plan sets goals and milestones in phases, starting with the existing conditions of the property at the time of certification and planning for up to 20 years in the future.

This planning process establishes a starting point for tracking performance and emissions. Other benefits of having a ZOT plan completed by the end of the certification process may include:

- An inventory of equipment, including its expected service life and a plan for its replacement
- A baseline for energy and emissions benchmarking, which may be required outside of green certification, along with consumption and production targets
- Ability to meet applicable local carbon-reduction requirements or goals and to take advantage of incentives
- Data needed for long-term capital planning

Once completed, the ZOT plan is a helpful resource to come back to regularly—for example, during annual upgrades or whenever equipment goes out of service.

REQUIREMENTS

Complete a Zero Emissions Over Time (ZOT) plan demonstrating how the project will eliminate scope 1 and scope 2 emissions within 20 years of its certification to the 2026 Green Communities Criteria. If the local municipality requires your project to reach zero emissions in a similar timeline, your ZOT timeline can match those local requirements.

Projects meeting Certification Plus Zero Emissions will have eliminated scope 1 and scope 2 emissions during design and are not eligible for points from Criterion 5.1 Energy Planning.

RECOMMENDATIONS

- When developing the ZOT plan, project teams should build from the fundamental energy-planning questions in the Project Priorities Survey under the section titled "Understanding Your Property's Zero Over Time Journey." Plan for a decarbonization audit aligned with an ASHRAE Level 2 energy audit as well as a solar feasibility model or assessment to ensure you have all the data you will need to include in the ZOT Template.
- To fill in Phase 1 of your ZOT plan with your energy-efficiency and electrification projections, use information you are preparing for *Criterion 5.2a Building Performance: New Construction*, *Criterion 5.2b Building Performance: Rehabilitation*, and/or *Criterion 5.3 Advanced Building Performance*. These can be based on either custom calculations or whole-building energy modeling.

- Refer to information in *Criterion 5.7 Renewable Energy* to plan for clean-energy scope and projected production to offset emissions.
- Complete renewable-energy feasibility modeling or assessments early on and include a path to clean energy that estimates the total energy use offset with either on-site or off-site renewables. This information will later be useful for adding renewable-energy capacity to the appropriate time period in the ZOT Template.
- Consider overall end-use costs (especially if fuel switching) and understand what post-retrofit projected energy use will likely be for tenant and common-area meters. Ensure utility costs for tenants will not exceed 6% of income levels, based on a reasonable estimate of future energy costs (see resources on energy burden below). Always plan for renewable energy to lower operating expenses where possible, but especially if:
  - » Needing to offset additional electric load where costs will increase
  - » Adding new air conditioning through heat pumps
  - » Switching from centralized heating and cooling to dwelling-unit heating and cooling, which may increase costs to residents
- Contact local utilities early in the process to understand rate structures and find out whether there are special rates (e.g., for using electric heating or for customers who meet certain income requirements) that may reduce service and delivery charges.
- If the local energy grid will transition to clean energy within the next 20 years and you can document this as part of your ZOT plan, you may not need to plan for the purchase or installation of renewables to meet zero emissions—but you may still want to do so for resilience and other benefits.

RESOURCES

- Enterprise Green Communities, Decarbonization Zero Over Time Audit Protocol: A Comprehensive Framework. This protocol, based on an ASHRAE Level 2 Energy Audit, helps project teams evaluate a facility's current carbon footprint, identifies opportunities for emission reductions, and outlines pathways to achieve net-zero carbon emissions. *www.greencommunitiesonline.org/sites/default/files/zero_over_time_-_audit_protocol.pdf*
- Enterprise Green Communities, Making it Happen: Creating Your Zero Over Time Plan. This is a step-by-step guide for translating a Zero Over Time building audit into a meaningful and actionable ZOT plan. *www.greencommunitiesonline.org/sites/default/files/zero_over_time_-_decarb_audit_to_zot_plan_.pdf*
- Enterprise Green Communities, Qualifications for Completing a Zero Over Time Audit. A summary to guide your team on who should be engaged to perform the decarbonization audit. *www.greencommunitiesonline.org/sites/default/files/zero_over_time_-_qualifications.pdf*
- NYSERDA, RMI, Building Energy Exchange, and the Urban Land Institute; Retrofit Playbook for Large Buildings. Comprehensive resource designed to assist building owners and operators in creating effective decarbonization strategies for large buildings. Includes case studies, technical guides, best practices, and educational materials. *https://retrofitplaybook.org*
- RMI, Best Practices for Achieving Zero Over Time for Building Portfolios. Outlines a roadmap to shift building portfolios to net-zero carbon over a 20-year period while increasing revenues. *https://rmi.org/insight/zero-over-time-for-building-portfolios*

ENERGY PLANNING EXPLAINER: DEFINING ZOT WITHIN GREEN COMMUNITIES

Criterion 5.1 Energy Planning incorporates a Zero Over Time (ZOT) Standard to plan for deep energy retrofits over the course of 20 years or less. The plan identifies specific leverage points within the life cycle of an affordable housing development and prioritizes upgrades that optimize emission reduction, energy efficiency, and cost savings.

The ZOT plan includes three distinct phases:

- **Phase 1: Green certification.** All impact measures that will be achieved immediately through the Green Communities Certification scope, with heavy emphasis on designing for high-performance system upgrades and prioritizing energy efficiency first.
- **Phase 2: Mid-cycle measures.** Upgrades that could not be completed by the time of construction or green certification but do fit in with appliance and equipment replacement schedules; may also include installation of new clean energy (either on or off the site).
- **Phase 3: Optimization.** Planning when and how each building reaches zero emissions through additional energy, electrification, and clean-energy optimization.

While 20 years is a common ZOT timeline, your ZOT plan should be tied directly to the timeline your development team and energy raters or auditors have created for system replacements and major capital improvements.

Within the template, you should be prepared to provide:

- Baseline (for retrofits) and projected inputs for energy use, clean energy produced, and emissions avoided
- Planned clean-energy sources for the project—including on-site and off-site renewables—that will be maintained, installed, and procured to offset the projected total energy consumption of the building
- An accounting of which systems are and are not electric at the outset of the ZOT plan, along with the phase during which each system will be electrified. A checklist in the template will help you document when the project incorporates the following, both in common areas and in dwelling units:
  - » Efficient electric heating and cooling
  - » Efficient electric domestic water heating
  - » Electric-resistance or heat-pump clothes dryers
  - » Electric-resistance or induction cooking

Required data inputs include:

- **Phase 1 data:** The energy model completed for Green Communities Certification should provide data inputs needed to complete Phase 1 of the ZOT Plan: baseline and projected inputs for energy use, clean energy provided, and emissions avoided.
- **Phase 2 and 3 data:** For data inputs needed for phases 2 and 3, the baseline energy model will need to be recalculated to update your baseline with what was completed in Phase 1 to:
  - » Properly size for any additional electrification upgrades, and/or
  - » Plan for size of renewables to be installed, and/or
  - » Plan for clean energy that will be needed to offset the remaining energy load

- City of Boston Environment Department, Planning for BERDO Compliance: Zero-Over-Time. This guide to ZOT planning for compliance with Boston's Building Emissions Reduction and Disclosure Ordinance (BERDO) is a helpful summary of the process. *www.boston.gov/sites/default/files/berdo/BERDO_ZeroOverTime.pdf*
- ACEEE, The Value of Prioritizing Equitable, Efficient Building Electrification. *https://aceee.org/research-report/b2405*

5.2a Building Performance: New Construction

Mandatory for New Construction

RATIONALE

ENERGY STAR-certified homes must meet strict program requirements (at least 10% more efficient than homes built to code and a 20% improvement on average), and they are independently verified to be energy-efficient and durable. These high-performance homes achieve energy savings in heating, cooling, hot water, lighting, and appliance efficiency, which can improve resident comfort, reduce operating costs, and decrease greenhouse gas emissions.

REQUIREMENTS

Certify all buildings with residential units in the project through the ENERGY STAR Residential New Construction Program, using ENERGY STAR Multifamily New Construction (MFNC), ENERGY STAR Manufactured Homes, and/or ENERGY STAR Certified Homes, as relevant. The ERI, prescriptive, and ASHRAE paths included in these programs are all acceptable. Use the appropriate specification version of ENERGY STAR with respect to the project's construction typology, permit date, and location.

RECOMMENDATIONS

- Due to increased potential for refrigerant leaks and uncontrolled emissions associated with variable-refrigerant-flow (VRF) HVAC equipment, as well as recurrent reports of installation failures, carefully consider the implications of VRF equipment with your MEP engineer and property maintenance staff before equipment selection.
- Project teams must engage a qualified energy rater throughout construction to complete third-party inspections and certify to ENERGY STAR. Be sure to clearly identify their role on the project team and review program guidance on partnership, training, qualifications, credentialing, and the certification process for the appropriate version of ENERGY STAR Residential New Construction.
- Builders, developers, raters, ASHRAE Path Energy Modelers, and Functional Testing Agents (FT Agents) have eligibility requirements within ENERGY STAR. We recommend that project teams engage these partners as early in the project design stage as possible.
- During the design phase, work with your qualified energy rater and/or ASHRAE Path Energy Modeler to set energy-efficiency goals that comply with the appropriate ENERGY STAR Residential New Construction Program. After the project team has decided on a compliant energy package, build these measures into the project plans and specs and into contractor work scopes, and work with the rater and/or FT Agent to create and implement a verification plan throughout construction.

- Under the ENERGY STAR Multifamily New Construction programs, raters may use a sampling protocol that is based on a pre-analysis of building plans to assess whether a group of dwelling units can meet ENERGY STAR guidelines. Raters then carry out subsequent testing and inspections of a sample set of the dwelling units.
- Consider using JA8-certified bulbs to ensure high lighting quality and performance.
- Consider incorporating daylighting practices through controlled admission of natural light, along with a daylight-responsive lighting control system.

RESOURCES

U.S. Environmental Protection Agency ENERGY STAR resources:

- Residential New Construction Programs (Multifamily New Construction, Manufactured New Homes, and Single-Family Homes). *www.energystar.gov/partner-resources/residential_new*
- Partner Locator. A search tool to identify a rater in the local area. *www.energystar.gov/partner_resources/partner_locator*
- Listings of Home Certification Organizations (HCOs) and Multifamily Review Organizations (MROs). These are the groups that oversee implementation of the ENERGY STAR Residential New Construction Programs; they each have their own sampling protocols.
  - » HCOs. *www.energystar.gov/partner-resources/residential_new/working/other_participants/hco*
  - » MROs. *www.energystar.gov/partner-resources/residential_new/working/other_participants/mros*

Helpful tools for optimizing energy performance:

- California Energy Commission, Joint Appendix 8 (JA8). Provides qualifications for residential lighting. *www.energy.ca.gov/filebrowser/download/5128*
- U.S. Department of Energy; Building America Climate Specific Guidance, 2021. A map and tool that shows climate zones for each state and county as well as the basic 2021 International Energy Conservation Code requirements for each climate zone. *www.energy.gov/eere/buildings/building-america-climate-specific-guidance*

5.2b *Mandatory for Substantial and Moderate Rehabs* **Building Performance: Rehabilitation**

RATIONALE

Dwelling units rehabilitated to a whole-building energy-efficiency standard can achieve energy savings in space heating and cooling, water heating, lighting, and appliance efficiency. These strategies can improve resident comfort, lower operating costs, and decrease greenhouse gas emissions.

Using energy modeling software during the design stage helps the team develop a cost-effective package of energy-efficiency measures to include in the project's scope of work to meet the project's energy goals.

REQUIREMENTS

All project teams must engage a qualified energy rater to verify achievement of the following requirements:

- **Select a compliance option:** Demonstrate energy efficiency through either the Energy Rating Index (ERI) option or the ASHRAE option described below. Projects in Colorado in Climate Zone 5 may follow a pathway administered by Energy Outreach Colorado in lieu of the ERI or ASHRAE options. Projects in California must, as described below, use the state's Building Energy Efficiency Standards and associated regulations to comply with the ERI or ASHRAE option.
- **Test HVAC performance:** For all HVAC systems, whether new or existing, that will be used post-retrofit, complete and pass testing via the National HVAC Functional Testing Checklist, ENERGY STAR Multifamily New Construction Version 1.1. This guidance applies to all HVAC systems in multifamily and single-family properties. For properties with more than one HVAC system, project teams may follow the sampling guidance as written on the checklist for all newly installed systems; 100% of all existing systems must be tested and must pass.
- **Size and select HVAC equipment:** Any newly installed HVAC equipment must perform in accordance with either 1) the Air Conditioning Contractors of America (ACCA) Manuals J and S **OR** 2) the most recent ASHRAE Handbook—Fundamentals available at time of specification.
- **Ensure airtight performance:** Compartmentalize dwelling units from air infiltration.
  - *Substantial rehabs:* Air infiltration should be no greater than 0.30 CFM50/sfbe.
  - *Moderate rehabs and substantial rehabs with historic designation:* Projects may choose to meet either 1) a .40 CFM50/sfbe compartmentalization target following procedures in ANSI/RESNET/ICC Std. 380, **OR** 2) a 20% improvement of CFM50/sfbe compared to pre-retrofit condition. A combination of these targets may be used at the project team's discretion (some dwelling units complying with the .40 CFM50/sfbe target and others complying with the 20% improvement target).
- **Install thermal insulation:** For any insulation installed as part of the rehab, achieve Grade I installation per ANSI/RESNET/ICC 301 Standard for the Calculation and Labeling of the Energy Performance of Dwelling and Sleeping Units using an Energy Rating Index (Standard 301). Grade II batts are permitted to be used in floors if they fill the full width and depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance **AND** the only defect preventing the insulation from achieving Grade I is the compression caused by the excess insulation.
- **Install efficient lighting:** Ensure at least 90% of permanently installed lights are LEDs.
- **Install efficient appliances:** For any appliances provided, ensure that clothes washers, dishwashers, and refrigerators are ENERGY STAR certified.

Note: Unless otherwise noted in *Criterion 5.2b Building Performance: Rehabilitation*, sampling to perform visual inspections and to verify airtightness in rehabilitation projects is permitted as follows:

- To establish a baseline infiltration rate, 5% of all units in the building must be tested. If results are inconclusive or highly variable, additional units should be sampled at the discretion of the project's qualified energy rater.

- Final infiltration testing and visual inspections must be completed on a minimum of 10% of all units within the building. If results are inconclusive or highly variable, additional units should be sampled at the discretion of the project's qualified energy rater.
- A sample of units should include a cross section of unit types, orientations, and locations (i.e. top, bottom, middle, corner, etc.) within the building.
- Unit types should be determined in accordance with ANSI/RESNET/ICC 301 Standard for the Calculation and Labeling of the Energy Performance of Dwelling and Sleeping Units using an Energy Rating Index (Standard 301).

Option 1: Energy Rating Index

For each dwelling unit in the project, achieve an Energy Rating Index (ERI) score of 80 or less.

Exception: Each dwelling unit of a building built before 1980 and undergoing moderate rehab is eligible for certification with an ERI score of 90 or less.

Any method or strategy, except for on-site power generation, may be implemented to satisfy the targeted minimum energy performance. The ERI shall be calculated using the most recent available version of ANSI/RESNET/ICC 301, Standard for the Calculation and Labeling of the Energy Performance of Dwelling and Sleeping Units, including all addenda and normative Appendices. For projects in California, the ERI value shall be calculated by a method approved by the California Energy Commission.

Option 2: ASHRAE 90.1

Demonstrate that the energy performance of the completed project will be equivalent to or better than ASHRAE Standard 90.1-2013—Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings, using an energy model created by a qualified energy services provider according to Appendix G of 90.1-2016. On-site power generation may not be included as a strategy for meeting this building performance target. Projects may use a "fuel-neutral" compliance tool to allow the baseline building to be modeled as all electric. Projects in California must use the version of Title 24 under which the project is permitted in lieu of ASHRAE 90.1 to achieve the targeted minimum energy performance.

RECOMMENDATIONS

- Before deciding on specific energy improvements, assess the interior and exterior of buildings for evidence of moisture problems as described in *Criterion 7.9b Managing Moisture in the Building Enclosure: Rehabilitation*.
- To ensure optimal long-term building performance and to better position a building to withstand power outages, prioritize envelope improvements (e.g., adding roof insulation) before mechanical and lighting upgrades.
- To succeed with either option, engage a qualified energy rater and/or ASHRAE Path Energy Modeler and/or Functional Testing Agent (FT Agent) as early in the project planning stage as possible. Their responsibilities will include:
  - » Creating an energy model during the design stage of the project to configure the preferred set of efficiency measures, including plans and specifications showing the building's projected energy performance, to enable the project to meet the target

  - » Conducting a mid-construction, pre-drywall inspection of the thermal enclosure
  - » Verifying the final performance of the building with post-construction testing, including a blower-door and duct-blaster test of the home and/or dwelling units
- Due to increased potential for refrigerant leaks and uncontrolled emissions associated with variable-refrigerant-flow (VRF) HVAC equipment, as well as recurrent reports of installation failures, carefully consider the implications of VRF equipment with your MEP engineer and property maintenance staff before equipment selection.
- Consider using JA8-certified bulbs to ensure high lighting quality and performance.

RESOURCES

Resources for finding an energy professional:

- ENERGY STAR, Partner Locator. A search tool for finding qualified energy raters by state. *www.energystar.gov/partnerlocator*

Energy-efficiency standards, software tools, and guidance:

- ENERGY STAR Home Certification Organizations (HCOs) support ERI scores; see each HCO's approach to software that generates the score: *www.energystar.gov/partner-resources/residential_new/working/other_participants/hco*
- Building Performance Institute, Inc. Standard for Multifamily Energy Auditing, 2021. *www.bpi.org/__cms/docs/BPI-1105-S-202x%20Standard%20for%20Multifamily%20Energy%20Auditing%20(8-19-21).pdf*
- U.S. Department of Energy, Air Sealing Technology Fact Sheet. This explainer describes the importance of sealing air leaks and providing controlled ventilation. *www1.eere.energy.gov/buildings/publications/pdfs/building_america/26446.pdf*
- ASHRAE Standard 90.1-2013—Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings. *www.ashrae.org/technical-resources/standards-and-guidelines/read-only-versions-of-ashrae-standards*
- State of California, Building Energy Efficiency Standards (Title 24) and compliance manuals. *www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency*

Search tools and other guidance for certified appliances and lighting:

- When preparing project specifications, find ENERGY STAR product information, including model numbers and savings calculators. *www.energystar.gov/products/certified-products*
- California Energy Commission Joint Appendix 8 (JA8) provides qualifications for residential lighting. *www.energy.ca.gov/filebrowser/download/5128*
- The Lighting Research Center. This university-based, independent lighting research and education group provides objective and timely information about lighting technologies and applications, and about human response to light. *www.lrc.rpi.edu/*
- Lamp Recycle lists locations where fluorescent lamps and ballasts may be taken for recycling. *www.lamprecycle.org*

Technical resources for HVAC equipment design and installation:

- ASHRAE Handbook—Fundamentals. *www.ashrae.org/technical-resources/ashrae-handbook*
- Air Conditioning Contractors of America, list of software programs reviewed by ACCA to perform Manual J calculations. *www.acca.org/standards/software*
- Air Conditioning Contractors of America, Manual J: Residential Load Calculation; Manual S: Residential Equipment Selection; Manual D: Residential Duct Design; Manual LLH: Low Load Homes. *www.acca.org/standards/technical-manuals*
- Air Conditioning Contractors of America, HVAC Quality Installation Specification: Residential and Commercial Heating, Ventilating, and Air Conditioning Applications. The page also includes links to various articles and other ANSI and ACCA standards. *www.acca.org/standards/quality*
- ENERGY STAR, Duct Sealing. Fact sheet, FAQ, and other resources on sealing ducts. *www.energystar.gov/saveathome/heating-cooling/duct-sealing*

5.3 Advanced Building Performance

Optional: 16 points maximum

Note for projects in humid climates: Projects located in climate zones 1A, 2A, 3A, or 4A following this criterion must also comply with *7.8 Managing Moisture: Dehumidification*.

RATIONALE

Improvements in building energy performance result in utility cost savings from more efficient space heating and cooling, water heating, lights, and appliances, which improve residents' comfort, lower operating costs, and decrease greenhouse gas emissions. Investments in deep energy retrofits, or in new construction properties that are more efficient than required in *Criterion 5.2a Building Performance: New Construction*, will provide deeper benefits at relatively low incremental cost. From a resilience standpoint, a highly-energy-conserving building envelope helps ensure that habitable temperatures will be maintained in the event of extended loss of power or interruptions in heating fuel.

REQUIREMENTS

Select one of the following options.

All projects

Option 1: Performance above mandatory requirement

Projects following an ENERGY STAR prescriptive path for Criterion 5.2a are not eligible for points from this option as they are not able to demonstrate compliance.

Design and construct a building that is projected to be more energy efficient than what is required of the project by the applicable mandatory performance criterion—5.2a for new construction or 5.2b for substantial and moderate rehabs. These additional reductions in energy use must be captured by energy conservation measures associated with improved building component systems and not through the addition of on-site power generation. *[5–10 points]*

If following the ERI path for 5.2a or 5.2b compliance:

- ERI score at least 5 lower than required *[5 points]*
- Each additional 2-point decrease in ERI score *[1 point]*

If following the ASHRAE path for 5.2a or 5.2b compliance:

- 5% greater efficiency than required *[5 points]*
- Each additional 1% greater efficiency *[1 point]*, up to 14% greater efficiency than required

OR

Option 2: Advanced building certification

Certify each building in the project to one of the following standards:

- DOE Efficient New Homes Program (formerly Zero Energy Ready Homes, or ZERH) *[12 points]*
- ENERGY STAR NextGen *[12 points]*
- Passive House International (PHI) certifications including Classic, Plus, Premium, LEB, and EnerPHit *[16 points]*
- Phius certifications including CORE, ZERO, and REVIVE *[16 points]*

Proof of certification with any of these programs will also suffice for compliance with the applicable mandatory performance criterion—5.2a for new construction or 5.2b for substantial and moderate rehab.

If the project is unable to provide that proof of certification at postbuild, the project will not be eligible for points under *Criterion 5.3 Advanced Building Performance*, and the project must demonstrate compliance with *Criterion 5.2a or Criterion 5.2b* in order to be eligible for certification. Some exceptions to this apply to projects pursuing the PHI and Phius certifications; refer to certification guidance for details.

OR

Rehabilitation

Option 3: Deep energy retrofit

Demonstrate significant energy savings via the ERI or ASHRAE pathway as compared to the requirements of *Criterion 5.2b Building Performance: Rehabilitation*. Reductions in energy use must be captured by energy conservation measures associated with improved building component systems and not through the addition of on-site power generation.

If following the ERI path for 5.2b compliance:

- Substantial rehabs must achieve an ERI score of 65 or less. Moderate rehabs must achieve an ERI score of 75 or less. *[14 points]*

If following the ASHRAE path for 5.2b compliance:

- Compared to *Criterion 5.2b Option 2: ASHRAE 90.1*, substantial rehabs must achieve at least 15% greater efficiency and moderate rehabs must achieve at least 10% greater efficiency. *[14 points]*

RECOMMENDATIONS

- Each of the programs and pathways listed in this criterion requires a significant commitment to ensure high levels of project performance. Begin strategizing about how to achieve your project goals through dual certification with these programs as early in the integrative design process as possible.
- Before deciding on specific energy improvements in rehab projects, assess the interior and exterior of buildings for evidence of moisture problems as described in *Criterion 7.9b Managing Moisture in the Building Enclosure: Rehabilitation*.

RESOURCES

- U.S. Department of Energy, Building America Solution Center. Expert information on hundreds of high-performance construction topics, including research publications, tools, specs, details, webinars, and newsletters on cost-effective, energy-efficient building strategies. *https://basc.pnnl.gov/*
- ENERGY STAR, NextGen. NextGen is a higher level of ENERGY STAR certification for multifamily and commercial buildings. In addition to advanced energy performance, projects must meet a carbon emission target and must source at least 30% of their operating energy from renewables. *www.energystar.gov/buildings/building_recognition/energy_star_nextgen_certification_commercial_buildings*
- U.S. Department of Energy, DOE Efficient New Homes (formerly Zero Energy Ready Homes, or ZERH). This program builds upon ENERGY STAR for Homes, along with proven Building America innovations and best practices. These homes are third-party verified to meet high standards of performance. *www.energy.gov/eere/buildings/doe-efficient-new-homes-program*
- U.S. Department of Energy, Tour of DOE Efficient New Homes. Features 400 case studies of award-winning homes and buildings; case studies can be sorted to show affordable projects. *www7.eere.energy.gov/buildings/residential/explorezerh/tour-of-zero*
- Phius. This U.S.-based nonprofit maintains and updates the Phius building standards and certifies professionals, buildings, and high-performance building products. *www.phius.org/*
- Passive House Institute (PHI). This international research institute developed the original Passive House standard and the energy modeling software used for Passive House design. It also certifies professionals, buildings, and building components. *https://passivehouse.com/*

5.4a

Mandatory for New Construction; Optional: 15 points

All-Electric and Electric-Ready Design: New Construction

RATIONALE

How electricity is used in a home impacts residents' health, utility bills, and ability to use clean energy.

When it comes to the type of power that is used in a home, the greatest and most direct impact on health will be from systems located in dwelling units. Designing a property's electrical service to provide electric power for cooking equipment eliminates the possibility of negative resident and staff health impacts from exposure to combustion by-products. And creating an electric-ready design for water-heating systems in dwelling units allows for greater ease of installing

electric water-heating systems in the future at a lower cost and with greater ease than if electric upgrades were needed at the time of replacement.

Consider the right approach for the property's electrical design in terms of improving health, utility bills, and emissions now and in the future—even if installing renewables is not feasible, the electric grid for the property is not yet clean, or the price of operating an all-electric building in the region is not yet cost-competitive. As grid sources of energy become cleaner, so will the emission profile of the property. All-electric buildings also allow for future grid flexibility, enabling a property to take advantage of favorable utility rate structures.

REQUIREMENTS

Mandatory
All equipment for cooking in new construction properties is required to be powered by electricity.

AND

If there is gas or propane equipment installed for dwelling-unit space heating and/or water heating, each dwelling unit must be all-electric-ready by meeting the requirements listed below. The electrical design is required to accommodate future electric dwelling-unit water heating as well as dwelling-unit heat pumps for space heating and cooling. In the all-electric-ready scenario, teams must furnish the following:

- Install branch circuits within 3 feet of gas space-heating and/or water-heating appliances in dwelling units (either tankless or with storage tanks) with no obstructions. Circuits must be dedicated to future electric replacement equipment (125V, 20 amp) and cannot be used for other appliances.
- Dedicate space in the electric panel next to the space-heating and/or water-heater breaker for future conversion to 240V and label it as "240 Ready."
- Include receptacles for future heat pumps and electric water heaters to be connected to the panel with a 120/240V, 3-conductor, 10AWG copper wire, with both ends of the unused conductor labeled. Ensure these are electrically isolated.
- Install a floor drain to accommodate condensate lines and approximately 3 feet by 3 feet of clear floor space with clearance height of at least 6 feet, assuming future installation of an integrated heat-pump water heater (iHPWH) unless the initially installed water heater is tankless.

Optional
A new construction project is eligible for points when, apart from emergency backup power, no combustion equipment is used as part of the building project: the project is all electric. *[15 points]*

RECOMMENDATIONS

- Use electricity for as many of the end uses as possible, but note that electric-resistance heating may be cost-prohibitive from an operations perspective. From an emissions perspective, start by electrifying components that otherwise would use propane or heating oil and then focus on electrifying components that otherwise would use natural gas.

- From a cost perspective, evaluate rates for various fuel sources and uses in the property.
- Consider installing heat pumps, including specialized cold-climate models as needed, to provide air conditioning as well as space heating. Unitary and central heat-pump water heaters and residential heat-pump clothes dryers are available; consider what electric technologies are appropriate for your property.
- Consult manufacturers' guidance for proper installation of heat-pump water heaters, taking careful note of space, ventilation, and noise. Heat-pump water heaters need to be located where they can freely exchange heat with outdoor air. In addition to location considerations, central iHPWH may require roughly 50% more space than a conventional gas boiler and tank.
- Consider how changing from one system type to another may change how residents interact with their space; include them in decision-making prior to retrofits and through education post-retrofit. For instance, electric induction stoves operate differently than all others; add these considerations to property manuals and resident engagement per *Category 8: Operations, Maintenance, and Resident Engagement*.
- Consider how changing from one system type to another may change property maintenance needs and schedules. For instance, filter changes may be needed for new equipment but not for existing equipment; consider where to store replacement filters, and add this responsibility to operational planning per *Category 8*.
- Consider pairing electrification with simultaneous installation of on-site solar generation. For example, reduce operating costs and emissions by sizing and controlling a central heat-pump water heater to heat and store water while the solar panels are producing, and then deliver hot water when the sun is down. An energy plan developed to meet the requirements of *Criterion 5.1 Energy Planning* can help the project team identify similar synergies.

RESOURCES

- Environmental Health Perspectives, Nate Seltenrich; Take Care in the Kitchen: Avoiding Cooking-Related Pollutants. Gas stoves—and cooking in general—can release potentially hazardous pollutants into indoor air. *http://dx.doi.org/10.1289/ehp.122-A154*
- Rocky Mountain Institute, The Economics of Electrifying Buildings. This analysis explores which building typologies can benefit financially from electrification. *https://rmi.org/insight/the-economics-of-electrifying-buildings/*
- Colorado Housing and Finance Authority, Colorado Multifamily Affordable Housing Electrification Hub. An interactive website that features technical resources, peer learning, and financing and development resources related to electrification design and decisions for affordable multifamily housing developments. *www.chfainfo.com/rental-housing/colorado-multifamily-electrification-hub*
- Redwood Energy, A Zero Emissions All-Electric Multifamily Construction Guide. Case studies of electrified multifamily properties from climate zones throughout the U.S., along with product guides for equipment and appliances. *https://fossilfreebuildings.org/ElectricMFGuide.pdf*

5.4b *Optional for Substantial and Moderate Rehabs: 12–15 points*
All-Electric and Electric-Ready Design: Rehabilitation

RATIONALE

How electricity is used in a home impacts residents' health, utility bills, and ability to use clean energy.

When it comes to the type of power that is used in a home, the greatest and most direct impact on health will be from systems located in dwelling units. Designing a property's electrical service to provide electric power for cooking equipment eliminates the possibility of negative resident and staff health impacts from exposure to combustion by-products. And creating an electric-ready design for water-heating systems in dwelling units, if they're not electric already, allows for greater ease of installing electric water-heating systems in the future at a lower cost and with greater ease than if electric upgrades were needed at the time of replacement.

Consider the right approach for the property's electrical design in terms of improving health, utility bills, and emissions now and in the future—even if installing renewables is not feasible, the electric grid for the property is not yet clean, or the price of operating an all-electric building in the region is not yet cost-competitive. As grid sources of energy become cleaner, so will the emissions profile of the property. All-electric buildings also allow for future grid flexibility, enabling a property to take advantage of favorable utility rate structures.

REQUIREMENTS

Option 1: All-electric or electric-ready dwelling units *[12 points]*

All equipment for cooking on the property is powered by electricity.

AND

If there is gas or propane equipment installed for dwelling-unit space heating and/or water heating, each dwelling unit in the project scope must be all-electric-ready by meeting the requirements listed below. The electrical design is required to accommodate future electric dwelling-unit water heating as well as dwelling-unit heat pumps for space heating and cooling. To achieve points under the all-electric-ready scenario, teams must furnish the following:

- Install branch circuits within 3 feet of gas space-heating and/or water-heating appliances in dwelling units (either tankless or with storage tanks) with no obstructions. Circuits must be dedicated to future electric replacement equipment (125V, 20 amp) and cannot be used for other appliances.
- Dedicate space in the electric panel next to the space-heating and/or water-heater breaker for future conversion to 240V and label it as "240 Ready."
- Include receptacles for future heat pumps and electric water heaters to be connected to the panel with a 120/240V, 3-conductor, 10AWG copper wire, with both ends of the unused conductor labeled. Ensure these are electrically isolated.
- Install a floor drain to accommodate condensate lines with approximately 3 feet by 3 feet of clear floor space with clearance height of at least 6 feet, assuming future installation of an integrated heat-pump water heater (iHPWH) unless the initially installed water heater is tankless.

Option 2: All-electric property *[15 points]*

Apart from emergency backup power, there is no combustion equipment used on the property; the project is all electric.

RECOMMENDATIONS

- Factor in the cost of potentially needing to upgrade electric service to the property against the potential savings from avoiding gas piping. Connect with the electric utility to evaluate whether additional feeder lines and/or electrical panels are necessary.
- Use electricity for as many end uses as possible, but note that electric-resistance heating may be cost-prohibitive from an operations perspective. From an emissions perspective, start by electrifying components that otherwise would use propane or heating oil and then focus on electrifying components that otherwise would use natural gas.
- From a cost perspective, evaluate rates for various fuel sources and uses in your property.
- Consider installing heat pumps, including specialized cold-climate models as needed, to provide air conditioning as well as space heating. Unitary and central heat-pump water heaters and residential heat-pump clothes dryers are available; consider which electric technologies are appropriate for your property.
- Consult manufacturers' guidance for proper installation of heat-pump water heaters, taking careful note of space, ventilation, and noise. Heat-pump water heaters need to be located where they can freely exchange heat with outdoor air. In addition to location considerations, central iHPWH may require roughly 50% more space than a conventional gas boiler and tank.
- Consider how changing from one system type to another may change how residents interact with their space; include them in decision-making prior to retrofits and through education post-retrofit. For instance, electric induction stoves operate differently than all others; add these considerations to your property manuals and resident engagement per *Category 8: Operations, Maintenance, and Resident Engagement*.
- Consider how changing from one system type to another may change property maintenance needs and schedules. For instance, filter changes may be needed for new equipment but not for existing equipment; consider where to store replacement filters, and add this responsibility to operational planning per *Category 8*.
- Consider pairing electrification with simultaneous installation of on-site solar generation. For example, reduce operating costs and emissions by sizing and controlling a central heat-pump water heater to heat and store water while the solar panels are producing and then deliver hot water when the sun is down. An energy plan developed to meet the requirements of *Criterion 5.1 Energy Planning* can help the project team identify similar synergies.

RESOURCES

- Environmental Health Perspectives, Nate Seltenrich; Take Care in the Kitchen: Avoiding Cooking-Related Pollutants. Gas stoves—and cooking in general—can release potentially hazardous pollutants into indoor air. *http://dx.doi.org/10.1289/ehp.122-A154*
- Rocky Mountain Institute, The Economics of Electrifying Buildings. This analysis explores which building typologies can benefit financially from electrification. *https://rmi.org/insight/the-economics-of-electrifying-buildings/*

- Colorado Housing and Finance Authority, Colorado Multifamily Affordable Housing Electrification Hub. An interactive website that features technical resources, peer learning, and financing and development resources related to electrification design and decisions for affordable multifamily housing developments. *www.chfainfo.com/rental-housing/colorado-multifamily-electrification-hub*
- Redwood Energy, A Zero Emissions All-Electric Multifamily Construction Guide. Case studies of electrified multifamily properties from climate zones throughout the U.S., along with product guides for equipment and appliances. *https://fossilfreebuildings.org/ElectricMFGuide.pdf*

5.5 Peak Demand Control

Optional: 8 points

RATIONALE

Once a building is all electric, its operating emissions depend on both 1) how much electricity the property uses (managed through energy efficiency and conservation) and 2) the emissions of power plants on the grid and the availability of renewable energy.

Controlling when a building uses grid electricity is as important as using efficient HVAC equipment and putting solar panels on the roof. This is because all grid regions rely on fossil fuels to some extent, and the most polluting power plants tend to come online when renewable sources are low (such as overnight), or when the grid is experiencing a surge in demand (for example, during hot summer afternoons). In some markets, times of peak demand are also when electricity is most expensive. Shifting and managing loads can help a property respond to time-of-use pricing and can also help a property get the most financial benefit from an on-site solar PV investment—especially if the utility does not offer net metering.

Residential buildings have significant opportunities to shift their energy use to reduce both emissions and costs.

How a building's energy use changes over the course of a day is called its "load profile." Residential buildings tend to have large peaks in this profile on either side of when the sun is shining—when many people are waking up and getting ready to leave the house, and in the late afternoon and evening when many people come home. Hot-water systems, ventilation systems, electric vehicles, and in-home appliances can all be controlled to shift more of their energy use to the middle of the day and cut back during a peak in demand.

REQUIREMENTS

Option 1: Hot-water thermal storage and control

Design or specify a hot-water system with sufficient capacity, storage, and control capability to meet hot-water demand from storage alone during the region's peak hours (ex: 4 p.m. to 9 p.m. and 5 a.m. to 8 a.m.).

Provide Ecosizer or an equivalent sizing calculation to show the sizing assumptions and peak-shifting potential. Include the specifications for the control interface and operating instructions in the operations manual. *[8 points]*

OR

Option 2: Residential demand management

Adopt a strategy for demand management of in-unit residential electrical loads. To be eligible for this option, provide evidence that 50% or more of residents are participating in a utility-managed or building-managed demand-response program. *[8 points]*

The most common examples of in-unit demand management are:

- Establishing a system for informing residents of their use and any utility bill savings associated with responding to peak-demand periods. Tools like Green Button and time-of-use energy monitors can help residents understand when voluntary curtailment can result in savings. These are often deployed as a part of a utility-sponsored demand-response program.
- Some third-party programs for demand response in homes allow for either event-specific curtailment, where residents sign up for notifications and have the option to reduce their use during an expected peak, or automated curtailment, where residents agree to allow smart switches and smart thermostats to curtail energy use automatically in response to peak events. Examples include OhmConnect and Meltek. These programs exist only where there are both smart meters and utility participation—but where they are available, because they are consumer focused, they are well-suited to residents of affordable housing who have support from on-site staff.
- Smart electric panels, while still emerging, are a fully automated option for controlling individual end uses according to a schedule. These may only be appropriate for certain home types.

RECOMMENDATIONS

- The project team should contact the local utility to determine the potential for participating in utility demand-response programs. These may be more appropriate for the building owner or the building residents, depending on the program design and the energy uses they target.
- It may not be easy or possible to accurately predict precise energy or cost savings from any one strategy. This is why no simulation or minimum reduction is required to earn points for peak demand control.
- Residential energy-demand management requires special consideration of the resident population and any potential concerns, perceived or real, about privacy and control. Avoid strategies that ask or encourage residents to change their behavior without a clear, meaningful benefit and a communication plan to support engagement.

RESOURCES

- Ecotope, Ecosizer. A free tool for sizing central heat pump water heaters. *https://ecosizer.ecotope.com/static/pdfs/ecosizer-chpwh-sizing-tool-manual07222024.pdf*
- Ecotope, Multifamily Load Shift Evaluation. Analyzes the energy and cost impacts of leveraging commercial heat-pump water heaters to reduce multifamily loads during afternoon peaks in both winter and summer in Seattle. *https://ecotope-publications-database.ecotope.com/2022_010_Ecotope%20-%20SCL%20-%20Load%20Shift%20-%20Final%2005242022.pdf*

Two examples of demand-control programs:

- OhmConnect. *www.ohmconnect.com*
- Meltek. *https://meltek.com/*

5.6 Backup Power

Optional: 8 or 10 points

RATIONALE

With more intense storms, flooding, wildfires, and heat waves occurring regularly, the frequency and duration of power outages have increased. "Islandable" electrical systems, so called because they can fully detach from the grid and continue operating, offer a significant level of resilience in such situations, supplying power to critical building systems when the grid cannot. Incorporating energy storage on the site to be used during an emergency also encourages a more resilient and efficient energy grid.

REQUIREMENTS

Size the backup power system to satisfy at least three of the most critical energy loads of the project for at least three consecutive days, 24 hours per day. Consider a larger system if needed to meet high-priority energy needs during extended power outages and/or to safely shelter all occupants and staff on an emergency basis for a power outage during extreme heat or cold.

The backup power for the three most critical energy loads may serve 100% of the property or solely a common space (including a community room within a multifamily building or a stand-alone clubhouse on a development campus) if that space is sized to accommodate at least 10 sf/person for the total population of the property.

