Installing Solar Panels on Historic Buildings

A Survey of the Regulatory Environment

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Prepared by

SunShot U.S. Department of Energy

NORTH CAROLINA Solar Center

National Trust *for* Historic Preservation
Save the past. Enrich the future.

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NOTICE

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SunShot Initiative

The U.S. Department of Energy SunShot Initiative is a collaborative national effort to dramatically reduce the costs of solar energy, making it cost-competitive with other forms of energy before the end of the decade.

Under the SunShot Initiative, DOE invests in competitive research and development for solar technologies that promise to transform the way we generate, store, and utilize energy. To make solar energy more accessible and affordable, SunShot aggressively drives innovation by investing in private companies, academia, and national laboratories to reduce the cost of solar electricity to about $0.06 per kilowatt-hour. This cost reduction will enable broad deployment of solar energy systems across the country and allow solar-generated power to account for roughly 14% of America's electricity generation by 2030.

Inspired by President Kennedy's "moon shot" program that put the first man on the moon, SunShot requires a national effort to use the best of our energies and skills to accomplish its goals. Since its launch in 2011, SunShot has invested approximately $250 million in more than 100 projects to help shape the next generation of solar energy technologies, remove regulatory and market barriers, and make it faster, easier, and cheaper for Americans to go solar.

SunShot Initiative advancements will ultimately benefit every American by:

- Providing clean, low-cost energy for homeowners, communities, businesses, and government;
- Enhancing America’s global technology leadership through advanced solar photovoltaic technologies and smart grid innovation;
- Creating U.S. jobs through domestic solar manufacturing and distribution; and
- Reducing greenhouse gas emissions and protecting the environment.

Learn more about SunShot and DOE's efforts to expand clean, accessible, and inexpensive solar energy across the nation by the end of the decade by visiting www.energy.gov/sunshot.

National Trust for Historic Preservation

The National Trust for Historic Preservation, a privately funded non-profit organization, works to save America's historic places.

Chartered by Congress in 1949, the organization is now supported entirely by private contributions. We take direct on-the-ground action when historic buildings and sites are threatened. Our work helps build vibrant, sustainable communities. We advocate with governments to save America's heritage. We strive to create a cultural legacy as diverse as the nation itself so that all of us can take pride in our part of the American story.

Changes in our energy production and consumption must be made at all scales – from historic buildings to Main Streets to vast public lands – as an element of sustainable development. At the same time, the National Trust for Historic Preservation works alongside preservationists nationwide to protect our nation's historic places by advocating for appropriate siting of renewable energy systems within a historic context.

Energy use – whether in our homes, commercial spaces, schools or other buildings – directly affects the integrity of our private and public lands. When we use less energy, less energy in turn must be produced. It is for this reason that the National Trust supports the removal of unreasonable regulatory barriers to the use of solar panels on historic sites, buildings and structures.

North Carolina Solar Center

The North Carolina Solar Center serves as a clearinghouse for solar and other renewable energy programs, information, research, technical assistance, and training for the citizens of North Carolina and beyond. Through its programs and services, the N.C. Solar Center seeks to stabilize energy costs for consumers, stimulate local economies, reduce dependence on foreign fuels, and mitigate the environmental impacts associated with fossil fuels. Established in 1988, the North Carolina Solar Center is operated by North Carolina State University's College of Engineering at North Carolina State University.

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Section 1: Practical Approaches to Installing Solar Technology on Historic Properties

Across the country, individuals, businesses, organizations and governments are all making efforts to minimize their impact on the environment by reducing their dependence on non-renewable energy sources. While environmentally sustainable practices can and do come in a variety of forms, certain technologies, such as solar panels, have taken on particular importance. Indeed, with the adoption of financial incentives and the removal of regulatory impediments to the use of solar as a viable power source, solar energy systems are being installed on buildings in urban and rural communities throughout the United States. As solar technology improves and solar panels become more affordable, this trend is likely to continue at an ever-increasing rate. The question is, then, when and how are solar panels to be installed on historic buildings, in historic districts or at historic sites?

The answer is not simple. On one hand, communities recognize that historic buildings present special circumstances and that, without careful review, solar panels can have a direct and irreversible impact on the same character-defining features of a historic building or its setting that make it significant to the community and thus worth preserving. On the other hand, not every alteration to a historic resource is detrimental to those same values, and indeed, solar panels can be (and have been) installed without adversely affecting the significance or integrity of historic resources.

Often these historic resources are owner occupied properties, such as schools, institutions or other long-term owners who would benefit from the potential low operating cost structure offered by solar energy installations. In many parts of the nation-especially those supported by strong solar access laws, rising energy costs and financial incentives-solar energy systems are generating an increasing portion of on-site energy needs for these buildings. However, in many jurisdictions, regulatory limitations and strict interpretations of historic standards may prevent adoption of solar technology where demand otherwise exists in the market.

Through the careful articulation of policies guiding the use of solar panels, communities can embrace practices that both promote renewable systems and support the protection of historic resources. Allowing solar to be installed on non-significant additions, previously altered areas (those that have diminished integrity), or perhaps less significant areas of a historic building can allow the property to meet sustainable energy goals without compromising or destroying the historic resource's significance or integrity.

Learn about . . .

- Basics on solar technology
- Trends in state and local solar access laws
- Solar panel design review under preservation ordinances

It is important to recognize, that even with the aid of well developed and market driven solar energy and historic preservation policies, there will be certain historic properties for which solar energy systems may not be appropriate. Such installations will likely be denied by historic preservation regulatory bodies found on either the local, state or national level. Designated historic landmarks, which represent properties of elevated status and importance to a community, are likely to comprise the majority of these restricted properties. Other properties that may face this constraint include those with historically significant landscapes that shade potential installation sites, or conversely, those historic landmarks with little to no open space for installations.

This guide offers a pathway to better integration of solar energy systems onto historic resources. The sections within this document provide an explanation of solar energy technology, descriptions of the current regulatory context governing the use of solar panels on historic properties at the state and local level, and propose regulatory solutions that take into consideration the value of both historic and energy resources. The guide also sets forth suggested design review principles that are intended to encourage solar siting solutions that protect historic features, materials and spatial relationship. Sources for additional information are located at the end of this publication.

Section 2: Understanding the Technology

There are two types of solar energy technologies: photovoltaic and thermal. Photovoltaic systems convert the sun's energy into electricity through the use of photovoltaic (PV) cells, typically composed of crystalline silicon, which are connected together into panels and mounted on a frame. Electricity generated from the cells is normally passed through an inverter which converts the direct current (DC) electricity produced by the panels into alternating current (AC) electricity. That current is then consumed, stored, or routed into the grid system (see definitions). In solar thermal systems, one or more solar collectors or panels heat water, air, or antifreeze. The solar heated air or liquid is then transferred into rooms or water supply.