Select the project's three most critical energy loads from the following:

- **Cooling:** Operation of a fan sufficient to provide emergency cooling if mechanical air conditioning equipment cannot operate
- **Heating:** Operation of the electrical components of fuel-fired heating systems
- **Charging:** Power for device charging via at least one functioning electrical receptacle per 250 square feet of occupied space
- **Connectivity:** Operation of a cable modem and wireless router, or other means of providing internet access within the building
- **Cold storage:** Sufficient power and a refrigerator appropriately sized and located for storage of medicine and other essentials for the population of the property
- **Emergency lighting:** Lighting level at a minimum of 3 foot-candles in all building spaces to define a path of egress to all required exits and to a distance of 10 feet on the exterior
- **Functional lighting:** One location for every 500 square feet that provides a minimum of 30 foot-candles measured 30 inches above the floor
- **Medical equipment:** Sufficient power for operation of critical medical equipment for residents
- **Potable water:** Operation of water pumps if needed to make potable water available to occupants

Select the backup system type from the following three options.

Option 1: Islandable PV + battery storage

Islandable solar photovoltaics (PV) with battery storage and a system to switch to battery backup when the electric grid goes down *[10 points]*

OR

Option 2: Off-peak battery storage

Battery energy storage system capable of storing off-peak energy and a system to switch to battery backup when the electric grid goes down *[10 points]*

OR

Option 3: Generator

Generator(s) and appropriate connections at the exterior of a building available on an as-needed basis *[8 points]*

Note for generator systems: Regular fuel testing is required for all backup-generator system types, in accordance with the National Fire Protection Association's 110 Standard for Emergency and Standby Power Systems.

RECOMMENDATIONS

- Consider which electrical equipment should run on backup power so buildings can remain habitable during extended blackouts. Because cogeneration and solar power systems are always in use, they can be more reliable than generators that are turned on only during emergencies.
- Prioritize emergency systems, such as egress lighting, fire alarms, water pumps, parking egress, elevators, and small but critical heating and cooling loads.
- Consider a bi-modal PV system, which can both feed power into the electric grid (net-metering) and shunt power to and from a battery bank, for significant flexibility and resilience, including power at night during outages.
- If using solar with battery storage, consider engaging a single contractor to manage procurement and installation of both systems, coordinating with PV and battery component suppliers and handling permitting, interconnection, virtual power purchase agreements, and other relevant details.
- If using lithium-ion batteries for energy storage, consider fire-protection needs up front. Often batteries will need to be installed outside of the building on a concrete pad.
- Where a permanent connection is being made for a portable generator, provide overcurrent protection and a means of disconnecting at the point of connection. For a temporary generator hookup, the property should facilitate easy access to an electrical connection point. Connections must be administered by qualified people who maintain and supervise the installation.

- Ensure building management personnel receive training and educational materials for configuring backup power during an emergency. This guidance should also be incorporated into materials developed per *Criterion 8.1 Building Operations & Maintenance Manual and Plan* as well as per *Criterion 8.2 Emergency Management Manual*.
- If using a gas-fired generator, consider the need to store an adequate amount of fuel, and set a schedule for fuel testing per the requirements of Option 3, above.

RESOURCES

- Enterprise Community Partners, Ready to Respond: Strategies for Multifamily Building Resilience. More than a dozen strategies and specific guidance, including for backup power, on building property resilience in the event of an emergency. *https://businesscontinuity.enterprisecommunity.org/sites/default/files/strategies-for-multifamily-building-resilience.pdf*
- Urban Green, Report of the NYC Building Resiliency Task Force. See Chapter 2: Backup Power. *www.urbangreencouncil.org/wp-content/uploads/2022/11/2013_brtf_summaryreport_0.pdf*
- U.S. Federal Emergency Management Agency, Safe Rooms for Tornadoes and Hurricanes. Guidance for designing residential and community safe rooms for use during storm emergencies. *www.fema.gov/sites/default/files/documents/fema_safe-rooms-for-tornadoes-and-hurricanes_p-361.pdf*
- National Fire Protection Association, NFPA 110— Standard for Emergency and Standby Power Systems. *www.nfpa.org/codes-and-standards/nfpa-110-standard-development/110*
- National Fire Protection Association, NFPA 111—Standard on Stored Electrical Energy Emergency and Standby Power Systems. *www.nfpa.org/product/nfpa-111-standard/p0111code*

5.7 *Optional: 7–11 points* Renewable Energy

RATIONALE

Renewable energy reduces environmental impacts, such as greenhouse gas emissions, which are associated with energy sourced and produced from fossil fuels. Use of renewable energy technologies can also result in energy cost savings and provide emergency power.

REQUIREMENTS

Install photovoltaic (PV) panels or another electricity-generating renewable energy source such as wind, a clean thermal-energy network, hydroelectric, or geothermal (not the same technology as ground-source heat pumps). The renewable energy may be owned and produced on-site or off-site if the associated renewable energy certificates (RECs) are retained or retired by the building owner.

Alternatively, the energy may be procured from a renewable source, such as community solar, virtual power purchase agreements, or Green-E-certified RECs.

Option 1: On-site and/or direct ownership of renewables

Prioritize direct ownership of renewables by following one or more of the strategies below:

- **Strategy A:** Calculate the area of usable roof space. Purchase and install on-site PV equipment on at least 50% of the calculated area. PV may be installed anywhere on the certifying property—including but not limited to rooftops, parking lots, side lots, canopies, or garages—provided the total area of the array equals at least 50% of the usable roof area. *[10 points]* **OR**

- **Strategy B:** Calculate the area of usable roof space. Install on-site PV equipment owned by another party on at least 50% of the calculated area. PV may be installed anywhere on the certifying property—including but not limited to rooftops, parking lots, side lots, canopies, or garages—provided the total area of the array equals at least 50% of the usable roof area. *[10 points]* **OR**

- **Strategy C:** Install on-site geothermal energy meeting at least 30% of total building site energy use. *[10 points]* **OR**

- **Strategy D:** Earn points under Strategy A **OR** Strategy B and combine with community solar or another type of contract to procure community renewable energy to offset at least 15% of total building site energy use. *[11 points]*

OR

Option 2: Procurement of community renewable energy

Procure community renewable energy (solar, wind, etc.) to offset at least 15% of total building site energy use. *[8 points]*

OR

Option 3: Procurement of off-site renewable energy

Procure renewable energy equivalent to at least 15% of total projected site energy use, either through Strategy A (direct purchase) or Strategy B (renewable energy credits).

- **Strategy A:** Directly procure renewable energy equivalent through a minimum 10-year contract. *[7 points]*
  - » Earn an additional point if procured renewable energy includes time-matched or time-aligned renewable energy *[1 point]* **AND/OR**
  - » Renewable energy originates within the same e-grid region *[1 point]*

  OR

- **Strategy B:** Procure voluntary Green-E-certified renewable energy credits from a location where there are no mandated Renewable Portfolio Standard or community energy programs. *[7 points]*

Notes for all options:

- Document how much renewable energy will be provided.
- To achieve Certification Plus Zero Emissions, total clean-energy sources for the project must meet or exceed the site energy use of the property.

RECOMMENDATIONS

- Focus first on reducing the building's overall energy consumption in building-performance criteria 5.2a, 5.2b, and 5.3 with energy-efficiency measures, which are generally more cost effective and longer lasting than renewables.
- Whether a building is individually metered or master-metered significantly influences how solar can be deployed and who benefits. In master-metered buildings, solar can directly offset the building's utility bills for common loads, making the financial modeling and implementation relatively straightforward.
- Look for a solar developer or energy consultant with experience evaluating utility rate structure to understand how load management and overall costs are affected by things like time-of-use rates and demand charges. Consider optimizing energy costs and resilience options by combining strategies found in *Criterion 5.5 Peak Demand Control* and/or *Criterion 5.6 Backup Power* with those in *Criterion 5.7 Renewable Energy*.
- Early on, establish an active asset-management and/or operations plan for monitoring on-site renewable energy production. Otherwise, operators may not know whether systems are working as intended. Consider entering into a maintenance or service plan with the original installer for routine inspections, and ensure that your property's project needs assessment (PNA) includes all components (inverters, panels, etc.) within its replacement reserve (RR) tables.
- Consider installing solar thermal water-heating systems for stand-alone laundry facilities in multifamily projects.
- If using solar with battery storage, consider engaging a single contractor to manage procurement and installation of both systems, coordinating with PV and battery component suppliers and handling permitting, interconnection, virtual power purchase agreements, and other relevant details.
- Evaluate and review your maintenance contract to ensure that it includes all renewable energy systems, all the appropriate reviews and protocols for their maintenance, and all relevant implications of roof-mounted systems.

RESOURCES

- U.S. Department of Housing and Urban Development (HUD), Treatment of Financial Benefits to HUD-Assisted Tenants Resulting from Participation in Solar Programs. *www.hud.gov/sites/dfiles/OCHCO/documents/2023-09hsgn.pdf*
- U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. This website provides information on renewable energy technologies and energy efficiency. *www.energy.gov/eere/office-energy-efficiency-and-renewable-energy*
- National Community Solar Partnership (NCSP+). A coalition of stakeholders working to expand access to affordable distributed solar to every U.S. household while also enabling communities to realize the meaningful benefits of solar energy, which include access, household savings, energy reliability and resilience, community-led economic development, and solar workforce opportunities. *www.energy.gov/communitysolar/community-solar*

- Stewards of Affordable Housing for the Future, Community Solar and HUD Subsidized Housing. A downloadable overview of policies, programs, and practices for expanding affordable access to solar energy in HUD-subsidized buildings. *https://sahfnet.org/resources/community-solar-and-hud-subsidized-housing-overview-current-policies-programs-and*
- American Solar Energy Society (ASES). A nonprofit organization committed to a sustainable energy economy, ASES accelerates the development and use of solar and other renewable energy resources through advocacy, education, research, and collaboration among professionals, policymakers, and the public. *www.ases.org*
- National Renewable Energy Laboratory (NREL). Photovoltaic research at NREL provides a clearinghouse of all aspects of photovoltaic solar cell systems. *www.nrel.gov/*
- North Carolina Clean Energy Technology Center at North Carolina State University, Database of State Incentives for Renewables & Efficiency (DSIRE). The most comprehensive source of information on incentives and policies that support renewables and energy efficiency in the U.S. DSIRE is supported by the Interstate Renewable Energy Council, Inc. and funded by the U.S. Department of Energy. *www.dsireusa.org*

Mandatory for Multifamily New Construction and Substantial Rehabs; Optional for all project types: 4 points

5.8 Electric Vehicle Charging

RATIONALE

The market for electric vehicles (EVs) is growing, and with it the need for charging infrastructure. EV operating costs can be significantly lower than the costs of operating vehicles with internal combustion engines. This is especially the case when charging at home, which is also the most common, flexible, and convenient option. Access to EV charging infrastructure is a major factor that can put EV ownership in reach for people who live in low-income communities—especially renters. Providing EV chargers, or at least the ability to install chargers in the future, is critical for new affordable properties.

Adding EV charging to multiunit residential buildings introduces a number of questions about the load added to the electrical service and about managing the logistics and costs during operation. This criterion aligns with many state requirements for adding EV charging and is designed for flexibility and affordability.

REQUIREMENTS

New Construction and Substantial Rehabs

Mandatory

For projects that include parking, at least one parking space on the site must be wired and installed with Level 2 electric vehicle supply equipment (EVSE).

In addition, for projects with 20 or more parking spaces, at least 10% of the total number of parking spaces must either be EV capable, EV ready, or have Level 2 EVSE installed. A space is considered EV capable when it has electrical capacity and conduit installed to support a Level 2 EV charger but lacks the wiring and outlet. A space is considered EV ready when it has all components wired and installed to support a Level 2 EV charger but lacks the charger itself.

Parking spaces are eligible whether they are in a lot, garage, driveway, or curbside, as long as they are under the developer's control.

For all EV-capable, EV-ready, or EVSE-installed parking spaces, an Automatic Load Management System (ALMS) may be used to reduce the maximum required electrical capacity to each space. If an ALMS will be used, the electrical system and any on-site distribution transformers shall have sufficient capacity to deliver at least 3.3 kW simultaneously to each EV charging station planned to be served by an ALMS. The branch circuit shall have a minimum capacity of 40 amperes, and installed EVSE shall have a minimum capacity of 30 amperes.

Exception, New Construction: Where meeting this requirement triggers an additional transformer that cannot be accommodated physically or within the project budget, the total number of EV-capable, EV-ready, and/or EVSE-installed spaces can be reduced. The project shall instead provide the total number of spaces that can be accommodated within the current electrical service capacity, taking full advantage of ALMS as prescribed above.

Exception, Substantial Rehabs: Where meeting this requirement on its own triggers an electrical service upgrade, the total number of EV-capable, EV-ready, and/or EVSE-installed spaces can be reduced. In making any necessary electrical service upgrades, this requirement shall be superseded by the electrification of other end uses (e.g., adding new air conditioning or ventilation, or electrifying the central plant). Once other loads are accounted for, the project shall instead provide the total number of spaces that can be accommodated in the upgraded service capacity, up to incurring additional costs.

All projects

Optional
For projects with 40 or more parking spaces, install Level 2 EVSE in at least 5% of the total number of parking spaces on the site. *[4 points]*

OR

For projects with four or more parking spaces, provide Level 2 EV-capable or EV-ready spaces in more than 50% of the total number of spaces on the site. *[4 points]*

RECOMMENDATIONS

- Implement a strategy to avoid high demand charges for simultaneous power use by multiple EV chargers. Equip the load-management technology with the ability for electric car owners to indicate how much charge is needed by a certain time of day, and then establish schedules that maximize charging when building loads are low.
- Determine who will own and be responsible for operation and maintenance of EV chargers.
- For projects with Level 2 EV-capable or EV-ready spaces, help ensure that future chargers are compatible with the electrical design: incorporate a specification for charging systems that may be installed in the future into the materials developed per *Criterion 8.1 Building Operations & Maintenance Manual and Plan.*
- Future-proof any garage by providing blanks in the building's electrical panel to serve additional spaces beyond those accounted for in the electrical service calculation. This ensures the physical space exists in the electrical panel to add new EV charging capacity and central building load management to meet higher levels of EV demand.

RESOURCES

- U.S. Department of Energy; Project Lessons: EV Charging for Multifamily Housing. Lessons learned from DOE-funded EV charging programs at multifamily housing developments. *https://cleancities.energy.gov/project-lessons-multifamily-housing/*
- California Department of Housing and Community Development, 2022 CALGreen Residential Mandatory Measures. This list includes a section (4.106.4.2.2) on EV charging infrastructure required for all new construction by the 2022 CALGreen residential code. *www.hcd.ca.gov/sites/default/files/docs/building-standards/CALGreen/hcd-shl-625-rev-0824.pdf*
- ENERGY STAR, Electric Vehicle Chargers. Includes a product finder for both AC-and DC-output models of EV charger. *www.energystar.gov/products/ev_chargers*
- California Energy Codes & Standards, The Fundamentals of Managed Charging. *https://localenergycodes.com/download/1617/file_path/fieldList/ALMS%20Fundamentals.pdf*
- U.S. Department of Energy, Alternative Fuels Data Center; Electric Vehicle Charging Stations. An introduction to EV charging technologies and terminology along with links to other resources. *https://afdc.energy.gov/fuels/electricity-stations*

5.9 Passive Survivability

Optional: 3 or 8 points

RATIONALE

Passive survivability is the ability of a building to provide survivable indoor conditions without grid-dependent mechanical systems. The increased volatility and severity of storms, wildfires, floods, and other events exacerbated by our changing climate can lead to frequent and extended power outages as well as loss of heating fuel for homes. Ensuring buildings are safe and functional for people during these disruptions is critical as extreme weather conditions and temperatures persist across the globe.

Passive survivability is especially vital for affordable housing properties located in areas that have limited tree coverage and are surrounded by asphalt, which is known to intensify ambient temperatures. Incorporating passive design strategies, such as shading and natural ventilation, can contribute to more comfortable thermal conditions inside a building when mechanical heating and cooling systems are not operable.

REQUIREMENTS

Through one of the options below, design your building to better maintain thermally comfortable conditions during a power outage.

Option 1: Passive cooling

Natural ventilation: Include in each dwelling unit at least one operable window that is equipped with an insect screen. *[3 points]*

OR

Shading: For all south-facing windows, provide exterior window shading and/or interior insulated window shades that have a full-perimeter track, meeting the requirements shown in Table 5.9 for your project's IECC Climate Zone map (*Appendix C*). *[3 points]*

TABLE 5.9 | PASSIVE COOLING REQUIREMENTS BY IECC CLIMATE ZONE

CLIMATE ZONE (IECC CLIMATE MAP)	PERCENTAGE OF WINDOW THAT NEEDS TO BE SHADED BY JUNE 21
1, 2	95%
3	75%
4 except Marine	75%
4 Marine, 5, 6, 7, 8	50%

Option 2: Thermal modeling pilot pathway

Demonstrate through thermal modeling that, during a power outage that lasts at least three consecutive days, the indoor conditions of every dwelling unit will never exceed a heat index of 90°F and will never drop below 50°F. Use ASHRAE 1% and 99% design temperature limits for the project location. *[8 points]*

SPECIAL INVITATION: NEW PATHWAYS FOR PASSIVE SURVIVABILITY

Thermal modeling for passive survivability is an emerging practice for many professonals in the affordable housing sector. Because of this, and because of the importance of providing safe, comfortable homes and spaces for people during a power outage now and in the future, the Green Communities team invites project teams of all types to share other methods and plans for demonstrating passive survivability. Please reach out to us at *certification@enterprisecommunity.org* and propose a path for Option 2 of *Criterion 5.9 Passive Survivability* to help us explore the best strategies together.

RECOMMENDATIONS

- Consider designating certain areas of the building as "thermal safety zones" during a power outage. If considering this approach, ensure there will be enough space to safely accommodate all residents and staff: total allowable population in thermal safety zones, based on local code maximums, should meet or exceed normal building occupancy.
- Note that for certain property types, such as those serving older adults, providing for passive survivability at the temperatures specified in Criterion 5.9 may not be adequate to maintain legally required conditions.

RESOURCES

- Keep Cool DC. This strategy aims to reduce the heat-island effect and keep residents safe during extreme heat in the District. *https://doee.dc.gov/keepcool*
- University of Washington Climate Impact Group, In the Hot Seat: Saving Lives from Extreme Heat in Washington State. Report describing actionable guidance for extreme heat. *https://cig.uw.edu/projects/in-the-hot-seat-saving-lives-from-extreme-heat-in-washington-state/*
- Fowler, Mithun. Improving passive survivability in multifamily buildings during extreme heat events. This study investigated the extent to which shading and fan-assisted air movement may diminish high indoor heat indexes. Innsbruck iPHC24 proceedings, page 73–78. *https://mithun.com/2024/04/04/improving-passive-survivability-in-multifamily-buildings-during-extreme-heat-events/*
- Rempel, Danis, Rempel, Fowler, and Mishra; Improving the passive survivability of residential buildings during extreme heat events in the Pacific Northwest. *www.sciencedirect.com/science/article/abs/pii/S0306261922006729*
- Mavrogianni, Davies, Taylor, Chalabi, Biddulph, Oikonomou, Das, Jones: The impact of occupancy patterns, occupant-controlled ventilation and shading on indoor overheating risk in domestic environments. Research report on passive survivability during extreme heat. *www.sciencedirect.com/science/article/abs/pii/S0360132314001048*
- Oropeza-Perez, Ostergaard: Active and passive cooling methods for dwellings: A review. Research report. *www.sciencedirect.com/science/article/abs/pii/S1364032117313084*
- Keith and Meerow. PAS Report 600 - Planning for Urban Heat Resilience. *www.planning.org/publications/report/9245695/*
- Plan Integration for Resilience Scorecard (PIRS™), example for Kent, Washington. An example of using an approach for communities to analyze how heat mitigation policies are integrated into different plans to better target heat mitigation policies. *https://repository.arizona.edu/handle/10150/666696*

"When I saw my electric bill, I almost fell on the floor. I was so worried for the first three months. But it's never gone over $25."

Sharon Morden, Cadence Resident

6 Materials

Energy
Health
Resilience

Good design does more with less. By using only what we need and selecting durable, low-impact, and healthy materials across their life cycles, we can reduce costs, protect precious resources, and support health and well-being.

6.1 Product Category Screening

Optional: 4 points

RATIONALE

Screening materials for embodied carbon and health impacts during early design phases allows project teams to examine and adjust their material choices to more positively impact the health of people and the planet. Screening the types of products selected during early design phases equips teams with information they can use to make informed decisions about product selection while options are still flexible and not yet associated with change-order fees. Early screening empowers project teams to explore and track the impacts of their choices and prioritize opportunities for positive material impact within and across projects.

REQUIREMENTS

During the concept or schematic design phase, project teams must perform a screening exercise—a high-level review of product categories—to understand the embodied carbon and material health implications of their initial product selections. This step is intended to inform project teams' design decisions, not to finalize product selections.

To perform the screening, complete all of the following *[4 points]:*

- Select at least three product categories to screen for embodied carbon and at least three product categories to screen for material health from the product category lists below. Categories should align with materials most likely to be used in the project, prioritized by volume.
- Select at least one screening resource to evaluate materials for their embodied carbon impacts and one screening resource to evaluate materials for potential health impacts.
- Use the Green Communities Product Category Screening Template to document the screening results for the project's initial material health and embodied carbon impacts and, if applicable, identify opportunities to avoid the worst impacts from products by shifting to those with lower embodied carbon and/or with lower risk of potential negative health impacts.
- Share the screening results with appropriate team members, including designers, general contractor, relevant trades, and sustainability consultants.
- Ensure team members consider the screening results when selecting products, writing specifications, and procuring products and materials.

1. Embodied carbon screening

Choose at least three of the following product categories to screen for embodied carbon:

- Cladding, exterior wall
- Concrete
- Flooring
- Gypsum
- Insulation
- Steel
- Wood, composite
- Wood, non-composite

Use at least one of the following resources to screen the selected product categories for their impacts related to embodied carbon. Evaluate the product categories' global warming potential (GWP) assuming a project use of 60 years; prioritize percentage reduction in $kgCO_2e/m^2$:

- Embodied Carbon in Construction Calculator (EC3)
- BEAM Estimator
- Kaleidoscope: Embodied Carbon Design Tool
- ZeroGuide
- C.Scale
- Athena Impact
- Tally
- Carbon Designer 3D (CD3D) by One Click LCA
- Common Materials Framework (CMF) climate health impact area

2. Material health screening

Choose at least three of the following product categories to screen for material health:

- Adhesives and sealants, wet-applied interior
- Cladding, exterior wall
- Flooring
- Insulation
- Paint, interior
- Wood, composite

Use at least one of the following resources to screen the selected product categories for their impacts related to human health. Evaluate the product categories for specific substances of concern and prioritize avoidance or removal of these substances.

- Common Materials Framework (CMF) human health impact area
- Habitable's Informed product guidance and benchmarking tools

RECOMMENDATIONS

- Use education and screening to understand the impact of your current practice and identify opportunities to improve.
- A simple way to rank materials within product categories is to focus on the scale and scope of their potential impacts. For example, try classifying materials in a product category as "good, better, best" or "red, yellow, green." Then seek opportunities to reduce or avoid use of the materials that contribute the worst health and/or carbon attributes.
- Apply what you have learned to achieve *Criterion 6.4 Advanced Material Selection*.
- Hold a team meeting to share and discuss the results of the screening. Include all relevant team members who impact material selection, procurement, and installation.

RESOURCES

Embodied carbon resources:

- mindful MATERIALS, Common Materials Framework (CMF) Reference Guide. The CMF is a shared "language" for product sustainability across five impact areas: human health, climate health, ecosystem health, social health and equity, and circular economy. Use the CMF reference guide, technology partners, and priority factors to guide material screening. *www.mindfulmaterials.com/cmf-reference-guide*
- Carbon Leadership Forum (CLF), Tools for Measuring Embodied Carbon. *https://carbonleadershipforum.org/tools-for-measuring-embodied-carbon/*
- Architecture 2030, Carbon Smart Materials Palette. A tool for understanding the highest-priority product categories for reducing embodied carbon. *www.materialspalette.org/palette/*
- Building Transparency, EC3. The Embodied Carbon in Construction Calculator is a free database of environmental product declarations (EPDs), used for product selection and procurement. *www.buildingtransparency.org/tools/#epd-database*
- Builders for Climate Action, BEAM Estimator. An emissions calculator for comparing biobased and conventional building materials. *www.buildersforclimateaction.org/beam-estimator.html*
- Payette, Kaleidoscope: Embodied Carbon Design Tool. A reference library comparing impacts of common assembly types. *www.payette.com/kaleidoscope/*
- NBBJ, ZeroGuide. An early-phase tool to support embodied carbon analysis. Note that ZeroGuide is browser-based and requires Chrome or Firefox. *https://zeroguide.nbbj.com/*
- C.Scale. A tool for early and mid-stage carbon assessments based on multiple scenarios to compare the impact of different carbon-reduction strategies. *www.cscale.io/*
- Tally. A subscription-based software plug-in that calculates environmental impact of building materials for whole building analysis as well as comparative analysis of design options. *https://choosetally.com/*
- Athena Impact. A freestanding software package that can be used to complete WBLCA or to compare building assemblies and materials. The tool includes a wide range of materials for structural systems, enclosures, and interiors across all life-cycle stages. *https://calculatelca.com/software/impact-estimator/*
- One Click LCA, Carbon Designer 3D (CD3D) is a design tool to address early carbon optimization, identify carbon hotspots, and benchmark different structural frames. *https://oneclicklca.com/en/resources/articles/carbon-designer-3d-guide*
- CARE (Carbon Avoided Retrofit Estimator) Tool. A comparison tool for concept and schematic design. Models total carbon impacts, both operational and embodied carbon, of an existing building as-is, renovating an existing building, and replacing it with a new one. *www.caretool.org/*

Material health resources:

- Habitable, Informed. A screening tool with intuitive red-to-green color ranking, based on in-depth research about the health impacts of chemicals throughout the product life cycle. *https://informed.habitablefuture.org/*
- mindful MATERIALS. Common Materials Framework (CMF) Reference Guide. The CMF is a shared "language" for product sustainability across five impact areas: human health, climate health, ecosystem health, social health and equity, and circular economy. Use the CMF reference guide and priority factors to guide material screening. A variety of technology partners offer product-search tools that include CMF filters. *www.mindfulmaterials.com/cmf-reference-guide*

6.2 Reduction of Materials and Waste

Mandatory; Optional: 6 points maximum

RATIONALE

Buildings drive high demand for global resources, and smarter design choices—such as scaling appropriately, minimizing material use, and designing for disassembly—can create cost savings while cutting carbon emissions and advancing other sustainability goals.

In addition to demanding resources, many common building materials cause pollution during their manufacture, installation, use, or disposal, often with significant impacts on the health of people and the environment. Producing and transporting new materials, and disposing of them in landfills, can also contribute to climate change. Some of the best ways to reduce costs while also reducing the potential negative environmental and health impacts of materials involve avoiding the use of a material altogether and reusing existing buildings or materials.

Alongside reducing material use, it is important to consider materials that are discarded during renovation, demolition, and construction. Construction and demolition (C&D) waste accounts for about 30% of all landfill waste in the U.S. Much of this waste has the potential to be recovered or recycled, helping reduce overall demand for new materials. To help that happen in the future, teams can design and build for adaptability, disassembly, and material reuse.

Modular construction methods reduce construction waste due to efficient manufacturing opportunities, and they often lend themselves to disassembly. With components assembled in a controlled factory setting, prefabrication can also save time and money.

REQUIREMENTS

Mandatory

New Construction and Substantial Rehabs: Implement at least two material reduction strategies (letters A through L) from the three strategy lists below—strategies relating to design, construction, or potential future uses. No optional points are awarded for the two mandatory strategies implemented.

Moderate Rehabs: Implement at least one material reduction strategy from the three lists below—strategies relating to design, construction, or potential future uses. No optional points are awarded for the one mandatory strategy implemented.

Optional

All projects: Project teams may select additional strategies from the three strategy lists below to accrue optional points. *[2 points per strategy, 6 points maximum]*

Material reduction through design

A. Right-size the structural system. Optimize building and structural bay dimensions, member sizing and shape, and material strengths. For example, use advanced framing techniques for low-rise housing. For larger buildings, use the lowest concrete strength needed at each structural condition rather than one concrete strength for the entire project. Submit a plan or diagram illustrating the areas of the building that were optimized and describe the reduction in volume of concrete and steel as compared to the original design or to a typical design from your organization.

B. Combine systems or eliminate finishes. Combine or eliminate at least two systems or finishes where not necessary for other purposes (e.g., polished concrete floors instead of flooring finish over slab). Submit final specifications and highlight eliminated systems and finishes. Quantify the material reductions.

C. Design based on standard product dimensions to minimize waste (e.g., if using a 2-foot tile or plank floor, design floor dimensions in 2-foot increments) for at least three product categories. Provide dimensional drawings indicating product module and a waste calculation showing the expected percentage of material waste across the project. Waste percentage should not exceed 5% of the total material used.

D. Implement industrialized modular construction methods. Integrate off-site, prefabricated volumetric, or panelized manufacturing for at least 50% of the square footage of all buildings in the project scope.

E. Use salvaged materials for at least 15% of an entire product category. Product categories can include flooring, ceilings, doors, glazing (windows, glass partitions, etc.), millwork, lighting, plumbing fixtures, insulation, landscape paving, or furniture. For example, ensure 15 of 100 installed interior doors were salvaged, or that 150 square feet out of 1,000 square feet of wood flooring was reclaimed. Document the products, quantity used, and original source.

Construction waste reduction

F. For projects with deconstruction or demolition scope: Complete a salvage assessment during design or prior to demolition. Identify all building materials, soils, and landscaping for removal and their approximate quantity. Reuse, donate, sell, or otherwise divert from landfill at least 35%.

G. Divert at least 50% of construction waste by weight from landfill by salvaging or recycling. Detail this through a waste-management plan.

H. Recycle all waste generated on the site for at least two of the following product waste types: cardboard, wood, drywall, metals, concrete, brick, asphalt, insulation, carpet, and plastics (e.g., PVC piping, plastic sheeting).

Future waste reduction

I. Develop end-of-use guidance for five product categories and include the guidance in materials developed per *Criterion 8.1 Building Operations & Maintenance Manual and Plan.* Product categories can include flooring, ceilings, doors, glazing, millwork, lighting, plumbing fixtures, furniture, roofing, or siding. Identify the products and describe their locations in the building, installed quantities, anticipated life spans, and recommended actions to either 1) salvage them for reuse, sale, or donation; or 2) recover them for recycling. Include information for specific organizations or businesses that will assist with end of use.

J. Install products with extended producer responsibility programs, such as take-back programs or product leasing ("product as a service"). These products must constitute at least 75% of at least three product categories referenced in *Criterion 6.1 Product Category Screening*. Provide a list of the product categories, products, installed quantities, and program information. These programs are currently most common for furniture, appliances, and finishes (e.g., flooring, tile, ceilings).

K. Identify and implement at least three opportunities for disassembly. For example, use reversible mechanical fasteners to allow for disassembly where adhesives or welds would typically be used. Provide a list of the assemblies, their locations in the building, the quantity of recoverable materials, and guidance or diagrams on the disassembly method.

L. Modular design for disassembly: Design for and implement modular construction methods that are also designed for disassembly. Provide guidance on the disassembly method.

RECOMMENDATIONS

Reduction through design:

- For structure, consider braced frames instead of moment frames. Instead of wide flange sections, consider joists, trusses, or castellated beams. These configurations are material-efficient methods of supporting loads.
- Using HVAC systems with less ductwork can allow for smaller ceiling plenums and shorter floor-to-floor heights.
- When selecting gypsum board, use thinner board (1/2 inch instead of 5/8 inch) where the greater thickness is not needed for fire rating or other performance requirements.
- Reclaimed materials can be sourced from deconstruction sites, salvage wholesalers and retailers, attic stock, or manufacturers' surplus stock.
- When specifying concrete strengths to reduce material needed, also consider performance specifications instead of a specific "recipe" for concrete. Performance specs give the supplier flexibility to meet structural performance requirements as well as sustainability goals, especially embodied carbon goals.

Construction waste reduction:

- Implement on-site separation of materials to the greatest extent feasible to help ensure a higher-quality product for recycling.
- Consider donating salvaged materials to nonprofit organizations or returning them through manufacturer take-back programs.

- For rehab projects: Consider recycling carpet when carpeting is being removed. The specification language below may be customized and included to determine whether carpet recycling is feasible and cost effective in your locale.
  - » Vendor shall supply a price quote to recycle carpet and carpet components at 100%, 50%, and 30% of product tonnage.
  - » Property manager shall identify the existing carpet product and polymers (e.g. polypropylene, nylon 6, or nylon 6,6), as documented in the carpet specification. This will enable the carpet vendor to ascertain the recyclability of the product.
- Create a feedback loop on waste generation from the site to the person responsible for material purchasing and/or paying disposal costs. The feedback loop could be as simple as a photo record of the dumpster after each major stage of construction, shared back with the materials purchaser who tracks disposal costs. Use this information to inform purchasing decisions and minimize waste.
- Create detailed framing plans or scopes of work and accompanying architectural details for use on the jobsite to proactively reduce waste. Create a detailed cut list and lumber order prior to construction.
- Ask manufacturers if they take back offcuts or old materials for recycling. This may be possible for drywall, flooring, or ceilings.
- Detail expectations for construction waste management in the project documentation (construction specification Division 1, Section 01 74 19).
- Investigate and document local options for reusing or recycling all anticipated major constituents of the project waste stream, including cardboard packaging and consumer recyclables (e.g., beverage containers used by the construction team).

Design for disassembly:

- Detail assembly components to be independent so they can be replaced or removed without impacting adjacent assemblies. For example, surface-mount fixtures, devices, and conduit, instead of recessing them into walls.
- Ensure fasteners for dismantling are visible and accessible.

RESOURCES

- National Institute of Building Sciences, Construction Waste Management. Part of the Whole Building Design Guide, this page describes incentives, strategies, and regulations pertaining to construction and demolition waste. *www.wbdg.org/resources/construction-waste-management*
- U.S. Environmental Protection Agency, Sustainable Management of Construction and Demolition Materials. Includes basic information on construction and demolition debris disposal practices, regional and state programs, publications, and links. *www.epa.gov/smm/sustainable-management-construction-and-demolition-materials*
- National Electrical Manufacturers Association, Lamp Recycle. Lists locations where fluorescent lamps and ballasts may be taken for recycling. *www.lamprecycle.org*

- Construction & Demolition Recycling Association, Find a Recycler. Searchable database to locate businesses that reuse or recycle concrete, drywall, and other materials. Can be filtered by material and location. *https://cdrecycling.org/find-a-recycler/*
- Find suppliers of reclaimed materials to either source or divert products:
  - » All for Reuse Ecosystem Map. *www.allforreuse.org/ecosystem-map*
  - » Build Reuse directory. *www.buildreuse.org/membership-directory*
  - » ReuseWood. *https://reusewood.org/*
- U.S. Department of Energy, Advanced House Framing. Wood-framing design strategies to reduce the amount of lumber needed. *www.energy.gov/energysaver/advanced-house-framing*
- Structural Engineering Institute, SE2050; Design Guidance for Reducing Embodied Carbon in Structural Systems. *https://se2050.org/resources-overview/structural-materials/lean-design-guidance/*
- RMI, Guidance for Developing Performance Standards and Specifications for Concrete. Tactical recommendations to support project teams in developing performance specs for concrete. Performance specs indicate desired structural properties rather than explicitly listing ingredients and can improve not only embodied impacts but also durability and performance. *https://rmi.org/guidance-for-developing-performance-standards-and-specifications-for-concrete/*
- City of Seattle, Design for Disassembly in the built environment: a guide to closed-loop design and building. Describes principles, strategies, design processes, and case studies. Includes model language for design for specifying disassembly and reuse in construction documents. *www.lifecyclebuilding.org/docs/DfDseattle.pdf*
- BuiltAustralia, How to Write a Building Disassembly Plan. Design guidance and templates for writing a building disassembly plan. *www.built.com.au/news/how-to-write-a-building-disassembly-plan/*

6.3

Mandatory for Substantial Rehabs of buildings constructed before 1978

Reduction of Lead Hazards in Pre-1978 Buildings

RATIONALE

Lead content in old paint is one of the most common causes of lead poisoning. Exposure to lead dust, lead in soil, and deteriorated lead-based paint poses significant risks—especially to children who are younger than six years old and people who are pregnant or nursing— affecting long-term neurological development and learning. In rare cases, extreme lead exposure can result in death. In homes built before 1978, the year the federal government banned consumer uses of lead-based paint, risk of exposure remains. Opportunities exist to control those lead hazards in buildings as part of renovation projects.

REQUIREMENTS

Reduce the risk of lead exposure by implementing one of the two options below. For both options, ensure that the people testing and remediating lead understand and adhere to lead-safe work practices to minimize and contain dust.

Option 1: Lead paint assessment and abatement

Conduct a lead risk assessment or inspection to identify lead hazards. Control identified lead hazards using lead abatement or interim controls. Follow U.S. Environmental Protection Agency (EPA) and state and/or local laws and requirements, where applicable. Check state or local regulations for additional requirements for lead-safe work pertaining to prohibited practices, notification, worker training and certification, and clearance dust training.

Option 2: Lead paint hazard reduction

If the project is funded by the U.S. Department of Housing and Urban Development, follow standard lead treatments defined by HUD as a series of hazard-reduction measures designed to reduce all lead-based paint hazards in a dwelling unit without the benefit of a risk assessment or other evaluation.

RECOMMENDATIONS

- Remove windows that have deteriorated lead-based paint and replace with energy-efficient windows.
- A lead inspection should be undertaken by an EPA-certified risk assessor to determine whether paint in a rehab project contains lead. Otherwise, paint should be presumed to contain lead, and lead-safe work practices are required.
- Perform dust lead clearance testing at the conclusion of renovation work; compare against EPA dust lead clearance standards.
- Remove or cover lead-contaminated soil so that it is inaccessible to children. If covering, all bare soil should be covered with 2 to 4 inches of clean soil, compost, or mulch.
- For gardening, use raised beds with lead-free soil.

RESOURCES

- U.S. Environmental Protection Agency (EPA), Lead Abatement, Inspection, and Risk Assessment. Learn the regulations and locate certified firms to complete lead abatement. *www.epa.gov/lead/lead-abatement-inspection-and-risk-assessment*
- EPA; Lead Renovation, Repair and Painting Program (a.k.a. the RRP Rule). Understand how the rules and regulations for lead abatement apply to different entities, including contractors and property managers. *www.epa.gov/lead/lead-renovation-repair-and-painting-program*
- U.S. Department of Housing and Urban Development (HUD), Office of Lead Hazard Control and Healthy Homes (OLHCHH). Access resources, training, and funding opportunities for lead-safe housing. *www.hudexchange.info/programs/lead-hazard-control-and-healthy-homes-programs/*

6.4 Advanced Material Selection

Mandatory; Optional: 31 points maximum

RATIONALE

Many building products contain hazardous chemicals or have significant embodied carbon footprints, contributing to environmental degradation and, in the context of affordable housing, potentially exacerbating environmental and health inequities. But a growing number of product types perform well across both health and climate impacts. By selecting materials from a vetted "best-in-class" list, project teams can reduce exposure to toxic chemicals, limit greenhouse gas emissions, and simplify their material selection process. The categories included below take priority because they are typically procured in high volumes in affordable housing, they address materials most likely to have negative health impacts, and they have implementable and affordable solutions available.

Acknowledging that not all housing developments can select the best-in-class material types, however, this criterion offers alternatives and provides guidance on product selection by addressing the following across priority categories:

- **VOC content and emissions:** Exposure to certain volatile organic compounds (VOCs) and mixtures of VOCs can cause or aggravate health conditions—both to jobsite workers who install or apply VOC-containing products and to people who live or work in spaces where VOCs off-gas from products continually over time. The requirements below address both VOC content and VOC emissions to reduce the risk of health impacts to installers, residents, and staff.
- **Healthier material selection:** By selecting products that are less toxic across their life cycles, from extraction through installation and beyond, project teams can reduce health risks for building occupants as well as jobsite workers, fenceline communities, and the public.
- **Embodied carbon:** Greenhouse gas emissions associated with extracting, manufacturing, transporting, and disposing of products are called embodied carbon or embodied emissions. Materials make up a significant amount of a property's carbon footprint and represent the environmental and health impacts of a building on day one, even before any lights or equipment are turned on.