Typically, photovoltaic systems located on or near a building or structure are used to meet the electricity needs of that site. If a solar energy system does not meet a site's full electricity demands, additional energy can be provided through conventional electrical systems. If a solar energy system produces surplus electricity, most jurisdictions allow this surplus energy to enter the grid and be used to offset future electricity purchases this arrangement is generally referred to as net metering, though the details vary from state to state and sometimes from utility to utility. This practice is often illustrated by an image of a customer's meter spinning backwards, subtracting on-site surplus energy from grid-supplied energy over a given billing cycle. More information on net metering and other renewable energy policies can be found through the Database of State Incentive for Renewables and Efficiency (DSIRE) or the Interstate Renewable Energy Council (IREC).

The size and viability of solar energy systems as an alternative energy source for a specific historic site depend on several variables including the local climate, installation costs, how the system will be used, and the characteristics of the buildings, structures, and site. A large building will, for example, typically require more solar panels than a smaller building or structure in order to offset required energy load. Ideally, solar panels should be oriented south; if oriented to the east or west, the panels will need to be tilted to achieve optimum performance. Moreover, in some cases, neighboring buildings and trees can interfere with ongoing access to the sunlight necessary to power solar panels.

Currently, solar panels are generally mounted on an existing roof plane or located on the ground. As research and product development evolves, however, this could change. Already, solar panels come in different shapes, and some have the appearance and function of traditional building materials, such as roof shingles or tiles. This type of solar system is usually referred to as Building Integrated Photovoltaic System (BVIP).

Terms You Should Know . . .

Active System. A solar heating or cooling system that requires technological assistance to transport collected heat. Examples include solar hot water heaters and photovoltaic systems.

Array. A set of photovoltaic modules or panels connected together that function as a single unit.

Building. Defined by the National Parks Service as structures intended to shelter some sort of human activity. The term building, as in outbuilding, can be used to refer to historically and functionally related units.

Cell. The smallest component of a solar panel, acting to convert sunlight into electricity.

Electrical Grid. The system, in a given geographical area, that distributes electricity to buildings, structures and sites. A "grid-connected" solar energy system uses the grid as a backup power source. In most areas, surplus energy produced by a solar energy system is allowed to enter the grid.

Inverter. The device used to convert direct current (DC) into alternating current (AC).

Module. Several connected cells. Synonymous with panel.

Mount. A method of attaching solar panels to the roof or ground.

Net Meter. An electrical meter that spins both forward and backward, depending upon whether electricity is flowing into or out of the grid.

Passive System. A system of heating and cooling buildings by natural energy resources, without technological assistance (e.g. pumps), by incorporating building features that absorb heat and then release it slowly to maintain the temperature within a building. Such building features often include large windows, masonry walls, stone flooring and building orientation

Photovoltaic (PV). Technology that converts sunlight (photons) into electrical energy through the use of silicon crystals or another semiconductor.

Site. Defined by the National Parks Service as discrete areas significant solely for activities in that location in the past, such as an historic battlefield, archaeologically significant area or designed landscape, and other locations whose significance is not related to the building or structure.

Solar Panel. A general term for the smallest discrete unit of a system that captures solar energy, usually measuring several feet on each side. It may refer to an electrical device consisting of an array of connected solar cells which converts solar energy into electricity or a device that captures thermal solar energy for space heating or domestic hot water production. Solar energy devices are commonly referred to as photovoltaic (PV) panels.

Solar Device. Solar membranes, solar shingles, solar in glass, non-PV technology, and solar hot water systems, and other solar technologies.

Solar Thermal. The process of creating heat by using sunlight to heat water or another fluid such as antifreeze.

Structure. Defined by the National Parks Service to differ from buildings, in that they are functional constructions meant to be used for purposes other than sheltering human activity.

Tilt. The angle of a solar panel. An ideal or optimum tilt would absorb the most sunlight.

Tracking Panels. Solar panels that change direction as the sun moves.

With increasing concern over the environmental impacts of fossil fuel usage and the depletion of conventional energy resources, a number of states have adopted new measures that promote solar energy systems and remove financial and logistical impediments to their widespread use.

Virtually every state encourages solar and other renewable energy technologies by offering some form of policy support, such as tax incentives and other subsidies to individuals, utilities, businesses, and other organizations. When combined with the federal government's 30% income tax credit for the cost of solar panels (available through 2016), state financial incentives provide property owners with even greater incentive to install solar panels by lowering upfront costs and reducing breakeven points.

The breadth and depth of state support is dramatically different from state to state and as a consequence solar development has historically been concentrated in a relatively small number of states with exceptional policies, such as California and New Jersey. However, in recent years the proliferation of state incentives coupled with rapidly declining costs and a maturing industry has helped create new and expanded opportunities throughout the country. Additionally, states often supplement direct financial incentives with other mechanisms that assist solar development, such as improved procedures for getting systems connected to the grid and policies that facilitate the use of innovative financing.

Section 3: Public Policy Framework for Historic Preservation

3.1 The Secretary of the Interior's Standards for Rehabilitation

Historic preservation boards and commissions are charged with the preservation of a community's identified historic resources, which may include individual sites as well as entire historic districts. Proposed alterations to these historic resources, although often permissible, are measured against standards and guidelines, including those established by the National Park Service (NPS) and called the Secretary of the Interior's Standards for the Treatment of Historic Properties. The most common set of applied regulations for historic district review are the Standards for Rehabilitation, which provides a framework for alteration of historic resources to meet continuing or changing uses while retaining the historic character of the building, site, and district. The Standards are intended to be regulatory, while accompanying NPS Guidelines are advisory and illustrate how the Standards may be reasonably applied.

Often, local design guidelines for historic buildings and/or historic districts are either directly modeled after the Secretary of the Interior's Standards for Rehabilitation or borrow heavily from their foundation. Two Standards are particularly pertinent to solar energy projects:

Standard 2: The historic character of a property will be retained and preserved.

Standard 9: New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the

historic materials, features, size and proportion, and massing to protect the integrity of the property and its environment.

The full set of Rehabilitation Standards can be found at:
www.nps.gov/tps/standards.htm

3.2 The Secretary of the Interior's Standards for Rehabilitation and Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings

The Guidelines on Sustainability supplement the existing Guidelines to the Secretary of the Interior's Standards for Rehabilitation. These guidelines offer recommendations for improving the energy efficiency of a building while still preserving the character of historic resources.

The Guidelines on Sustainability stress the inherent sustainability of historic buildings and offer general guidance for efficiency related improvement. Treatments are either "recommended" or "not recommended," depending on whether a measure may negatively impact a building's historic character. Additionally, illustrations of both types of treatments are included. The Guidelines are designed to assist building owners in planning rehabilitation projects that will meet the standards for Rehabilitation.

The NPS Guidelines on Sustainability can be found at:
www.nps.gov/tps/standards/rehabilitation.htm

3.3 State Solar Access Regulation

States have become increasingly interested in removing barriers to installation solar and wind energy systems and the development of practical approaches to the installation of renewable energy technology.

DSIRE (Database of State Incentives for Renewables & Efficiencies), a project run by the NC Solar Center and the Interstate Renewable Energy Council and funded by the Department of Energy, provides comprehensive information on renewable energy policies and programs and tracks individual state laws, policies and programs. Go to: http://www.dsireusa.org.