REQUIREMENTS

Use products that comply with the specifications below.

Notes for all product categories:

- Percentages of installed quantities are by cost or volume within the product category, except where existing materials are preserved or repaired.
- "CDPH Standard Method" refers to the Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers, version 1.2, from the California Department of Public Health.
- PFAS, commonly known as "forever chemicals," are per- and polyfluoroalkyl substances, which are common coatings on consumer products, including food containers. In construction, they are often used on textiles, window treatments, and exteriors to repel dirt and stains.

Adhesives and sealants, wet-applied interior

Mandatory
For adhesives and sealants applied inside the air barrier:

- **VOC content** is less than or equal to the thresholds provided by the most recent version of South Coast Air Quality Management District (SCAQMD) 1168 available at the time of product specification.
- **VOC emissions** of 80% by volume are verified as meeting the CDPH Standard Method for the school or residential scenario.

Cladding, exterior wall

Optional
If not preserved or repaired existing cladding, 100% of exterior wall cladding is expanded cork board, natural wood (including heat treated), bamboo, engineered wood, thin brick, natural stone, ceramic, terra-cotta, lime plaster, or fiber cement. *[2 points]*

Concrete

Optional
Use the most recent Carbon Leadership Forum North American Material Baselines report or current, regional industry-average environmental product declarations (EPDs) to determine typical impact values per concrete strength class in the property's location. Provide a product-specific EPD for at least 90% of newly installed concrete, demonstrating global warming potential (GWP) that is either:

- 20% lower than the regional average *[5 points]*
- No higher than the regional average *[2 points]*

Flooring

Mandatory
Implement Option 1: Best-in-class flooring standards **OR** Option 2: Minimum flooring standards below. Points are available for selecting Option 1 or for going beyond the minimum standards in Option 2.

Option 1: Best-in-class flooring standards
A minimum of 90% of all flooring is a combination of 1) repaired existing floor, 2) linoleum, 3) solid wood flooring that is FSC-certified or salvaged wood, 4) pre-finished engineered wood or bamboo, 5) pre-finished cork (excluding rubber/cork composite), 6) no floorcovering (e.g., concrete or CLT structural slab without a finish or sealer) or 7) ceramic/porcelain tile (no added lead). *[4 points]*

OR

Option 2: Minimum flooring standards

- All flooring products are either an inherently nonemitting source of VOCs (such as unfinished stone or porcelain tile) or have VOC emissions verified as meeting the requirements of the CDPH Standard Method for school or residential scenarios.

- No carpet may be installed in building entryways, laundry rooms, bathrooms, kitchens/kitchenettes, or utility rooms. Walk-off mats manufactured especially for that purpose are acceptable at entryways.
- None of the below may be installed:
  - » Flexible PVC with phthalates (in either vinyl flooring or carpet backings)
  - » Rubber or rubber–cork flooring made with tire-derived crumb rubber
  - » Carpet with intentionally added PFAS stain-repellant treatments
- Fluid-applied finish floors may be installed only in spaces that are not regularly occupied, such as mechanical rooms.

Optional
Project teams implementing Option 2: Minimum flooring standards may also select any, all, or none of the below for points:

- All flooring adhesives, coating, and sealants, whether pre-applied or site-applied, do not contain PFAS. Site-applied flooring adhesives, coatings, and sealants meet CDPH Standard Method emission requirements and do not contain epoxy or polyurethane. *[1 point]*
- No carpet is installed anywhere in the project. *[1 point]*
- No vinyl flooring is installed anywhere in the project. *[1 point]*

Gypsum wallboard

Optional
At least 60% of all newly installed interior gypsum wallboard is lightweight gypsum board AND meets CDPH Standard Method emission requirements. *[2 points]*

Insulation

Mandatory
Implement Option 1: Best-in-class insulation standards, Option 2: Intermediate insulation standards, or Option 3: Minimum insulation standards below.

Points are available for selecting Option 1 or Option 2.

Option 1: Best-in-class insulation standards
At least 75% of all newly installed above-grade insulation (exterior and interior) is bio-based, such as wood fiber, hemp fiber, cellulose or cotton, hempcrete, or straw. All other insulation meets the minimum requirements in Option 3. *[5 points]*

Option 2: Intermediate insulation standards
At least 90% of all newly installed above-grade insulation (exterior and interior) is bio-based (acceptable materials are listed in Option 1), fiberglass batts, formaldehyde-free mineral wool batts, and/or unfaced fiberglass or mineral wool boards. *[3 points]*

Option 3: Minimum insulation standards

- Mineral wool batt insulation, if used, is formaldehyde free.
- Two-part spray polyurethane foam may be used in limited scope only to establish a sealed air barrier if no other viable material options are available.
- Foam insulation, if used, has blowing agents with low global warming potential (GWP150).

Paint and other coatings, wet-applied interior

Mandatory
Implement Option 1: Best-in-class paint and coating standards, Option 2: Intermediate paint and coating standards, or Option 3: Minimum paint and coating standards below.

Points are available for selecting Option 1 or Option 2.

Option 1: Best-in-class coating standards
At least 50% of all paints are mineral paint, such as lime or mineral silicate, and 90% of the remaining portion of paints, coatings, and primers meet the requirements of Option 3: Minimum coating standards. *[4 points]*

Option 2: Intermediate coating standards
At least 90% of interior paints, coatings, and primers are free of PFAS and alkylphenol ethoxylates (APEs) and meet the requirements of Option 3: Minimum paint and coating standards. Mineral paints are exempt from documentation. *[2 points]*

Option 3: Minimum coating standards
For interior paints, coatings, and primers:

- **VOC content** is less than or equal to the thresholds provided by the most recent version of SCAQMD 1113 available at time of product specification.
- **VOC emissions** of 90% by volume are verified as compliant with CDPH Standard Method for school or residential exposure scenarios.

Steel

Optional
Implement either Option 1 or Option 2 below.

Option 1: Best-in-class steel standards
Specify 100% steel produced by electric-arc furnace, and/or with at least 90% recycled content, instead of by blast furnace or basic oxygen furnace. *[4 points]*

Option 2: Intermediate steel standards
For 75% of steel deck and cold-formed steel framing AND For 75% of structural steel, specify products with global warming potential (GWP) at least 20% lower than baseline as indicated in the most recent Carbon Leadership Forum North American Material Baselines report. *[3 points]*

Wall coverings

Mandatory
Do not install wall coverings that contain vinyl.

Wood, composite

Mandatory
Formaldehyde emissions must be less than or equal to the thresholds provided by California Air Resources Board (CARB) Phase II Composite Wood Products Airborne Toxic Control Measure and/or Toxic Substances Control Act (TSCA) Title IV for all hardwood plywood, particleboard, medium-density fiberboard (MDF), and these materials within other products (e.g., cabinets and doors).

Optional
In addition, teams may also select either, both, or none of the below.

- All composite wood products are certified to have no added formaldehyde (NAF). *[2 points]*
- At least 50% of composite wood installed as part of the project is certified to the Forest Stewardship Council (FSC) standard. *[2 points]*

Wood, noncomposite

Optional
At least 50% of noncomposite wood installed as part of the project is certified to the Forest Stewardship Council standard. *[2 points]*

TABLE 6.4a | SELECTED LIMITS FOR WET-APPLIED ADHESIVES AND SEALANTS: SQACMD 1168

As of October 9, 2025

PRODUCT TYPE	MAXIMUM VOC LIMIT (G/L)
Carpet pad adhesives	50
Wood flooring adhesives	120
Rubber floor adhesives	60
Subfloor adhesives	50
Vinyl composition tile and asphalt tile adhesives	50
Drywall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Structural wood member adhesive	140
Architectural sealants: clear, paintable, and immediately water-resistant	250
Architectural sealant primers: nonporous	250
Architectural sealant primers: porous	775

TABLE 6.4b | SELECTED LIMITS FOR WET-APPLIED PAINTS AND OTHER COATINGS: SQACMD 1113

As of October 9, 2025

PRODUCT TYPE	MAXIMUM VOC LIMIT (G/L)
Primers, sealers, and undercoatings	100
Coatings, flats and non-flats, and floor	50
Rust-preventive coatings	100
Wood coatings	275
Stains, interior	250
Tub and tile refinishing coatings	420

RECOMMENDATIONS

VOC content and emissions:

- Reduce VOC exposure and negative health impacts in interior applications. The South Coast Air Quality Management District (SCAQMD) thresholds ensure that products have limited VOC content, and the California Department of Public Health (CDPH) emission standard ensures that products are verified to have limited indoor emissions of the specific VOCs tested.
- For all wet-applied materials, be sure to closely follow manufacturers' instructions, paying particular attention to appropriate safety gear and ventilation requirements during installation and curing.
- If residents are in place while potentially hazardous materials are being used, take extra precautions. Residents should be moved out of the building during product application and for the duration of the curing period noted by the manufacturer.

Embodied carbon:

- To compare design choices beyond individual product selection, whole-building or assembly-level life-cycle assessments (LCAs) can be conducted. Free tools are available for all stages of design, from concept to construction documents. They help estimate the quantities of materials used in a design and reference EPD databases to calculate the total global warming potential (GWP) of the assembly or building being assessed.
- A material may have a higher carbon footprint but also greater durability, resulting in fewer replacements over a building's lifespan. The assumed frequency of product replacement over a building's life cycle can be accounted for in a whole-building LCA to help weigh a product's durability against the negative impacts—including costs—associated with replacing it.
- For ready-mixed concrete, consider performance specifications rather than conventional prescriptive "recipes." Performance specs can require a GWP maximum alongside strength class, allowing suppliers greater flexibility in customizing the mix to meet the specifications.

Labor rights and supply-chain transparency:

- Source materials from suppliers and manufacturers that demonstrate a commitment to fair labor practices. This includes safe working conditions, fair wages, and the absence of child labor or forced labor. Consider these actions in addition to material health and embodied carbon:
  - » Prioritize manufacturers with third-party certifications indicating appropriate supply-chain risk management.
  - » See Design for Freedom's high-risk product list (*www.designforfreedom.org/wp-content/uploads/2024/12/Ethical-Materials-Tracking-Schedule-DFF-Guidance-and-Toolkit.xlsx*) and identify any high-risk products in the project. Consider the country of origin for the project's selection of those products and compare against the high-risk locations for those products.
  - » Sourcing from countries with comprehensive and enforced labor laws is a more reliable (though not guaranteed) way to procure ethically.
  - » Use reclaimed and salvaged materials to reduce demand for extraction of raw materials, in which forced labor can be prevalent.

RESOURCES

- Health Product Declaration Collaborative (HPDC). Creator of the health product declaration (HPD), a standard for disclosing product ingredients and their health hazards. Review HPDC's materials, including its repository of HPDs, to more easily find products with fewer hazards or lower concentrations of potentially toxic chemicals. *www.hpd-collaborative.org/*
- mindful MATERIALS, Common Materials Framework (CMF) Reference Guide. The CMF is a shared "language" for product sustainability across five impact areas: human health, climate health, ecosystem health, social health & equity, and circular economy. Use the CMF reference guide, technology partners, and priority factors to guide material screening. *www.mindfulmaterials.com/cmf-reference-guide*
- Pratt, Healthy Materials Lab. Helps teams select healthier building products that are also affordable as well as products with low embodied carbon. *https://healthymaterialslab.org/material-collections/healthier-affordable-products*
- Habitable and Perkins&Will, Embodied Carbon and Material Health in Insulation, Gypsum Drywall, and Flooring. Investigates the intersection of carbon impacts and material health in three of the most common building materials. *https://habitablefuture.org/resources/embodied-carbon-and-material-health-in-insulation/*
- Habitable. This product guidance tool compiles decades of comprehensive research on the health impacts of chemicals throughout the product life cycle. *https://informed.habitablefuture.org/*
- Architecture 2030, Carbon Smart Materials Palette. A guide to common building materials with high-impact potential for emissions reductions, along with alternative materials and whole-building solutions. *www.materialspalette.org/palette/*

Product selection resources for VOC limits:

- South Coast Air Quality Management District (SCAQMD), South Coast AQMD Rule Book. Check here for the most recent VOC content limits at the time of product specification for wet-applied interior adhesives and sealants (Rule 1168), and paints and coatings (Rule 1113). *www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book*
- Coatings Research Group, Incorporated; Green Wise Gold. Green Wise Gold-certified paint products have been tested and certified to pass the indoor air quality requirements of CDPH Standard Method emission testing, and to contain less than 5 grams VOC per liter, even after tinting with specified colorants. *www.greenwisepaint.com/green-wise-gold*
- Master Painters Institute, MPI Approved Products List. The Extreme Green, or X-Green, paint standard sets VOC levels in line with SCAQMD and tests for performance and durability. *www.mpi.net/APL/index.asp*
- Underwriters Laboratories, UL SPOT. A free database allowing users to filter for products with GREENGUARD Gold certification (which meet CDPH requirements and limit total VOC emissions) and other third-party-verified green certifications and claims. *https://spot.ul.com/ https://spot.ul.com/main-app/products/catalog/*
- SCS Global Services, Certified Green Products Guide. A free database allowing users to filter for products with Indoor Advantage Gold and FloorScore certification (which meet CDPH requirements) and other third-party-verified green certifications and claims. *www.scsglobalservices.com/certified-green-products-guide*

- U.S. Environmental Protection Agency, Indoor AirPlus: How to Find Compliant Building Materials. A resource for identifying and sourcing building products compliant with EPA's Indoor AirPlus standard. *www.epa.gov/system/files/documents/2024-08/iap-compliant-building-products-july-2024_508-compliant.pdf*
- Habitable. Low VOC? Don't Stop There. Guidance for selecting products with ingredient transparency, lower toxicity, and other attributes beyond VOC content and indoor emissions. *https://informed.habitablefuture.org/resources/news/129-low-voc-dont-stop-there*

Embodied carbon standards and tools:

- Carbon Leadership Forum (CLF), 2025 CLF North American Material Baselines. Use the most recent version of CLF's report on North American embodied carbon baselines to establish baseline GWP values for various product types. *https://carbonleadershipforum.org/2025-clf-north-american-material-baselines/*
- CLF, Life Cycle Assessment of Buildings (LCA): A Practice Guide. Introduces the concept of LCA to building professionals and provides guidance, including a sample LCA for a gingerbread house. *www.carbonleadershipforum.org/lca-practice-guide/*
- CLF, Tools for Measuring Embodied Carbon. A list and overviews of available LCA tools for architects, engineers, and consultants. *https://carbonleadershipforum.org/tools-for-measuring-embodied-carbon/*
- Underwriters Laboratories, UL SPOT. A free database allowing users to filter for products with environmental product declarations and other third-party-verified green certifications and claims. *https://spot.ul.com/*
- National Academies Press, EAF Steel Facilities in the U.S. A list of steel plants making steel with a lower carbon footprint by using an electric arc furnace. *https://nap.nationalacademies.org/read/26881/chapter/13*
- International EPD System, EPD Library. Filter by geographical scope and product sector to find EPDs for North American construction products. *www.environdec.com/home*
- Henning Larsen, What is the environmental impact of paint? A comprehensive review of environmental and human health impacts of 30 indoor white paints available in Denmark, including chemical content, indoor air emissions, and embodied carbon. *https://henninglarsen.com/news/new-report-what-is-the-environmental-impact-of-paint*

Supply-chain fair-labor transparency

- Design for Freedom, International Guidance & Toolkit. Resources for prioritizing supply-chain transparency regarding forced labor and child labor. Includes a supplier engagement template and sample spec language. *www.designforfreedom.org/home/design-for-freedom-international-guidance-toolkit/*
- B|W|B|R, Forced Labor in the Material Supply Chain: A Mitigation Framework. A four-step framework, including data visualizations and templates, to help project teams recognize and mitigate the risks of forced labor within the supply chain. *www.bwbr.com/2024/06/06/forced-labor-supply-chain-mitigation-framework/*

- BlueGreen Alliance Foundation, *buildingclean.org*. A database of building products manufactured at more than 4,500 sites throughout the U. S. Search for products manufactured near the project site. *https://buildingclean.org/building/zipcode-search*. Use the advanced search to filter by product category, state, green certifications, and union status. *https://buildingclean.org/manufacturers/search*

6.5 Recycling Storage

Optional: 2 points

RATIONALE

Recycling prevents usable materials from entering the waste stream. Providing bins within the living space for separating recyclables from trash encourages higher rates of recycling.

REQUIREMENTS

For projects in locations with municipal recycling infrastructure and/or recycling haulers, provide separate bins for the collection of trash and recycling in each dwelling unit and all shared community rooms. For multifamily buildings, provide an area for separate bins (trash and recycling) or separate trash chutes for each floor. Additionally, provide clear signage and labeling to distinguish recycling bins from general trash bins at all communal recycling and trash sites. Ensure the project's trash and recycling facilities are easily accessible to all residents and are sized appropriately for the number of residents being served.

For projects in locations without municipal recycling infrastructure or recycling haulers, advocate to the local waste hauler or municipality for regular collection of recyclables. Commit to providing recycling bins if service becomes available.

RECOMMENDATIONS

- Ensure that the recycling program has management support. Include procedures in materials developed per *Criterion 8.1 Building Operations & Maintenance Manual and Plan* and the *Criterion 8.3 Resident Manual*.
- Ensure that signage and bin colors are consistent across the project and with local community norms where applicable. Consider opportunities for functional artwork through creative or artistic recycling containers.
- Add additional recycling bins or collection areas for paper and cardboard in locations where residents routinely check their mail.
- Identify local waste handlers and buyers for glass, plastic, metals, office paper, newspaper, cardboard, batteries, electronics, and organic waste. This may include artists or public art organizations seeking to divert solid waste by creating art from recycled materials.
- Make recycling accessible to your resident population. In multifamily buildings, instruct occupants on recycling procedures through clear and visible signs that include pictures. Ensure instructions appear in a variety of languages spoken by residents. Use signs with large and/or raised letters to support people who are blind or have limited vision.
- Incorporate composting alongside recycling where local compost collection or community composting programs exist. Provide separate bins with clear instructions.

RESOURCES

- Enterprise Green Communities, Resident Engagement Tools. Green Communities hosts a variety of resident engagement tools and trainings, including a module on waste reduction and recycling. *www.greencommunitiesonline.org/resources#sec_377*
- U.S. Environmental Protection Agency, How Do I Recycle Common Recyclables? A list of common materials that can be recycled, along with general information on how to prepare them for processing. *www.epa.gov/recycle/how-do-i-recycle-common-recyclables*
- Lamp Recycle lists locations where fluorescent lamps and ballasts may be taken for recycling. *www.lamprecycle.org*
- NYC, Zero Waste Design Guidelines, Chapter 02: Residential Waste Stream. Recommendations for designing multifamily buildings to accommodate multiple waste streams. *www.zerowastedesign.org/02-building-design/a-residential-building-context/*

"It's the nicest apartment I've ever had. I have more freedom now. It made my life easier."

Rodney Johnson, Fabrica Lofts Resident

Healthy Living Environment

A safe home is more than shelter: It is the foundation of health and community. Safe, welcoming, and inclusive homes can nurture social support, connect us to vital resources, and equip communities to withstand life's stresses.

A Safe Place to Call Home

A safe, stable home is foundational for health. Yet many homes expose residents to preventable hazards, including poor indoor air quality, moisture or mold, radon, and circumstances that can lead to injuries. Additionally, most of us are exposed to some trauma (e.g., witnessing or experiencing violence, a natural disaster, a serious accident, or chronic stress) in our lives, and different people may react differently to the same adverse event or exposure, often with mental or physical health consequences. A stable and safe home is fundamental to reducing trauma reminders and promoting healing.

The criteria in this section, from 7.1 through 7.13, establish a baseline of safety for affordable housing by addressing these risks. They support the creation of homes that can protect against environmental hazards, prevent injury and violence, and offer refuge—a place where everyone can breathe clean air, feel secure, and move freely. Together, these strategies align with Housing First and Housing Is Health Care approaches to ensure every home is truly a safe place to live.

7.1

Mandatory for New Construction and Substantial Rehabs

Clean Air: Radon Testing and Mitigation

RATIONALE

Radon is a radioactive gas generated by the natural decay of uranium in the soil and rocks below and around buildings. It can enter homes through holes and cracks. Breathing radon gas increases the risk of lung cancer, and radon is the leading environmental cause of cancer mortality in the United States.

Fortunately, radon-related risks are preventable. For new construction, the most effective strategy is to incorporate prevention during design and construction, especially in high-risk areas. This reduces the likelihood of more costly retrofits later.

For rehabilitation, the first step is to test homes for elevated radon levels. Testing is easy and inexpensive, and elevated radon levels can be reliably mitigated, if necessary, with simple, durable, and commonly available materials and techniques.

REQUIREMENTS

Determine your property's radon potential by consulting the U.S. Environmental Protection Agency (EPA) map of radon zones (*www.epa.gov/radon/epa-map-radon-zones*).

New Construction

If your project is in EPA Radon Zone 1, install passive radon-resistant features below the slab. Also install a vertical vent pipe with a junction box within 10 feet of an electrical outlet, in case an active system proves necessary in the future.

Exception: Buildings with garages attached to a foundation system do not require soil-gas vent systems if compliant with Section 5.2 of ANSI/ASHRAE Standard 62.1-2022—Ventilation and Acceptable Indoor Air Quality for ventilation and pressurization of enclosed spaces surrounding the garage.

Substantial Rehabs

If your project is located in EPA Radon Zone 1, implement the following tests and, if required, follow-up measures:

- Under the supervision of a radon professional, test for the presence of radon in accordance with ANSI-AARST MA-MFLB-2023—Protocol for Conducting Measurements of Radon and Radon Decay Products in Multifamily, School, Commercial and Mixed-Use Buildings (for multifamily buildings) or ANSI-AARST MAH-2023—Protocol for Conducting Measurements of Radon and Radon Decay Products in Homes (for single-family homes). In time-sensitive situations, consistent with the U.S. Department of Housing and Urban Development's (HUD) radon policy, a radon professional may sample a minimum of 25% of randomly selected ground-level dwelling units.
- If the radon level is at or above the EPA action level of 4 picocuries per liter (pCi/L), install radon-reduction measures per either ANSI-AARST SGM-MFLB-2023—Soil Gas Mitigation Standards for Existing Multifamily, School, Commercial and Mixed-Use Buildings or SGM-SF-2023— Soil Gas Mitigation Standards for Existing Homes, as applicable to the project.
- After all rehab work is complete, test again.
  - » If the post-rehab radon level is below the EPA action level of 4 pCi/L, no further action is required.
  - » For post-test levels between 4 and 10 pCi/L, consider a long-term test (minimum 90 days) to confirm an increase before undertaking the mitigation process. Then, if radon levels after renovation are BOTH ≥ 4 pCi/L AND higher than the radon levels before upgrades, install mitigation in accordance with one of the following, as applicable:
    - For multifamily homes, ANSI-AARST SGM-MFLB-2023—Soil Gas Mitigation Standards for Existing Multifamily, School, Commercial and Mixed-Use Buildings
    - For single-family homes, EITHER ANSI-AARST SGM-SF-2023—Soil Gas Mitigation Standards for Existing Homes OR ASTM E2121—Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings

All projects

A radon professional shall have:

- Certification from either the American Association of Radon Scientists and Technologists' (AARST) National Radon Proficiency Program (NRPP) or the National Radon Safety Board (NRSB)

AND

- Certification/license from the state in which the testing or mitigation work is being conducted, if the state has this requirement

RECOMMENDATIONS

- For new construction properties, refer to these standards for construction guidelines, as applicable to the project: ANSI-AARST CCAH-2020: Reducing Radon in New Construction: 1 & 2 Family Dwellings and Townhouses and ANSI-AARST CC-1000-2018-0523: Soil Gas Control Systems in New Construction of Multifamily, School, Commercial and Mixed-Use Buildings.
- Short-term tests offer an affordable screening method for many homes. Longer-term testing may provide a more accurate representation of the annual exposure to radon and the potential need for mitigation. If short-term results are between 2 and 10 pCi/L, consider conducting a long-term radon test (minimum 90 days).
- Elevated levels of radon have been found in homes built in all three zones on EPA's Map of Radon Zones. Consult your state radon program for current information about radon in your area.
- A radon vent fan should be installed when the test result is 4 pCi/L or more. EPA recommends that all homes built with radon-resistant features in Radon Zone 1 pre-emptively include a radon vent fan. EPA also recommends radon-resistant features for homes built in radon zones 2 and 3, along with testing for radon prior to occupancy.
- Guidance for underground garages:
  - The International Mechanical Code (IMC) requires a minimum ventilation rate of 0.75 CFM per square foot for garages serving multifamily projects, and ASHRAE Standard 62.1-2022 section 5.2 encourages maintaining attached-garage air pressure at or below that of adjacent occupiable spaces.
  - If the pressure-management strategy is not designed to continually maintain negative pressure in the underground garage space relative to the occupied spaces (e.g., if a timer is used for exhaust-fan control), then radon control is not assured. In such situations, use the radon-resistant new construction techniques summarized in EPA's Indoor AirPlus Version 2 Verification Requirements, item 2.2 (*www.epa.gov/system/files/documents/2024-07/iap-v2-verification-requirements_508.pdf*) and/or test the occupied space for radon.
  - If the underground garage does not cover the entire foundation (e.g., some living space is directly above a slab or crawlspace), then those portions of the project should be handled per Indoor AirPlus requirements.
  - Any mechanical or service closets in the garage area that are connected to the conditioned enclosure should be meticulously sealed between the garage and the conditioned space.

- For projects that are not in Radon Zone 1 but are located on a brownfield or proximate to industrial operations, consider testing for radon to determine whether levels are elevated on the property. If the radon level is 4 pCi/L or higher, install radon-reduction measures.
- Preemptive radon-reduction measures include:
  - » Installing airtight drain fittings (e.g., a trap or flange system) in the floor drains of the foundation
  - » Sealing and caulking penetrations, openings, or cracks in below-grade walls and floors that contact the ground with a sealant that meets the requirements of ASTM C920-18 Standard Specification for Elastomeric Joint Sealants
  - » Covering exposed earthen floors in basements and crawlspaces according to Section 1.2 of EPA's Indoor AirPlus Version 2 Verification Requirements
  - » Air-sealing sumps by installing an airtight sump cover in such a way that water can drain from above (e.g., with a ball valve) and below the sump cover

RESOURCES

- U.S. Environmental Protection Agency (EPA), Maps of Radon Zones and Supporting Documents by State. *www.epa.gov/radon/epa-maps-radon-zones-and-supporting-documents-state*
- EPA, Map of Radon Zones and Supplemental Information. Find your state radon coordinator's contact details to determine whether your project is located in Radon Zone 1. *www.epa.gov/radon/epa-map-radon-zones-and-supplemental-information*
- American Lung Association, Radon Fact Sheet. A general overview of the health risks associated with radon exposure. *www.lung.org/clean-air/indoor-air/indoor-air-pollutants/radon*
- Washington State University, Extension Energy Program, Builder's Field Guide. Chapter 2 provides tips, procedures, and schematics for mitigating radon risks during new construction. *www.energy.wsu.edu/Documents/Builders_Field_Guide-2006.pdf*
- National Center for Healthy Housing, Radon-Resistant Construction: Low-Rise Multi-Family Housing. *https://nchh.org/resource-library/Factsheet_Radon--no%20HDF.pdf*
- EPA, Building Radon Out: A Step-by-Step Guide on How to Build Radon-Resistant Homes. *https://19january2021snapshot.epa.gov/sites/static/files/2014-08/documents/buildradonout.pdf*
- American Association of Radon Scientists and Technologists, ANSI-AARST standards. *https://aarst.org/standards-library/*
  - » Building design: CCAH-2020 for homes and CC-1000-2018 for larger buildings
  - » Measuring radon: MAH-2023 for homes and MA-MFLB-2023 for multifamily buildings
  - » Mitigating radon in existing buildings: SGM-MFLB-2023 for multifamily buildings and SGM-SF-2023 for homes
- ASTM International, ASTM E2121-21 Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings. *https://store.astm.org/e2121-21.html*

7.2 Clean Air: Combustion Equipment

Mandatory for projects with combustion equipment in conditioned space

RATIONALE

Combustion appliances and equipment (e.g., gas stoves, water heaters, furnaces, or fireplaces) can release harmful pollutants such as carbon monoxide, nitrogen dioxide, and particulate matter into the indoor environment. These pollutants can exacerbate or increase the risk of acquiring certain chronic diseases, like asthma. To support resident health, proper installation of combustion equipment and appliances is key, as are ventilation and air-quality monitoring.

Direct-vent appliances bring outdoor air through a sealed pipe and then exhaust combustion products directly outdoors through another hard-piped vent. No indoor air is used, so there is very little risk of spillage or back-drafting. Power-vented appliances rely on indoor air but use a fan to push exhaust products through the flue to the outside. These are far less susceptible to spillage and back-drafting than conventional units.

REQUIREMENTS

Criterion 7.2 Clean Air: Combustion Equipment does not apply to projects without any combustion equipment (e.g. space heaters, water heaters, cooktops, clothes dryers) nor to projects with combustion equipment located only in detached utility buildings or nonenclosed spaces.

All projects

If there are any combustion appliances or equipment—whether new or existing—in the conditioned space, install one hard-wired carbon monoxide (CO) alarm with battery backup function for each sleeping zone, placed per National Fire Protection Association (NFPA) 72—National Fire Alarm and Signaling Code. If installing new combustion appliances or equipment for space or water heating in conditioned space (e.g., inside an apartment or utility room), install power-vented or direct-vented appliances.

Substantial and Moderate Rehabs

Follow the testing and reporting instructions below if existing combustion appliances or equipment for space or water heating are 1) located within the conditioned space **AND** 2) are not power-vented or direct-vented **AND** 3) are not scheduled for replacement:

- Conduct combustion safety testing prior to and after the retrofit for central systems and for 10% of individual dwelling-unit systems.
- Use either 1) RESNET Standard for Combustion Safety Testing and Work Scope, 2) BPI Combustion Appliance and Fuel Distribution System Inspection, or, in California only, 3) Multifamily Home Energy Retrofit Coordinating Committee (MF HERCC) Combustion Safety Testing Protocols for Existing Multifamily Buildings.
- Report any deficiencies immediately to the owner or owner's representative if any system fails testing.

RECOMMENDATIONS

- If CO alarms or detectors are installed prior to construction completion, protect them from dust, paint, and other contaminants until construction is complete.
- Carbon monoxide and smoke detectors may be hard-wired to the heating and domestic hot-water system, thus activating if that equipment malfunctions.
- Install low-level carbon monoxide monitors for earlier detection, especially in homes where children, older adults, or people with respiratory conditions live.
- Perform gas-leak testing on new and existing systems both inside and outside buildings. Consider common leak points, such as gas meters, appliance connections, and mechanical rooms. Repair promptly if any leaks are found.

RESOURCES

- U.S. Environmental Protection Agency (EPA); Sources of Combustion Products, and Carbon Monoxide's Impact on Indoor Air Quality. These two extensive EPA sites describe the sources of carbon monoxide and other combustion gases, their health effects, steps to reduce exposure, and related standards and guidelines. They also provide additional resources and links. *www.epa.gov/indoor-air-quality-iaq/sources-combustion-products* and *www.epa.gov/indoor-air-quality-iaq/carbon-monoxides-impact-indoor-air-quality*
- National Fire Protection Association, NFPA 72—National Fire Alarm and Signaling Code. Requirements for the performance, installation, operation, inspection, testing, and maintenance of CO detection and warning equipment. These requirements address installations of commercial systems and components as well as installations of single- and multiple-station CO alarms and household CO detection systems. *www.nfpa.org/codes-and-standards/nfpa-72-standard-development/72*
- Underwriters Laboratories, Carbon Monoxide Alarm Considerations for Code Authorities. A basic overview of the problems associated with carbon monoxide and tips for purchasing and installing alarms. *https://code-authorities.ul.com/about/blog/carbon-monoxide-alarm-considerations-for-code-authorities/*
- U.S. Consumer Product Safety Commission, Carbon Monoxide Questions and Answers. *www.cpsc.gov/Safety-Education/Safety-Education-Centers/Carbon-Monoxide-Information-Center/Carbon-Monoxide-Questions-and-Answers*
- Building Performance Institute, Combustion Appliance Safety Inspection for Vented Appliances. *http://bpi.org/sites/default/files/COMBUSTION%20APPLIANCE%20SAFETY%20INSPECTION%20FOR%20VENTED%20APPLIANCES.pdf*
- Environmental Health Perspectives, Nate Seltenrich; Take Care in the Kitchen: Avoiding Cooking-Related Pollutants. Environmental Health Perspectives 122:A154–A159. *http://dx.doi.org/10.1289/ehp.122-A154*

7.3 *Mandatory* Clean Air: Garage Isolation and Vehicle Pollution Management

RATIONALE

Attached garages and enclosed parking areas can be harmful to resident health and safety due to the hazardous pollutants released by cars and other vehicles. Carbon monoxide, nitrogen dioxide, and particulate matter are among these and are harmful to human health, especially to children, older adults, and people with respiratory conditions. These pollutants can easily infiltrate a living space through air leaks, shared ventilation, and pressure differentials. Physical separation, air barriers, air sealing, separation of HVAC systems, and anti-idling policies will help prevent these pollutants from migrating into the living space from the garage. Additionally, a CO alarm helps ensure that residents are alerted in case of accidental accumulation of the gas.

REQUIREMENTS

- Provide a continuous air barrier between the conditioned space and any garage space to prevent the migration of contaminants into the living space. Visually inspect common walls and ceilings between attached garages and living spaces to ensure they are air-sealed before insulation is installed.
- Do not install ductwork or air-handling equipment for the conditioned space in a garage. If installing HVAC systems for garages, these must be completely separate from HVAC systems serving conditioned interior spaces.
- Fit all connecting doors between conditioned space and garages with gaskets. Alternatively, make these doorways substantially airtight with weather stripping and airtight door sweeps.
- Install one hard-wired carbon monoxide (CO) alarm with battery backup function for each sleeping zone of the project, placed per National Fire Protection Association (NFPA) 72—National Fire Alarm and Signaling Code, unless the garage is mechanically ventilated or is an open parking structure as defined by code.
- Prohibit vehicles on the property from idling longer than two minutes. This policy must be noted with visible signage in parking and drop-off areas and detailed in resident and staff handbooks.

RECOMMENDATIONS

- Refer to ASHRAE standards for indoor air quality (62.2 and 62.1) and follow isolation measures for garage contaminants.
- Designate any delivery or drop-off/pick-up zones at least 40 feet from building entries, air intakes, and operable windows.
- Designate parking spaces close to play areas, building entries, operable windows, and air intakes for low-emitting, fuel-efficient, and/or electric vehicles.

RESOURCES

- National Institute of Standards and Technology, Air and Pollutant Transport from Attached Garages to Residential Living Spaces: Literature Review and Field Tests. An overview of the major issues with siting garages near living spaces as well as a review of relevant scientific studies and a series of field studies. *www.nist.gov/publications/air-and-pollutant-transport-attached-garages-residential-living-spaces-literature*
- Building Science Corporation; Joseph Lstiburek, Ph.D., P.Eng.; Builder's Guide series for specific North American climate zones. Refer to the discussions and construction details regarding air-sealing and connected garages. *https://buildingscience.com/bookstore*
- U.S. Environmental Protection Agency, Indoor AirPlus Verification Requirements, Version 2. *www.epa.gov/system/files/documents/2024-07/iap-v2-verification-requirements_508.pdf*
- U.S. Department of Energy, IdleBox: A Toolkit for Idle Reduction Education and Outreach. An online education and outreach toolkit for reducing vehicle idling. *https://cleancities.energy.gov/technical-assistance/idlebox/*

7.4 Clean Air: Smoke-Free Policy

Mandatory; Optional: 6 points

RATIONALE

Secondhand tobacco smoke is the third leading cause of preventable death in the U.S. It is also a common asthma trigger and is associated with coronary artery disease. Air filtration and ventilation systems do not eliminate the health hazards caused by secondhand smoke. Smoke from one dwelling unit may seep through the cracks, be circulated through a shared ventilation system, or otherwise enter others' living space. There is no safe level of exposure to secondhand tobacco smoke. In addition to the negative health effects, smoking significantly increases fire hazards as well as cleaning and maintenance costs.

REQUIREMENTS

Mandatory

- Implement and enforce a smoke-free policy in all common areas and within a 25-foot perimeter around the exterior of all residential buildings, or up to the property line if the parcel does not allow for a 25-foot distance.
- Lease language must prohibit smoking in these locations and must provide a graduated enforcement policy. This policy must not include eviction for first offenses; smoking should be considered a minor lease violation.
- The smoke-free policy shall apply to all owners, tenants, guests, and people who provide services on the property. The use of e-cigarettes and vape pens shall be prohibited wherever smoking is prohibited.
- Include the smoke-free policy, including how it will be enforced and information on the harms of smoking, in materials developed per *Category 8: Operations, Maintenance, and Resident Engagement*, and ensure they are readily available and easily accessible for residents, staff, and visitors.

Optional
Expand the mandatory smoke-free policy to include all indoor spaces on the property, including individual dwelling units. *[6 points]*

RECOMMENDATIONS

- Ensure that staff members—not residents—are solely responsible for enforcement of the smoke-free policy. Enable consistent enforcement by ensuring staff receive adequate training.
- Eviction should only be a last resort in response to a smoking violation, and a graduated enforcement policy emphasizes communication to residents about the policy and its impacts. Through graduated enforcement, you may reset the enforcement steps after a set time period without another violation, include a reasonable accommodation policy, and establish steps such as these:
  - » First offense: verbal warning and reminder of property's smoke-free policy
  - » Second offense: written warning
  - » Third offense: more serious warning paired with requirements for the resident to demonstrate that they are moving toward compliance
  - » Fourth offense: strenuous warning, cleaning fee comparable to costs required for dwelling-unit turnover, and more strenuous requirements for a resident to demonstrate that they are moving toward compliance
- If implementing a smoke-free policy in an occupied building, plan a 12- to 18-month resident engagement effort and a pre-quit campaign. See below for supportive resources.
- If working with new or unoccupied buildings, all building marketing materials should clearly state the smoke-free policy. Project owners and managers should inform residents that they are prohibited from smoking in or around the property. This information should be incorporated into the resident manual and into materials for building management and maintenance staff (see *Category 8: Operations, Maintenance, and Resident Engagement*).
- Effectively communicate the rationale for implementing the smoke-free policy, with particular attention and education around the harms of second-and thirdhand smoking.
- Consider designating an outdoor smoking area outside the smoke-free buffer zone as an alternative arrangement for those who smoke or vape. Design this area to be as attractive as possible, provide shelter from the elements, have lighting at night, and be accessible for people who use mobility equipment. Provide suitable receptacles in the designated outdoor smoking area for the disposal of cigarette butts. Ensure that the receptacles are inside the project line and do not encroach on public space.

RESOURCES

- American Nonsmokers' Rights Foundation, Resources & Tools for Smokefree Multiunit Housing. A collection of templates, tools, and education for housing providers as well as for residents who do and do not smoke. Includes educational resources on going smoke-free as well as lease templates and information for housing providers on funding sources, policy creation and enforcement, legal assistance, and more. *https://no-smoke.org/resources-tools-smokefree-multi-unit-housing/*

- American Lung Association, Air Quality in the Home. This site includes an entire section devoted to indoor air quality in the home, including maintaining a healthy indoor environment. *www.lung.org/clean-air/indoor-air/building-type-air-resources/at-home*
- American Lung Association, Tobacco Cessation Coverage. Information on health insurance coverage and other funding to support quitting. *www.lung.org/policy-advocacy/tobacco/cessation/coverage*
- Public Health Law Center and American Lung Association. Smoke-Free Multi-Unit Housing Enforcement Guide. Best practices for equitable implementation and enforcement of smoke-free housing policies. *www.publichealthlawcenter.org/sites/default/files/resources/SF-MUH-Cal-Enforcement-Guide.pdf*
- U.S. Department of Housing and Urban Development (HUD), Implementing HUD's Smoke-Free Policy in Public Housing: HUD Guidebook. *https://no-smoke.org/wp-content/uploads/2025/04/Implementing-HUDs-smoke-free-policy-in-public-housing_HUD-guidebook.pdf*
- HUD, Smoke Free Housing, A Tool Kit for Residents of Federally Assisted Public and Multi-family Housing. *www.naccho.org/uploads/resource-hub-images/Smoke-Free_Housing_2-id2862.pdf*
- Tobacco Technical Assistance Consortium. LISC webinar, Going Smoke Free: Best Practices of Multifamily Housing Owners & Managers. *www.lisc.org/our-resources/resource/lisc-experts-online-going-smoke-free-best-practices-multifamily-housing-owners-managers/*
- State-and city-specific smoke-free housing listings:
  - » Michigan Smoke-Free Apartments. *www.mismokefreeapartment.org/listing.html*
  - » Smoke-Free Housing Coalition of Maine. *https://breatheeasymaine.org/*
  - » Minnesota Smoke-Free Housing. *www.mnsmokefreehousing.org*
  - » New York Landlord Smoke-Free Housing Toolkit. *www.tobaccopolicycenter.org/documents/SFHNY%20Landlord%20Toolkit%20-%20Oct%202014.pdf*
  - » NYC Department of Health Smoke-Free Housing Resources. *www.nyc.gov/site/doh/health/health-topics/smoking-smoke-free-housing.page*

Mandatory for all New Construction and Substantial Rehabs
Optional for Moderate Rehabs: 12 points maximum

7.5 Clean Air: Ventilation

RATIONALE

Optimal ventilation improves indoor air quality, contributing to a healthier living environment.

Properly sized and controlled exhaust fans in bathrooms and kitchens remove moisture-laden air, lowering the potential for indoor mold growth that may yield odors, pose health hazards to residents, and create durability concerns. Kitchen fans over fuel-burning appliances also help remove carbon dioxide and carbon monoxide as well as other air contaminants that are by-products of fuel-burning appliances and of cooking. In bathrooms, ENERGY STAR-qualified fans use 65% less energy on average than standard models and move more air per unit of energy used—with less noise. Timers and humidistat sensors help ensure that fans regularly remove moisture and provide adequate ventilation.

REQUIREMENTS

For each dwelling unit, install the following:

- A demand-controlled mechanical exhaust system in each kitchen per ANSI/ASHRAE Standard 62.2-2022—Ventilation and Acceptable Indoor Air Quality in Residential Buildings, sections 5 and 7. Alternatively, projects that achieve Option 2: Advanced building certification of *Criterion 5.3 Advanced Building Performance* may, provided there are no combustion-fueled appliances within the dwelling unit, use kitchen exhaust vented to the outdoors (e.g., a heat-or energy-recovery ventilator, or a ceiling-or wall-mounted fan) with a continuous rate of either 5 ACH or 25 CFM per Table M1507.3 of the 2009 International Residential Code. *[4 points for moderate rehabs]*
- A mechanical exhaust system in each bathroom per ASHRAE 62.2-2022 sections 5 and 7. *[4 points for moderate rehabs]*
- A whole-house mechanical ventilation system per ASHRAE 62.2-2022 sections 4 and 7, but excluding section 4.2; local exhaust airflow may be used for this system *[4 points for moderate rehabs]*

For each property of four stories or more:

A mechanical ventilation system for all hallways and common spaces per ANSI/ASHRAE Standard 62.1-2022—Ventilation and Acceptable Indoor Air Quality. *[3 points for moderate rehabs]*

For all mechanical ventilation systems:

- Whether the ventilation equipment is new or existing, verify and test that all dwelling-unit ventilation systems operate as designed, with flow rates within +/-15 CFM or +/-15% of design value, whichever is smaller.
- For all new ventilation systems and associated ductwork, install per manufacturer's recommendations.
- Specify cleaning, sealing, balancing, and right-sizing of rooftop fans for all existing central ventilation systems and associated ductwork.
- Ensure mechanical exhaust ventilation systems terminate outdoors—not in attics or interstitial spaces. Recirculating fans do not satisfy the kitchen exhaust requirements.
- For fans serving individual bathrooms, install ENERGY STAR-labeled fans.
- If bathroom fans do not run continuously, install them with controls intended to ensure adequate run time.
- For systems delivering 2,000 CFM or more of outside air, provide real-time air-volume measurements with data logging and alarms to indicate when flow varies by +/-15% of design value.

RECOMMENDATIONS

- Substantial and moderate rehab projects, particularly those of a historic or landmark nature, may consult Appendix A of ASHRAE 62.2 for compliance options specifically for existing buildings.

- Install MERV 13 or higher-rated filters for outdoor-air ventilation equipment, particularly in geographic locations where outdoor air pollution does not meet national standards for particulate matter (PM2.5, PM10) or ozone, and within 500 feet of busy streets and highways.
- Limit uncontrolled intake of air by avoiding exhaust-only ventilation strategies.
- Proper installation of ventilation systems is as critical to their performance as proper design. Adhere to best practices for installation by referencing resources below.
- Install range hoods or microwave range hoods with a minimum capture efficiency of 70%, as tested in accordance with current editions of ASTM E3087—Standard Test Method for Measuring Capture Efficiency of Domestic Range Hoods.
- For kitchen exhaust fans, consult the prescriptive duct-sizing requirements in Table 5-3 of ASHRAE 62.2 or the ENERGY STAR Kitchen Exhaust Guidance.
- Consider testing exhaust-fan performance as soon as power is available. Hold two squares of toilet paper to the exhaust fan. If the fan can hold these squares in place when turned on, it is reasonable to assume that the fan is working correctly. If the fan cannot hold the squares of toilet paper, examine its installation.

RESOURCES

- ASHRAE, Standards 62.2 and 62.1. This page provides a free preview of ASHRAE Standards 62.2 and 62.1 addressing indoor air quality in homes and multifamily common spaces. *www.ashrae.org/technical-resources/standards-and-guidelines/read-only-versions-of-ashrae-standards*
- Pacific Northwest National Laboratory Building America Solution Center, Ventilation and Exhaust Strategies for Multifamily Housing. Pictorial guides and best practices for multifamily ventilation system design and installation. *https://basc.pnnl.gov/resource-guides/ventilation-and-exhaust-strategies-multifamily-housing*
- Building Science Corporation, Review of Residential Ventilation Technologies. Reviews current and potential ventilation technologies for residential projects, with particular emphasis on North American climates and construction. *https://buildingscience.com/documents/guides-and-manuals/gm-review-residential-ventilation-technologies/view*
- Oak Ridge National Laboratory; National Weatherization Assistance Program Impact Evaluation, Impact of Exhaust-Only Ventilation on Radon and Indoor Humidity—A Field Investigation. *https://weatherization.ornl.gov/wp-content/uploads/pdf/WAPRetroEvalFinalReports/ORNL_TM-2014_367.pdf*
- U.S. Environmental Protection Agency, ENERGY STAR Ventilation Fans. Describes the advantages of ENERGY STAR-labeled ventilation fans and provides product and manufacturer lists. *www.energystar.gov/products/ventilation_fans*
- Home Ventilating Institute (HVI), Ventilation Systems and Controls. The HVI provides consumers an assurance of product performance. It also works to increase public awareness of the need for good ventilation and provides resources for selecting appropriate ventilation products. *www.hvi.org/*
- Center for Energy and Environment, Energy Recovery Ventilators: What you need to know. A brief, easy-to-understand overview of heat- and energy-recovery ventilators. *www.mncee.org/energy-recovery-ventilators-what-you-need-know*

Mandatory for all properties with newly installed central HVAC systems in the scope of work

7.6 Clean Air: Indoor Air Filtration

RATIONALE

Installing high-efficiency air filters in homes can help prevent exposure to particle pollution. The health risks associated with exposure to particulate matter (PM) include a range of negative respiratory and cardiovascular impacts. Filtering out pollutants when outside air is brought into a home, and when air recirculates in a home, is a meaningful strategy to reduce indoor PM exposure. Filters with higher MERV ratings (short for Minimum Efficiency Reporting Value) are more efficient at capturing airborne particles and contaminants of different sizes, reducing the indoor air levels of allergens and other common household pollutants. High-efficiency filters, like MERV 13 and above, offer greater health protection by trapping smaller contaminants, including bacteria and viruses, airborne particulate matter, and respiratory irritants.

REQUIREMENTS

Install MERV 13 or higher-rated filters for any central forced-air HVAC system that is newly installed.

RECOMMENDATIONS

- Ensure that your HVAC design assumptions include an accurate MERV rating. Otherwise, air flow in the home and HVAC system lifespan could be compromised in favor of filtration.
- Ensure filters are easy to access and replace. Inconvenient locations lead to skipped filter changes and diminished performance.
- Ensure that filters are changed according to the manufacturer's recommendations.
- Note that even MERV 13 filters may not be sufficient to safely filter indoor air during periods of intense wildfire smoke. Follow steps recommended by the U.S. Environmental Protection Agency for wildfire smoke events when needed. Where possible, design new HVAC systems to accommodate MERV 16 filters. This future-proofs the system and maximizes health protection, especially in regions with frequently poor outdoor air quality.
- Communicate with residents about the purpose and health benefits of having high MERV ratings and changing filters regularly.

RESOURCES

- Bob Vila, MERV Ratings: What do they mean? *www.bobvila.com/articles/merv-ratings/*
- ASHRAE, ANSI/ASHRAE Standard 62.2—Ventilation and Acceptable Indoor Air Quality in Residential Buildings. This page provides a free preview of ASHRAE Standards. *www.ashrae.org/technical-resources/standards-and-guidelines/read-only-versions-of-ashrae-standards*
- Pacific Northwest National Laboratory Building America Solution Center, Proper Installation of Furnace and Air-Handler Filters. Includes pictorial guides and best practices for installation of filters. *https://basc.pnnl.gov/resource-guides/proper-installation-furnace-and-air-handler-filters*
- Pacific Northwest National Laboratory Building America Solution Center, High-MERV Filters. Pictorial guides and best practices for selecting and installing high-efficiency air filters. *https://basc.pnnl.gov/resource-guides/high-merv-filters*

National Air Filtration Association, Best Practice Guidelines: Filtration for the Residential HVAC Industry. *www.nafahq.org/residential/*

PurpleAir Real-Time Air Quality Map. This web map is set to display real-time readings from public outdoor PurpleAir sensors. Though not exhaustive, these measurements are helpful in seeing general trends in outdoor air quality in certain areas of the country. *https://map.purpleair.com/*

Environmental Law Institute, Reducing Indoor Exposure to Particle Pollution from Outdoor Sources: Policies and Programs for Improving Air Quality in Homes. This 2020 paper is a comprehensive study of best practices and recommendations for home air filtration. *www.eli.org/sites/default/files/eli-pubs/web-reducing-indoor-exposure-particle-pollution-outdoor-sources.pdf*

7.7 Clean Air: Enhanced IAQ

Optional: 3 or 6 points

RATIONALE

Left unchecked, particulate matter and air pollution produced by typical construction practices can negatively impact the health and well-being of people working on or living near the construction site. Yet relatively simple practices implemented before and after construction can reduce this pollution and its negative impacts.

Similarly, attention to detail across several aspects of construction (moisture control, radon, pest prevention, HVAC, pollutant control, building materials, occupant education) included in the Indoor AirPlus program require a relatively small level of effort above and beyond Green Communities requirements and will leave the property with an additional level of third-party certification specifically designed to improve project indoor air quality.

REQUIREMENTS

Option 1: Management of construction pollution

In all dwelling units, seal all heating, cooling, and ventilation ducts and returns throughout construction to prevent dust, harmful particles, and other construction-related pollution from entering.

AND

Flush all dwelling units after completion of construction and prior to occupancy either 1) for at least 48 hours (may be nonconsecutive) with all windows and interior doors open and all HVAC fans running; or 2) with at least 14,000 CFM/sf of floor area. Replace all air-handling equipment filters after flushing. *[3 points]*

Option 2: Indoor AirPlus

Earn the EPA Indoor AirPlus label. *[6 points]*

RECOMMENDATIONS

- Consider testing dwelling-unit air quality to ensure that desired performance levels are achieved.

RESOURCES

- U.S. Environmental Protection Agency, Indoor AirPlus. Indoor AirPlus is a voluntary partnership and labeling program that helps new home builders improve the quality of indoor air by outlining construction practices and product specifications that help minimize exposure to airborne pollutants and contaminants. *www.epa.gov/indoorairplus*

7.8 Moisture: Dehumidification

Mandatory for properties in climate zones 1A, 2A, 3A, and 4A following Criterion 5.3 Advanced Energy Performance; Optional for all other properties: 7 points

RATIONALE

Interior relative humidity levels above 60% are often uncomfortable and can create conditions for the growth of mold, mildew, bacteria, and other biological allergens. The more energy efficient a building is, the greater the need to manage its moisture flow. Often the heating and cooling system cannot sufficiently manage a building's temperature and moisture levels throughout the year. Traditional systems are designed to manage temperature only, and they run less frequently in energy-efficient homes. Supplemental dehumidification is often needed to manage the property's moisture loads, particularly in cooling-dominated climates.

REQUIREMENTS

Option 1: Dedicated dehumidification system

Design, select, and install supplemental dehumidification equipment to keep relative humidity at or below 60%.

OR

Option 2: Dehumidification readiness

Equip all dwelling units with dedicated space, drains, and electrical hook-ups for permanent supplemental dehumidification systems to be installed if needed.

OR

Option 3: ERV or HRV

Advisory: **This Option is not recommended for properties located below the "Warm–Humid" line shown in Figure 301.1 of the 2019 International Energy Conservation Code.**

Ensure all dwelling units are served by an energy-recovery ventilator (ERV) or heat-recovery ventilator (HRV). Provide a written statement attesting that the mechanical engineer has evaluated humidity potential in the interior. The statement must attest that buildings and systems have been designed to ensure that year-round interior relative humidity will not exceed 50% in the winter and 60% in the summer.

Create the following:

- Condensation evaluation for window-to-wall connections and at any non-thermally-broken metal penetrations through the exterior envelope to reduce the risk that condensation will occur at the project's outdoor design conditions with indoor winter conditions held at 68°F (20°C) and 50% relative humidity. Projects pursuing Passive House certification may submit their Passive House thermal bridge modeling report to comply with this item.
- Narrative summarizing ERV/HRV control strategies that are being used to manage year-round interior relative humidity levels
  - » Measures that must be included to help manage interior humidity levels during the cooling season are:
    - – Appropriately sized cooling systems to ensure dehumidification capacity is maximized, given the expected loads in the apartments
    - – Use of an ERV with moisture recovery to help keep exterior humidity from entering the space
  - » An optional measure to help manage interior moisture levels is use of a "dry mode" on the dwelling unit's cooling system to improve dehumidification capacity during periods of high interior humidity
  - » Measures that must be included to help manage interior humidity levels during the heating season:
    - – If a unitized ERV is being used, the ERV system must have the capability to boost flow rates during periods of high interior humidity.
    - – If a centralized ERV is being used, the ERV must have the capacity to partially bypass the energy-recovery core or slow down the enthalpy wheel during periods of high interior humidity.
    - – For all ERV and HRV systems, drawings must show relative humidity monitors in return-air ducts at the ERV or HRV to monitor relative humidity.

Note on Option 3: The system used to comply with Option 3 will likely also satisfy the requirements of Criterion 7.5 Clean Air: Ventilation.

RECOMMENDATIONS

- As buildings become more energy efficient and loads decrease, proper sizing and thoughtful approaches to year-round moisture control become more critical in all climate zones.
- For projects located in humid climates, supplemental dehumidification may be necessary to maintain comfort during times of high ambient relative humidity. Design a system with the capacity to meet ASHRAE requirements and then provide additional accommodations to adjust the outside air as needed. Calculate partial-load performance of HVAC equipment by using ASHRAE Dehumidification 1% Design Days when designing equipment to maintain 60% relative humidity. Use ACCA Manual LLH sizing calculations to size systems to maintain interior relative below 60%; refer to Appendix 3, Ancillary Dehumidification, for explicit guidance on latent loads.
- Do not use electric-resistance reheat as a strategy for controlling interior moisture as it will lead to high utility bills for those systems.

- Carefully consider interior sources of moisture (e.g., cooking) when sizing HVAC and dehumidification systems; dense properties may require more dehumidification than initially expected.
- Consider the project's ventilation system. Although balanced systems and ERVs will not necessarily eliminate the need for stand-alone dehumidification, prefer ventilation strategies that do not exacerbate interior moisture loads.

RESOURCES

- National Renewable Energy Laboratory, Measure Guideline: Supplemental Dehumidification in Warm–Humid Climates, by Armin Rudd. *www.nrel.gov/docs/fy15osti/62677.pdf*
- Air Conditioning Contractors of America, Manual LLH—2019: HVAC System Design for Low Load Homes. *www.acca.org/store#/productdetail/508e0cb0-ff40-e911-a974-000d3a1991fc*
- Green Building Advisor; Ductwork for ERVs, Dehumidifiers, and Forced-Air Heating System, by David Treleven. *www.greenbuildingadvisor.com/article/ductwork-ervs-dehumidifiers-forced-air-heating-systems*
- Building Science Corporation, Supplemental Dehumidification in Warm–Humid Climates. *www.buildingscience.com/documents/bareports/ba-1310-supplemental-dehumidification-warm-humid-climates/view*
- Pacific Northwest National Laboratory Building America Solution Center, Whole House Dehumidification. Pictorial guides and best practices for designing and installing supplemental dehumidification systems. *https://basc.pnnl.gov/resource-guides/whole-house-dehumidification*
- ASHRAE Journal, Dehumidification and Cooling Loads from Ventilation Air, by Lewis G. Harriman III, Dean Plager, and Douglas Kosar. *www.gti.energy/wp-content/uploads/2018/11/BinMaker-Pro-Vent-Cool-Loads.pdf*

7.9a

Mandatory for New Construction

Managing Moisture in the Building Enclosure: New Construction

RATIONALE

Managing moisture in the building enclosure, especially in energy-efficient buildings, is critical for residents' health and for the continued availability of affordable housing. Dampness and mold—which can often flourish out of sight within the building enclosure—are strongly linked with chronic respiratory problems, including asthma. They can also make homes more susceptible to pests and can compromise a building's durability and structural integrity. Leaks and other moisture issues can potentially lead to costly repairs, increase insurance and litigation risks, and take homes and buildings out of service for extended periods of time.

Moisture can move through building structures in four ways: 1) as bulk water, 2) through capillary action ("wicking"), 3) through air transport, and 4) through vapor diffusion. The dominant type of moisture control needed in a given scenario will dictate the types of materials that should be installed, and how those materials should be installed, to allow and/or suppress moisture movement.

Ideally, a property will be designed and constructed with four continuous control layers and will also allow drying if moisture enters the enclosure. The four continuous controls layers, in order of priority for moisture management, are: 1) continuous weather-resistant barrier that includes flashing and sealed penetrations to manage bulk water and capillary moisture movement away from the structure, 2) continuous air-control layer enclosing the conditioned space, 3) continuous vapor-management layer, 4) continuous thermal-control layer (insulation).

Ensuring that building assemblies can dry if they get wet requires attention to each of these layers and to all the other materials that make up the walls, roof, and foundation.

While installation of the four continuous control layers and the drying potential of assemblies should always be front of mind, basic strategies below can help solve for egregious moisture movement across the enclosure.

REQUIREMENTS

1. Wall and roof systems

Follow the specific guidance below **OR** cite a specific resource and approach that will be implemented on the site for all buildings' wall and roof moisture management.

- Use roof overhangs, gutters, downspouts, and/or other strategies to divert bulk water away from wall systems and onto a downward slope at least 5 feet from the foundation — or, if relying on underground catchment systems, at least 10 feet from the foundation.
- Properly install weather barriers, including flashing and drainage planes, to help direct water away from wall cavities.
- Install flashing at the bottom of exterior walls, along with a continuous, fully sealed drainage plane behind exterior cladding that laps over the flashing.
- Include weep holes, weep screed, or an equivalent drainage system appropriate to the assembly type and materials.
- Fully flash and lap all wall and roof penetrations, including windows and doors.

2. Foundations

At the foundation, bulk water may enter from three different sources: groundwater, surface runoff from the site, and runoff from the building itself. Properly install foundation drainage, moisture barriers, and waterproofing materials to reduce the migration of moisture.

Note: Projects on raised-pier foundations with no foundation walls are exempt from the foundation requirements below.

Beneath concrete slabs, including those in basements and crawl spaces:

- Install a capillary break as follows: 4-inch layer of ½-inch diameter or greater clean aggregate OR a 4-inch uniform layer of sand overlain with a layer or strips of geotextile drainage matting installed according to the manufacturer's instructions.
- Immediately above the capillary break, install insulation as necessary.
- Above that, install at least 6-mil polyethylene sheeting overlapped at least 6 inches at the seams to serve as a vapor retarder in direct contact with the slab above.

Beneath crawl spaces without slabs:

- Install at least 8-mil cross-laminated polyethylene on the crawlspace floor, extended up at least 12 inches on piers and foundation walls, and with joints overlapping at least 12 inches. The 8-mil and the cross-lamination ensure longevity of the poly.
- Line the likely "high-traffic" areas of the crawl space with foam board so the polyethylene beneath will not be disturbed.

RECOMENDATIONS

- Protect all building materials from moisture on the jobsite. Do not enclose framing members or insulation products that have high moisture content and do not install any building materials with visible signs of water damage or mold.
- Where a high water table is anticipated or observed or has been documented in the soil boring report, or where specifically recommended by the geotechnical engineer, provide subsurface drain tile or another drainage system in strict accordance with the geotechnical engineer's or other qualified professional's recommendations to divert underground water away from the structure.
- Install a "perfect" wall. *www.buildingscience.com/documents/insights/bsi-001-the-perfect-wall*
- Assess and adjust the vapor profile, including the drying potential, of the enclosure during design to ensure it can manage moisture in a way that is appropriate to the climate, the site conditions, and the envelope's thermal performance.
- Use the Building Science Advisor education resources and online tool from Oak Ridge National Laboratory (*https://bsa.ornl.gov*) to compare wall scenarios and select the optimal wall-assembly type for managing thermal and moisture performance simultaneously.
- Ensure that subsequent trades' work does not puncture the moisture-management layer (sometimes called a moisture barrier or vapor retarder).

RESOURCES

- U.S. Environmental Protection Agency (EPA), ENERGY STAR Multifamily New Construction National Water Management System Requirements. Note: Although these requirements serve to document best practices, they are no longer mandatory for ENERGY STAR certification. *www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20MFNC%20Water%20Mgmnt%20System%20Reqt%20Version%201_1.1_1.2_Rev04.pdf*
- EPA. ENERGY STAR Water Management System Builder Requirements, ENERGY STAR Certified Homes, Version 3/3.1. *www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/water_mgmt_sys_bldr_req.pdf*
- Green Building Advisor, Vapor Profiles Help Predict Whether a Wall Can Dry, by Peter Yost. *www.greenbuildingadvisor.com/article/vapor-profiles-help-predict-whether-a-wall-can-dry*
- U.S. Department of Energy, Building America's Climate-Specific Guidance. Provides access to expert information on hundreds of high-performance design and construction topics, including contracting documents and specifications, installation guidance, CAD drawings, "right and wrong" photographs of installation practices, and training videos. *www.energy.gov/eere/buildings/building-america-climate-specific-guidance*

- Whole Building Design Guide, Moisture Management. Free guidance on managing all four forms of moisture and optimizing drying potential. *www.wbdg.org/resources/moisture-management*
- EPA, Indoor AirPlus construction specifications. *www.epa.gov/indoorairplus/indoor-airplus-program-documents*
- U.S. Department of Energy Office of Energy Efficiency & Renewable Energy, Building America. Free downloads on best building practices. *www.energy.gov/eere/buildings/building-america*
- Advanced Energy, Crawl Spaces. Comprehensive best practice crawl space design and installation guidelines. *www.advancedenergy.org/crawl-spaces*
- Building Science Corporation, Conditioned Crawlspace Construction, Performance and Codes, by Joseph Lstiburek, Ph.D., P.Eng. *https://buildingscience.com/documents/bareports/ba-0401-conditioned-crawlspace-construction-performance-and-codes/view*
- Building Science Corporation, Crawlspace Insulation; Keeping the Water Out of Basements. Guidance on design and installation of below-grade walls. Crawlspaces: *www.buildingscience.com/documents/information-sheets/crawlspace-insulation* Basements: *https://buildingscience.com/documents/building-science-insights-newsletters/bsi-110-keeping-water-out-basements*
- The Partnership for Advanced Technology in Housing. Has an extensive, searchable resource section with pertinent information about construction solutions. *www.pathnet.org/*

7.9b

Mandatory for Rehabilitation

Managing Moisture in the Building Enclosure: Rehabilitation

RATIONALE

Managing moisture in the building enclosure is critical for residents' health and for the continued availability of existing affordable housing. Dampness and mold—which can often flourish out of sight within the building enclosure—are strongly linked with chronic respiratory problems, including asthma. They can also make homes more susceptible to pests and can compromise a building's durability and structural integrity.

Project teams should assess and, if necessary, take action to improve moisture management of the enclosure—even if no work on the enclosure is planned as part of the rehab.

The urgency of this assessment increases if the team intends to upgrade the thermal performance of the envelope. Improving energy efficiency inevitably changes how moisture moves through the building interior and the enclosure. The term "hygrothermal" captures the deeply intertwined relationship between energy performance and moisture movement.

Moisture can move through building structures in four ways: 1) as bulk water, 2) through capillary action ("wicking"), 3) through air transport, and 4) through vapor diffusion. The dominant type of moisture-movement control needed in a given scenario will dictate the types of materials that should be installed, and how those materials should be installed, to allow and/or suppress moisture movement.

Ideally, the property was originally designed and constructed with four continuous control layers and will also allow drying if moisture enters the enclosure. The four continuous controls layers, in order of priority for moisture management, are: 1) continuous weather-resistant barrier that includes flashing and sealed penetrations to manage bulk and capillary moisture movement away from the structure, 2) continuous air-control layer enclosing the conditioned space, 3) continuous vapor-management layer, 4) continuous thermal-control layer (insulation).

Missing layers, or gaps in continuity, can increase the risk of moisture and mold within the enclosure. Changing conditions over the time the building has been in service can elevate the risk as well. These could include prior upgrades to envelope performance, higher outdoor temperatures and humidity than in the past, or alterations in stormwater runoff patterns due to changing on-site conditions or new off-site development.

REQUIREMENTS

1. Property assessment

For substantial rehabs, assess the interior and exterior of all buildings in the scope of work for evidence of moisture problems. For moderate rehabs, assess at minimum the interior and exterior of all building **assemblies** in the scope of work for evidence of moisture problems. The assessment should look for:

- Water stains or wet spots
- Musty odors
- Foundation cracks and evidence of seepage
- Roof leaks
- Plumbing leaks
- Condensation in attics, and in or around windows and doors
- Moisture damage near all envelope penetrations, including windows and doors; utility hookups; and mechanical, electrical, and plumbing systems

Indicate all those that will be addressed in the scope of work, noting any repairs and remediation that must occur before the rehab begins.

Advisory: **If the inspection reveals major mold or moisture problems that will not be addressed during the rehab, avoid performance improvements to relevant portions of the envelope, or consult a building enclosure specialist for expert guidance.**

2. Moisture management for roofs and walls

Mandatory for all rehab projects that have deficiencies in or include replacing particular assemblies called out below

Wall systems:

- Provide a continuous housewrap/weather-resistive barrier with sheets lapped shingle-style to prevent bulk water from penetrating the wall assembly or being introduced through window or door openings or through other penetrations. Alternatively, install a fluid-applied weather-resistive barrier in accordance with manufacturer instructions. Taped systems such as Zip, Force Field, and others are acceptable.

- Prior to any exterior finish being installed, integrate flashings with the weather-resistive barrier and drainage plane to prevent bulk water from entering the exterior wall assembly. This must be done at roof–wall intersections and wall penetrations—including but not limited to plumbing, electrical, vents, and HVAC refrigerant lines in addition to windows and doors. Include kick-out flashing where a sloped-roof eave terminates in a wall with siding, stucco, or other applied finish apart from brick veneer.

Roof systems:

- For sloped roofs, install drip edge at the entire perimeter of the roof.
- At roof–wall intersections, maintain a minimum 2-inch clearance (or other if recommended by the manufacturer) between wall cladding and roofing materials. Install flashing along the intersection and use kick-out flashing as noted above for wall systems.

RECOMMENDATIONS

Prior to the retrofit:

- Before air sealing or insulating, repair leaks, correct drainage, and address any and all issues identified with all four sources of moisture—bulk water, capillary action, air transport, and vapor diffusion.
  - » Remediate mold only after managing moisture problems at their original source.
  - » Protect all building materials from moisture on the jobsite. Do not enclose framing members or insulation products that have high moisture content and do not install any building materials with visible signs of water damage or mold.
- Install a "perfect" wall. *www.buildingscience.com/documents/insights/bsi-001-the-perfect-wall*
- Assess and adjust the vapor profile of the enclosure during design to ensure it is appropriate to the climate, the site conditions, and the envelope's thermal performance.
- Use the Building Science Advisor education resources and online tool from Oak Ridge National Laboratory (*https://bsa.ornl.gov*) to compare wall retrofit scenarios and select the optimal assembly type for managing thermal and moisture performance simultaneously.

RESOURCES

- Oak Ridge National Laboratory, Building Science Advisor. Free educational resources and an online assessment tool specifically for housing retrofits. The tool facilitates comparison of the thermal and moisture performance of different wall assemblies. *https://bsa.ornl.gov*
- U.S. Department of Energy, Building America's Climate-Specific Guidance. Provides access to expert information on hundreds of high-performance design and construction topics, including contracting documents and specifications, installation guidance, CAD drawings, "right and wrong" photographs of installation practices, and training videos. *www.energy.gov/eere/buildings/building-america-climate-specific-guidance*
- U.S. Environmental Protection Agency (EPA), Energy Savings Plus Health: IAQ Guidelines for Single-Family Renovations. Best practices for improving indoor air quality in conjunction with energy upgrades in single-family homes. *www.epa.gov/indoor-air-quality-iaq/energy-savings-plus-health-iaq-guidelines-single-family-renovations*

- EPA, Energy Savings Plus Health: IAQ Guidelines for Multifamily Renovations. Best practices for improving indoor air quality in conjunction with energy upgrades in multifamily homes. *www.epa.gov/indoor-air-quality-iaq/indoor-air-quality-multifamily-housing*
- National Renewable Energy Laboratory, Standard Work Specifications (SWS) for Home Energy Professionals. Industry guide for ensuring home energy upgrades are effective, durable, and safe. *https://sws.nrel.gov*
- National Association for State Community Service Programs, SWS Aligned Field Guides by State. Central location of state-by-state weatherization "field guides" of best practices for energy practitioners. *https://nascsp.org/wap/waptac/wap-resources/best-practices/field-standards-and-guides/*
- EPA, Indoor AirPlus Program Documents. Includes detailed construction specifications, several of which are focused on moisture management. *www.epa.gov/indoorairplus/indoor-airplus-program-documents*

Mandatory for all New Construction and Substantial Rehabs, and for Moderate Rehabs with relevant areas in the scope of work

7.10 Managing Moisture: Bath, Kitchen, and Laundry Assemblies

RATIONALE

The use of durable, cleanable, moisture-resistant materials in wet areas reduces the potential for damage due to moisture and the potential for indoor mold growth that may yield odors and pose health hazards to residents and staff. These materials and proper moisture detailing reduce long-term maintenance costs as well.

REQUIREMENTS

Use materials that have durable, cleanable surfaces throughout bathrooms, kitchens, and laundry rooms. Materials installed in these rooms should neither be prone to deterioration due to moisture intrusion nor encourage the growth of mold.

Behind tub and shower enclosures, use moisture-resistant backing materials such as cement board, fiber-cement board, or equivalent. Paper-faced materials are not acceptable, even if marketed as "moisture resistant." Backings in these areas must meet the requirements of ASTM C1288 (Standard Specification for Fiber-Cement Interior Substrate Sheets); or of ISO 8336 (Fibre-cement flat sheets—Product specification and test methods), Category C; or must be listed as acceptable alternative materials in the ENERGY STAR Multifamily New Construction National Water Management System Requirements. Projects using a one-piece fiberglass tub or shower enclosure are exempt from this requirement.

Note: Although ENERGY STAR water-management requirements serve to document best practices, they are no longer mandatory for ENERGY STAR certification.

RECOMMENDATIONS

When possible, avoid using materials such as unsealed grout, which traps and holds moisture and can facilitate mold growth.

RESOURCES

- ASTM International, ASTM C1288-17—Standard Specification for Fiber-Cement Interior Substrate Sheets. *https://store.astm.org/c1288-17.html*
- International Organization for Standardization, ISO 8336:2017: Fibre-cement flat sheets—Product specification and test methods. Specifies methods for the inspection and testing of fiber-cement board and acceptance conditions for their use. *www.iso.org/standard/62950.html*
- U.S. Environmental Protection Agency (EPA), ENERGY STAR Multifamily New Construction National Water Management System Requirements. Note: Although these requirements serve to document best practices, they are no longer mandatory for ENERGY STAR certification. *www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20MFNC%20Water%20Mgmnt%20System%20Reqt%20Version%201_1.1_1.2_Rev04.pdf*
- EPA; ENERGY STAR Water Management System Builder Requirements, ENERGY STAR Certified Homes, Version 3 / 3.1. *www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/water_mgmt_sys_bldr_req.pdf*

Mandatory

7.11 Reducing Allergens and Disease Vectors: Integrated Pest Management

RATIONALE

Exposure to allergens from pests is linked with asthma and respiratory issues. Rodents may also carry diseases.

Integrated pest management (IPM) is an approach to manage pest damage by the most economical means and with the least possible hazard to people, property, and the environment. While pest damage can be—and often is—controlled through application of pesticides, IPM is a more holistic approach that has applications throughout building design, construction, and operations.

Incorporating pest prevention in the design of new buildings and in retrofits increases the durability of the building and in the end saves time and money through proactive steps to avoid attracting pests. Sealing of cracks and penetrations will minimize entry points for pests like rodents and cockroaches.

Avoiding unnecessary pesticides, improving resident housekeeping, promptly responding to pest problems, and correcting conditions that contribute to pests will reduce the chemicals needed to and will keep homes pest-free longer than relying solely on a routine program of chemical treatments.

REQUIREMENTS

Design for easy inspection of all pest-prone areas (interior and exterior), and engineer slabs and foundations to minimize pest entry.

Seal all wall, floor, and joint penetrations with low-VOC caulking or other low-hazard sealing methods, such as screens, door sweeps, escutcheon plates, or elastomeric sealants, to prevent pest entry. Use rodent- and corrosion-proof screens, such as those made of copper, stainless steel mesh, or rigid metal cloth, for openings greater than ¼ inch (about 2/3 centimeter). Pay close attention to entry points under kitchen and bathroom sinks and seal them off promptly if pest problems arise.

RECOMMENDATIONS

- Refer to *Category 8: Operations, Maintenance, and Resident Engagement* to integrate complementary practices into materials and programming developed for staff and residents.
- Plan exterior surfaces, lighting, drainage, and landscaping to minimize the attractiveness of the site to pests.
- Complete preventive pest-management work in conjunction with air sealing. Project teams should work with an air-sealing contractor and a pest-management professional to ensure that IPM strategies are part of the scope.
- Hire a pest-management professional with experience in IPM to work with the general contractor and trades and to integrate pest-prevention activities into contractors' scopes of work. Qualifications to consider include GreenShield or QualityPro certified; association membership with a national or state pest management association; PMP certification: Associate Certified Entomologist (ACE); or Board Certified Entomologist (BCE).
- Rehabilitation of an existing building provides the opportunity to address physical barriers that make handling garbage difficult. Engage with residents and building maintenance staff to identify and correct problems with the collection and storage of waste (e.g., inadequate space in trash rooms, narrow stairs, improper signage, unsafe access to exterior trash receptacles). Also, before the rehab, consider engaging a pest-management professional to inspect the building, review resident feedback, and provide a report on pest conditions and corrective recommendations.

RESOURCES

- San Francisco Department of the Environment, Pest Prevention by Design: Authoritative Guidelines for Designing Pests Out of Structures. *www.sfenvironment.org/pest-prevention-design-guidelines*
- NYC Department of Health and Mental Hygiene; Pest Control for Building Owners, Managers, Supers, and Workers. *www.nyc.gov/site/doh/health/health-topics/pests-and-pesticides-building-owners.page*
- NYC Department of Health and Mental Hygiene, Healthy Homes Program: Pest Prevention Opportunities During Renovation Work. A fact sheet for home renovations. *www.nyc.gov/assets/doh/downloads/pdf/pesticide/mgmt-oportunities.pdf*
- The National Center for Healthy Housing, Integrated Pest Management Interventions for Healthier Homes Case Study Series. *https://nchh.org/who-we-are/nchh-publications/case-studies/ipm-interventions-for-hh-case-studies/*

- Seattle Public Utilities, Integrated Pest Management. The City of Seattle maintains many helpful resources concerning sustainable, natural care of plants and lawns, including information on integrated pest management strategies and helpful fact sheets. *www.seattle.gov/utilities/protecting-our-environment/sustainability-tips/landscaping/for-professionals/integrated-pest-management*
- StopPests, Integrated Pest Management: A Guide for Affordable Housing. Available in English and Spanish. *www.stoppests.org/what-is-ipm/guide/*

7.12a

Optional for New Construction: 5, 8, or 13 points

Sensory and Rest Friendly: Noise Reduction, New Construction

RATIONALE

Mitigating noise is an important health and quality-of-life issue. Noise impacts privacy, sleep, concentration, mental well-being, and satisfaction with housing. These impacts are particularly pronounced among people who have experienced trauma.

Exposure to traffic noise over time poses a risk to adults and is linked to complications with cardiovascular health, diabetes, hypertension, stroke, depression, and high blood pressure. In children, exposure to chronic aircraft noise has been shown to impair reading comprehension, mental arithmetic, and proofreading. Continuous noise levels from internally generated noise sources (e.g., HVAC, amenities, appliances, plumbing, daily living activities) have the potential to increase stress, reduce focus, and decrease people's satisfaction with their living conditions.

Impact noise and airborne sound transmission between dwelling units has been a leading complaint in multifamily real estate since its inception. During Enterprise's research for the 2026 Green Communities Criteria, residents raised noise between units as a high-priority need, sharing how it impacts their families' sleep and stress levels. With an influx of buildings designed with lightweight construction, noise and airborne sound transmission have become common. A growing evidence base illustrates the connection between health impacts and exposure to noise in the home.

This criterion creates a consistent baseline for indoor noise, with opportunities to further minimize noise through optional points and recommendations.

REQUIREMENTS

Manage outdoor and/or indoor sources of noise in homes through one or more of the following:

Option 1: Outdoor noise abatement

- Design and install exterior walls with a composite Outdoor–Indoor Transmission Class (OITC) of 40 or greater **AND**
- Specify and install all windows with an OITC rating of 30 or greater. *[5 points]*

Note: Some projects, depending on their location and local policies, may be subject to additional noise or sound regulations.