Many states have enacted laws make prohibitions against solar energy systems (typically found in restrictive covenants and other deed restrictions) void and unenforceable. These are often referred to as "solar rights" laws, and may apply to either private restrictions (e.g., such as those promulgated by homeowner's associations), public restrictions (e.g., local zoning laws and ordinances) or both. In addition, a growing number of states are adopting solar access laws that protect access to the sun and easement laws that facilitate the adoption of voluntary solar access easements. Solar access easements allow the owner of a solar energy system to secure the rights to continued access to sunlight from a neighboring property owner.

With respect to solar rights laws that pertain to public restrictions, a number of states, such as California, Florida, Indiana, Nevada, North Carolina, Vermont, Virginia, Oregon, and Wisconsin, have adopted new laws or strengthened existing laws to ensure that zoning and other land-use laws banning or unreasonably restricting solar energy systems are expressly prohibited. While these states permit restrictions on solar installations for public health and safety reasons, they prohibit restrictions that would significantly decrease the efficiency or performance of a system or significantly increase its cost. The interpretation of what constitutes a "significant" impact may be subjective, though specific benchmarks are sometimes established for this purpose. For instance, in Nevada a 10% decrease in system efficiency is considered significant.

In addition to the removal of regulatory barriers for solar system installations, California, Missouri, New Mexico, and Wisconsin also protect access to the sun through solar shade protection laws or the establishment of enforceable solar rights. Other states, such as Rhode Island, require that zoning laws address solar access, and some state laws, including those adopted in Connecticut, Massachusetts, Minnesota, Nebraska, New York, Oregon and Utah, authorize local governments to adopt ordinances and/or planning measures that encourage the installation of solar energy devices.

The relationship between laws designed to facilitate or remove legal barriers to the use of solar energy systems, and historic preservation ordinances designed to protect historic resources has been specifically addressed in only a few states. Connecticut, Maine, New Mexico and North Carolina are some of the states which have addressed the issue:

- **Connecticut** prohibits a preservation commission from denying an application for a certificate of appropriateness for a "solar energy system designed for the utilization of renewable resources" unless "the commission finds that the feature cannot be installed without substantially impairing the historic character and appearance of the district." The commission may impose conditions on the issuance of a certificate of appropriateness, including design modifications and limitations on the location of the feature, provided that the effectiveness of the system is not significantly impaired.
- **Maine** prohibits legal instruments (including ordinances, deed restrictions, homeowner association and condominium regulations) that restrict the installation and use of solar energy devices. However, "reasonable restrictions" necessary to protect "historic or aesthetic values," may be adopted "when an alternative of reasonably comparable cost and convenience is available."
- **New Mexico** prohibits a county or municipality from imposing restrictions on the installation of solar collectors *except* in a historic district.
- **North Carolina** makes its general prohibition on the adoption of laws restricting solar energy systems on residential properties applicable to historic districts but authorizes local jurisdictions to regulate the location or screening of solar collectors" by "requiring

the use of plantings or other measures to ensure that the use of solar collectors is not incongruous with the special character of the district." Even under the general prohibition, local governments may restrict solar energy systems to the extent they are visible from the ground and "installed (1) on the facade of a structure that faces areas open to common or public access; (2) on a roof surface that slopes downward toward the same areas open to common or public access that the facade of the structure faces; or (3) within the area set off by a line running across the facade of the structure extending to the property boundaries on either side of the facade, and those areas of common or public access faced by the structure."

Explicitly addressing preservation issues within the state regulatory framework can help to facilitate the integration of solar technology with historic properties. While an across-the-board exemption from prohibitions against solar panels would be exceptionally broad, exceptions for installations based on the application of reasonable guidelines should be considered. North Carolina's state policy both fosters the development of renewable energy technology while preserving the integrity of the state's historic resources. Policies such as these allow local governments the leeway to protect their communities' historic resources on a case-by-case basis.

3.4 Local Solar Access Regulation

Local governments are working to foster sustainable energy, building and development practices in a variety of ways, including the adoption of new building and zoning laws that specifically encourage green building practices and renewable energy systems.

3.5 Local Building Standards

Some communities now require the use of sustainable construction techniques and products through the application of high performance or "green" building standards. Currently, such standards are commonly associated with the United States Green Building Council's flagship rating system: Leadership in Energy and Environmental Design (LEED), though other systems such as the Green Building Initiative's Green Globes rating system, and the International Code Council's National Green Building Standard are becoming more prevalent.

Solar Permitting Requirements

Solar energy systems must comply with local building codes to ensure that solar panels and associated electrical and/or plumbing work meet minimum standards and are correctly installed. Roofs and mounting systems must be able to carry the weight of the solar panels, and the system's wiring must meet the local electrical and building codes. The local zoning code may establish minimum setbacks and maximum height allowances. If a building is in a local historic district, or subject to restrictive covenants, design review and approval may be required.

In the District of Columbia, beginning in 2012, all privately-owned commercial projects with 50,000 square feet or more must meet or exceed the LEED Silver standard and in addition post a performance bond. The City of Austin requires that all building projects meet the city's new environmental building code and buildings within certain districts must achieve a minimum of one star under the "Austin Energy Green Building" rating system. Such policies may prompt the installation of on-site renewable energy generation, such as photovoltaic systems, in order to achieve the newly mandated standards within these communities.

The development of local sustainable building principles, efficiency mandates and benchmarking policies are designed to hold both new and existing building stock to increasingly high performance standards. As communities incorporate such guidelines, historic resources can play a significant role in meeting their goals. Cities, such as Minneapolis, award density bonuses for specific green activities that promote increased energy efficiency and reliance upon alternative energy systems such as solar and wind. The prevailing density within numerous historic districts may well qualify for such bonus. The city of San Francisco, in addition to establishing minimum green standards under LEED or GreenPoint, requires that if a building is demolished to make way for new construction, additional points be subtracted from the project's rating. The project must then achieve a higher rating to compensate for the demolition, and therefore encouraging the reuse of existing and historic buildings. Still others, such as Santa Monica, encourage the use of alternative energy systems by streamlining their permitting procedures for solar panel installations on existing buildings.

3.6 Local Preservation Ordinances and Zoning Codes

Many communities are also revising their zoning and subdivision laws to protect or promote solar access, either in response to state directives or on their own initiative. Providence, Rhode Island, for example, amended its zoning laws to allow solar panels as accessory uses, which are land uses that are incidental and subordinate to the main use of the site and located on the same site as the main use. An accessory use may be located either in the principal structure or an accessory structure. Other municipalities have adjusted setback requirements, height restrictions and in some cases, have imposed building orientation requirements, to maximize solar accessibility for newly-constructed houses.

Many states are adopting laws that prohibit unreasonable barriers to solar laws, enabling cities and towns to adopt similar local ordinances. How these new local laws potentially modify or conflict with existing laws—including historic preservation ordinances—must be considered. Solar access laws that address the special circumstances of historic properties and that specifically include guidelines for the review and approval of solar

panels and other energy-based alterations for historic properties will ensure that the interests of both sustainability and historic preservation are equally addressed.

Examples of how communities have combined sustainability and energy considerations with historic preservation include:

- **Santa Monica, CA** encourages solar panels by streamlining its review of applications to install solar panels. Under Ordinance 2291, adopted in July 2009, the city created an expedited permitting process for the installation of solar panels by treating solar panel permit reviews that meet certain design standards, as ministerial/non-discretionary actions. The ordinance allows an exception for historic properties and contributing structures, requiring review by a "Landmarks Commission Liaison" under the city's Certificate of Appropriateness process. In cases where the city's minimum design standards are not met, a project may be approved under the city's discretionary review process, unless a historic property is involved, in which case, the full Landmarks Commission reviews that proposed project.

Santa Monica, CA Ordinance 2291 :
http://www01.smgov.net/planning/planningcomm/2291.pdf

- **Portland, OR** worked with community members to create standards which exempt the review process of solar panels on historic resources in the city's Historic Districts and Conservation Districts through a regulatory improvement project, Regulatory Improvement Code Amendment Package (RICAP) 5. In cases where a property is located within a Conservation District, and not a designated landmark, the review of proposed solar installations is streamlined by following a set of Community Design Standards. In general these standards provide guidance for solar installations that require solar modules be installed with the plane of the panels parallel to the roofline and not increase the footprint or height of the structure. These standards are intended to allow for flexibility in design and minimize aesthetic impacts to historic resources.

  The Historic Design Review process may still be required for designated Historic Landmarks, designated Conservation Landmarks and properties located within designated Historic Districts. Accessory structures are held to the same standards s primary buildings.

Portland's information on "Solar and Your Historic Home" can be found at:
http://www.portlandonline.com/bps/index.cfm?a=324757&c=43478

3.7 Design Review within Historic Preservation Ordinances

As solar becomes increasingly attractive to more consumers, demand to integrate solar systems into historic properties is likely to increase. Fortunately, in most cases, historic buildings, structures, and sites can be preserved while also accommodating solar energy installations.

The following 10 siting principles can aide preservation boards in their review of solar energy system requests and, in addition, can provide a foundation for the adoption of formal local guidelines related to solar energy installations.

These 10 principles encourage solutions that protect historic features, materials and spatial relationships and work to minimize the visibility of all solar energy system installations.

Roof-Mounted Solar Panels

Solar panels are traditionally installed on roofs because they offer the best access to light. While historic buildings with flat roofs may readily accommodate solar panels, hipped or gabled roofs can be problematic. When feasible, consider locating solar panels:

- In a minimally-visible area of the landscape;
- On a non-historic building or addition;
- In a minimally-visible location on the building.

3.8 Sample Design Principles

1. Locate solar panels on the site of a historic resource. If possible, use a ground-mounted solar panel array. Consider solutions that respect the building's historic setting, locating the solar panel arrays in an inconspicuous location, such as a rear or side yard, low to the ground and sensitively screened to further limit visibility. Care should be taken to respect the historic landscape, including both its natural and designed features, including materials and topography.

2. Locate solar panels on new construction. In cases where new buildings or new additions to historic buildings are proposed, encourage the placement of solar panels on the new construction. To achieve overall compatibility with the historic building and its setting, consider solutions that integrate the solar panel system in less visible areas of the new design.

3. Locate solar panels on non-historic buildings and additions. If the site cannot accommodate solar panels, and the project does not include new construction, consider placing solar panels on an existing, non-historic addition or accessory structure, thereby minimizing the impact of solar installation on the significant features of the historic resource as well as specifically protecting historic fabric against alteration.

4. Place solar panels in areas that minimize their visibility from a public thoroughfare. The primary facade of a historic building is often the most architecturally distinctive and publicly-visible, and thus the most significant and character-defining. To the greatest extent possible, avoid placing solar panels on street-facing walls or roofs, including those facing side streets. Installations below and behind parapet walls and dormers, or on rear-facing roofs, are often good choices.

5. Avoid installations that would result in the permanent loss of significant, character-defining features of historic resources. Solar panels should not require alterations to significant or character-defining features of a historic resource, such as altering existing roof lines or dormers. Avoid installations that obstruct views of significant architectural features, such as overlaying windows or decorative detailing, or intruding on views of neighboring historic properties in a historic district.

6. Avoid solutions that would require or result in the removal or permanent alteration of historic fabric. Solar panel installations should be reversible. The use of solar roof tiles, laminates, glazing and other technologies that require the removal of intact historic fabric, or which permanently alter or damage such fabric, should be avoided. Consider the type and condition of existing building fabric upon which solar panels installation is proposed, as well as the method of attachment and removal in the future. Minimizing the number of points of attachment, including the use of brackets, will avoid damaging historic fabric.

7. Require low profiles. Solar panels should be flush with, or mounted no higher than a few inches above, the existing roof surface and should not be visible above the roofline of a primary facade.

8. On flat roofs, set solar panels back from the edge. Flat roofs, because they are generally hidden from view, can provide an ideal surface for solar panel arrays. To ensure that a solar installation is minimally visible, set the solar panels back from the roof's edge and adjust the angle and height of the panels as necessary.

9. Avoid disjointed and multi-roof solutions. Solar panels should be set at angles consistent with the slope, or pitch, of the supporting roof. For example, avoid solutions that would set panels at a 70 degree angle when the roof pitch is 45 degrees. In addition, solar panels should be located on one roof plane (as opposed to scattered among several roofs) and arranged in a pattern that matches the general shape and configuration of the roof upon which they are mounted.

10. Ensure that solar panels, support structures, and conduits blend into the surrounding features of the historic resource. The overall visibility and reflectivity of solar panels and their support structures can be substantially reduced if elements of the solar installation match the surrounding building fabric in color.

Examples of communities with existing Solar Panel Guidelines for historic districts and resources can be found in the Appendices or by visiting: www.preservationnation.org/issues/sustainability/solarpanels

Location, visibility, and appearance of solar panels are key concerns when working with historic resources. Factors to consider include:

→ Siting options (solutions that achieve solar access yet protect historic fabric and character)
→ Screening potential
→ Integrity and condition of resource, especially roof
→ Impact on historic fabric, including mounting system
→ Overall size of panel array
→ Panel arrangement and design
→ Color/Reflectivity
→ Reversibility of Installation

Solar Energy Projects on Public Lands

Federal public lands are and will continue to play an important role in utility-scale solar development and the accommodation of renewable energy transmission. The impact of utility-scale solar projects on public lands is also an important issue and merits further research and analysis of its own beyond of the scope of this guide.

Section 4: Moving the Conversation Forward

Both the preservation and renewable energy communities should continue to research and highlight best practices on incorporating renewable energy technologies on historic properties

By working with property owners, contractors, and technology manufacturers, local government leaders, code officials, preservation commission staff and planning directors can be key players in ensuring that historic resources and public lands continue to actively contribute to environmentally, economically, socially and culturally sustainable communities.