AND/OR

Option 2: Indoor sources of noise

- Separation walls (party walls) between dwelling units must achieve a Sound Transmission Class (STC) rating of at least 50 (laboratory tested) or an Apparent Sound Transmission Class (ASTC) of at least 45 (field tested) **AND**
- Floor and ceiling assemblies between dwelling units must achieve an Impact Insulation Class (IIC) rating of at least 50 (lab tested) or an Apparent Impact Insulation Class (AIIC) of at least 45 (field tested). *[8 points]*

RECOMMENDATIONS

- Suggested best practices to minimize sound transmission in buildings include:
  - » Sealing party walls to be airtight around the full perimeter
  - » Staggering all joints in multilayer gypsum board partitions
  - » Sealing all penetrations in party walls and floor–ceiling assemblies with acoustical sealant or gaskets
  - » Limiting direct line of sight through ductwork by using elbows or other transitions
  - » Avoiding back-to-back outlet boxes unless separated by one stud width, with an insulated cavity provided by acoustical/fire-rated putty pads around the back and sides of the box
- Control noise within dwelling units from sources such as HVAC, elevators, trash chutes, plumbing, electrical components, etc., in accordance with Chapter 49 of ASHRAE Handbook—Fundamentals or ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2018—Standard for the Design of High Performance, Green Buildings.
- Avoid locating bedrooms in areas that face sources of continuous or excessive noise from common spaces, such as mechanical equipment rooms, rooftop mechanical units, generators, plumbing, elevator shafts, and other sources of periodic or continuous operational noise. Avoid the use of packaged-terminal air conditioners (PTAC) in bedrooms, especially when the project site is located within an area of unacceptable noise levels (as determined using HUD 24 CFR 51B).
- Design and install floor–ceiling assemblies as full-span assemblies connected to walls and partitions and sealed at all flanking paths around all penetrations in accordance with ASTM C919-22—Standard Practice for Use of Sealants in Acoustical Applications, and with the sealant manufacturer's recommendations.
- Install or retrofit resilient underlayment, concrete slabs, and/or composite floor–ceiling constructions to meet the minimum code requirements for impact noise insulation, as applicable.
- Consider installing sound-reducing barriers around exterior mechanical equipment to limit noise intrusion through the building facade.
- Include building lease language with a description of quiet hours and allowable use of excessive noise sources (e.g., mowing, music, events).

- If fitness amenities include high-impact or heavy weightlifting elements, it is highly recommended that a professional in acoustics provide recommendations. Because sound from heavy impact noise can travel in all directions throughout the structure of a building, not just from the floor above, locate building fitness amenities with high-impact activities like weightlifting, treadmills, and plyometrics on the ground level and away from dwelling units. Provide impact insulation as necessary such that sound from impacts is reduced within dwelling units.

RESOURCES

- U.S. Department of Housing and Urban Development (HUD), Noise Abatement and Control. Regulation 24 CFR Part 51, Subpart B describes noise standards established by HUD. This page includes links to the guidelines, Day/Night Noise Assessment Tool, Sound Transmission Class Assessment Tool, and Barrier Performance Module. *www.hudexchange.info/programs/environmental-review/noise-abatement-and-control/*
- International Code Council, ICC G2-2010 Guideline for Acoustics. Free guidance and verification methods for reducing sound leaks and flanking between dwelling units. *www.iccsafe.org/wp-content/uploads/asc_a117/Supporting_doc_8-15-5_ICC_G2-2010_Guideline_for_Acoustics-A1171_Committee.pdf*
- U.S. Environmental Protection Agency, Clean Air Act Title IV—Noise. This site includes sections related to noise abatement, health effects, regulated noise sources, and other useful education related to noise as a pollutant. *www.epa.gov/clean-air-act-overview/clean-air-act-title-iv-noise-pollution*
- International Code Council, International Green Construction Code—Powered by ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2018. The acoustic-control section of ASHRAE 189.1-2018 offers guidance on noise-control elements for green buildings, which are most effective when explored during preliminary design stages. *www.ashrae.org/technical-resources/bookstore/standard-189-1*
- International Code Council; 2015 International Building Code, Chapter 12: Interior Environment. Section 1207 details the minimum code requirements for sound transmission and includes a link to view ICC-ES (evaluation service) providers that can provide additional support when installing resilient flooring. *https://codes.iccsafe.org/content/IBC2015P4/chapter-12-interior-environment?site_type=public*
- World Health Organization, Guidelines for Community Noise. *https://iris.who.int/handle/10665/66217*

7.12b

Optional for Rehabilitation: 8 points maximum

Sensory and Rest Friendly: Noise Reduction, Rehabilitation

RATIONALE

Mitigating noise is an important health and quality-of-life issue. Noise impacts privacy, sleep, concentration, mental well-being, and satisfaction with housing. These impacts are particularly pronounced among people who have experienced trauma.

Exposure to traffic noise over time poses a risk to adults and is linked to complications with cardiovascular health, diabetes, hypertension, stroke, depression, and high blood pressure. In children, exposure to chronic aircraft noise has been shown to impair reading comprehension, mental arithmetic, and proofreading. Continuous noise levels from internally generated noise sources (e.g., HVAC, amenities, appliances, plumbing, daily living activities) have the potential to increase stress, reduce focus, and decrease people's satisfaction with their living conditions.

Impact noise and airborne sound transmission between dwelling units has been a leading complaint in multifamily real estate since its inception. During Enterprise's research for the 2026 Green Communities Criteria, residents raised noise between units as a high-priority need, sharing how it impacts their families' sleep and stress levels. With an influx of buildings designed with lightweight construction, noise and airborne sound transmission have become common. A growing evidence base illustrates the connection between health impacts and exposure to noise in the home.

REQUIREMENTS

Manage outdoor and/or indoor sources of noise in homes through one or more of the following options.

Option 1: Outdoor noise assessment and abatement plan

Conduct a noise assessment and provide a site-specific noise-abatement plan that covers general noise mitigation techniques in accordance with U.S. Department of Housing and Urban Development (HUD) regulation 24 CFR Part 51, Subpart B. *[3 points]*

Option 2: Outdoor noise abatement

Minimal Approach [3 points]

- Design and install exterior walls with a composite Outdoor–Indoor Transmission Class (OITC) of 40 or greater **AND**
- Specify and install all windows with an OITC rating of 30 or greater.

Advanced Approach [4 points]

- Design and install exterior walls with a composite OITC of 45 or greater **AND**
- Specify and install all windows with an OITC rating of 35 or greater.

AND/OR

Option 3: Interior sources of noise in bedrooms

For bedroom party walls, use the guidance and verification methods in International Code Council ICC G2-2010 Guideline for Acoustics to mitigate the potential for sound leaks and "flanking," which is the ability of sound to move through building materials in party walls. Verify acceptable/Grade B *[3 points]* or preferred/Grade A *[4 points]* performance.

RECOMMENDATIONS

See *Recommendations for Criterion 7.12a Sensory and Rest Friendly: Noise Reduction, New Construction*.

RESOURCES

- U.S. Department of Housing and Urban Development (HUD), Noise Abatement and Control. Regulation 24 CFR Part 51, Subpart B describes noise standards established by HUD. This page includes links to the guidelines, Day/Night Noise Assessment Tool, Sound Transmission Class Assessment Tool, and Barrier Performance Module. *www.hudexchange.info/programs/environmental-review/noise-abatement-and-control/*
- International Code Council (ICC), ICC G2-2010 Guideline for Acoustics. Free guidance and verification methods for reducing sound leaks and flanking between dwelling units. *www.iccsafe.org/wp-content/uploads/asc_a117/Supporting_doc_8-15-5_ICC_G2-2010_Guideline_for_Acoustics-A1171_Committee.pdf*
- ICC; 2015 International Building Code, Chapter 12: Interior Environment. Section 1207 details the minimum code requirements for sound transmission and includes a link to view ICC-ES (evaluation service) providers that can provide additional support when installing resilient flooring. *https://codes.iccsafe.org/content/IBC2015P4/chapter-12-interior-environment?site_type=public*
- U.S. Environmental Protection Agency, Clean Air Act Title IV—Noise. This site includes sections related to noise abatement, health effects, regulated noise sources, and other useful education related to noise as a pollutant. *www.epa.gov/clean-air-act-overview/clean-air-act-title-iv-noise-pollution*
- World Health Organization, Guidelines for Community Noise. *https://iris.who.int/handle/10665/66217*

7.13 Personal and Social Safety

Mandatory for multifamily New Construction and Substantial Rehabs

RATIONALE

Personal safety is one of the top health needs consistently raised by residents. Living in areas with low crime and a strong sense of personal safety is associated with lower stress, increased social connections, increased physical activity, and better physical and mental health.

Elements of choice, flexibility, predictability, nature, and attachment can all support perceptions of personal and social safety. Additionally, people may react differently to the same event or exposure; consider the past trauma that residents, staff, and family members may carry with them and how the built environment can be designed to avoid reminders of traumatic events

or periods. For example, offering free communal access to water and food can support people who have gone through times in their lives when water or food were not regularly available. With intentionality, the design and operation of properties can support safe, comfortable experiences in common spaces, both inside and outside the building, as well as positive relationships with surrounding areas.

REQUIREMENTS

Include at least two different design strategies (letters A through I) from the lists below. The design strategies are grouped by principles and may apply to dwelling units, interior common spaces, or sites. Adapt the strategies to the needs of both new and long-term residents.

Design principle 1: Navigation, visibility, and defensibility

A. Reduce blind corners and keep common-space paths wide enough for two people to comfortably pass. On the site and in all common areas inside buildings, maintain clear lines of visibility and avoid blind corners (e.g., use window slits, transparent materials, convex mirrors, or other design features at corners). No more than 20% of public spaces and common areas shall include blind corners for the path of travel.

B. Install "peephole" door viewers or windows in all dwelling-unit entry doors.

C. Stagger entry doors into dwelling units in double-loaded corridor buildings and across walkways in walkup apartments.

D. Provide secure, resident-controlled site access at all property entrances. Ensure gates and/or fences aside from the resident-controlled access point prevent direct entry to buildings from streets or adjacent lots. Barriers, fences, and gates should be designed in a way that balances security with connection to the surrounding community, avoiding tall, fortress-like fences or walls.

E. Develop a landscaping and maintenance plan that promotes safety. The plan should include at least one of the following: vegetated streets, vegetated walkways, landscaped fence lines or borders, or rain gardens. All landscaped areas within 25 feet of a pedestrian path, building entry, playground, or parking area should be well maintained to preserve clear sightlines, keep shrubs and hedges trimmed to a maximum of 3 feet, and ensure tree canopies have a clearance height of 6 feet or more above ground level. Integrate resident stewardship opportunities.

Design principle 2: Reliability, control, and consistency

F. Design and equip all dwelling units with at least two different features that allow residents control over their personal environment. The features may be functional (e.g., climate systems/thermostat; ceiling fans; shading devices; lighting that allows tuning, dimming, and/or switching between task, accent, and ambient conditions; adjustable vents) or aesthetic (e.g., entryway exterior shelves).

G. Provide locked storage for at least 50% of units to support control and privacy for residents. Storage should be, at minimum, 10 square feet per dwelling unit. It should be provided outside of the unit.

H. Provide on-site access to consistent resources for residents, including a drinking fountain or hydration station in at least one accessible common area as well as free or low-cost access to fresh fruits and vegetables (e.g., options 3, 4, or 5 of *Criterion 2.7 Access to Fresh, Local Foods*).

I. Provide a designated and well-lit area for mail and packages that is designed to minimize theft and promote resident safety. For multifamily properties with more than 12 dwelling units, provide secure mailboxes and lockable package storage or lockers. For single-family homes and multifamily properties with fewer than 12 units, provide lockable mailboxes.

RECOMMENDATIONS

- Engage resident leaders and community partners to identify safety priorities.
- Pair safety measures achieved with strategies from Criterion 7.16 Healing-Centered and Culturally Responsive Design. Incorporate art, color, and local cultural elements that promote identity and belonging along with feelings of personal safety and security.
- In areas where blind spots cannot be avoided, use art or murals, lighting, landscaping, or screening.
- Ensure staff members are trained in trauma-informed engagement and de-escalation strategies.
- Avoid overuse of cameras or aggressive surveillance technologies; focus instead on natural surveillance, lighting, sight lines, and other design strategies that promote safety.

RESOURCES

- Preservation of Affordable Housing and Enterprise Community Partners, Trauma-Informed Housing: A Deeper Dive into the Intersection of Trauma & Housing. A brief exploring the relationship between trauma and housing through the lens of Adverse Childhood Experiences (ACE). *https://traumainformedhousing.poah.org/sites/default/files/assets/A_Deeper_Dive_into_the_Intersection_of_Trauma_and_Housing.pdf*
- BRIDGE Housing Corporation and The Health Equity Institute, Trauma Informed Community Building Model Guide to using trauma-informed strategies and practices to engage affordable housing communities. *https://organizingengagement.org/models/trauma-informed-community-building-model/*
- Collective Colorado, Using Trauma-Informed Design, Buildings Become Tools for Recovery. Case study and profile of Sanderson Apartments, a community for people experiencing chronic homelessness and dealing with substance use or other mental health issues. *https://collective.coloradotrust.org/stories/using-trauma-informed-design-buildings-become-tools-for-recovery/*
- Perkins&Will, Posttraumatic Understanding, by Matthew Finn. Connects post-traumatic stress and human-centered design, proposing ways that design could help veterans heal from the psychological wounds of war. *https://static1.squarespace.com/static/586cf7b2be659472709cd98a/t/59f8cc9310952631f619f90f/1509477523905/PosttraumaticUnderstanding_2014.pdf*
- Urban Institute, Trauma-Informed Community-Building and Engagement. Trauma-informed approaches to community engagement with accountability, including background on trauma and community healing, strategies and practices for trauma-informed resident engagement, and two case studies. *www.urban.org/sites/default/files/publication/98296/trauma-informed_community_building_and_engagement_0.pdf*

- Ceriden Owen and James Crane, Trauma-Informed Design of Supported Housing: A Scoping Review through the Lens of Neuroscience. Examines relationships between trauma history and housing design, exploring the evidence base for trauma-informed design principles and elements. *https://pmc.ncbi.nlm.nih.gov/articles/PMC9658651/*
- National Child Traumatic Stress Network, Trauma-Informed Care. Overview materials and training resources for learning about trauma-informed work. *www.nctsn.org/trauma-informed-care*

A Welcoming Community

Physical environments affect people's sense of worth and dignity. With intention, they can lift people up and contribute to healing from various historical, community, or life traumas. Spaces within affordable housing properties as well as surrounding communities have a significant role in ensuring that residents can experience healing and well-being through welcoming, safe, and accommodating spaces. A sense of belonging and inclusion can be a critical shift to promote and support mental health.

A community's social infrastructure also enhances access and connections to resources, services, and support in the surrounding community. The goal of criteria 7.14 through 7.16 is to ensure that affordable homes are not an isolated refuge but rather a welcoming and empowering community node that is integrated into the broader fabric of the neighborhood. These intentional moves build a community of care and can create upstream opportunities to promote resident health.

Mandatory

7.14 Social Connection and Accessibility: Design for All Ages and Abilities

RATIONALE

By anticipating people's diverse physical, sensory, and cognitive needs over the course of their lives, design can create homes that are safe and usable and provide connectivity for everyone. For example, features that prevent falls, minimize stress, and support mobility protect residents' health as they age, ease daily living for children, support caregivers and families, and allow people to remain connected. When common spaces encourage use and connection, residents experience reduced isolation, improved mental and physical health, and greater resilience during hard times. Integrating these design principles up front proactively addresses health and accessibility needs over time, reducing burdens on residents and building owners.

REQUIREMENTS

Consider the anticipated resident population, including age, abilities, and the top health concerns identified in *Criterion 1.1 Project Priorities Survey* and how residents' needs may change over time.

Using this information, select and implement at least two different strategies (letters A through P) from the lists below. For any strategy impacting dwelling units, include that strategy in at least 25% of the project's dwelling units. Adapt the features to the needs of both new and long-term residents.

Design principle 1: Universal wayfinding and sensory sensitivity

Create spaces that support residents of all ages and abilities by being easy and intuitive to use and navigate. For example, consider older adults and people with vision impairments, dementia, or sensory sensitivities. Strategies:

A. Provide clear signage for wayfinding throughout the interior and exterior of the property that avoids jargon, uses plain language, incorporates a positive frame, and is multilingual where appropriate. Incorporate illustrations and color to encourage universal understanding.

B. Avoid strong patterns on floor finishes and instead provide subtle, neutral patterns with plain matte finishes, which can help reduce glare in brightly lit conditions.

C. Install light switches and power outlets that contrast in color and value with wall surfaces and have an indicator light when turned off. Mount light switches at 52 inches and power outlets at 20 inches above the finished floor.

Design principle 2: Opportunities for social connection

D. When programming the design of your project, consider the daily or weekly needs of residents for space (e.g., a mailroom, laundry, and entryway). Locate these spaces off the common areas or along a common path to the stairs or elevator to encourage regular opportunities for casual encounters. Provide at least three seats in these commonly used spaces. Furniture should be flexible to allow people to rearrange, rest, socialize, or spend time.

E. For properties with more than 12 units, design for opportunities to form microcommunities by creating subclusters with communal shared spaces, such as a seating nook, shared patio, shared entry area or foyer, or shared play area. These microcommunities should be designed to serve between 4 and 12 dwelling units.

F. Provide at least one universally accessible restroom in common areas. Restrooms should be designed to accommodate residents of all ages, abilities, and identities and to be usable by single occupants, families, or a person and a caregiver.

Design principle 3: Universal mobility and dexterity support

Promote safety, create spaces that allow for human error, and support residents who use mobility equipment or are living with dementia, vision impairments, or aging-related mobility needs. Provide access that requires minimal physical effort.

G. For shared interior spaces, provide permanent access to essential amenities, including seating, toilets, drinking water, internet, and charging stations.

H. Install slip-resistant, hard-surface finishes in common spaces, hallways, entryways, and outdoor pathways.

I. Install grab bars to provide extra support in bathrooms, including in the shower, and in bedrooms and other areas where they could provide assistance. Mount grab bars horizontally or vertically—not on the diagonal. Ensure all towel bars are able to support the same loads that grab bars are required to support by code.

J. Install thermostatic or anti-scald faucets.

K. Design all interior and exterior doors to be accessible without the use of steps or raised thresholds, and design all sloped surfaces to have proper support on both sides.

L. Install handles and controls that maximize ease of use. Install lever handles on all doors within the interior and exterior of the units; drawer and cabinet hardware that requires no grasping, pinching, or twisting of the wrist and no small knobs. Faucets should be single-lever, and lighting controls should use rocker or large-paddle light switches.

Design principle 4: Universal fit

Create spaces with the appropriate size and space to allow for use, whatever the user's form of mobility, size, or posture.

M. Design all hallways with 42-inch (1.1m) clearance.

N. Ensure a 32-inch doorway clearance and/or a 36-inch rough opening for all doors to allow passage into and within the home. This includes entry doors, doors to habitable rooms or hallways, doors to walk-in closets, patio doors, and utility and storage doors.

O. Ensure a turning radius for common mobility equipment of 5 feet in kitchens and bathrooms.

P. Provide dedicated storage space for mobility equipment, such as wheelchairs, walkers, electric scooters, and strollers.

RECOMMENDATIONS

- During integrative design (see *Category 1*), determine which universal design features to incorporate, based on the anticipated resident population.
- Implement selected design features in as many units as possible.
- Incorporate co-design workshops into the process to foster a sense of belonging and community early in design or planning. These workshops should prioritize human-centered planning that responds to the needs of the resident community.
- Design community and amenity spaces to be human-scaled and thoughtfully arranged, with a variety of furniture layouts that welcome and encourage social interaction. Enhance the resident experience by offering choices in the level of engagement. Everyone interacts with the built environment in different ways. Incorporating flexibility can accommodate a broader range of preferences, allowing more people to comfortably interact with the same space.
- Organize circulation pathways around key communal areas of collaborative activity, such as lounges, seating spaces, courtyards, mail rooms, and other community amenities. These community spaces should be designed to improve visibility, offer flexible seating options, and integrate sensory elements like harmonious color palettes, natural materials and elements, and sound-absorbing materials.

RESOURCES

- International Code Council, ICC /ANSI A117.1-2017 Standard for Accessible and Usable Buildings and Facilities. *https://shop.iccsafe.org/icc-a117-1-2017-standard-for-accessible-and-usable-buildings-and-facilities-1.html*
- New York City Housing Preservation and Development, Aging in Place Guide for Building Owners: Recommended Age-Friendly Residential Building Upgrades. With explicit focus on existing housing, this resource recommends specific upgrades to help people remain in their own homes as they grow older. *www.aiany.org/wp-content/uploads/2016/10/AIP_2017_EN.pdf*

- The Center for Universal Design, The Principles of Universal Design, Version 2.0. Seven design principles that can be used to evaluate existing designs and guide new design processes. *www.oaith.ca/assets/files/AGM/AGM%20Resources/principles_universal_design.pdf*
- New York City Mayor's Office for People with Disabilities, Inclusive Design Guidelines. Technical guidance for designing spaces that accommodate a wide range of physical and mental abilities for people of all ages. *www.nyc.gov/site/mopd/publications/inclusive-design-guidelines.page*
- Enterprise Green Communities, Aging in Place Design Guidelines: For Independent Living in Multifamily Buildings. Guidance and design charrette tools to help affordable housing owners assess and respond to the needs of aging residents. Covers both existing housing and new construction. *www.greencommunitiesonline.org/sites/default/files/aging_in_place_design_guidelines.pdf*
- California Department of Housing and Community Development, Universal Design Model Ordinance. *www.hcd.ca.gov/building-standards/state-housing-law-program/universal-design-model-ordinance*
- National Disability Authority, Centre for Excellence in Universal Design; Universal Design Guidelines Resources from Ireland that can be applied anywhere. Includes guidelines and a layout checklist for general housing as well as specialized guidance on dementia-friendly housing. *https://universaldesign.ie/built-environment/housing/*
- National Institute of Building Sciences, Design Guidelines for the Visual Environment. A comprehensive resource on accessibility for people with low vision. Addresses layout, lighting, and other details in common and private spaces, both in buildings and on the site. *https://nibs.org/design-guidelines-for-the-visual-environment/*
- U.S. Department of Housing and Urban Development, Residential Remodeling and Universal Design: Making Homes More Comfortable and Accessible. *www.huduser.gov/publications/pdf/remodel.pdf*
- Institute for Human Centered Design, Inclusive Design at Home. Resource hub with tip sheets, videos, case studies, and other publications that support resident health, safety, comfort, and confidence. *https://ihcdhome.humancentereddesign.org*
- Housing Studies Association, A Neurodivergent Architect's Journey: Rethinking Housing Performance in the UK. *www.housing-studies-association.org/articles/a-neurodivergent-architect-s-journey-rethinking-housing-performance-in-the-uk*
- Gallaudet University, DeafSpace. Describes how deaf people experience the built environment and what designers can learn from the deaf community's unique spatial awareness. *https://gallaudet.edu/campus-design-facilities/campus-design-and-planning/deafspace/*
- Psychology Today, 6 Ways to Design for Social Connection and Community. *www.psychologytoday.com/us/blog/designed-for-happiness/202305/6-ways-to-design-for-social-connection-and-community?msockid=2047d7fa78dd603c3e37c24079bf61d6*
- ArchDaily,7 Principles of Universal Design. *www.archdaily.com/1019661/how-do-the-7-principles-of-universal-design-help-us-create-better-architecture?ad_campaign=normal-tag*

7.15 Access to Nature and Biophilic Design

Optional: 3 or 6 points

RATIONALE

Outdoor spaces and biophilic design increase connections with nature, which can have extensive health benefits. But historically disinvested neighborhoods have significantly less green space and tree canopy than others. There is a documented nature gap among different communities, including inequitable access to outdoor spaces, which are largely due to systemic disparities based on race, wealth, and income.

Spaces that support equitable connections to nature and to one another can combat these spatial inequities and help build cultural resilience. Exposure to natural light can boost the immune system, lower blood pressure, and improve sleep quality. Exposure to nature through direct access or by way of interior biophilic design can reduce the risk of chronic diseases, including cardiovascular disease and obesity, and has the potential to benefit people who are managing diabetes.

REQUIREMENTS

Design must provide meaningful and multisensory interactions with nature, connecting residents and staff to a living landscape and the natural environment to provide a deeper level of engagement with native flora and fauna as well as with natural cycles, seasons, and rhythms.

For all dwelling units and at least one space accessible to all staff, include two or more of these strategies *[3 points]*:

- Direct physical connection to a usable outdoor space (e.g., a balcony, patio, terrace, or rooftop garden) that allows access to vegetation with views of the sky, multisensory interactions (e.g., touch, scent, sound), and seasonal or sensory variability
- Biophilic design features—such as indoor installation of live plants, natural materials, or patterns that mimic nature—informed by resident input or cultural preferences
- Tunable circadian lighting systems that 1) shift with natural daylight cycles to support sleep and mood regulation and 2) can be controlled by residents
- Views of biodiverse, native, and intentionally designed landscapes, such as pollinator gardens, tree canopy, or water features (does not include views of parking lots, other buildings, or areas of minimal vegetation)

AND/OR

Across interior and exterior common areas, provide at least three of the following strategies *[3 points]*:

- Usable outdoor spaces with a mix of native and/or culturally significant vegetation that varies seasonally, along with environmental care practices that support biodiversity (e.g., are pollinator friendly) and use hand or electric maintenance and no chemical herbicides
- Opportunities for residents to interact with plants: raised beds, community gardens, or plantings with a variety of scents and textures
- Fauna-supporting features, such as flowering plants, bird baths, pollinator houses, bat houses, or perches

- Water features (e.g., fountains, rain chains, bioswales) that offer an auditory and visual experience as well as safe and accessible access
- Pet-friendly areas and policies that allow for daily interaction with animals and the natural world

RECOMMENDATIONS

- Consider maximizing outdoor biophilic strategies alongside resilient design options from *Category 3: Site Design*. For example, some types of landscaping can help projects achieve high levels of stormwater performance for *Criterion 3.4 Surface Stormwater Management*. Certain rainwater harvesting options in *Criterion 3.6 Outdoor Water Use: Alternative Sources* may have synergies with outdoor amenities. And vegetated roofs could potentially meet the stringent requirements of *Criterion 3.8 Heat-Island Management*.
- Engage residents—particularly older adults and those with cultural knowledge of plants and land—in landscaping and biophilic design choices.
- Employ visual and kinetic experiences of nature, such as dappled or reflective light, or movement of leaves, water, or grasses.
- Provide perceptible air movement or varied thermal zones, such as breezeways, operable windows, or shaded areas with cross-ventilation.
- In architectural detailing, use mathematical sequences or patterns found in nature, such as spirals, fractals, or nested geometry.
- Make seasonal and natural cycles visible by way of deciduous plantings, seasonal light variation, or areas where residents can observe the passage of time (e.g., rain gardens, moonlight pathways, seasonal blooms).
- Select vegetation that reflects the local ecoregion and cultural traditions, and ensure plantings support local fauna and pollinators.
- Design outdoor spaces for daily usability by including water, shade, privacy, and movable furniture.
- Include community programming, such as gardening days, nature walks, or plant-care training.
- Encourage visual access to natural rhythms like sunrise/sunset, rainfall, and seasonal shifts through architectural orientation and landscape design.
- Design transitional spaces (e.g., lobbies, elevator bays) to include changing light, scents, and sounds from nature.
- In renovations or retrofits, prioritize low-cost strategies like operable windows, window views to vegetation, indoor plants, and low-noise nature soundscapes.

RESOURCES

- International Living Future Institute, Biophilic Design. *https://living-future.org/biophilic-design/overview/*
- University of Minnesota Twin Cities; Biophilic Design, Regenerative Design, and Equity. *https://pubs.lib.umn.edu/index.php/muraj/article/download/3618/2783/18518*
- Weber Thompson, Designing for health in affordable housing, by Jeff Reibman. Examples of simple biophilic design elements. *www.weberthompson.com/designing-for-health-in-affordable-housing/*

7.16 Healing-Centered and Culturally Responsive Design

Optional: 6 points maximum

RATIONALE

Design that reflects and affirms culture, identity, and community for residents can promote a sense of belonging and connection, which can ultimately strengthen mental health by reducing stress, anxiety, and depression and promoting long-term stability in a community. Incorporating resident voices, cultures, and narratives into the built environment—especially for communities historically excluded from design and development decisions—supports community resilience. Additionally, these practices are linked to increased pride in living spaces, higher satisfaction, and even decreased vandalism.

REQUIREMENTS

Select one or more strategies *[6 points maximum]*:

Community-generated art

Incorporate artwork, murals, mosaics, textiles, woodwork, metal work, or other contemporary crafts that were created by or in collaboration with residents and/or local artists. The art should reflect the community that will be served or has historically lived in the community. Art must be visible in shared indoor or outdoor spaces. *[2 points]*

Storytelling through space

Create a narrative for the housing development that incorporates resident identities and cultures into design elements. Engage residents or other community members in at least two ways—for example, through a writing workshop, design charrette, or opportunity to record oral histories—to inform the story and design process. Then select at least three design and naming elements in which resident identities and cultures are reflected. For example, the engagement efforts could inform the names of rooms or spaces, lead to selection of salvaged materials from a historic building, or inspire floor patterns that reflect a culturally relevant story. *[2 points]*

Cultural partnerships or programming

Establish a formal partnership, to include a contract or memorandum of understanding, with a cultural or community-based organization or Native American group to support ongoing culturally centered programming. Examples include art installations, culturally relevant health fairs, storytelling events, or seasonal celebrations. *[2 points]*

RECOMMENDATIONS

- Build on the cultural resilience assessment or cultural advisory group from *Criterion 1.7 Inclusive Community Engagement* to inform your design decisions.
- Engage residents early and often in the design process by using accessible and culturally appropriate methods, such as story circles, celebrations, altar making, charrettes, or participatory art making or design.
- Partner with local cultural organizations, community historians, long-term residents, or local artists to inform your design decisions.
- As the project team designs healing-centered strategies, use the following considerations as guiding principles:

  - » Do not inadvertently retraumatize people. Project teams should first consider which strategies to select based on the intention to do no harm.
  - » Consider and be sensitive toward the trauma residents may hold. This requires resident engagement and understanding. It is critical to meet residents where they are and develop strategies around that.
  - » Consider and confirm with residents which strategies are likely to help people deepen their sense of connection and well-being or move toward healing.
- Engage the full project team, including architects and interior designers, around the trauma-informed and healing-centered approach. Consider including a mental health professional or other professional with experience in designing for trauma and healing. The professional can help project teams as they consider:
  - » Biases as a developer (architect, designer, etc.)
  - » Acknowledgment of barriers
  - » Reflections on these biases and barriers
  - » How to design from a place of cultural context and empathy
- Engage residents or other community members and build power by incorporating their voices and ensuring that residents feel represented in the space.
- Use empowering language toward your community throughout this process and project life cycle.
- Evaluate this process and the strategies incorporated. This evaluation is an opportunity for continual feedback and incorporation of new needs. Sample questions could include “Do you see yourself in this space?” and “Does the space make you feel better?”

RESOURCES

- Enterprise Community Partners, Building to Heal: A Framework for Holistic Community Development. Guidance and tools to help community development professionals explore and implement healing-centered strategies. *www.enterprisecommunity.org/learning-center/resources/building-heal-framework-holistic-community-development*
- Enterprise Community Partners, Building to Heal: Tools Catalogue. A range of practical tools to support healing-centered community development, including using community altar building as a tool and practice. *www.enterprisecommunity.org/learning-center/resources/building-heal-tools-catalogue*
- Design Justice Network, Resource Overview. Principles and resources to use design to support care, healing, liberation, joy, and deep sustainability. *https://designjustice.org/resources-overview*
- National Endowment for the Arts, How to Do Creative Placemaking. Case studies and essays on how arts organizations and artists can play an essential role in communities. *www.arts.gov/publications/how-do-creative-placemaking*
- The Center for Active Design, Assembly: Civic Design Guidelines. A playbook for creating well designed and well maintained public spaces as a force for building trust and healing divisions in local communities. *www.centerforactivedesign.org/publications/project-three-8zgh7-ghaax*

- Shawn Ginwright, Ph.D.; The Future of Healing: Shifting from Trauma Informed Care to Healing Centered Engagement. *https://medium.com/@ginwright/the-future-of-healing-shifting-from-trauma-informed-care-to-healing-centered-engagement-634f557ce69c*
- Happy Cities, Happy Homes Interactive Toolkit. Illustrated design solutions to enhance social well-being in multifamily housing. *https://happycities.com/happy-homes-toolkit*

Well-Being and Empowerment

Holistic support for well-being and opportunities to advance systemic health equity are possible through inclusion in economic, educational, and power systems. Increased access to these systemic opportunities may include partnerships and programs and can have long-lasting ripple effects. The forward-looking measures promoted in Criteria 7.17 and 7.18 can empower residents and enhance long-term life outcomes, effectively transforming affordable housing into a platform for health, opportunity, and upward mobility. As more projects advance these upstream drivers, together, their collective impact has potential to improve long-term health outcomes across communities, cultures, and identities.

7.17

Optional: 5 points

Active Design: Promoting Physical Activity

RATIONALE

Physical inactivity increases the risk of many chronic diseases and conditions, including obesity, hypertension, heart disease, stroke, some cancers, and Type 2 diabetes. Two minutes a day of stair climbing burns enough calories to prevent annual average weight gain. Common stairs also encourage social interactions and improve mental health. Climbing 20 to 34 floors of stairs per week (about three to five floors per day) is associated with a reduced stroke risk of 29%, and climbing 100 to 150 floors of stairs per week is associated with a 10% to 20% decrease in mortality from all causes.

For some residents, stairway travel may be dangerous due to limited mobility, but other key design considerations may positively influence their level of physical activity. In these instances, building or site design that increases the frequency or duration of physical activity is encouraged.

Child play and adult exercise reduce the risk of obesity, improve mental health, and encourage social interactions. Improving access to places for physical activity can result in a 25% increase in the number of people who exercise at least three times per week.

REQUIREMENTS

Option 1: Encourage everyday stair use

Eligibility note: Buildings that include stairs as the only means to travel from one floor to another—whether in a two-story single-family home or a multifamily walk-up building—are not eligible for this option.

- Provide a staircase that is accessible and visible from the main lobby as well as visible and within a 25-foot walk distance from any edge of the lobby. Ensure that no turns or obstacles prevent visibility of or access to the qualifying staircase from the lobby, and that the staircase is encountered before or at the same time as the elevators. Ensure that stairway lighting and finishes are consistent with, or better than, those in the building corridor to encourage use. Place point-of-decision signage at building entrances and corridor intersections to promote stair use (rather than elevator use) for health and other benefits. From the corridor, accessible staircases should be made visible by at least one of the below means:
  - » Providing transparent glazing of at least 10 square feet at all stair doors or at a sidelite
  - » Providing magnetic door holds on all doors leading to the stairs, as long as allowable by fire code
  - » Removing door enclosures and vestibules, as long as allowable by fire code *[5 points]*

OR

Option 2: Provide activity spaces

Provide a dedicated on-site recreation space with exercise or play opportunities for adults and/or children that is open and accessible to all residents. The space must be at least 400 square feet, include adult exercise and/or children's play equipment for a minimum of 5% of residents, and ensure minimum operational hours of 10 hours per day at least 3 days per week. *[5 points]*

RECOMMENDATIONS

Encouraging everyday stair use:

- Include residents in exploring active design strategies as part of the integrative design process. Determine which features are appropriate based on the expected resident population, building characteristics, and potential related programming strategies.
- Stairwell finishes, as well as clear and appealing visuals such as windows or artwork, provide a pleasant experience and encourage stair use for those who are able.
- In high-rise buildings, provide an integrated vertical circulation system that incorporates stair use for travel between adjacent floors so that elevators are used primarily for vertical travel of four floors or more.
- Consider programming elevators so they do not automatically return to the ground floor and do not rest in the open position when not in use.
- While maintaining at least one (or more if required by code) ADA-accessible elevator to all floors, consider installing additional skip-stop elevators, where appropriate for the building.
- Provide daylighting at each floor and at the roof level of the stair by using windows and/or skylights of at least 8 square feet in size. Consider fire-rated glass at egress doors on stair landings to increase lighting and encourage use, along with daylighting in all corridors if feasible.

- Incorporate permanent artwork, murals, and/or music into the stair environment.
- Incorporate natural ventilation into the stair environment.
- For rehabs, consider working with existing patterns on the property and enhance an existing pathway or stairwell.

Activity spaces:

- Develop complementary resident engagement strategies to promote outdoor play, exercise, gardening, or other physical activity.
- Include residents in exploring active design strategies as part of the integrative design process. Determine which features are appropriate based on the expected resident population, building characteristics, and potential related programming strategies.
- Design a courtyard, garden, terrace, or roof that can serve as outdoor space for play and/or fitness activities for people of all ages.
- Design recreation spaces for versatile use by people of a variety of ages and abilities, including landscape features when possible, rather than traditional playground equipment. Play spaces can be works of art or landscape architecture that provide a visual appeal and a pleasant environment for all users.
- In the design of parks and playgrounds, create a variety of environments to facilitate activity in different seasons and weather conditions. Provide shaded areas as well as areas that are open to sunlight.
- Ensure play areas and fitness amenities do not contribute unnecessarily to stormwater runoff, and consider how these spaces might help the project attain higher levels of performance under *Criterion 3.4 Surface Stormwater Management*, *Criterion 3.8 Heat-Island Management*, or other criteria in *Category 3: Site Design*.
- Locate physical activity spaces in a centrally visible location in the building to help increase awareness and use of these spaces, as well as a sense of safety and security.
- Provide lights on sidewalks and active play areas to extend opportunities for physical activity into the evening. (Ensure the lights meet the mandatory requirements of *Criterion 3.3 Exterior Lighting*.)
- Install water-bottle fillers adjacent to activity spaces and supply residents with reusable water bottles.
- Provide views to the outdoors from playrooms and other areas for physical activity.

RESOURCES

- City of New York, Active Design: Affordable Designs for Affordable Housing. *www1.nyc.gov/assets/doh/downloads/pdf/environmental/affordable-designs.pdf*
- City of New York, Active Design Guidelines. *www.nyc.gov/site/ddc/about/active-design.page*
- Centers for Disease Control and Prevention, Guide to Strategies to Increase Physical Activity in the Community. *www.cdc.gov/diabetes/news/media/pdfs/CDC-guide-strategies-increase-physical-activity.pdf*

- Task Force on Community Preventive Services, The Community Guide: What Works to Promote Health. A collection of findings on built environment strategies to increase physical activity. *www.thecommunityguide.org/pages/task-force-findings-physical-activity.html#environmental-policy*
- OCAD University, Georgia Institute of Technology, NYC Department of Health and Mental Hygiene; Active Design Supplement: Affordable Designs for Affordable Housing. Research on the economics of active design solutions and a project profile evaluating NYC's active design guidelines. *https://activelivingresearch.org/active-design-supplement-affordable-designs-affordable-housing*
- Observatoire de la prévention of the Montreal Heart Institute, Climbing stairs is associated with reduced risk of cardiovascular disease. Findings on the association between stair-climbing intensity and the risk of heart disease. *https://observatoireprevention.org/en/2025/01/15/climbing-stairs-is-associated-with-reduced-risk-of-cardiovascular-disease/*
- Johns Hopkins Center for Injury Research and Policy, NYC Department of Health and Mental Hygiene, Society for Public Health Education. Active Design Supplement: Promoting Safety, Version 2. Design guidelines for increasing safety while also promoting health and physical activity in the built environment. *www.nyc.gov/assets/doh/downloads/pdf/environmental/promoting-safety.pdf*

7.18 Place-Based Wealth Building

Optional: 4 points

RATIONALE

Real estate and homeownership have long been among the primary ways Americans build and transfer wealth across generations. Yet, due to systemic injustices like redlining, restrictive covenants, predatory lending, and other exclusionary practices, many people and communities have been shut out of wealth-building opportunities in housing. This has contributed to persistent racial and economic inequities, as families who rent or who were denied access to homeownership have missed the chance to accrue equity and financial security.

For affordable housing to truly promote long-term stability and equity, it must explore ways to help residents build assets and economic resilience. Wealth building is crucial as a pathway to economic stability. It can break cycles of poverty by enabling families to handle emergencies, invest in education or businesses, and eventually pass on resources to the next generation. In rapidly gentrifying areas, mechanisms that give residents an ownership stake or equity interest in their housing can also prevent displacement, allowing people to remain in their communities and benefit from their growth. Focusing on wealth building within affordable housing aligns with the goals of economic mobility and empowerment, as it seeks to ensure that residents have not only an affordable home today but also a more secure financial foundation for the future.

REQUIREMENTS

Implement one of the following options to support residents' economic empowerment and wealth building.

Option 1: Homeownership or equity opportunities for residents

Offer residents a way to build equity through the housing development via models such as limited-equity co-ops, rent-to-own programs, or equity credit arrangements such as trusts. These options should be clearly explained, low risk, and affordable for residents. The intent is to give residents, not just investors and owners, a share in the value created by the property.

OR

Option 2: Local hiring

Demonstrate that a local preference for construction employment and subcontractor hiring was part of your bidding process.