Section 5: Further Reading

Academic Articles

- Dan Becker and Jack Williams, "A Sustainability Framework for the Local Consideration of Alternative or Substitute Materials, Pt. II, *The Alliance Review* (National Alliance of Preservation Commissions Nov./Dec. 2009). Available through the National Alliance at: http://www.uga.edu/napc/programs/napc/publications.htm
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On-line Resources

American Planning Association: http://www.planning.org/
Austin's Green Building Program: http://www.austinenergy.com
California.gov (Integrated Waste Management Board): Sustainable (Green) Building Remodel, Renovate, and Upgrade Green: http://www.calrecycle.ca.gov/GREENBUILDING/Residential/Remodel/default.htm
Consortium for Energy Efficiency: http://www.cee1.org/
Database of State Incentives for Renewables and Efficiency: http://www.dsireusa.org
Department of Energy, Energy Efficiency and Renewable Energy: http://www.eere.energy.gov/. See also, National Renewable Energy Laboratory: http://www.nrel.gov/
Environmental Protection Agency, Green Building: http://www.epa.gov/greenbuilding/index.htm
Green Building Finance Consortium: http://www.greenbuildingfc.com/
Green Communities: http://www.greencommunitiesonline.org/about/
Green Recommendations for Historic Rehabilitation and Urban Infill National Institute of Building Sciences, Whole Building Design Guide Historic Preservation Subcommittee: http://www.wbdg.org/resources/sustainable_hp.php
National Park Service: http://www.nps.gov/history/index.htm
National Trust for Historic Preservation: http://www.preservationnation.org/issues/sustainability/
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Sustainable Buildings Industry Council: http://www.sbicouncil.org/
U.S. Green Building Council: http://www.usgbc.org/

APPENDICES

I. STATE SOLAR ACCESS LAWS

STATE	CITATION	SUMMARY
California	Cal. Civ. § 714, et seq.; Health and Safety § 17959.1; Government Code § 65850.5	Prohibits local governments from restricting solar energy systems based on aesthetics and precludes receipt of state grants/loans for solar energy systems if unreasonable restrictions are placed on solar energy systems—including significant increases in cost of system, significant decreases in efficiency or specified performance, or failure to allow alternative systems at comparable cost, efficiency, and energy conservation benefits. Also limits local government review to public health and safety and requires use of non-discretionary review process.
	Cal. Pub. Res. Code § 25980-25986	Prohibits property owner from allowing tree/shrub to cast shadow greater than 10 % of collector absorption area upon solar collection surface between 10 a.m. and 2 p.m. once system is installed; exempts trees subject to local ordinance.
Connecticut	Conn. Gen. Stat. § 7-147f	"No application for a certificate of appropriateness for an exterior architectural feature, such as a solar energy system, designed for the utilization of renewable resources shall be denied unless the commission finds that the feature cannot be installed without substantially impairing the historic character and appearance of the district. A certificate of appropriateness for such a feature may include stipulations requiring design modifications and limitations on the location of the feature which do not significantly impair its effectiveness. In passing upon appropriateness as to parking, the commission shall take into consideration the size of such parking area, the visibility of cars parked therein, the closeness of such area to adjacent buildings and other similar factors."
	Conn. Gen. Stat. § 8-2; § 8-23, § 8-35a	Authorizes municipalities to adopt regulations that encourage the use of solar and other renewable forms of energy and energy conservation and provide incentives for developers who use passive solar energy techniques in planning a residential subdivision development. Requires municipalities to prepare conservation and development plan that includes solar energy objective

		and requires that subdivision regulations encourage use of passive solar energy systems. Also encourages regional planning agencies to include use of solar energy in plans.
Florida	Fla. Laws § 163.04	Forbids prohibitions on solar and other energy devices by local ordinance.
Indiana	Ind. Code § 36-7-2-8	Prohibits adoption of ordinances that ban or unreasonably restrict use of solar energy systems by significant increases in cost of system, significant decreases in efficiency or specified performance, or failure to allow alternative systems at comparable cost, efficiency, and energy conservation benefits.
Maine	33 MRSA c. 28-A §§ 1421-1424	Municipalities, homeowners association and others may not prohibit the installation and use of solar energy devices except when necessary to, among other things, protect "historic or aesthetic values, when an alternative of reasonable comparable cost and convenience is available."
Massachusetts	Mass. Gen. L. ch. 40a § 9B; ch. 41 § 81Q	Authorizes municipalities to adopt rules encouraging the use of solar energy systems and providing for solar access.
Minnesota	Minn. Stat. § 462.357; § 473.859.2(b)	Authorizes the regulation of access to solar light for solar energy systems and allows for variances based on lack of solar access; land use plan must contain element for protection and development of access to solar light.
Missouri	Mo. Rev. Stat. § 442-012.1	Establishes use of solar energy as property right (but prohibits use of eminent domain).
Nebraska	Neb. Rev. Stat. §§ 66-913—914	Authorizes local governments to adopt zoning laws and plans that encourage access to solar energy and to grant variances to facilitate such access.
Nevada	Nev. Stat. § 278.0208	Local governments may not enact ordinances, plans, or other restrictions that prohibit or unreasonably restrict solar energy systems by significantly decreasing efficiency or performance of system and by not allowing use of alternative system at comparable cost and with comparable efficiency and performance.
New Jersey	N.J.S.A. C.40:27-6.6 & C.40:55D-4	Excludes solar panels from the calculation of impervious coverage. Also identifies solar panels as an "inherently beneficial use" in granting use variances.
New Mexico	N.M. Stat. § 47-3-1, et seq.	Declares right to use solar energy as property right which is enforceable against any person blocking access to light once solar collector is installed.

	N.M. Stat. § 3-18-32	Prohibits county or municipality from restricting the installation of solar collectors except in historic districts.
New York	N.Y. General City Law § 20 (Consol.)	Enables cities to regulate solar energy systems and solar access provided that, among other things, regulations are made with "reasonable regard to the character of buildings."
North Carolina	N.C. Gen. Stat. § 160A-201; § 22B-20; § 160A-400.4(d) (governing historic districts)	Prohibits local governments from adopting laws that restrict solar energy systems on residential property except if visible from the ground and "installed (1) on the façade of a structure that faces areas open to common or public access; (2) on a roof surface that slopes downward toward the same areas open to common or public access that the facade of the structure faces; or (3) within the area set off by a line running across the facade of the structure extending to the property boundaries on either side of the facade, and those areas of common or public access faced by the structure." Attorneys' fees awarded to prevailing parties. Also makes void and unenforceable covenants/deed restrictions prohibiting solar access systems on single family homes but allows restrictions on solar collectors as above. Provisions under N.C. Gen. Stat. § 160A-201 made applicable to historic districts but local jurisdictions authorized to regulate the location or screening of solar collectors" by "requiring the use of plantings or other measures to ensure that the use of solar collectors is not incongruous with the special character of the district."
Oregon	Or. Rev. Stat. §§ 105.880—105.895	Makes provisions in covenants, deeds, and other conveyance instruments that prohibit solar energy systems void and unenforceable.
	Or. Rev. Stat. §§ 215.044—215.047 & §§ 227.190—227.195	Authorizes county and city governments to enact ordinances that provide and protect solar access by consideration of factors such as the orientation of lots, siting and height of neighboring buildings, the type and placement of trees, and so forth. Comprehensive plans must be consistent with ordinance, if adopted.
Rhode Island	R.I. Pub. Laws § 45-24-33(a)(4)(iv)	Requires zoning ordinances to address solar access.
Utah	Utah Code § 10-92-610	Authorizes land use authorities to refuse to approve plats, subdivisions, and so forth for properties that

		prohibit or have the effect of prohibiting reasonably sited solar energy devices.
Vermont	Vt. Stat. tit. 24 §§ 2291 and 4413(g)	Municipalities may not prohibit solar and other renewable energy devices or enact laws that have the effect of prohibiting such devices except on patio railings in condominiums, cooperatives, and apartments.
Wisconsin	Wis. Stat. § 6604.01; § 844.22	Prohibits local governments from restricting directly/indirectly installation or use of solar energy systems *unless* restrictions (a) serve public health/safety; (b) do not significantly increase cost of system or decrease efficiency; or (c) allow for alternative system of comparable cost and efficiency. Local government may adopt laws requiring trimming of vegetation blocking solar energy. Structures/vegetation blocking solar energy access are also deemed to be "private nuisances," thereby enabling lawsuits to compel removal of such structures/vegetation.
	Wis. Stat. § 700.41	Authorizes compensation/damages against property owners obstructing access to solar collection.

II. STATE STATUTORY PROVISIONS ADDRESSING HISTORIC PRESERVATION

DELAWARE
25 Del. C. § 318

§ 318. Restrictive covenants

(a) As used in this section, "roof" or "roofs" means:

(1) A roof of a single family dwelling unit which is solely owned by a person, persons, trust or entity and which is not designated as a common element or common property in the governing documents of an association; and

(2) A roof of a townhouse dwelling unit, which for the purposes of this section means any single-family dwelling unit constructed with attached walls to another such unit on at least 1 side, which unit extends from the foundation to the roof, and has at least 2 sides which are unattached to any other building, and the repair of the roof for the townhouse dwelling unit is designated as the responsibility of the owner and not the association in the governing documents.

(b) No covenant, restriction, or condition contained in a deed, contract or other legal instrument which affects the transfer, sale or any other interest in real property that prohibits or unreasonably restricts the owner of the property from using a roof mounted system for obtaining solar energy on that owner's property shall be allowed in any deed contract or legal instrument recorded after January 1, 2010.

(c) This section shall not amend, nullify, or affect the enforceability of any covenant, restriction, or condition contained in a deed, declaration, contract or other legal instrument concerning land owned by a maintenance corporation or homeowner's association.

(d) This section shall not amend, nullify, or affect the enforceability of any conservation easement or historic preservation covenant.

(e) Any covenants, restrictions, or conditions contained in a deed or declaration, including a declaration under the Unit Property Act [§ 2201 et seq. of this title], for residential property which does not explicitly include a mechanism to amend the document, may hereafter be amended by a vote requiring the affirmative vote of 2/3 of the property owners. Covenants, restrictions, or conditions contained in a deed or declaration, including a declaration under the Unit Property Act [§ 2201 et seq. of this title], for residential property that prohibit or restrict the installation of rooftop or ground-mounted solar systems may be amended to allow or promote installation of rooftop or ground-mounted solar systems by an affirmative vote of 2/3 of the property owners.

(f) No covenant, restriction, or condition contained in a deed, contract, or other legal instrument which affects the transfer, sale, or any other interest in real property, which is zoned for residential use and the lot or lots are 1/2 of an acre or greater in size, that prohibits or unreasonably restricts the owner of the property from installing or using a ground mounted system for obtaining solar energy on that owner's property shall be allowed in any deed, contract or other legal instrument. A covenant, restriction, or condition which requires that fencing, landscaping, or other appropriate means be used to

shield the system from view, so that it is not readily visible from adjacent streets shall be deemed to be a reasonable restriction.

CONNECTICUT

Conn. Gen. Stat. § 7-147f

Sec. 7-147f. Considerations in determining appropriateness. Solar energy systems.
(a) If the commission determines that the proposed erection, alteration or parking will be appropriate, it shall issue a certificate of appropriateness. In passing on appropriateness as to exterior architectural features, buildings or structures, the commission shall consider, in addition to other pertinent factors, the type and style of exterior windows, doors, light fixtures, signs, above-ground utility structures, mechanical appurtenances and the type and texture of building materials. In passing upon appropriateness as to exterior architectural features the commission shall also consider, in addition to any other pertinent factors, the historical and architectural value and significance, architectural style, scale, general design, arrangement, texture and material of the architectural features involved and the relationship thereof to the exterior architectural style and pertinent features of other buildings and structures in the immediate neighborhood. No application for a certificate of appropriateness for an exterior architectural feature, such as a solar energy system, designed for the utilization of renewable resources shall be denied unless the commission finds that the feature cannot be installed without substantially impairing the historic character and appearance of the district. A certificate of appropriateness for such a feature may include stipulations requiring design modifications and limitations on the location of the feature which do not significantly impair its effectiveness. In passing upon appropriateness as to parking, the commission shall take into consideration the size of such parking area, the visibility of cars parked therein, the closeness of such area to adjacent buildings and other similar factors.

LOUISIANA

LA R.S. 9:1255

§1255. Solar collectors; right of use
A. For purposes of this Section, "solar collector" means any device or combination of elements which relies on sunlight as an energy source.
B. No person or entity shall unreasonably restrict the right of a property owner to install or use a solar collector.
C. The provisions of this Section shall not supersede zoning restrictions, servitudes as provided by Civil Code Article 697 et seq., or building restrictions, as provided by Civil Code Article 775 et seq., which require approval prior to the installation or use of solar collectors.
D. The provisions of this Section shall not apply to property or areas which have been identified as historic districts, historical preservations or landmarks by any historic

preservation district commission, landmarks commission, or the planning or zoning commission of a governing authority.

MAINE
33 MRSA c. 28-A

CHAPTER 28-A SOLAR RIGHTS

§ 1421. Definitions
As used in this chapter, unless the context otherwise indicates, the following terms have the following meanings.
1. Legal instrument. "Legal instrument" includes:
   A. Municipal ordinances, bylaws or regulations that directly regulate the installation or use of solar energy devices on residential property;
   B. Rules, bylaws or regulations of an association of property owners, including but not limited to a homeowners association, unit owners association or condominium owners association; and
   C. Deed restrictions, restrictive covenants, declarations, contracts or similar binding agreements.
2. Residential property. "Residential property" means real property located in this State that is used for residential dwelling purposes.
3. Solar clothes-drying device. "Solar clothes-drying device" means a clothes line, drying rack or other equipment used for solar drying of clothing.
4. Solar collector. "Solar collector" means a device, structure or part of a device or structure that is designed and used to transform solar energy into thermal, chemical or electrical energy to meet the water heating, space heating, space cooling or electricity generation requirements of one residential dwelling.
5. Solar energy device. "Solar energy device" means a solar collector or solar clothes-drying device.

§ 1422. Policy
It is the policy of the State to promote the use of solar energy and to avoid unnecessary obstacles to the use of solar energy devices.