Notes:

- "Local preference" is defined as preference for any individual who resides within 25 miles of the project site or is located within the city or county limits.
- Native American preference can be solely that, without a miles-to-project requirement.

OR

Option 3: Local employment

Demonstrate that you achieved at least 20% local employment for construction and subcontractor hiring.

To determine the percentage of local employment, calculate:

$$\frac{\text{Total hours worked by local individuals}}{\text{Total \# of hours on the project}} \times 100 = \text{\% of local employment}$$

Notes:

- If sweat-equity hours were used to complete some of the labor for the project, those hours are eligible and should be included in the above calculation.
- "Local employment" is defined as any individual who resides within 25 miles of the project site or is located within the city or county limits.
- Native American preference can be solely that, without a miles-to-project requirement.

RECOMMENDATIONS

- Engage with residents early to understand their priorities and tailor the wealth-building strategies to their interests and readiness.

- Pair opportunities with education by offering coaching or support on financing alongside any ownership, savings, or business initiative.
- Consult with legal, financial, and other technical experts when developing a program for Option 1: Homeownership or equity opportunities for residents.
- Use proven models for ownership or entrepreneurship, or start small with a pilot program.
- Track impact over time by monitoring metrics like income, credit, savings, and participation in programs. This can build additional support moving forward.

RESOURCES

- Real Change News, The new Liberty Bank Building in the Central District is a historic step against displacement and gentrification. News article highlighting an affordable housing development designed with a community-wealth-building lens. *www.realchangenews.org/news/2019/03/27/new-liberty-bank-building-central-district-historic-step-against-displacement* and *https://libertybankbuilding.org/blog-partnership/*
- Grounded Solutions, Resource Library. Provides extensive resources on community land trusts, limited-equity co-ops, and other shared-equity models that maintain long-term affordability while allowing residents to accumulate some equity. *https://groundedsolutions.org/tools-success/resource-library/*
- Enterprise Community Partners, Renters Wealth Creation Fund. This fund provides renters with wealth-building opportunities that are traditionally limited to homeowners. *www.enterprisecommunity.org/impact-areas/upward-mobility/renter-wealth-creation*. These case studies from the Pacific Northwest show these opportunities in action. *www.enterprisecommunity.org/about/where-we-work/pacific-northwest*
- Habitat for Humanity, Financial Education. Introductory financial information about budgets, loans, and credit; designed to prepare families for homeownership. *www.habitat.org/our-work/financial-education*

> "The only thing I can complain about now is that my tortillas take longer to make in an electric stove," she says, laughing. "But it's worth it."
>
> Marta Castro, Fort Stevens Place Resident

8 Operations, Maintenance, and Resident Engagement

The integrative process doesn't end with design. Effective communication, training, and documentation set the project up for success and help residents and operators realize long-term benefits from affordability, health, efficiency, and resilience.

8.1

Mandatory for all multifamily projects

Building Operations & Maintenance Manual and Plan

RATIONALE

Regular building operations and maintenance (O&M) practices using green methods can reduce utility bills and minimize building maintenance needs. They can also provide a healthier, safer, and more durable living environment for residents. Developing a building O&M plan throughout project design, development, and construction allows the project team to properly customize these documents with the input of project installers.

REQUIREMENTS

Develop a comprehensive O&M manual. This manual may be compiled as a distinct manual or may be included within the developer's existing framework or manual for documenting and communicating operations and maintenance information about the property.

Regardless of the format, the O&M manual must include thorough O&M guidance for the property as well as an accountability process. The manual and any accompanying materials must be readily available and accessible to staff and must provide, at a minimum, information covering specifications, maintenance schedules, and any established contracted services and service providers for the property and dwelling units.

Specifically, the plan must include the following topics:

General topics:

- Location of mechanical, electrical, fuel, and water-system turnoffs
- A list of topics included in the emergency management manual (see *Criterion 8.2*) and where this manual is available
- Green cleaning product specifications and cleaning schedules

Topics for common spaces and/or dwelling units:

- HVAC systems
- Plumbing systems, including, if applicable, the *Legionella* water-management program developed per *Criterion 4.3 Water Quality*
- Electrical and lighting equipment
- Any common-space appliances and equipment, as applicable
- Landscaping and hardscaping
- Paint and other finishes that require regular updates
- Backup power systems

Other topics, if applicable:

- Any other specialized systems (e.g., solar photovoltaics, solar water heating, ground-source heating and cooling, cogeneration)
- Name and purpose of each community-portal application for sharing information between building personnel and residents
- A copy of the property's Zero Over Time plan (if the project is pursuing *Criterion 5.1 Energy Planning*) and guidance to refer to this plan for equipment replacement and capital planning
- Maintenance of active recreation and play spaces or other site amenities (e.g., playground equipment, ground markings, gardening spaces, seating)
- Type and location of any supporting tools for staff and residents (magnets, short informational videos, QR code stickers)

RECOMMENDATIONS

Prior to and during construction:
Begin creating a thorough and well-developed O&M manual well before construction completion.

- Work with designers, system installers, and O&M staff to assemble critical information and schedules for best-practice operations and maintenance strategies. Continue developing the manual materials throughout the course of design, development, and construction so that knowledge can be transferred across each stage of the project life cycle to staff members on the operations, resident-services, and asset-management teams.
- During the design process, keep a running list of how maintenance and landscaping teams and residents may need to be involved with the property to help ensure systems perform as intended.
- Once the project team has completed the integrative design process (*Category 1*), amend templates of O&M documents with project-specific information for maintenance staff and residents. This ensures the building O&M manual and plan will be informed by the development process and completed by the time the project is ready for occupancy.
- Identify senior management positions with oversight responsibility for O&M.
- Identify the job roles responsible for producing, managing, and/or implementing the manual and plan.

- Ensure that building performance goals and requirements established for the project during integrative design are included in the O&M manual and plan.
- Create a knowledge-transfer plan to ensure that accurate as-built information is captured during construction, startup, and commissioning, and is integrated into the O&M manual and plan. For example, if possible, create a training video for staff by recording the commissioning agent or system installers while they demonstrate key maintenance checks.
- Discuss the O&M training plan with appropriate client representatives to ensure that responsible staff will be up to speed on the operation of the property prior to turnover and occupancy.
- Develop a succession plan to ensure that important information is retained from departing staff and transferred to new staff. This could include an exit interview checklist, maintenance log review, etc.
- As construction nears completion and into operations, finalize your building O&M manual and plan. Clearly identify key O&M activities, assign those activities to a person or job role, and establish a schedule to verify that maintenance is performed.

To enhance your O&M manual and plan, include:

- Supporting materials that underscore topics addressed in the manual, such as equipment stickers, QR codes, short videos, and magnets with instructions or contact information
- A quarterly training for building personnel that highlights Green Communities building features, their impacts on resident daily life and well-being, and how these features are operated and maintained
- Account information on energy- and water-performance-tracking software, including who will monitor accounts and what procedures will take place at different intervals
- A maintenance schedule for HVAC systems, including assignments of key tasks to specific job roles and a system to track which maintenance tasks were completed when
- Information on lighting equipment, including specs for replacement bulbs and a maintenance strategy for when to replace inaccessible fixtures (e.g., what percentage of bulbs/diodes can fail in any one lamp pylon before you install replacements)
- Irrigation system maintenance plans that include periodic visual inspection (since irrigation systems are often scheduled to operate when O&M staff are off duty)
- Landscape and hardscapes (paved surfaces) review protocols, such as the inspection schedule for landscaping and paving, and which job roles will perform key tasks
- Green cleaning schedules, including procurement specifications for products and vendors; and assignment of key tasks to specific job roles; and a system to track when actions are completed
- A greywater policy, if applicable, that requires biodegradable soaps, cleaners, and other products if they are likely to be flushed down drains
- Training videos of system installers explaining best practices for regular maintenance as well as strategies to address common problems
- Local information on handling hazardous waste, including where to recycle fluorescent and compact fluorescent lighting (CFLs)

RESOURCES

- Enterprise Green Communities, Building Maintenance Manual Templates. *www.greencommunitiesonline.org/sites/default/files/green-operations-and-maintenance-manual-template.xlsm*
- San Francisco Department of the Environment, Pest Prevention by Design: Authoritative Guidelines for Designing Pests Out of Structures. *https://sfenvironment.org/article/pest-prevention-by-design-guidelines*
- University of Minnesota, Guide to Integrated Pest Management (IPM): A science-based approach for ecologically sound land management. *https://ncipmhort.cfans.umn.edu/sites/ncipmhort.cfans.umn.edu/files/2022-03/2020-Guide-to-Integrated-Pest-Management.pdf*
- National Center for Healthy Housing, Healthy Homes Maintenance Checklist. *https://nchh.org/resource-library/healthy-homes-maintenance-checklist_english.pdf*
- Stewards of Affordable Housing for the Future, Multifamily Energy and Water Management Toolkit. Checklists, worksheets, references, and tips to reduce costs, improve efficiency, and preserve affordable properties. Also available in Spanish. *https://sahfnet.org/resources/multifamily-energy-and-water-management-toolkit*
- NYC Department of Health and Mental Hygiene; Integrated Pest Management Toolkit for Building Owners, Managers, and Staff. *www1.nyc.gov/assets/doh/downloads/pdf/pesticide/ipm-toolkit.pdf*
- Federal Energy Management Program, Operations & Maintenance Best Practices: A Guide to Achieving Operational Efficiency. *www.energy.gov/sites/prod/files/2020/04/f74/omguide_complete_w-eo-disclaimer.pdf*
- U.S. Environmental Protection Agency, ENERGY STAR Operations and Maintenance Checklist. *www.energystar.gov/buildings/save-energy-commercial-buildings/ways-save/checklists*
- ASHRAE, Guideline 1.4P: 2014, Published Guideline Procedures for Preparing Facility Systems. Public comment draft of procedures for producing a systems manual for training, O&M, and facility upgrades. *www.eeperformance.org/uploads/8/6/5/0/8650231/systemsmanualsgdl1_4-201x__chair_approved.pdf*
- ASHRAE, Guideline 32-2018, Management for Sustainable, High-Performance Operations and Maintenance. Offers guidance for operating and maintaining buildings with goals of sustainability and high performance in mind. */www.techstreet.com/standards/guideline-32-2018-management-for-sustainable-high-performance-operations-and-maintenance?product_id=2021318*
- ASHRAE, Fundamentals of Building Operation Maintenance and Management. Continuing education course covering O&M strategies, costs, building management systems, HVAC controls, and related topics. *www.ashrae.org/education--certification/self-directed-or-group-learning/fundamentals-of-building-operation-maintenance-and-management*
- Urban Green Council, GPRO Operations & Maintenance Essentials. Twelve-hour training to help O&M professionals transition from conventional to sustainable operations. *www.urbangreencouncil.org/what-we-do/educating-building-professionals/gpro/gpro-operations-and-maintenance-essentials/*

8.2 Emergency Management Manual

Mandatory for all multifamily projects

RATIONALE

Creating and socializing a plan for building managers and residents before an emergency occurs increases the likelihood that disturbances and losses due to the emergency—whether it be flooding, an earthquake, a power outage, or another event—can be appropriately managed. As the harsh impacts of climate change become more severe through weather events and ongoing environmental changes, people in low-income communities will experience them disproportionately. It is ever more critical that affordable housing properties are prepared to respond.

REQUIREMENTS

Create a manual on emergency operations for O&M staff and other on-site personnel. This emergency manual may be compiled as a distinct manual or may be included within the developer's existing framework or manual for documenting and communicating key information about the property.

When an online community portal or other digital mechanism is available for sharing information with residents and building staff, ensure that this emergency guidance is easily accessible in those locations.

Regardless of the format, the manual must address responses to various types of emergencies, leading with those most likely to threaten lives and damage the property. It must also provide guidance for sustaining adequate housing throughout an emergency, including:

- A completed Building Readiness Report from the Enterprise Business Continuity Toolkit
- Communication plans and resources for staff and residents to use in the event of an emergency
- Contact information for property management, resident services, public utilities, and building insurance providers
- Building shutdown procedures, including appropriate steps for securing electrical and mechanical systems, on-site fuel sources, elevators, and the site perimeter
- A plan for regular testing of backup energy systems, if applicable

RECOMMENDATIONS

- Consider using the full Enterprise Business Continuity Toolkit, which offers an abundance of resilience resources to help developers prepare for unexpected emergencies. Some of these items should be reviewed annually and updated if needed. Tools include:
  - » Overview and role-assignment tools, including job action sheets stating the responsibilities of the relevant team member: *https://businesscontinuity.enterprisecommunity.org/intro-to-the-toolkit*
  - » Templates for developing and testing emergency plans, communication, and coordination across staff and residents—including a tabletop exercise to practice your emergency response

  - » Critical Vendor Contact List template for recording contact information for emergency contractors and agencies: *https://businesscontinuity.enterprisecommunity.org/sites/default/files/documents/preview/critical_vendor_contact_list.pdf?width=1000&height=600&iframe=true*
  - » Resident Services Contact List for contact information for resident services during an emergency: *https://businesscontinuity.enterprisecommunity.org/document-preview/958?width=800&height=500&iframe=true*
  - » Building Shutdown and Reopen Checklist, Office Shutdown Checklist, Command Level Meeting Checklist, and IT Continuity Checklist: *https://businesscontinuity.enterprisecommunity.org/document-library*
- Store a copy of the emergency manual in a protected water-proof sleeve or vessel to ensure accessibility during a flood or other emergency weather event.
- Inspect backup power systems and fuel sources weekly, practice backup procedures monthly, and test systems at least once every 12 months. Refer to the National Fire Protection Agency (NFPA) 110 Standard for Emergency and Standby Power Systems for detailed recommendations.
- Consider having at least one staff member for every 50 regular occupants (residents plus on-site staff) who is trained in first aid, CPR, and the use of automated external defibrillators (AEDs). Include information about these resources within the emergency management manual.
- Update the emergency manual annually or more often in both digital and hard-copy formats.
- Ensure staff job descriptions and performance requirements include responsibility for reviewing and updating all emergency maintenance manuals.
- Plan for people with varying abilities and mental, physical, sensory, or cognitive needs in the emergency management manual. People who use electrically powered life-sustaining equipment should have special priority. If utility costs are covered in rent, building owners can notify the utility provider that a person in the household uses such equipment. For buildings in which tenants directly pay for utilities, encourage residents to register with the utility provider themselves. This type of registration allows utilities to notify people who use electrically powered life-sustaining equipment when there is a power outage and potentially to conduct check-ins during a power outage.
- Consider including multiple types of contact information for building managers and other staff in the communication plan and sharing the information with residents via cell phone, email, etc.
- Consider using a phone app to contact tenants with emergency information, reminders to charge devices, and locations of emergency power and charging locations.

RESOURCES

- Enterprise Green Communities, Business Continuity Toolkit; Building Readiness Report. *https://businesscontinuity.enterprisecommunity.org/document-preview/966?width=800&height=500&iframe=true*
- Enterprise Green Communities, Business Continuity Toolkit; Building Shutdown and Reopen Checklist. *https://businesscontinuity.enterprisecommunity.org/document-preview/967?width=800&height=500&iframe=true*
- Enterprise Green Communities, Business Continuity Toolkit; Disaster Response Staffing Plan. *https://businesscontinuity.enterprisecommunity.org/build-your-team*

- Stewards for Affordable Housing of the Future, Extreme Weather Threats to Affordable Housing: SAHF Portfolio Climate Risk Assessment. *https://sahfnet.org/updates/extreme-weather-threats-affordable-housing-sahf-portfolio-climate-risk-assessment*
- U.S. Department of Homeland Security, *Ready.gov*. A public service campaign designed to educate and empower people to prepare for and respond to emergencies, including natural and human-caused disasters. *www.ready.gov*
- Federal Emergency Management Agency, Get Assistance After a Disaster. *www.fema.gov/assistance*
- American Red Cross, Disaster Relief. *www.redcross.org/about-us/our-work/disaster-relief.html*
- City of Seattle, Emergency Management: Education and Engagement. This page links to many valuable resources, including a Resident Disaster Recovery Booklet available in several languages. *www.seattle.gov/emergency-management/publications*
- Urban Green Council; Building Resiliency Task Force Report, Chapter 4: Better Planning. *www.urbangreencouncil.org/wp-content/uploads/2022/11/2013_brtf_summaryreport_0.pdf*
- District of Columbia Department of Energy & Environment, Resilience Opportunity Assessment Tool. This page links to many resources, including a resilience-assessment tool focused on buildings. Scroll down to "Attachments" and click to download the spreadsheet. *https://doee.dc.gov/climateready*
- National Fire Protection Association, NFPA 110 Standard for Emergency and Standby Power Systems. *www.nfpa.org/codes-and-standards/nfpa-110-standard-development/110*

8.3 *Mandatory* Resident Manual

RATIONALE

Guides that share information on the features of a Green Communities-certified project can enable residents to fully realize the environmental, health, and economic investments made to the property.

REQUIREMENTS

Provide a guide for homeowners and renters that explains the intent, benefits, use, and maintenance of their homes' green features and practices. This guide may be compiled as a distinct manual or may be included within the developer's existing framework or manual for communicating information about the property to residents.

When an online community portal or other digital mechanism is used for sharing information with residents, ensure that this resident guidance is easily accessible in those locations.

Regardless of the format, the resident manual should encourage green and healthy activities and should raise awareness of green elements of the property that support resident health and quality of life.

A range of topics should be provided. Those topics must include, but are not limited to:

- A description of the Green Communities criteria included in the project that are particularly relevant to residents
- An overview of the emergency management manual (Criterion 8.2)
- Instructions for accessing online communication tools and bulletins, such as apps, portals, or other mechanisms for information sharing between residents and building operations and services, as applicable
- A routine maintenance plan, as applicable, that outlines the responsibilities of residents and maintenance staff and includes information for residents about reporting maintenance issues
- HVAC operation instructions and explanations of other systems that are part of the home
- Green cleaning guidelines
- Smoke-free building policy
- Location of electrical, mechanical, gas, and water shutoffs
- Recycling and other waste-management instructions
- Integrated pest management protocols
- Information on community connectivity, including public transportation, vehicle-share and bike-share amenities, and other accessibility features
- Information on community gardens and other ways to access fresh food
- Energy and water consumption information, including how the property will collect and report utility data

RECOMMENDATIONS

- Hold quarterly on-site "office hours" or training sessions about property and dwelling-unit features to encourage residents' awareness of the property's features and amenities and to discuss ways that residents can realize their benefits.
- When developing your resident manual and engagement information, include maps, floor plans, graphics, images, videos, and social media information to make the material more engaging and effective.
- During the design process, keep a running list of how maintenance and landscaping teams and residents may need to be involved with the property to ensure that it will perform as intended. Once the project team has completed the integrative design process (see *Category 1*), amend templates of the O&M documents and resident manual with project-specific information. This helps ensure that the development process informs these documents and that the documents are complete by the time the project is ready for occupancy.
- Provide information and guidance for residents on the integrated pest management (IPM) approach developed as part of *Criterion 7.11 Reducing Allergens and Disease Vectors: Integrated Pest Management*. Topics may include pesticide use, housekeeping, and prompt reporting of problems with cockroaches, rodents, or bed bugs. Ensure that anyone applying pesticides is licensed and working under a scope that includes IPM provisions.
- Provide residents with information about local transportation options by including maps, public transit schedules, vehicle- and bike-share programs, and the building's bicycle amenities.

- Provide residents with maps of neighborhood locations for physical activity and healthy food amenities, including farmers' markets, community gardens, walking trails, parks, playgrounds, and exercise facilities.
- Amplify the impact of access to fresh food by hosting cooking classes to build expertise in making healthy meals.
- Consider how you label trash, recycling, and composting receptacles throughout the building. For example, use consistent colors to ensure landfill receptacles are visually distinct from recycling or compost containers throughout the property. Provide examples and instructions for which materials are recyclable and compostable.
- Provide residents with local information for handling household hazardous waste, including batteries.
- If the project is using greywater, design and institute a policy that requires biodegradable soaps, cleaners, and any other product types that are likely to be flushed down the drains.
- Consider bulk purchases of nontoxic cleaning materials for residents to buy at a discount.
- Consider including ENERGY STAR "Best Practices" information in the Resident Manual. Select a product type and click on "Savings Tips."
  - » For washers: *www.energystar.gov/products/clothes_washers*
  - » For dryers: *www.energystar.gov/products/clothes_dryers*
  - » For refrigerators: *www.energystar.gov/products/refrigerators*
  - » For dishwashers: *www.energystar.gov/products/dishwashers*
  - » For additional best practices on ENERGY STAR products: *www.energystar.gov/products*

RESOURCES

- Enterprise Community Partners, Green Communities Resources. Workbooks and sample manuals, including Resident Engagement: Operations & Maintenance. *www.greencommunitiesonline.org/resources#masthead*
- Connecticut Department of Environmental Protection, A Green Home Is a Healthy Home. A simple brochure with a readable layout and quality presentation. *https://portal.ct.gov/-/media/deep/p2/individual/healthyhomepdf.pdf*
- NYC Department of Health and Mental Hygiene, Pest Management Tips for Building Residents. *www1.nyc.gov/assets/doh/downloads/pdf/pesticide/mgmt-tips.pdf*
- Homebuyer, Home Maintenance Checklist for Homeowners. Information for homeowners on maintaining their homes. Includes seasonal checklists as well as special instructions for new home buyers. *https://homebuyer.com/learn/home-maintenance-checklist*
- Canada Mortgage and Housing Corporation, Preventing Mould in Your Home. Information on mold identification and remediation in existing homes. *www.cmhc-schl.gc.ca/professionals/industry-innovation-and-leadership/industry-expertise/indigenous-housing/develop-manage-indigenous-housing/maintenance-solutions/mould-in-housing*
- NYC Department of Health and Mental Hygiene, Integrated Pest Management Toolkit for Building Owners, Managers, and Staff. The final page is a resident-facing resource with IPM tips. *www.nyc.gov/assets/doh/downloads/pdf/pesticide/ipm-toolkit.pdf*

- Federal Energy Management Program, Operations & Maintenance Best Practices: A Guide to Achieving Operational Efficiency. *www.energy.gov/sites/prod/files/2020/04/f74/omguide_complete_w-eo-disclaimer.pdf*
- U.S. Environmental Protection Agency, ENERGY STAR Maintenance Checklist. Includes a checklist on occupant behavior and education. *www.energystar.gov/buildings/save-energy-commercial-buildings/ways-save/checklists*

8.4 Walk-Throughs and Orientations to Property Operation

Mandatory

RATIONALE

An orientation to the building and community helps educate residents, property managers, and building staff about the green features that were designed to deliver health, resilience, economic, and environmental benefits. It also empowers people to realize those benefits in their own lives and in the lives of future residents. Without an orientation to the information included in the O&M materials, resident manual, and emergency information created per criteria 8.1 through 8.3, that valuable information may not be used, and the project's goals may not be met.

REQUIREMENTS

Provide a comprehensive walk-through and orientation for all residents and for all property managers and building operations staff. Orient new residents to the property's green features before move-in, or within 90 days of move-in. Orient all property managers and building operations staff to building maintenance and dwelling-unit turnover procedures within 90 days of initial occupancy. For staff joining after the initial orientation, provide walk-throughs and orientations to green features within their first 90 days. For all orientations and walk-throughs, share the list of Green Communities criteria that were implemented as part of the project and use the materials generated per Criteria 8.1 through 8.3 as the basis of the curriculum.

For home-ownership properties, walk-throughs and orientations should take place at time of sale.

RECOMMENDATIONS

- During trainings for property management and resident services staff, focus on how the features of the property function and are maintained, and explain how those features help the residents. For example, point out which green features provide comfort, protect health, save money, conserve resources, and support environmental stewardship. It is important for all staff to understand how buildings and systems were designed to operate so that issues can be identified and addressed promptly.
- Resident orientations should focus on engaging occupants in the process of creating and maintaining a green and healthy environment and on increasing resident awareness of healthy food options and opportunities for physical activity both on the site and nearby.

- Orientations should be tailored to residents and their needs (e.g., families, older adults) and should educate residents on how to operate key features and access on-site resources (e.g., recycling, thermostats, fans, lighting). Resident orientation should also explain why certain green features were selected (e.g., less carpet in favor of smooth flooring can improve indoor air quality). A thorough resident orientation should aim to improve outcomes relating to energy, water, waste, material use, and health.
- Resident orientation should also stress the important role that residents have in reporting building-related problems so that issues can be addressed in a timely fashion.
- Consider providing a packet of resources on green and healthy living, including healthy recipes, recycling information, information about green cleaning, and important contact information in case of any problems.
- Engage new residents at regular intervals (e.g., at move-in, three months, one year, and then annually) that coincide with existing resident engagement opportunities. This will help staff identify potential needs for support.
- Provide residents with local information on handling household hazardous waste, such as batteries.
- Educate residents and staff on what to do in case of an evacuation or shelter-in-place scenario. Consider providing key staff and residents with additional training and "go-bags" so that they can help one another during an emergency.

8.5 Energy and Water Data Collection and Monitoring

Mandatory except for detached single-family homes and owner-occupied homes

RATIONALE

A system for collecting and monitoring utility data allows project owners, on-site staff, and residents to understand project performance and accurately analyze the costs and benefits of energy- and water-efficiency improvements. This information may be used to influence future retrofit and repair work, and to identify day-to-day performance issues as they arise. Catching problems early allows staff and residents to take appropriate actions to meet goals for durability, cost savings, and health benefits.

REQUIREMENTS

Collect and report consumption and cost data for all energy and water utilities for the residential components of the project. Data must be uploaded and tracked at least annually in an online utility benchmarking platform for at least five years after EITHER 1) issue of the certificate of occupancy for rehabs OR 2) lease-up for new construction. Viewing access must be granted to Enterprise for the required five-year period. Ensure residents are given insight into their utility bills for the purposes of empowerment and education, even if the property owner pays all utility bills directly.

Depending on the property's utilities, use any one of the following options.

Option 1: Owner-paid utility bills only

The property owner pays 100% of the property's utility bills and uses these bills as the source for tracking whole-property utility data in the online platform.

Option 2: Aggregated whole-property utility data

Regardless of the split of owner-paid and tenant-paid utility bills across the property, the property owner requests, and then uploads and tracks, aggregated whole-property utility data from utility providers.

Option 3: 100% of tenant-paid utility data

The property owner collects 100% of the individual tenant-paid utility data from utility providers or tenants and tracks these as well as owner-paid accounts in the online platform.

Option 4: Sample of tenant-paid utility data

The property owner collects a sample of individual tenant-paid utility data from utility providers or tenants, which is then used to produce an estimate of whole-property utility data as well as owner-paid accounts. To extrapolate the whole-building data from the sample set, teams may use either 1) the Better Buildings Challenge sampling protocol, found in Appendix C of the Better Buildings Challenge Data Manual, OR 2) HUD's Assisted Housing Utility Allowance Calculations sampling protocol, found in Part VI of HUD Notice H-2015-04.

Note on Option 4: When using sample tenant-paid utility data to estimate whole-property data, the "Estimation" box must be checked when submitting the data in ENERGY STAR Portfolio Manager.

RECOMMENDATIONS

- Ensure that training for both residents and building maintenance staff includes information on how to effectively use the collection, monitoring, and reporting system. Engage residents whenever possible in campaigns to reduce water and energy use.
- Carefully consider metering and/or utility monitoring to ensure the process meets your needs not only for utility billing but also for diagnosing potential energy or water issues. Providing consumption and cost data to each resident from their own dwelling unit may encourage lower consumption, while being cognizant of dominant sources of energy use can help owners proactively notice and address outlier conditions in real time. The metering and monitoring systems should be specified during integrative design, tracked through O&M procedures, and shared with residents and staff.
- Install smart thermostats in units to allow residents more control over their energy and water use.
- For owner-occupied units, residents should collect and monitor their energy and water performance data in a manner that allows for easy access and review, and that provides the ability to influence home operations for at least five years from time of first occupancy. Also allow Enterprise access to this data.
- Ensure resident privacy is protected if individual units are being monitored.
- Develop a protocol for reviewing and responding to utility data so that operation can continuously improve.

RESOURCES

- U.S. Department of Housing and Urban Development (HUD), Multifamily Utility Benchmarking Toolkit. This comprehensive guide to utility benchmarking for the multifamily sector has three sections: Benchmarking 101, Utility Benchmarking Step-by-Step, and Policies and Programs. *www.hudexchange.info/programs/utility-benchmarking/toolkit/*
- American Council for an Energy-Efficient Economy, Benchmarking Initiatives in the Multifamily Market. Includes best practices for multifamily energy tracking. *www.aceee.org/toolkit/2017/09/benchmarking-initiatives-multifamily-market*
- U.S. Environmental Protection Agency (EPA). ENERGY STAR Portfolio Manager Quick Start Guide. A reference guide for using Portfolio Manager, which is a free, online, interactive energy-management tool. Users can measure and track energy and water consumption, identify investment priorities, and verify improvements over time. Multifamily housing communities can use it to track and benchmark weather-normalized energy use intensity, energy costs, greenhouse gas emissions, and water consumption. *www.energystar.gov/buildings/tools-and-resources/portfolio-manager-quick-start-guide*
- EPA, Water Score for Multifamily Housing. In addition to a energy benchmarking, Portfolio Manager is designed to create a Water Score, which can compare actual consumption to a model. *www.epa.gov/watersense/water-score-multifamily-housing*
- Private, fee-based benchmarking and utility tracking tools are available. Among others, these include eGauge (*www.egauge.net*), Embue (*www.embue.com/*), Energy Score Cards (*www.energyscorecards.com*), WegoWise *(www.wegowise.com*), and Yardi (*www.yardi.com/*).
- HUD. Approved sampling methodologies for *Criterion 8.5 Energy and Water Data Collection and Monitoring*, Option 4.
- Appendix C—Multifamily Sampling Protocol, from the Better Buildings Challenge Data Manual: *https://files.hudexchange.info/resources/documents/Better-Buildings-Challenge-Data-Tracking-Manual-Multifamily-Sampling-Protocol.pdf*
- Methodology for Completing a Multifamily Housing Utility Analysis, Part VI of HUD Notice H-2015-04: *www.hud.gov/sites/documents/15-04hsgn.pdf*

> "People who live here love how beautiful it is. I'm just more open and confident here. I believe I belong here. I appreciate it, and it's going to appreciate me because I'm going to take care of it."
>
> Sharon Morden, Cadence Resident

Appendices

APPENDIX A

Construction Typology Definitions

SUBSTANTIAL AND MODERATE REHABS

Given that the scope of work on existing buildings can vary widely (from minor repairs to gut rehabs), we have defined two levels of rehabs to guide project team planning.

While Substantial and Moderate Rehabs are defined as specifically as possible below, each project will most likely have more nuance than can be captured here. Please use these definitions as the start of this guidance, strive for the most inclusive level of integrating the Criteria, and note that compliance with the energy-performance requirements of *criteria 5.2a and 5.2b* often is the factor that places a project in the New Construction pathway (possible for some gut rehabs), Substantial Rehab pathway, or Moderate Rehab pathway, or precludes Certification all together.

A Substantial Rehab is defined as a project where the work area exceeds 50% of the aggregate area of the building: an International Code Council level 3 alteration scope of work, according to the most recent version of the International Existing Building Code published at the time of project Prebuild application.

- Aggregate area of the building includes anything within the surrounding exterior walls, including covered exterior spaces, e.g., balconies that have a roof or floor above (does not include roof, outdoor space, etc.)
- Work area is defined as the area on the plans that will be considered reconfigured, addition or removal of a window or door, or reconfiguration or extension of any system, or installation of a new system.

A Moderate Rehab is defined as a project where the work area does not exceed 50% of the aggregate area of the building (the work scope is less than an ICC level 3 alteration), yet is still able to comply with the energy-performance requirements of *Criterion 5.2b Energy Performance: Rehabilitation*.

RURAL/TRIBAL/SMALL TOWN

Projects that meet one or more of the four criteria below qualify for the Rural/Tribal/Small Town pathway in the 2026 Criteria.

1. A statistical geographic entity delineated by the Census Bureau that does not meet the definition of an urbanized area contained in the Office of Management and Budget's 2010 Standards for Delineating Metropolitan and Micropolitan Statistical Areas, 75 FR 37252 (June 28, 2010). That is, a rural area is an area that is not a statistical geographic entity delineated by the Census Bureau, which would consist of densely settled census tracts and blocks and adjacent densely settled territory that together contain at least 50,000 people. To determine whether the area where the project is located qualifies as rural, enter the ZIP code or city at *www.arcgis.com/home/webmap/viewer.html* to confirm eligibility. Areas shaded pink are not eligible geographies.
2. Projects located on Native American Reservations, Hawaiian Homesteads, and land owned by Native Alaskans
3. Projects located in colonias communities as defined by HUD and certified by one of the four border states: Texas, New Mexico, Arizona, and California
4. Projects eligible for funding under USDA Rural Housing Services (RHS) programs. *https://eligibility.sc.egov.usda.gov/eligibility/welcomeAction.do*

APPENDIX B

Integrative Design Project Priorities Survey

Effective as of January 1, 2026

PROJECT NAME: _____

PROJECT ADDRESS: _____

SURVEY COMPLETION DATE: _____

Understanding the context of your affordable housing development project is critical to ensuring the project successfully meets the needs of residents. Once completed, this survey will guide the integrative design process to inform overall project goals while also strengthening the project's potential impact on health, energy, and resilience within the community.

ENGAGE THE COMMUNITY

Hold conversations with community members and property personnel as specified below to better understand the community context for the property—what people value most, what works, and what doesn't work in their current residences and neighborhood.

Teams should engage with:

- Residents and/or community members: Have conversations with residents, potential residents, or community members.
- Building management:
  - **Existing buildings:** Consult with current building management or resident services staff members who have regular interactions with building residents, and seek input from operations or maintenance staff.
  - **New construction:** Speak with building managers, operations or maintenance staff and/or resident service staff of similar local projects.

We encourage teams to engage with residents and building management staff as much as is feasible given your project timeline and resources. At a *minimum*, one conversation with residents and/or community members and one conversation with building management or resident services staff must occur.

1. Identify populations served

Identify the unique populations of your development below, as applicable. If your project is accommodating any eligible persons seeking housing, please select "no specific population identified." Please check all that apply.

- ☐ Families
- ☐ Veterans
- ☐ LGBTQ
- ☐ People with physical or intellectual disabilities
- ☐ Older adults, independent living
- ☐ Older adults, assisted living
- ☐ Supportive housing
- ☐ People who were formerly incarcerated
- ☐ Mixed-income households
- ☐ People experiencing homelessness or people who were formerly homeless
- ☐ Alternative family or household structures (e.g., multigenerational, foster families, single parents, grandfamilies)
- ☐ Short-term housing (e.g., vocational training programs)
- ☐ No specific population identified
- ☐ Other population; describe:

2. Ground truth

In addition to one-on-one conversations, what forms of feedback have you used or will you use to collect input from residents or community members that will inform the priorities for this project? Please check all that apply.

We recommend asking residents and community members first about their preferences for giving feedback to ensure your methods are appropriate. A combination of methods can complement each other and align with preferred ways to provide feedback.

- ☐ Surveys
- ☐ Interviews
- ☐ Focus groups
- ☐ Community-designed feedback systems; communities decide what and how they would like to provide feedback (please specify):
- ☐ Resident council
- ☐ Community advisory group
- ☐ Suggestion box for confidential feedback
- ☐ Other; describe:

3. Community reflection and understanding

Responses below should be informed by 1) individual factors where applicable, including age, health, physical and neurological ability, language, and employment; and 2) site and location factors where applicable, including weather, physical infrastructure quality, and proximity to jobs, services, and transit.

1. Who does this development serve? Who does it not serve? Among those populations it is intended to serve, who is most vulnerable?

2. Identify some challenges and opportunities people you serve (particularly the most vulnerable) are facing. What are the root causes of those challenges?

3. What are the assets, cultural norms, or community resources this community uses to overcome challenges?

4. What are the opportunities for ongoing resident leadership in the design and development of this project?

4. Comprehensive community development

Based on information gathered from the ground-truth and community-reflection activities above, what are two key takeaways that will inform your engagement process?

IDENTIFY RESIDENT HEALTH FACTORS

Identifying health factors in a community is a starting point for positively influencing health outcomes and quality of life for residents. Project design, development, operation, and management, as well as programs, play a significant role in influencing these outcomes.

Follow the steps below to identify community health factors for your project and then reflect on findings by responding to the prompts.

- Go to *www.countyhealthrankings.org/*.
- Scroll down to the "How healthy is your community?" search field.
- Input the county or ZIP code of your Green Communities certification project in the search field. A list of counties should appear in the dropdown.
- Select the appropriate county and click "Search." Wait for tables of Population Health and Well-being and Community Conditions for the project's county to load.
- Read the data in the Population Health and Well-being and Community Conditions tables, including the highlighted metrics that appear when clicking the boxes labeled "Show areas to explore" and "Show areas of strength." Then answer the following:

List three or more factors identified as "areas to explore" for your community:

List three or more factors identified as "areas of strength" for your community:

What specific health factors should you consider when designing and developing this project?

How will this information impact your project?

For consideration

Project teams may choose to operationalize the health findings in this section further by instituting optional *Criterion 1.6 Design for Health and Well-Being: Health Action Plan*, and by incorporating strategies throughout the 2026 Green Communities Criteria intended to support positive health outcomes for residents of affordable housing. To identify specific healthy design strategies for your project, look for criteria throughout all eight categories tagged with the blue cross icon, indicating health as a leading theme for that criterion.

UNDERSTAND PROJECT ENERGY USE

Managing energy costs begins with design to set the property up for success. Annual energy use, the emissions associated with that energy, and the energy associated with production of building materials are all influenced by both design and property management. Informed and intentional decision-making about these choices can bring down costs and reduce environmental impacts.

As the market for electricity and other heating fuel shifts, energy planning is a critical strategy for developers and property managers to consider emissions and operating costs for the future.

In collaboration with your project team and with energy raters or auditors, answer the following prompts:

1. Indicate whether these systems will be fueled by electricity in the first year of operation after project completion:

   - ☐ Domestic water heating
   - ☐ Ventilation
   - ☐ Heating
   - ☐ Cooling
   - ☐ Cooking
   - ☐ Clothes drying

2. To achieve zero emissions, equipment replacements (particularly emergency replacements) must be considered carefully and planned in advance for systems that are not fueled by electricity. If any of the systems indicated above are not electric, consider how the property would respond to an unexpected equipment failure. List three ways to prepare in advance (e.g., an electric panel study to ensure adequate electric service and/or additional wiring needs) to better ensure that the replacement equipment is electric and efficient.

Refer back to this activity as your team compiles the Operations & Maintenance Manual in Category 8.

3. Who will pay the costs of heating and cooling?
   - ☐ Owner
   - ☐ Tenants
   - ☐ Combination of owners and tenants

4. Does your project include clean energy production?
   - ☐ Yes ☐ No

   Consider how the project could leverage clean energy to offset annual energy costs for tenants.

5. A growing number of electric utility providers offer discounted rates for customers with electric heating systems and/or for customers within certain income brackets. These discounted rates can, when compared with rates for other sources of energy, make an all-electric building the most cost-effective one to operate.

   Does the project's local utility provide a special rate structure for heating and cooling with electricity?

   ☐ Yes ☐ No

   Compare the monthly fixed charges from your potential utility providers as well as the rates for energy.

For consideration

Project teams may lower energy costs by incorporating strategies throughout the 2026 Green Communities Criteria intended to optimize energy efficiency and clean energy sources. To identify specific energy strategies for your project, implement optional *Criterion 5.1 Energy Planning* and/or look for criteria throughout all eight categories tagged with a green asterisk icon indicating energy as a leading theme for that criterion.

DETERMINE CLIMATE HAZARDS AND ASSESS RISKS

The best way to maintain housing through a significant weather event or emergency is to plan for likely scenarios. Complete the following steps to understand and document the climate hazards and associated risks for your project.

1. Identify location-specific resources on climate hazards, ensuring they are up to date. Consult at least one of the available resources to determine the hazards likely to impact your project. Local hazard-mitigation plans and resources are typically available online from city, county, or state offices focused on planning, climate resilience, risk management, or similar services. Mark the hazards likely to impact your project in Column 2 of Table 1, below.