§ 1423. Use and installation of solar energy devices
1. Application. This section applies to a legal instrument adopted or created after September 30, 2009 that defines or limits the rights or privileges of owners or renters with respect to the use of residential property.
2. Right to install and use solar energy devices. Except as provided in subsections 3 and 4, a legal instrument subject to this section may not prohibit a person from installing or using:
   A. A solar energy device on residential property owned by that person; or

B. A solar clothes-drying device on residential property leased or rented by that person.

3. Exception. A legal instrument subject to this section may prohibit the installation and use of solar energy devices on residential property in common ownership with 3rd parties or common elements of a condominium.

4. Reasonable restrictions. A legal instrument subject to this section may include reasonable restrictions on the installation and use of a solar energy device. For the purposes of this section, a reasonable restriction is any restriction that is necessary to protect:

A. Public health and safety, including but not limited to ensuring safe access to and rapid evacuation of buildings;

B. Buildings from damage;

C. Historic or aesthetic values, when an alternative of reasonably comparable cost and convenience is available; or

D. Shorelands under shoreland zoning provisions pursuant to Title 38, chapter 3, subchapter 1, article 2-B.

§ 1424. Limitation

This chapter does not supersede any existing authority of any entity to adopt and enforce any laws, rules or regulations on any matter other than the installation and use of solar energy devices on residential property.

MARYLAND

MD Code: Real Property § 2-119

§2–119.

(a)(1)In this section the following words have the meanings indicated.

(2)"Restriction on use" includes any covenant, restriction, or condition contained in:

(i) A deed;

(ii) A declaration;

(iii) A contract;

(iv) The bylaws or rules of a condominium or homeowners association;

(v) A security instrument; or

(vi) Any other instrument affecting:

1. The transfer or sale of real property; or
2. Any other interest in real property.

(3) "Solar collector system" means a solar collector or other solar energy device, the primary purpose of which is to provide for the collection, storage, and distribution of solar energy for electricity generation, space heating, space cooling, or water heating.

(4) "Solar easement" means an interest in land that:

(i) Is conveyed or assigned in perpetuity; and

(ii) Limits the use of the land to preserve the receipt of sunlight across the land for the use of a property owner's solar collector system.

(b)(1) A restriction on use regarding land use may not impose or act to impose unreasonable limitations on the installation of a solar collector system on the roof or exterior walls of improvements, provided that the property owner owns or has the right to exclusive use of the roof or exterior walls.
(2) For purposes of paragraph (1) of this subsection, an unreasonable limitation includes a limitation that:
(i) Significantly increases the cost of the solar collector system; or
(ii) Significantly decreases the efficiency of the solar collector system.
(c) (1) A property owner who has installed or intends to install a solar collector system may negotiate to obtain a solar easement in writing.
(2) Any written instrument creating a solar easement shall include:
(i) A description of the dimensions of the solar easement expressed in measurable terms, including vertical or horizontal angles measured in degrees or the hours of the day on specified dates when direct sunlight to a specified surface of a solar collector system may not be obstructed;
(ii) The restrictions placed on vegetation, structures, and other objects that would impair the passage of sunlight through the solar easement; and
(iii) The terms under which the solar easement may be revised or terminated.
(3) A written instrument creating a solar easement shall be recorded in the land records of the county where the property is located.
(d) This section does not apply to a restriction on use on historic property that is listed in, or determined by the Director of the Maryland Historical Trust to be eligible for inclusion in, the Maryland Register of Historic Properties.

NEW MEXICO
N.M. Stat. § 3-18-32

3-18-32. Limitation of county and municipal restrictions on solar collectors.
A. A county or municipality shall not restrict the installation of a solar collector as defined pursuant to the Solar Rights Act [47-3-1 NMSA 1978], except that placement of solar collectors in historic districts may be regulated or restricted by a county or municipality.

B. A covenant, restriction or condition contained in a deed, contract, security agreement or other instrument, effective after July 1, 1978, affecting the transfer, sale or use of, or an interest in, real property that effectively prohibits the installation or use of a solar collector is void and unenforceable.

NORTH CAROLINA
N.C. Gen. Stat. § 160A-400.4(d) and N.C. Gen. Stat. § 160A-201

§ 160A-400.4. Designation of historic districts.
(d) The provisions of G.S. 160A-201 apply to zoning or other ordinances pertaining to historic districts, and the authority under G.S. 160A-201(b) for the ordinance to regulate

the location or screening of solar collectors may encompass requiring the use of plantings or other measures to ensure that the use of solar collectors is not incongruous with the special character of the district.

§ 160A-201(b). Limitations on regulating solar collectors.

(a) Except as provided in subsection (c) of this section, no city ordinance shall prohibit, or have the effect of prohibiting, the installation of a solar collector that gathers solar radiation as a substitute for traditional energy for water heating, active space heating and cooling, passive heating, or generating electricity for residential property, and no person shall be denied permission by a city to install a solar collector that gathers solar radiation as a substitute for traditional energy for water heating, active space heating and cooling, passive heating, or generating electricity for residential property. As used in this section, the term "residential property" means property where the predominant use is for residential purposes.

(b) This section does not prohibit an ordinance regulating the location or screening of solar collectors as described in subsection (a) of this section, provided the ordinance does not have the effect of preventing the reasonable use of a solar collector for residential property.

(c) This section does not prohibit an ordinance that would prohibit the location of solar collectors as described in subsection (a) of this section that are visible by a person on the ground:

(1) On the facade of a structure that faces areas open to common or public access;

(2) On a roof surface that slopes downward toward the same areas open to common or public access that the facade of the structure faces; or

(3) Within the area set off by a line running across the facade of the structure extending to the property boundaries on either side of the facade, and those areas of common or public access faced by the structure.

(d) In any civil action arising under this section, the court may award costs and reasonable attorneys' fees to the prevailing party.

WEST VIRGINIA

W.Va. Code §36-4-19

§36-4-19. Solar energy covenants unenforceable; penalty.

(a) It is the policy of the state to promote and encourage the residential and commercial use of solar energy systems and to remove obstacles thereto to promote energy efficiency and pollution reduction. Therefore, any covenant, restriction, or condition contained in any governing document of a housing association executed or recorded after the effective date of this section that effectively prohibits or restricts the installation or use of a solar energy system is void and unenforceable: *Provided*, That a housing association may, by vote of its members, establish or remove a restriction that prohibits or restricts the installation or use of a solar energy system. (b) For the purposes of this section: (1) “Solar energy system” means a system affixed to a building or buildings that uses solar devices, which are

thermally isolated from living space or any other area where the energy is used, to provide for the collection, storage, or distribution of solar energy; and (2) "reasonable restriction" means those restrictions that do not effectually result in a prohibition of their use by eliminating the system's energy conservation benefits or economic practicality. (c) This section does not apply to provisions that impose reasonable restrictions on solar energy systems including restrictions for historical preservation, architectural significance, religious or cultural importance to a given community. Nothing in this section precludes the regulation of solar energy systems by state and local authorities which may establish land use, health and safety standards. Nothing in this section precludes housing associations from restricting or limiting the installation of solar energy systems installed in common areas and common structures.