   Note for all projects: If local and/or state resources are unavailable, look to national climate and resilience authorities that filter hazards by location. Examples include the U.S. Federal Emergency Management Agency (FEMA) National Risk Index and Enterprise Community Partners' Portfolio Protect tool. See *Resources* from *Criterion 1.5 Adaptive Planning for Resilient Communities* for additional details. Consider consulting with professionals who have climate expertise (e.g., a civil or environmental engineer).

   Note for substantial and moderate rehabs: Rehabilitation project teams are encouraged to seek firsthand hazard insights from residents and operations and maintenance teams. Mark the hazards likely to impact your project in Column 2 of Table 1, below.

2. Drawing from field experts, project charrettes, and other available sources, indicate in Column 3 the risks posed by each applicable hazard (e.g., extreme temperature, structural or water damage) to future residents and physical infrastructure in your project.

3. Based on the severity of risks identified and overall project goals, prioritize at least three hazards for the project in Column 4.

TABLE 1 | CLIMATE AND ENVIRONMENTAL RESILIENCE: HAZARDS AND ADAPTATIONS

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
HAZARDS	IS THE HAZARD APPLICABLE? (MARK THOSE APPLICABLE WITH AN "X.")	DESCRIBE RISKS TO RESIDENTS AND PROPERTY. CONSIDER VULNERABLE POPULATIONS, PHYSICAL INFRASTRUCTURE CHALLENGES, ETC.	INDICATE THE TOP 3 PRIORITY HAZARDS, BASED ON RISKS.
Avalanche			
Coastal flooding			
Cold wave			
Drought			
Earthquake			
Hail			
Heat wave			
Hurricane			
Ice storm			
Landslide			
Lightning			

Continued on next page

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
HAZARDS	IS THE HAZARD APPLICABLE? (MARK THOSE APPLICABLE WITH AN "X.")	DESCRIBE RISKS TO RESIDENTS AND PROPERTY. CONSIDER VULNERABLE POPULATIONS, PHYSICAL INFRASTRUCTURE CHALLENGES, ETC.	INDICATE THE TOP 3 PRIORITY HAZARDS, BASED ON RISKS.
Rainwater flooding			
Riverine flooding			
Strong wind			
Tornado			
Tsunami			
Volcanic activity			
Wildfire			
Winter weather			
Other (please list):			

For consideration

Project teams may build from this hazard identification and risk assessment by implementing optional *Criterion 1.5 Adaptive Planning for Resilient Communities* and by incorporating strategies throughout the 2026 Green Communities Criteria intended to support development of more resilient affordable housing. To identify specific resilience strategies for your project, look for criteria throughout all eight categories tagged with an orange arrow icon indicating climate resilience as a leading theme for that criterion.

CREATE AND CLARIFY YOUR PROJECT'S MISSION

The data and insights you have gathered should inform and empower the project team, residents, staff members, and other stakeholders. To bring all that together before launching into the focused work ahead, project team members should articulate a clear, concise understanding of what this project will accomplish in the context of its place and time.

The project mission statement should express at a high level what the project will achieve for the community. It should reflect the values of the organizations involved but should be distinct from those missions. It should be direct, using clear, plain language that is free of industry jargon. And it should be short—no more than two sentences.

Review the Project Mission Writer (*www.enterprisecommunity.org/learning-center/resources/design-matters-toolkit*) and these three project mission examples from affordable housing developers.

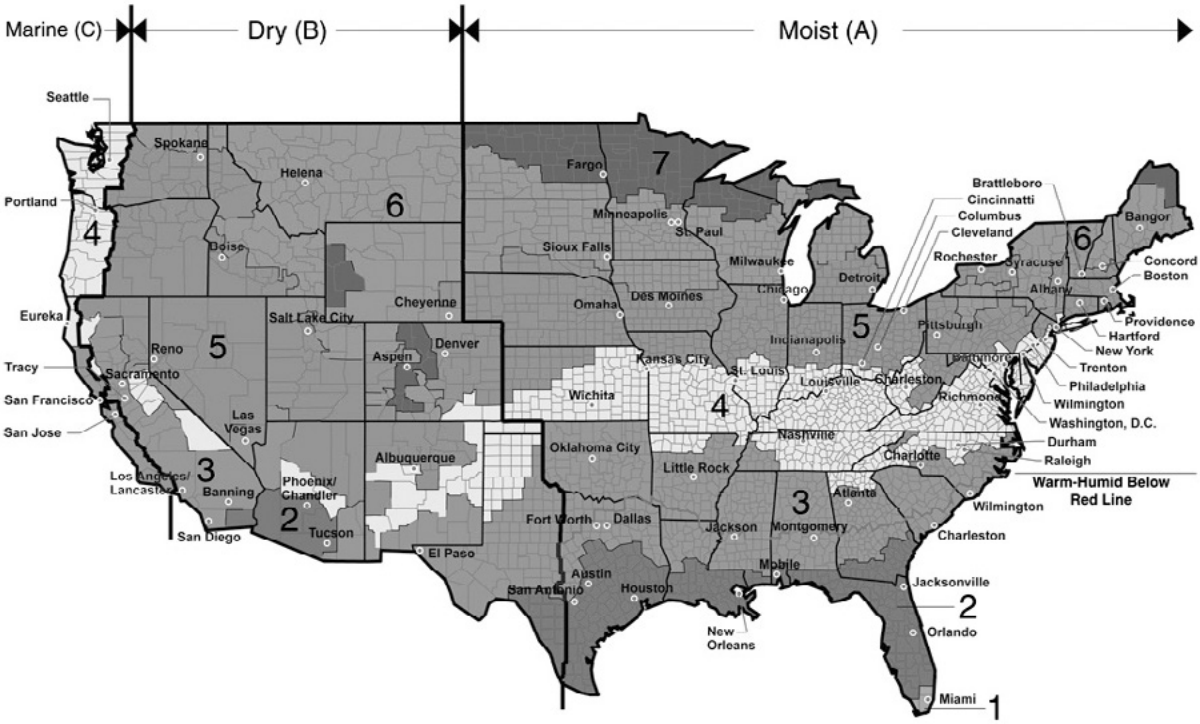
Example project missions:

1. Prioritize a healthy indoor resident experience (e.g. warm, welcoming common spaces; high-visibility common spaces) that extends into the exterior and surrounding neighborhood to provide a vibrant environment by incorporating an amenity-rich green space, tree coverage from existing and newly planted trees and shrubs, and traffic-calming strategies to ensure resident safety.
2. Develop a senior property that features aging-in-place design strategies and is prepared to withstand negative impacts of weather events with adequate back-up power for cooling and other critical loads. The property will center the lived experience of older adults through a series of collaborative art pieces co-created by residents and their families, which will be installed in prominent locations throughout the lobby and building.
3. Create housing for veterans that focuses on resident health and reduced utility bills. To achieve this, we will develop a high-performance all-electric building with on-site renewable energy generation (photovoltaic panels with battery storage) to offset a significant portion of the property's energy load. By switching to an all-electric property, we will be eliminating combustion from the building, thereby improving resident indoor air quality and making the property safer to operate and maintain.

Project Mission Statement

APPENDIX C

IECC Climate Zone Map

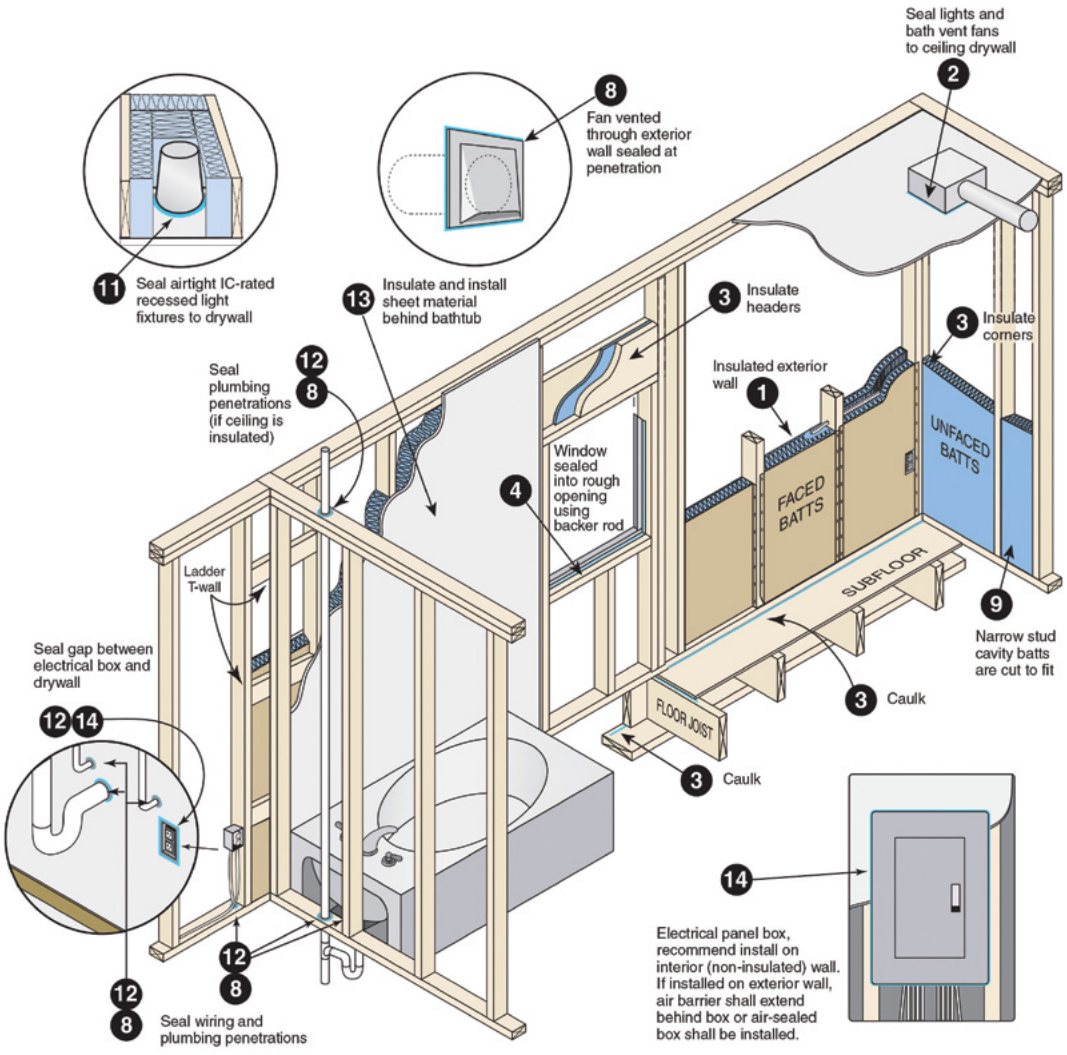


Zone 1 includes: Hawaii, Guam, Puerto Rico, and the Virgin Islands

Alaska is Zone 7, except for the following boroughs in Zone 8: Bethel, Dellingham, Fairbanks, North Star, Nome North Slope, Northwest Arctic, Southeast Fairbanks, Wade Hampton, and Yukin-Koyukuk

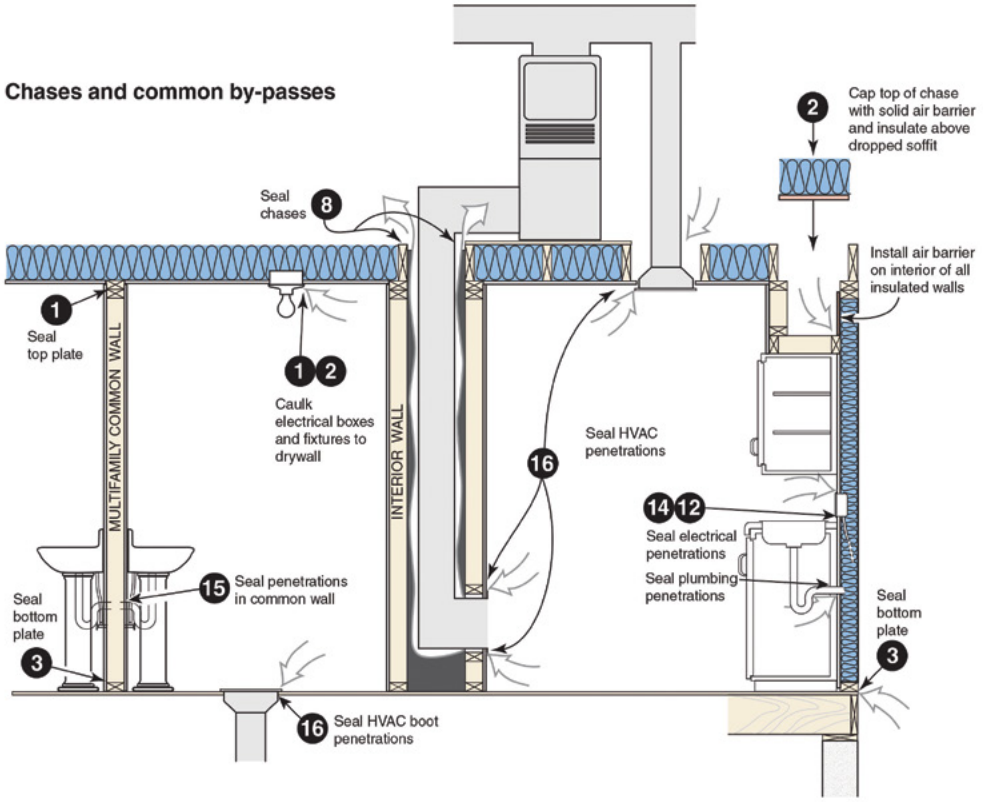
APPENDIX D

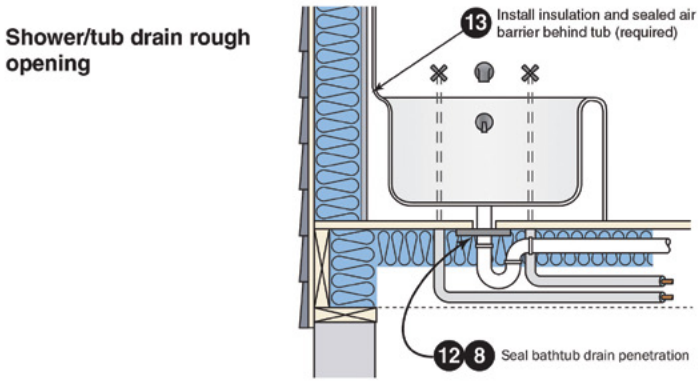
Air Sealing Details

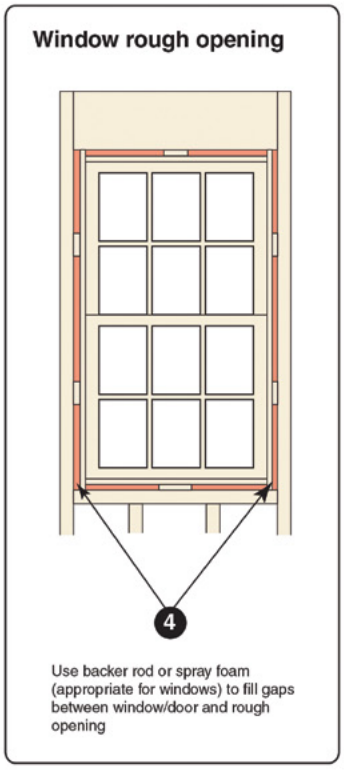


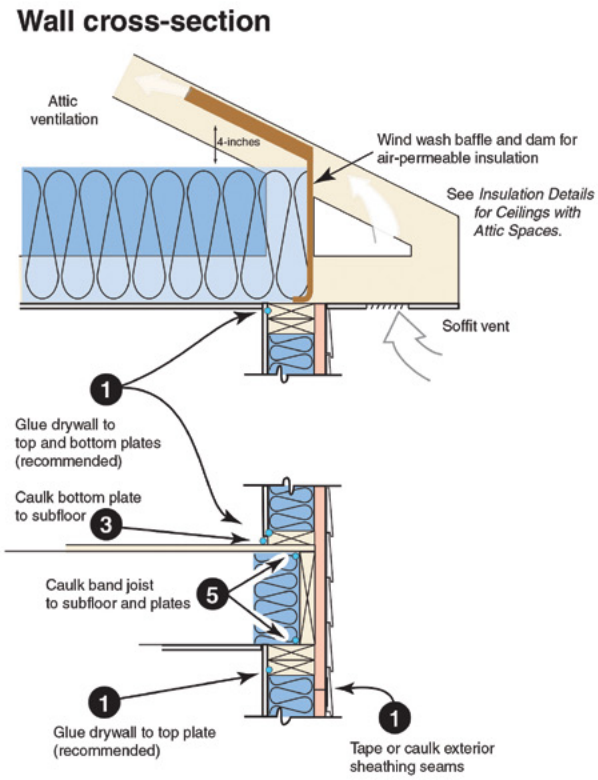
The Air Sealing Detail images are intended solely to help graphically demonstrate the air leakage provisions of section 402.4 of the 2012 IECC. It does not cover all air sealing location or techniques. Other code provisions may be applicable as well.

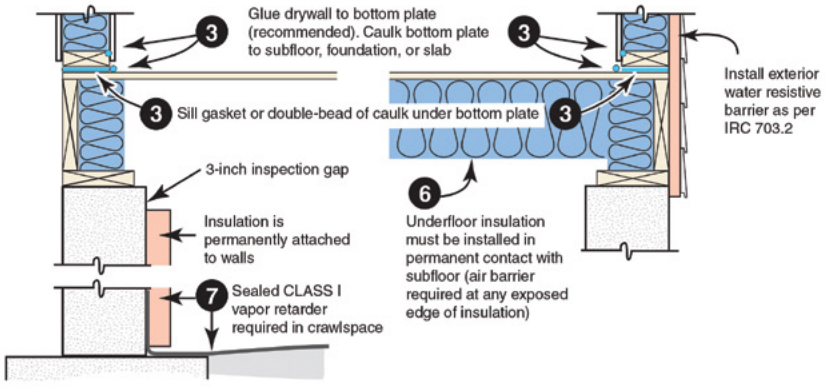
All AirSealing Detail Images courtesy of Southface. Reprinted with permission.

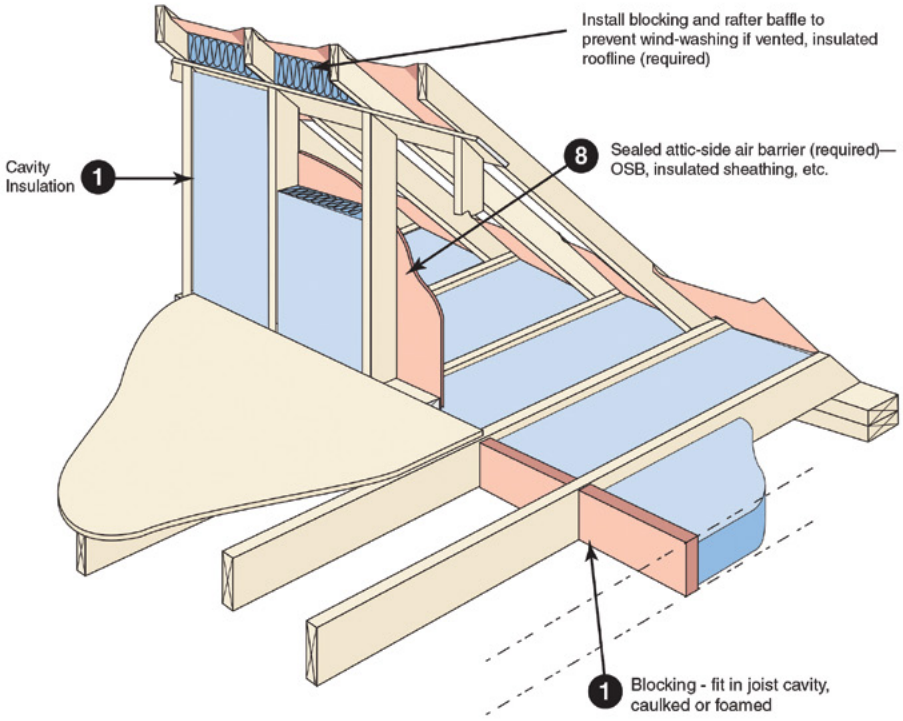

Chases and common by-passes
2
Cap top of chase with solid air barrier and insulate above dropped soffit
Seal chases
8
Install air barrier on interior of all insulated walls
1
Seal top plate
MULTIFAMILY COMMON WALL
1 2
Caulk electrical boxes and fixtures to drywall
INTERIOR WALL
Seal HVAC penetrations
16
14 12
Seal electrical penetrations
Seal plumbing penetrations
15
Seal penetrations in common wall
Seal bottom plate
3
Seal bottom plate
3
16
Seal HVAC boot penetrations


Shower/tub drain rough opening
13
Install insulation and sealed air barrier behind tub (required)
12 8
Seal bathtub drain penetration

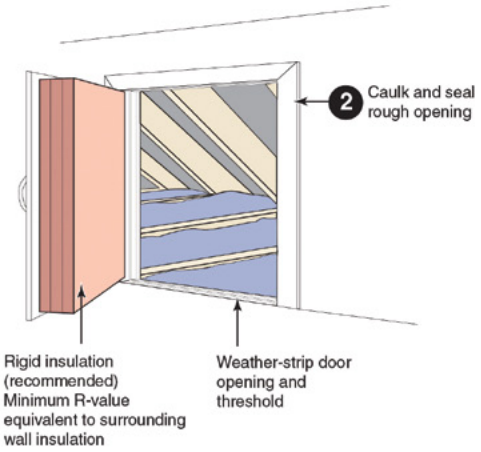

Window rough opening
4
Use backer rod or spray foam (appropriate for windows) to fill gaps between window/door and rough opening


Wall cross-section
Attic ventilation
4-inches
Wind wash baffle and dam for air-permeable insulation
See *Insulation Details for Ceilings with Attic Spaces.*
Soffit vent
1
Glue drywall to top and bottom plates (recommended)
Caulk bottom plate to subfloor
3
Caulk band joist to subfloor and plates
5
1
Glue drywall to top plate (recommended)
1
Tape or caulk exterior sheathing seams

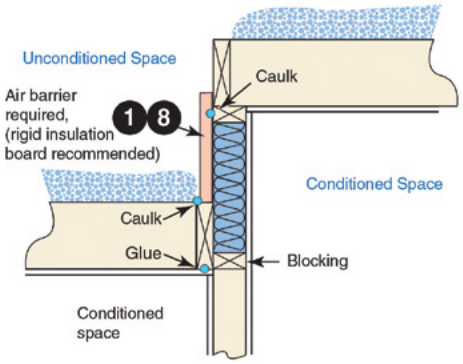

3
Glue drywall to bottom plate (recommended). Caulk bottom plate to subfloor, foundation, or slab
3
3
Sill gasket or double-bead of caulk under bottom plate
3
Install exterior water resistive barrier as per IRC 703.2
3-inch inspection gap
6
Underfloor insulation must be installed in permanent contact with subfloor (air barrier required at any exposed edge of insulation)
Insulation is permanently attached to walls
7
Sealed CLASS I vapor retarder required in crawlspace



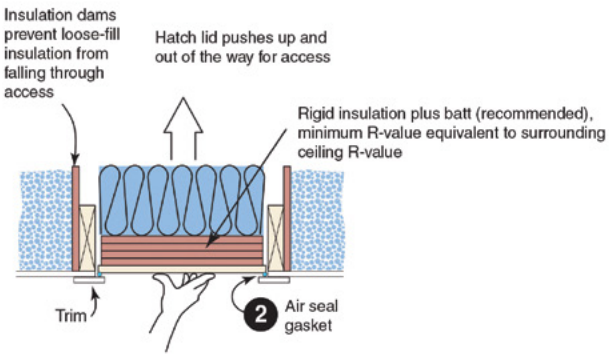
Attic knee-walls



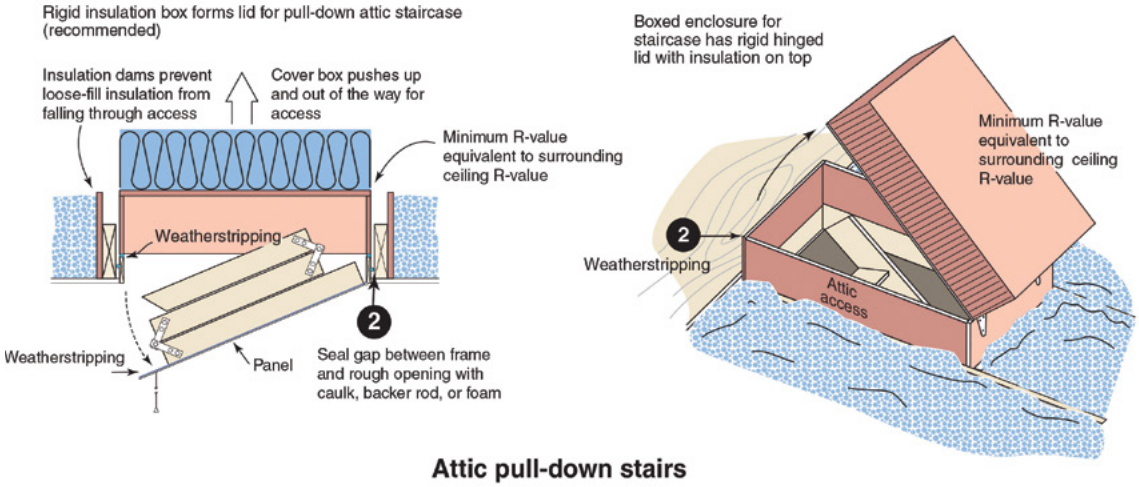
Two-level attic



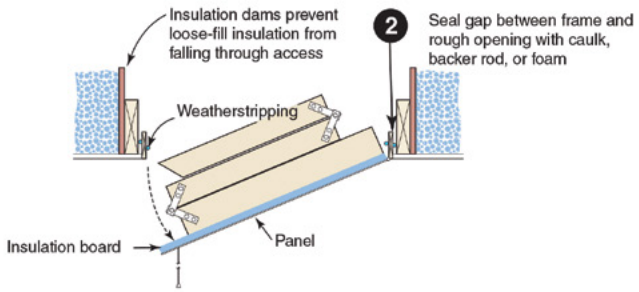
Attic scuttle



Attic pull-down stairs



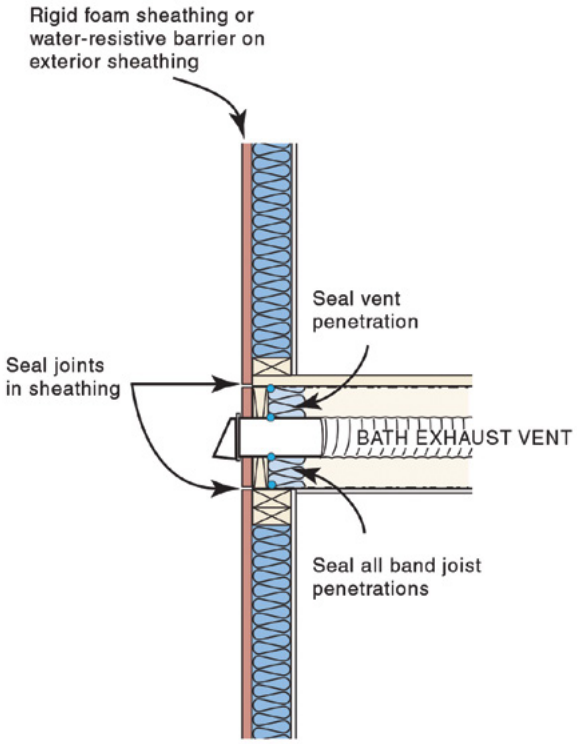
Attic pull-down stairs



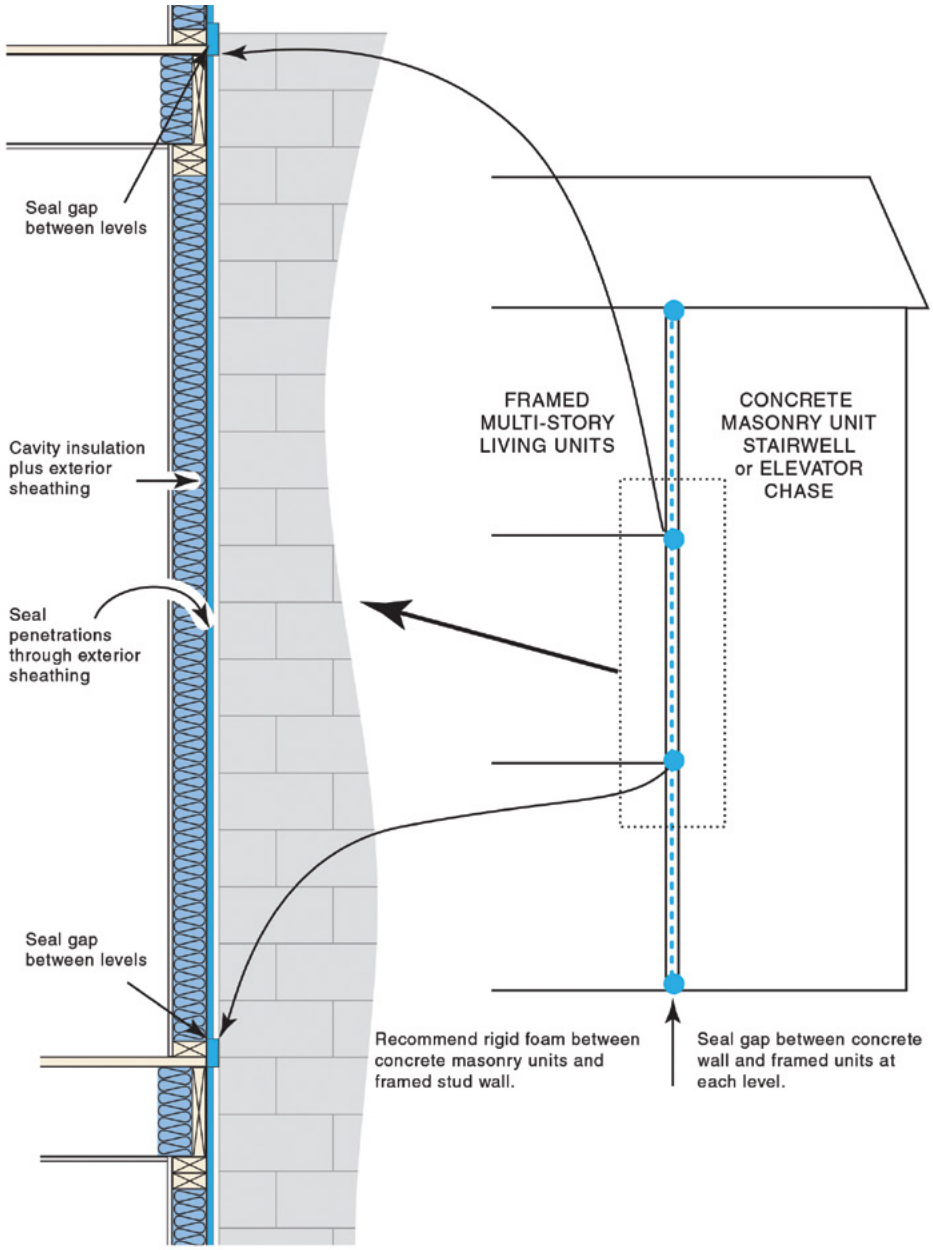
Multifamily

Cap and seal all chases, including chases for grouped utility lines and radon vents.

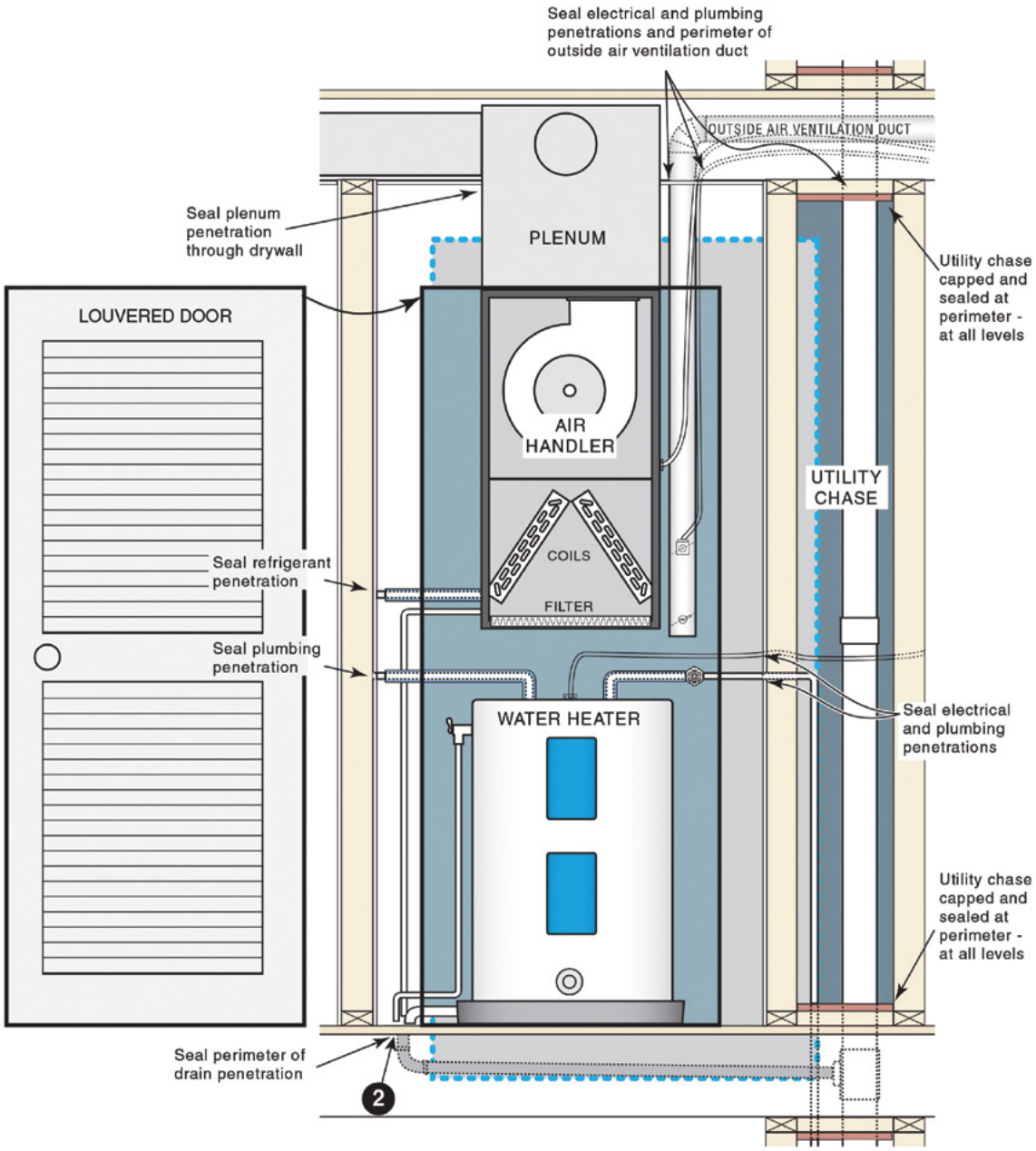
1. Seal penetrations in mechanical closet, including penetrations for the:
   - Supply plenum
   - Outside air ventilation
   - Refrigerant line
   - Plumbing
   - Electrical
   - Gas fuel
2. Seal band area at exterior sheathing side and all penetrations through band.
3. Air-seal at drywall finishing for any wall adjacent to stairwell or elevator. Air-seal this gap at every change in floor level.
4. Seal miscellaneous clustered penetrations through building envelope (e.g., refrigerant lines).



Multifamily

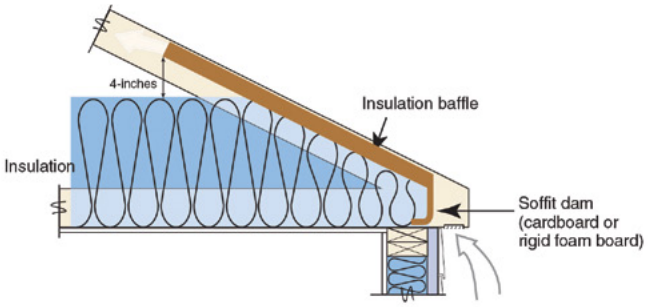


Mechanical Closet

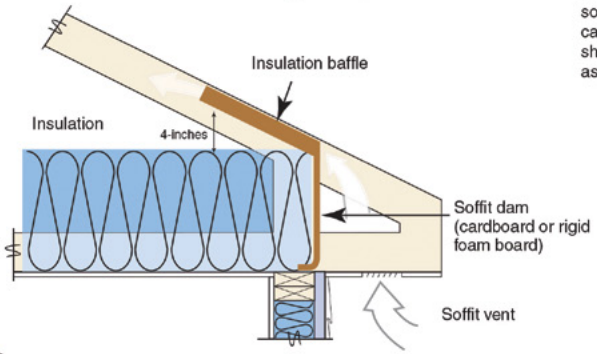


Roof and Truss

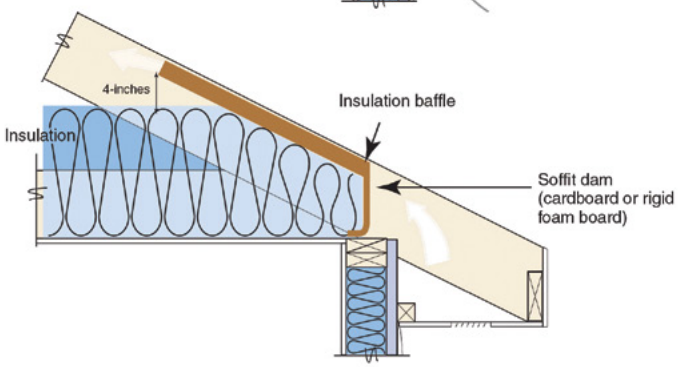
Standard Truss
with tapered
insulation depth



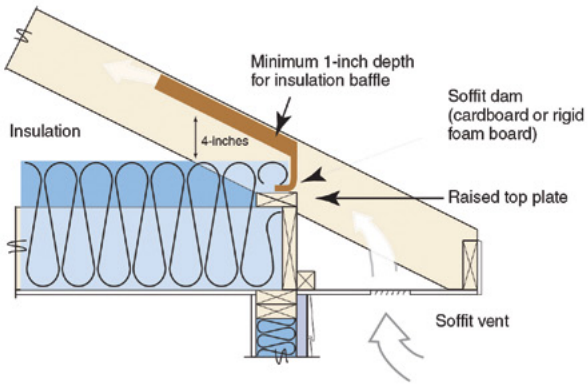
Energy Truss
with full height insulation
(recommended)



Standard rafter and top plate
with tapered
insulation depth

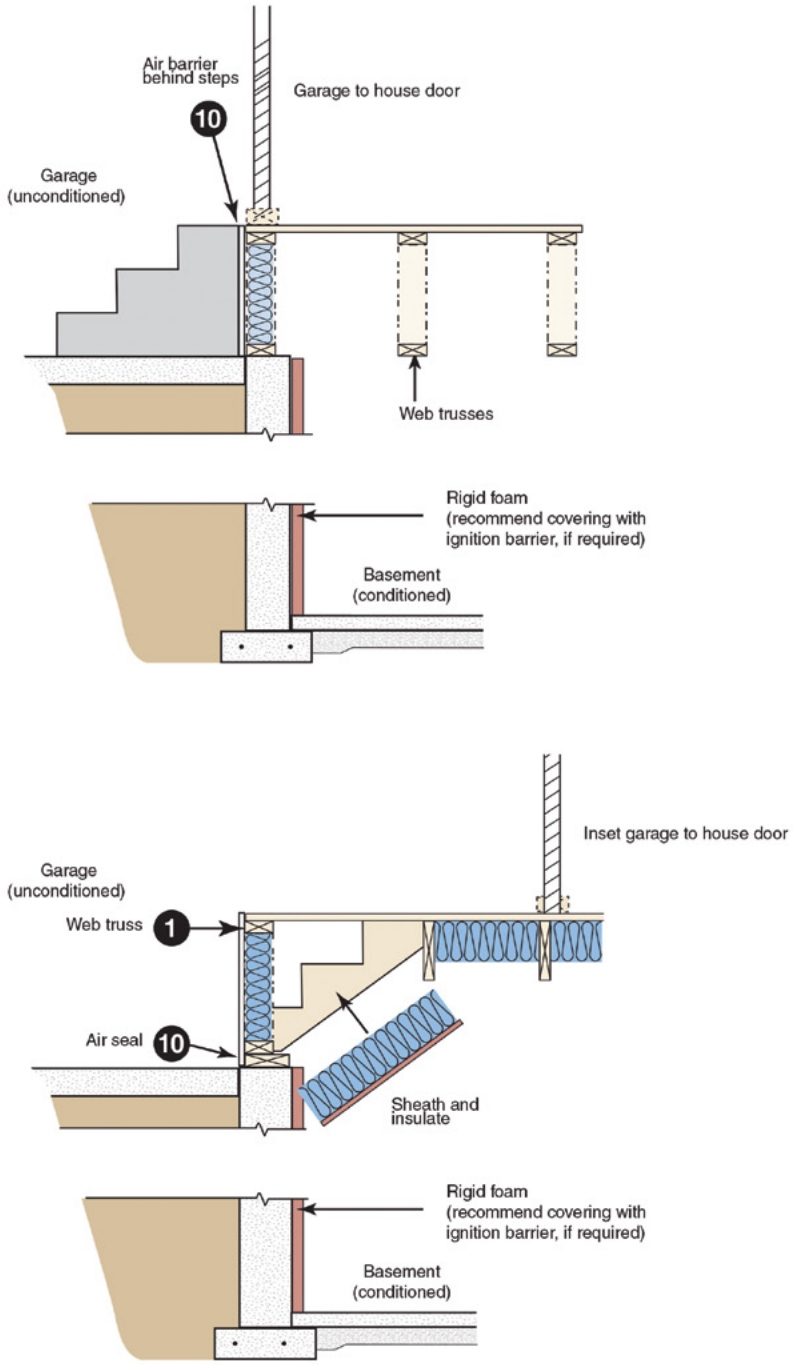


Rafter on raised top plate
with full height insulation
(recommended)



Note: Wind wash baffle and air-permeable insulation dam. For air permeable insulation in vented attics, baffles shall be installed adjacent to soffit and eave vents. A minimum of a 1-inch of space shall be provided between the insulation and the roof sheathing and at the location of the vent. The baffle shall extend over the top of the insulation inward until it is at least 4 inches vertically above the top of the insulation. Any solid material such as cardboard or thin insulating sheathing shall be permissible as the baffle.

Garage


Air barrier
behind steps
10
Garage to house door
Garage
(unconditioned)
Web trusses
Rigid foam
(recommend covering with
ignition barrier, if required)
Basement
(conditioned)
Inset garage to house door
Garage
(unconditioned)
Web truss
1
Air seal
10
Sheath and
insulate
Rigid foam
(recommend covering with
ignition barrier, if required)
Basement
(conditioned)

Glossary

Websites listed were last accessed September 25, 2025. Please note that some of the links below may require subscriptions to access content.

Active design: An approach to the development of buildings, streets, and neighborhoods that uses architecture and urban planning to make daily physical activity and healthy foods more accessible and inviting.

Adapted plant species: A non-native plant species that performs similarly to a native species in a particular region, state, ecosystem, and habitat, and that 1) can survive temperature or other weather extremes in the microclimate; 2) requires little irrigation or fertilization, once established; 3) is resistant to local pests and diseases; and 4) does not displace other plants, as invasives do.

Adaptive reuse: When an existing building is being renovated to accommodate a new use, e.g., rehabilitating an old school for use as housing.

Air barrier: Air barriers are systems of materials designed and constructed to control airflow between a conditioned space and an unconditioned space. The air barrier system is the primary air enclosure boundary that separates indoor (conditioned) air and outdoor (unconditioned) air. In multi-unit construction, like townhomes and apartments, the air barrier system also separates the conditioned air between any given dwelling unit and adjacent units. *www.buildingscience.com/documents/digests/bsd-104-understanding-air-barriers*

Albedo: The fraction of light that a surface reflects. See also *Solar Reflectance Index*.

ARCSA: The American Rainwater Catchment Systems Association, a membership-based organization advocating for and supporting advancements in rainwater catchment and use. *https://arcsainternational.org/*

ASHRAE: An international society of heating, refrigerating, and air-conditioning professionals that sets standards relating to heating, cooling, and ventilation. (Formerly the American Society of Heating, Refrigerating and Air-Conditioning Engineers.) *www.ashrae.org/*

ASHRAE Standard 62.1—Ventilation and Acceptable Indoor Air Quality and 62.2—Ventilation and Acceptable Indoor Air Quality in Residential Buildings: The recognized standards in the U.S. for ventilation system design and acceptable indoor air quality. *www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2*

ASHRAE Standard 90.1—Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings: Provides the minimum requirements for energy-efficient design of most buildings, including both passive systems like exterior walls and windows and active systems like HVAC systems. Also provides, in Appendix G, broadly accepted requirements for requirements for whole-building energy modeling.

Automatic Load Management System (ALMS): A system designed to manage load across one or more electric vehicle chargers to share electrical capacity and/or automatically manage power at each connection point. See also *electric vehicle supply equipment*. *https://sbcc.wa.gov/sites/default/files/2021-08/Load%20Management%20System_Examples.pdf*

Base flood elevation (BFE): The height floodwaters are predicted to reach during a 100-year flood event, commonly used while evaluating flood risk.

Berm: A sloped wall or embankment, typically constructed of earth, hay bales, or timber framing, used to prevent the flow of material into or out of an area.

Biophilic design: Architectural design that reconnects people with nature. It has been credited with reducing stress, improving cognition, and supporting health and well-being in other ways. *www.terrapinbrightgreen.com/reports/14-patterns/*, *https://living-future.org.au/biophilic-design/*

Bioswale: Vegetated, shallow depressions in the landscape engineered to capture, treat, and infiltrate stormwater to reduce runoff. Compared with conventional swales, bioswales are intentionally designed with enhanced soil and plants to maximize treatment. *https://nacto.org/publication/urban-street-design-guide/street-design-elements/stormwater-management/bioswales/*

Blue roof: A non-vegetated stormwater detention system that is installed over a sealed roof membrane. It typically uses check dams, trays, or modified roof drains to capture and temporarily detain stormwater before it reaches downspouts. *https://water.phila.gov/gsi/tools/blue-roof/*

Blue-green roof: A roof system with a separate layer beneath the vegetated layer that contains structural voids that provide temporary detention capacity in addition to the retention capacity of the vegetated layer. Best suited for flat or low-sloped roofs. *www.sciencedirect.com/science/article/pii/S0301479721018120*

Bollards: A series of vertical posts or barriers that guide traffic and/or protect pedestrian areas. *www.wbdg.org/resources/bollard-non-crash-and-non-attack-resistant-models*

Building enclosure: The building enclosure is made up of the roof, foundation, and exterior wall assemblies, that separate the indoors from the outdoors, providing protection against weather, pests, noise, and other elements that impact comfort and energy efficiency. *www.wbdg.org/resources/residential-building-enclosure*

Building Performance Institute (BPI): A national standard developer and credentialing organization for residential energy auditing and upgrade work and provides training through affiliate organizations as well as other related programs. *www.bpi.org/*, *https://bpi.org/about-us/*

Carbon: See *Emissions*.

CFM (cubic feet per minute): A standard unit of measurement for airflow through HVAC systems. It indicates how many cubic feet of air are passing through a fixed point per minute and is used to test air tightness.

Charrette: An intensive work session in which various stakeholders and experts come together before schematic design to articulate project goals and begin integrating green principles into design while setting the project up for success during construction and operation. In addition to housing professionals, a charrette may include funders, policymakers, health practitioners, and community stakeholders.

CO (carbon monoxide): A colorless, odorless and tasteless gas that greatly affects indoor air quality. Because it is impossible to see, taste, or smell the toxic fumes, CO can kill you before you are aware that it is in your home. At lower levels of exposure, CO causes mild effects that are often mistaken for the flu. These symptoms include headaches, dizziness, disorientation, nausea, and fatigue. *www.epa.gov/co-pollution*

CO_2 or **CO_2e:** See *Emissions*

Colonias community: Any identifiable community in the U.S.–Mexico border regions of Arizona, California, New Mexico and Texas that is determined to be a colonia on the basis of objective criteria, including lack of a potable water supply, inadequate sewage systems, and a shortage of decent, safe and sanitary housing. The border region means the area within 150 miles of the U.S.–Mexico border, excluding Metropolitan Statistical Areas with populations exceeding one million (according to the National Affordable Housing Act of 1990, Section 916).

Common area: An area available for use by more than one person, including rental or sales offices, entrances, hallways, laundry rooms, shared activity or leisure rooms, and spaces for providing resident services.

CSA (Community-supported agriculture): A community of individuals who pledge support to a farm operation so that the farmland becomes the community's farm, with the growers and consumers providing mutual support and sharing the risks and benefits of food production. Typically, members of the farm or garden pledge in advance to cover the anticipated costs of the farm operation and the farmer's salary. In return, they receive shares in the farm's bounty throughout the growing season. Members also share the risks of farming, including poor harvests due to unfavorable weather or pests. *www.nal.usda.gov/farms-and-agricultural-production-systems/community-supported-agriculture*

Community solar: A solar-powered electrical system that, through a voluntary program, provides power and/or financial benefit to, or is owned by, multiple community members. *www.nrel.gov/docs/fy11osti/49930.pdf*

Compost blanket: A layer of loosely applied compost or composted material that is placed on the soil in disturbed areas to control erosion and retain sediment resulting from sheet-flow runoff.

Critical root zone (CRZ): The critical root zone, or CRZ, is defined as the area of soil where roots required for future tree health and survival are located. This area can also be defined as a circle with a minimum radius of 1 foot for every 1 inch of trunk diameter at 4.5 inches above ground.

Dead leg: A length of pipe leading to an outlet which has been removed, is rarely used, or is entirely unused. Dead legs do not have regular water flow, increasing the opportunity for bacterial growth in the system.

Dedicated bike lane: A dedicated travel area exclusively for bicyclists that is located on or directly adjacent to the roadway. *https://ddot.dc.gov/sites/default/files/dc/sites/ddot/DDOT%20Bicycle%20Facility%20Design%20Guide%20-%20Version%202%20%28Final%29.pdf*

Defensible space: In the context of wildfire adaptation, defensible space is a buffer between a structure and the surrounding area that acts as a barrier to slow or halt fire progress. *www.fire.ca.gov/dspace*

Design flood elevation (DFE): The minimum elevation to which a structure must be elevated or floodproofed, as set and regulated by local authorities. *www.reducefloodrisk.org/glossary/design-flood-elevation-dfe/*

Detention basin: An artificial pond or structure designed to capture and hold stormwater runoff with an engineered discharge structure that controls the elevation and rate of release. A dry detention system does not permanently maintain a permanent pool of water and provides treatment via infiltration. A wet detention system is designed to retain a permanent pool of water and has specific vegetated zones designed to provide treatment through nutrient uptake.

Dial-a-ride program: A program that provides an on-demand ride service, requiring passengers to call ahead to reserve a ride. These programs may be privately or publicly operated and usually provide connections between different transportation systems and/or employment centers.

Diameter at breast height (DBH): Diameter of a tree taken at 4.5 feet (or 1.37 meters) above ground level. Common measure of tree girth used for tree preservation during construction projects.

Distribution uniformity: A measure of the evenness of irrigation water coverage over a defined area.

Drying potential: The extent to which a material or building assembly permits evaporation of moisture. *www.greenbuildingadvisor.com/article/understanding-drying-potential*

Dwelling unit: A single unit providing complete, independent living facilities for one or more people, including permanent provisions for living, sleeping, eating, cooking, and sanitation. From Addendum J to ASHRAE 62.2-2010, found online at: *www.ashrae.org/standards-research--technology/standards-addenda*

ECM (electronically commutated motor): Also known as brushless DC motors, ECMs are synchronous motors that are powered by a DC electric source via an integrated inverter/switching power supply that produces an AC electric signal. Used, for example, in HVAC equipment that uses electricity efficiently, particularly at lower speeds.

Ecologically sensitive: Describes a natural area with significant ecological value that is vulnerable and could be easily harmed by human activities or environmental disturbances.

Ecosystem services: The direct and indirect economic, social, and environmental benefits that ecosystems provide to humans. *www.climatehubs.usda.gov/ecosystem-services*

Electrical vehicle service equipment (EVSE): A system that transfers power to an electric vehicle. EVSE must include an energized conductor as well as charging equipment—either a connector and plug (i.e., charging cord) or apparatus for wireless (e.g., inductive) charging—to provide power directly to a vehicle. EVSE may also optionally include load management, scheduling, adapters, and other features to facilitate on-site electric vehicle charging.

Embodied carbon or Embodied emissions: The greenhouse gas emissions arising from the manufacture, transportation, installation, maintenance, and disposal of building and infrastructure materials. *https://carbonleadershipforum.org/embodied-carbon-101-v2/*

Emissions: For indoor emissions, see *VOCs*. The release of heat-trapping gases into Earth's atmosphere, contributing to global warming and climate change. Primarily used to describe atmospheric pollution caused by human activities, particularly combustion of fossil fuels. The following terms are commonly used as synonyms: carbon, carbon footprint, carbon dioxide, carbon dioxide equivalent, greenhouse gas emissions, GHG emissions, fossil fuel emissions, global warming potential, climate change potential. "Carbon" is often used as an abbreviation to refer to global warming potential. See also *Life-cycle emissions*, *Embodied carbon*, *Operating carbon*, and *scope 1*, *scope 2*, and *scope 3* greenhouse gas emissions.

Emissions intensity: Emissions per square foot per year at a property. Can be used before design to set a carbon target, during design to compare performance scenarios, and during operation to measure carbon performance.

Employer vanpool: A program in which 5 to 15 people over the age of 16 ride together to and from work. The vanpool may be public or private but must carry all passengers more than half the distance to work to qualify. Vanpools may be employer-operated, sponsored by transit agencies, or administered by third-party operators.

ENERGY STAR: A set of voluntary certification and labeling programs designed to incentivize energy efficiency in buildings. Introduced by the U.S. Environmental Protection Agency in 1992, ENERGY STAR includes labels for appliances and equipment, newly constructed single-and multifamily homes, and existing multifamily and commercial buildings. *www.energystar.gov*

Energy use intensity (EUI): Energy use per square foot per year at a property. Used before design to set an energy target, during design to compare performance scenarios, and during operation to measure energy performance.

Engineered wood products: Wood building materials manufactured by gluing particles, fibers, or veneers to increase strength. For the purposes of *Criterion 6.4 Advanced Material Selection*, Green Communities considers prefabricated and precut wood products to be engineered wood products. *https://iwpllc.com/products/engineered-wood-products/*

Entryway: Threshold separating the indoor space from the outdoor space.

Environmental product declaration (EPD): An independently verified and publicly registered document that discloses standardized data representing the estimated environmental impacts of products at different stages in their life cycles. The standardized format and other controls enable practitioners to compare the estimated environmental impacts of multiple products in the same product category. EPDs are frequently used to compare embodied emissions of different products. See also *Embodied carbon*.

Environmental site assessment: An investigation of the site's conditions, often performed before acquisition of a property to satisfy the due-diligence requirements of a property transaction.

Energy Rating Index (ERI): A rating that compares the energy performance of an actual home with the energy performance of a reference home of the same geometry built to the requirements of the 2006 International Energy Conservation Code. The lower the number, the better the energy performance. An ERI of 100 means no difference in energy between the actual home and the reference home. An ERI of 0 means no net purchased energy annually. The rules for rating homes and reporting their scores are established in ANSI/RESNET/ICC 301—Standard for the Calculation and Labeling of the Energy Performance of Dwelling and Sleeping Units Using an Energy Rating Index. One example of an ERI Is RESNET's proprietary HERS Index.

Erosion blankets or Geotextile mats: Porous fabrics used on a construction or building site for a variety of purposes, including separators, reinforcement, filtration and drainage, and erosion control.

Erosion control plan (ECP): A plan detailing the devices and conservation measures used to minimize erosion caused by stormwater runoff and to prevent sediment pollution from entering waterways. *https://doee.dc.gov/esc*

Fenestrated panel: Screen or panel with openings (perforations) used to reduce wind exposure. The perforations allow some wind to pass through, reducing overall wind load and mitigating wind impact.

Filter sock: A mesh tube filled with composted material that is placed perpendicular to sheet-flow stormwater runoff to control erosion and retain sediment in disturbed areas.

Formaldehyde: A chemical used widely by industry to manufacture building materials and numerous household products. Formaldehyde is also a by-product of combustion and certain other natural processes and thus may be present in substantial concentrations both indoors and outdoors. Health effects include eye, nose, and throat irritation; wheezing and coughing; fatigue; skin rash; and severe allergic reactions. High levels of exposure may cause some types of cancer. *www.epa.gov/formaldehyde*

Freeboard: The additional height above base flood elevation (BFE) protecting a building from flooding, usually 1 to 3 feet for critical facilities. *www.reducefloodrisk.org/glossary/freeboard/*

Furnishing zone: A section of sidewalk located adjacent to a curb that serves as a buffer, typically 3 to 5 feet wide, between pedestrians and the roadway. So called because it often includes seating or other amenities. Furnishing zones enhance pedestrian safety and provide space for sidewalk elements to maintain a clear path of travel. *www.nycstreetdesign.info/furniture/furnishing-zone*

Global warming potential (GWP): The capacity of a gas to trap heat in Earth's atmosphere. GWP is a way to compare the climate impact of different substances, with carbon dioxide as the benchmark with a GWP of 1. A higher GWP means a gas can trap more heat, worsening global warming. Although established for comparing greenhouse gases, GWP can apply by extension to any activity, process, or physical object, and it is one of the impact categories in an environmental product declaration (EPD). In that context, it is roughly equivalent to embodied carbon. GWP is expressed as carbon dioxide equivalent, or CO_2e.

Green infrastructure (GI): A landscape feature designed to mimic nature and capture rainwater where it falls instead of allowing it to run off the site as stormwater. GI reduces and treats stormwater at its source while also providing multiple community benefits, such as reducing localized flooding and improving community quality of life and resilience. *www.epa.gov/G3/why-you-should-consider-green-stormwater-infrastructure-your-community*

Green roof: A vegetated rooftop system (extensive or intensive) consisting of barriers to prevent water or root damage to the structure, a drainage layer to aid in water drainage, a growing medium, and a vegetative layer. Green roofs reduce roof surface and adjacent air temperatures, helping moderate the heat-island effect; filter rainwater and reduce runoff; absorb pollutants and carbon dioxide; provide natural habitat; and can serve as recreational green space. *www.epa.gov/soakuptherain/soak-rain-green-roofs and www.epa.gov/heatislands/using-green-roofs-reduce-heat-islands*

Greywater: Wastewater produced from baths and showers, clothes washers, and lavatory sinks. Greywater gets its name from its cloudy appearance and from its status as being neither fresh (as in potable water) nor heavily contaminated (as in blackwater from toilet waste). (Source: U.S. Environmental Protection Agency)

Health Product Declaration (HPD): a document that provides standardized information about the contents of building products and their potential health impacts.

Hydrozone: The landscaping practice of grouping together plants with similar water requirements, with the goal of conserving water.

Hygrothermal: The dynamic and interrelated movement of heat and moisture. Requires awareness and attention in the context of green building because energy-efficient design impacts moisture dynamics, including condensation potential and drying potential inside the building enclosure. *www.designingbuildings.co.uk/wiki/Hygrothermal*

ICC (International Code Council): Produces model building codes, including the International Building Code (IBC) and the International Residential Code (IRC).

IECC (International Energy Conservation Code): A model building energy code created by the ICC to set a minimum standard for energy efficiency; updated on a three-year schedule. *www.iccsafe.org/*

iHPWH (integrated heat pump water heaters): Integrated heat-pump water heaters (iHPWHs) are the most commonly used heat-pump technology for domestic water heating. iHPWHs have their heat-pump compressor and heat exchangers attached directly to the water heater's storage tank. *www.energystar.gov/partner-resources/residential_new/educational_resources/sup_program_guidance/heat_pump_water_heater_guide#:~:text=*%20Integrated%20Heat%20Pump%20Water%20Heaters,propane%2C%20or%20kerosene%20water%20heaters.*

Immediate impact measures: In the context of Zero Over Time planning, immediate impact measures are building strategies identified to achieve early, meaningful reductions in carbon emissions while maintaining flexibility for future renovations within the project plan to achieve net-zero emissions in 20 years or less.

Impact Insulation Class: Impact Insulation Class (IIC) is an acoustical rating used to quantify impact sound absorption and vibration isolation in floor and ceiling assemblies. Assemblies with acoustical underlayments have a higher IIC rating because they block more impact sound. *https://acousticalsolutions.com/what-is-iic-impact-insulation-class/?srsltid=AfmBOor7q_PQKL9slois4xuZlJ2cVwvff5Wz_pj9gQMkNDSh0lJZgv6yInfill*

Infill site: A site with 75% of its perimeter bordering existing development or roads and with access to existing infrastructure.

Integrated water factor (IWF): An efficiency metric used for clothes washers, IWF is the quotient of the total weighted per-cycle water consumption divided by the capacity of the clothes washer. Lower numbers indicate more efficient use of water.

Integrative design: A design approach that brings together at an early stage in project planning all the members of the building stakeholder community, including residents or potential residents, and the design and construction team (including green building consultants such as the green rater, energy experts, and others) to look at the project objectives, building materials, systems, and assemblies from many different perspectives. This approach is an alternative to the typical planning and design process of relying on the expertise of specialists who work in their respective specialties somewhat isolated from each other. *www.enterprisecommunity.org/solutions-and-innovation/green-communities/tools-and-services/charrette-toolkit*

Invasive species: A species that is non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. *www.fs.usda.gov/wildflowers/invasives/index.shtml*

JA8 bulbs: High-efficiency light bulbs certified to meet California's Title 24 Building Energy Efficiency Standards, Joint Appendix 8. *www.energy.ca.gov/sites/default/files/2022-08/CEC-400-2022-010-AP.pdf*

LED (light-emitting diode): Energy-efficient lighting products that produce less initial heat per lumen, consume less energy, and last longer than conventional incandescent and fluorescent lights.

Life-cycle emissions: The sum of the operating emissions and embodied emissions of a building.

Lighting power density (LPD): An indicator of energy efficiency for a space's lighting scheme. Measured in watts of lighting per square foot of room floor area (W/sf).

Local food system: The geographic context in which food is produced, marketed, and consumed, including intermediate supply-chain steps taking food from farm to table. *https://localfood.ces.ncsu.edu/about-localfood/more-about-local-food/*

Low-Impact development (LID): A stormwater management approach and set of practices that can reduce runoff and pollutants by managing runoff as close to the source as possible. LID includes both overall site design approaches and individual small-scale stormwater management practices that promote the use of natural systems for infiltration of rainwater. *www.epa.gov/sites/default/files/2015-09/documents/bbfs2terms.pdf*

Luminaire: A complete lighting unit consisting of a lamp or lamps together with the parts designed to distribute the light, to position and protect the lamps and ballast (where applicable), and to connect the lamps to the power supply.

Manual D Residential Duct Design: Standard developed by the Air Conditioning Contractors of America (ACCA) for designing residential duct systems. *www.acca.org/store#/productDetail/71E94104-BC20-E511-80F8-FC15B428DD54/*

Manual J Residential Load Calculation: Standard developed by ACCA for determining heating and cooling loads of residential structures. *www.acca.org/store#/productDetail/DB68FDFC-BB20-E511-80F5-C4346BAC9A78*

Manual LLH Low Load Homes: Standard developed by ACCA that uses Manuals J, S, D, T, and others as a baseline and identifies equipment options and approaches to address low cooling and/or heating loads. *www.acca.org/standards/*

Manual S Residential Equipment Selection: Manual prepared by ACCA on selecting residential heating and cooling equipment to match the heating and cooling loads of residential structures. *www.acca.org/technical-manual/manual-s/*

MERV: Minimum Efficiency Reporting Values (MERVs) report an air filter's ability to capture larger particles between 0.3 and 10 microns (µm). *www.epa.gov/indoor-air-quality-iaq/what-merv-rating*

Micromobility: Small, low-speed vehicles intended for personal use. *https://highways.dot.gov/safety/pedestrian-bicyclist/safety-tools/pg-25-transit-and-micromobility*

Moderate rehabilitation: Refer to the definition in *Appendix A* of this manual.

Modular construction: The fabrication of building components in an off-site facility, which are then transported and put together on-site. *www.wbdg.org/resources/site-and-modular-construction-explained*

Mudflat: An unvegetated area of land consisting of mud, sand, or gravel deposited by oceans, seas, or tributaries when the tide comes in, and exposed when the tide lowers.

Native plant: Plant species that occurs naturally, without direct or indirect human actions, in a particular region, state, ecosystem, and habitat. *www.audubon.org/content/why-native-plants-matter*

On-site renewable energy: Any renewable energy collected and generated within the site boundary that is used for building energy; includes any excess renewable energy exported outside the site boundary. The renewable energy certificates (RECs) associated with the renewable energy must be retained or retired by the building owner or lessee to count as on-site renewable energy for the purposes of the Green Communities Criteria. *www.energy.gov/sites/prod/files/2015/09/f26/bto_common_definition_zero_energy_buildings_093015.pdf*

Open space: Undeveloped land that is permanently set aside for public use. Open space may be used as community open space or preserved as green space, and includes parcels in conservation easement or land trust, park or recreation areas, and community gardens.

Operating carbon or Operating emissions: Commonly refers to the global warming potential attributed to the operation and use of a building. *https://buildinginnovationhub.org/resource/get-started/understanding-building-emissions/*

Particulate matter: A mixture of solid particles and liquid droplets found in the air, including those so small that they can be inhaled. *www.epa.gov/pm-pollution/particulate-matter-pm-basics*

Permeable paving: A porous cover system that encourages groundwater recharge and infiltration. "Permeable" and "pervious" are often used interchangeably to describe these systems. *www.epa.gov/green-infrastructure*

PFAS (per- and polyfluoroalkyl substances): A group of manufactured chemicals, widely used as water- and stain-repelling ingredients, that break down slowly and can build up in people, animals, and the environment over time. PFAS are commonly referred to as "forever chemicals." *www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas*

Photosensor: A light-sensitive device that detects ambient light and controls exterior fixtures accordingly.

Photovoltaics (PV): Composite materials that convert sunlight directly into electrical power.

PNA (physical needs assessment): A comprehensive evaluation of a property's current physical condition, repair needs, and long-term capital requirements. *https://files.hudexchange.info/course-content/pha-occupancy-webinar-series-physical-needs-assessment/PHA-Occupancy-Webinar-Physical-Needs-Assessment-Handout.pdf*

PSH (permanent supportive housing): See *Supportive housing dwelling units*.

Public–private regional transportation: Arrangement in which a private company offers public transit services, with a regular schedule and permanent stops, through a public funding stream.

Purple roof: Roof system with a friction-based fabric layer integrated with a vegetated layer; the fabric layer provides detention capacity in addition to the retention capacity of the vegetated layer. It can be installed on flat or sloped roofs. *www.hydrotechusa.com/sites/default/files/press/CAM%20Magazine%20-May%20-2023.pdf*

Qualified energy rater: Trained and certified professional who evaluates a building's features to identify opportunities for enhanced performance. *www.energystar.gov/partner-resources/residential_new/working/energy_rating_cos*

Radon: The second leading cause of lung cancer in the United States, according to the EPA. Radon is a colorless, odorless, and tasteless radioactive gas that is naturally occurring in soil and rocks and can circulate undetected in a home's indoor air. Tests are inexpensive, and simple mitigation strategies can protect residents from exposure to this major carcinogen. *www.epa.gov/radon*

Rainwater: In the context of stormwater management and water reuse, rainwater generally refers to precipitation that falls on roof surfaces and is thereby less contaminated than rainfall that has come into contact with ground surfaces.

Recapitalization: A process whereby the type, amount, income, return, or priority of a loan, ownership interest, or other securities of a property are adjusted, restructured, or replaced. *https://files.hudexchange.info/course-content/hud-multifamily-affordable-housing-preservation-clinics/Preservation-Clinic-Glossary-of-Multifamily-Affordable-Housing-Preservation-Terms.pdf*

Recessed light fixture (recessed can): A luminaire that is installed into an opening in the ceiling or wall.

Renewable energy: According to the U.S. Energy Information Administration glossary, these energy resources are naturally replenishing but flow–limited, meaning they are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Renewable energy resources include biomass, hydro, geothermal, solar, wind, ocean thermal, wave action, and tidal action. *www.energy.gov/sites/prod/files/2015/09/f26/bto_common_definition_zero_energy_buildings_093015.pdf*

Renewable energy certificates (RECs): A REC represents and conveys the environmental, social, and other nonpower qualities of one megawatt-hour of renewable electricity generation and can be sold separately from the underlying physical electricity associated with a renewable-based generation source. *www.energy.gov/sites/prod/files/2015/09/f26/bto_common_definition_zero_energy_buildings_093015.pdf*

Resilience: The capacity to adapt to changing conditions and to maintain or regain functionality and vitality in the face of stress or disturbance. Relative to climate change, resilience involves adaptation to the wide range of regional and localized impacts that are expected with a warming planet: more intense storms, greater precipitation, coastal and valley flooding, longer and more severe droughts in some areas, wildfires, melting permafrost, warmer temperatures, and power outages. May be used to describe a community of people, a physical property, or both. *www.resilientdesign.org/resilient-design/*

Resilient flooring: An organic floor-surfacing material made in sheet or tile form or formed in place as a seamless material of which the wearing surface is non-textile. These products are characterized by having some elasticity (when compared with hard-surface flooring, like wood or stone) and are typically able to recover from strain or deformation caused by compressive stress. Includes linoleum, cork, rubber, and polymeric products. *https://rfci.com/about-the-industry/*

RESNET (Residential Energy Services Network): An ENERGY STAR Home Certification Organization (HCO), RESNET is a national nonprofit membership corporation that is also a recognized standard-making body for national energy-efficiency rating and certification programs. *www.resnet.us*

Retention basin: An artificial pond or structure designed to capture, retain, and treat stormwater runoff. Retention basins are designed to permanently hold water without an engineered surface discharge structure and provide treatment via nutrient uptake from planted vegetation.

Rock filter or Filter berm: A permanent or temporary stone structure installed to serve as a sediment-filtering device in drainage ways. Allows a pool to form in an excavated or natural depression, where sediment can settle. The pool is then dewatered through the gravel rock dam. *http://water.epa.gov/polwaste/npdes/swbmp/Construction-Site-Stormwater-Run-Off-Control.cfm*

Rural: Refer to the definition in *Appendix A* of this manual.

Scope 1 greenhouse gas emissions: Emissions from sources controlled directly by the building owner or operator, such as those from on-site fossil fuel combustion when heating water or cooking on a gas range. *www.epa.gov/climateleadership/scopes-1-2-and-3-emissions-inventorying-and-guidance*

Scope 2 greenhouse gas emissions: Emissions associated with purchased energy and thus controlled indirectly by the building owner or operator, such as electricity purchased from the grid or heating purchased from a district energy system. *www.epa.gov/climateleadership/scopes-1-2-and-3-emissions-inventorying-and-guidance*

Scope 3 greenhouse gas emissions: Emissions associated with the value chains of products and services, such as the embodied carbon of building materials purchased by an owner or developer, or the emissions from a general contractor's equipment during building construction on behalf of the owner or developer. *www.epa.gov/climateleadership/scopes-1-2-and-3-emissions-inventorying-and-guidance*

Seasonal wetlands: Areas of land that are inundated by water for variable periods from winter to spring, when water is plentiful, but may be completely dry for most of the summer and fall.

Sight triangle: The area of visibility required on a corner to allow for the safe operation of vehicles, trains, pedestrians, and cyclists in the proximity of intersecting streets, rail lines, sidewalks, and bicycle paths. *https://store.transportation.org/Item/CollectionDetail?ID=180&AspxAutoDetectCookieSupport=1*

Silt fencing: A temporary fabric barrier surrounding a site to control stormwater runoff.

Silt sacks: Tube-shaped erosion-control devices.

Site energy: Energy consumed by buildings on the property, as measured at the site boundary. Comprises energy delivered to the property (e.g., gas, electricity, district heat) and energy that is both generated and used on the property—but does not include energy that is generated on the site and then exported to the grid. Aside from energy generated and consumed on the property, site energy is reflected in utility bills for operating HVAC, domestic hot water, lighting, plug loads, process loads, and all other end uses in buildings. Site energy does not account for losses occurring when energy is generated or transported. See *Source energy*.

Slab: One type of foundation, with many variations (monolithic slabs, floating slabs, rat slabs, in conjunction with a basement, etc.), that may be above, at, or below grade. Wood frame crawl foundations are an alternative to slabs.

Social isolation: Social isolation is when a person does not have relationships or contact with others and has little-to-no social support. *www.cdc.gov/social-connectedness/risk-factors/index.html*

Solar hot water system: Captures, converts, and transfers heat from direct and indirect sunlight to heat an auxiliary water tank and provide hot water for a building's occupants.

Solar reflectance index (SRI): A measure of a material's ability to reflect sunlight (including the visible, infrared, and ultraviolet wavelengths) on a scale of 0 to 1. A SRI value of 0.0 indicates that the surface absorbs all solar radiation, and a 1.0 solar reflectance value represents total reflectivity.

Sound transmission class: Sound transmission class (STC) ratings are a single-number metric which describes how much sound is blocked from going through a product. This rating is helpful in attempting to reduce the amount of noise leaving a room. *www.acousticalsurfaces.com/blog/acoustics-education/sound-transmission-class-stc-rating/*

Source energy: Site energy plus the energy lost or consumed beyond the site boundary in the extraction, processing, and transport of primary fuels such as coal, oil, and natural gas; energy losses in thermal combustion in power generation plants; and energy losses in transmission and distribution to the building site. *www.energy.gov/sites/prod/files/2015/09/f26/bto_common_definition_zero_energy_buildings_093015.pdf*

Static service pressure: The pipeline or municipal water supply pressure when water is not flowing.

Stormwater: Excess rainwater or melted snow that runs off streets and rooftops, and over land, rather than soaking into the ground at the point of origin.

Stormwater pollution prevention plan (SWPPP): A site-specific written document required by the EPA's National Pollutant Discharge Elimination System (NPDES) program. The SWPPP identifies potential sources of pollution and describes how a project will prevent pollution runoff during the construction process. See also *Erosion control plan*.

Straw bale: A bound block of straw and organic material used as an erosion control measure. Straw bales can also be used a bio-based insulation and/or structural material in low-rise construction.

Substantial rehabilitation: Refer to the definition in *Appendix A* of this manual.

Supportive housing dwelling units: Permanent housing with attached intensive services targeted to populations that have special needs, including people who are currently or formerly homeless; those with serious, chronic mental health issues; people in various stages of recovery from substance abuse; people with HIV/AIDS, or physical or developmental disabilities; the formerly incarcerated; the frail elderly; homeless or emancipated youth; victims of domestic violence; and other groups that would not be able to live independently and maintain housing without intensive support. Permanent supportive housing is commonly abbreviated as PSH.

Swale: A shallow, grass-covered channel that helps slow stormwater runoff and facilitate infiltration—relying, in contrast with a *Bioswale*, on natural conditions for basic conveyance and infiltration rather than intentional engineering.

Tenant-in-place rehabilitation: Occurs when planned construction activity will take place during daytime hours, requiring tenants to leave their homes for several hours on one day or for several days, but allowing tenants to return to a safe and functional dwelling unit every night with a working bathroom, working kitchen, and space conditioning, as applicable.

Thermal pollution: The release of excess heat or cold into the environment, commonly from construction or industrial processes.

Tiers: Earthen embankments that reduce erosion by slowing, collecting, and redistributing surface runoff to stable outlets that increase the distance of overland runoff flow.

Title 24: The building energy-performance standards for the state of California. *www.energy.ca.gov/title24/*

Transit ride: An opportunity to take a transportation line or route from a permanent, scheduled stop along a defined route of one form of public transportation (bus, rail, or ferry).

Universal design: The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. The principles of universal design are 1) equitable use, 2) flexibility in use, 3) simple and intuitive use, 4) perceptible information, 5) tolerance for error, 6) low physical effort, and 7) size and space for approach and use. *https://disabilityandmultimodality.wordpress.ncsu.edu/universal-design-ud/*

Usable roof space: The total usable roof space is calculated as the horizontally projected gross roof area less the area covered by skylights, occupied roof decks, rooftop equipment, vegetated roof areas, and mandatory access or setback areas required by the International Fire Code (IFC).

Vapor profile: Vapor profile is an assessment of the vapor permeabilities of each component in a building assembly (a wall, ceiling, or roof). This assessment determines the assembly's drying potential and its drying direction. The vapor profile shows whether the building assembly protects itself from getting wet and how it dries when it gets wet.

Vapor retarder: The International Residential Code (IRC) defines vapor retarders as Class I, II, or III based on how permeable they are to water vapor: The lower the permeability, the less water vapor will pass through the vapor retarder.

- *Class I:* Very-low-permeability vapor retarders—rated at 0.1 perms or less. Sheet polyethylene (Visqueen) or unperforated aluminum foil (FSK) are Class I vapor retarders.
- *Class II:* Low-permeability vapor retarders—rated greater than 0.1 perms and less than or equal to 1.0 perms. The kraft facing on batts qualifies as a Class II vapor retarder.
- *Class III:* Medium-permeability vapor retarders—rated greater than 1.0 perms and less than or equal to 10 perms. Latex and enamel paint qualify as Class III vapor retarders.

  For additional information, visit NAIMA at: *www.naima.org/insulation-knowledge-base/residential-home-insulation/insulation-and-vapor-retarders.html*

Vehicle-share program: A private system in which a company or a group of individuals share vehicles on a reservation basis and pay for use based on time or mileage. To qualify under *Criterion 2.6 Transit, Mobility, and Walkability*, a vehicle-share program must have an established formal agreement among participants.

Ventilation: The process of supplying outdoor air to, or removing air from, an interior space by natural or mechanical means. Such air may or may not have been conditioned.

Virtual power purchase agreement (VPPA): A financial structure allowing a buyer to fund development of new clean-energy capacity by purchasing the RECs for a new energy project. A VPPA differs from a physical PPA because the buyer continues to procure retail energy directly from the local grid through a utility. The buyer owns the environmental attributes of the clean energy by virtue of owning the RECs, while the owner of the energy project sells the energy itself on the open market. *https://rmi.org/insight/virtual-power-purchase-agreement/*

VOCs (volatile organic compounds): A large group of carbon-based chemicals that easily evaporate (or "off-gas") at room temperature, causing indoor emissions that can continue for extended periods of time after building materials have been installed. Exposure to certain VOCs in our homes can harm our health, depending on how much we breathe in and how often. *www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality*

Walk distance: The distance a pedestrian must travel between origins and destinations without obstruction, in a safe and comfortable environment on a continuous network of sidewalks, all-weather-surface footpaths, crosswalks, or equivalent pedestrian travel areas. Any crossing of a street with speeds at or greater than 30 miles per hour requires controlled crossing (e.g., a stop sign or stop light).

Weather-based irrigation controller (WBIC): An automated device that uses current weather data to operate an irrigation system based on local weather, landscape conditions, and plant watering needs rather than on a preset, fixed schedule. *www.epa.gov/sites/production/files/2017-01/documents/ws-products-minireport-irrigation-controllers.pdf*

Weekend service: When a public transit service (bus, rail, or ferry) is available to riders on Saturday and Sunday. Employer-assisted vanpools and dial-a-ride programs are examples of qualifying weekend service for *Criterion 2.6 Transit, Mobility, and Walkability*.

Well-being: The presence of positive emotions and moods (e.g., contentment, happiness), the absence of negative emotions (e.g., depression, anxiety), satisfaction with life, fulfillment, and positive functioning. While "health" primarily means the absence of sickness, well-being can be described as judging life positively and feeling good.

Wildland-urban interface (WUI): The line, area, or zone where structures and other components of human development meet or intermingle with undeveloped wildland or vegetative fuels. *www.usfa.fema.gov/wui/what-is-the-wui/*