III. SOLAR PANEL PRESERVATION GUIDELINE EXAMPLES

PASADENA, CALIFORNIA

DESIGN GUIDELINES FOR HISTORIC DISTRICTS IN THE CITY OF PASADENA, CALIFORNIA

7.22 Minimize the visual impacts of skylights and other rooftop devices.

- Locating a skylight or a solar panel on a front roof plane should be avoided.
- Skylights and solar panels should not be installed in a manner that will interrupt the plane of the historic roof. They should be lower than the ridgeline.
- Flat skylights that are flush with the roof plane may be considered on the rear and sides of the roof.

10.38 Solar devices should not block views or be placed where they are visible from the public right-of-way.

- If attached to the building, solar devices should lay flush with the roof line.
- If not attached to the building, collectors should be located only in the side and rear yards. Exposed hardware, frames and piping should have a non-reflective finish.
- Collectors not attached to the building should be screened by landscaping.

BOULDER, COLORADO

GENERAL DESIGN GUIDELINES FOR BOULDER'S HISTORIC DISTRICTS AND INDIVIDUAL LANDMARKS

3.1 Roofs, Skylights, and Solar Panels

.4 Minimize the visual impact of solar collectors.
- The use of energy-efficient and energy-conserving materials is encouraged, but they should not compromise the historic integrity of the building.
- Solar collectors should not alter the existing profile of the roof nor be highly visible, particularly from the front of the house. They should be mounted flush on rear-facing roofs, or placed on the ground in an inconspicuous location.

8.2 Energy Efficiency

.4 It is not appropriate to install solar collectors in locations that compromise prominent roofs. The installation of solar collectors may be appropriate provided it does not detract from the historic character of the property, landmark or historic district.

8.3 Mechanical and Utility Facilities

.4 It is not appropriate to install ventilators, antennas, skylights, satellite dishes or other mechanical equipment in locations that compromise character-defining roofs, or on roof slopes that are prominently visible from the street.

BRECKENRIDGE, COLORADO

Solar Panel Policy

Solar Panels and Solar Devices

(1) Within the Conservation District: The preservation of the character of the Conservation District and the historic structures and sites within the Conservation District are of the utmost importance. The Town encourages the installation of solar panels and solar devices as an alternative energy source. However, there may be instances where solar panels or solar devices are not appropriate on a particular building or site if such a device is determined to be detrimental to the character of the Conservation District.

(2) Within the Conservation District, no solar devices shall be installed on a structure or site without first obtaining a Class C minor development permit. Solar panels and solar devices are encouraged to be installed on a non-historic building or building addition and integrated into the building design. To ensure that the character of the Conservation District and its historic structures and sites are protected, an application for a development permit to install a solar panel or solar device within the Conservation District will be reviewed under the following requirements:

(a) Solar panels or other solar devices on roofs shall be placed on a non-character defining roofline of a non-primary elevation (not readily visible from public streets). Solar panels and solar devices shall be setback from the edge of a flat roof to minimize visibility and may

be set at a pitch and elevated if not highly visible from public streets. On all other roof types, solar panels and solar devices shall be located so as not to alter a historic roofline or character defining features such as dormers or chimneys. All solar panels and solar devices shall run parallel the original roofline and shall not exceed nine inches (9") above the roofline.

Applications for new structures within the Conservation District are encouraged to include building integrated solar panels and other solar devices into the initial design, including a similar roof color, rather than as a later addition. Solar panels and solar devices which contrast with the color of the roof of new or historic structures are inappropriate if found to be detrimental to the character of the Conservation District.

(b) Detached arrays of solar panels and solar devices at a historic site may be located in the rear or side yard if the arrays are not highly visible from the public streets and do not detract from other major character defining aspects of the site. The location of detached solar arrays shall also consider visibility from adjacent properties, which shall be reduced to the extent possible while still maintaining solar access.

(c) Character defining elements such as historic windows, walls, siding or shutters, which face public streets or contribute to the character of the building, shall not be altered or in connection with the installation of solar panels or solar devices. Solar devices in non-historic windows, walls, siding or shutters which do not face public streets are encouraged.

(2) Outside the Conservation District: The Town encourages the installation of solar panels and solar devices on structures or sites located outside the Conservation District as an alternative energy source. The following regulations shall apply to the installation of solar panels or solar devices outside the Conservation District:

(a) No solar panel or solar devices shall be installed on a structure or site without first obtaining a Class D development permit. The director shall have the right to reclassify an application as a Class C minor application, and to require review by the Planning Commission, if he feels the purpose of this code would be best served by the reclassification. Reclassification shall be done pursuant to the definition of "Classification" in Section 9-1-5 of this chapter.

(b) Solar panels and solar devices shall run closely parallel to the roofline and shall not exceed nine inches (9") above the roofline. New structures are encouraged to include building integrated solar panels and solar devices into the initial design, rather than as a later addition.

(c) Detached arrays of solar panels and solar devices may be located in the rear or side yard if not highly visible from the public streets. The location of detached solar arrays shall also consider visibility from adjacent properties, which shall be reduced to the extent

possible while still maintaining solar access. Detached solar arrays which serve the residence on the site may be located outside of the building or disturbance envelope if no significant existing vegetation must be removed for the installation and an adequate buffer is provided to adjacent properties. (Ord. 26, Series 2008)

EUREKA SPRINGS, ARKANSAS

Solar and Other Energy Conservation Equipment
Contemporary energy conservation equipment additions have no visual historic counterpart and make a strong impact on existing buildings. Both goals of historic preservation and energy conservation are important, and care must be taken that one is not achieved at the expense of the other. Before installing a large, publically visible energy retrofit, owners should first improve the building's energy efficiency. It is much less expensive to reduce heating, cooling and lighting demand than it is to satisfy that demand with a high-tech solar energy system. The Eureka Springs Historic District Commission will use the US Department of the Interior

Guidelines for Rehabilitation Historic Buildings: Energy Retrofitting as a basis for Design Review in this section.

- **A.** Character defining features of existing buildings (i.e. roofline, chimneys, dormers) must not be damaged or obscured when introducing new roof or exterior wall-mounted energy conservation systems such as solar devises, skylights, or water retention systems.
- **B.** Equipment should be screened or hidden to the greatest possible while still achieving maximum function and effectiveness. *The goal should be high performance with low public visibility.* Installation of an energy conservation system at a publicly visible location may be permitted if the Commission determines that the placement does not have an adverse effect on the character defining features of the building, street, or the District as a whole.
- **C.** Publicly visible solar devises mounted on roofs shall be evaluated on the basis of: size; least visible/high-performance location; panel arrangement and design; system infrastructure; color contrast with roof, and glare.
- **D.** Preferred location for arrays of solar devices on roofs shall be on a non-character defining roof line of a non-primary elevation which is not readily visible from public streets -- the least visible location where at least 85% of optimal system performance can be achieved. Location on the rear façade or ancillary structures is preferred. If the south side is publicly visible, solar devises should be installed on the west or east side if less publicly visible and shade factors are appropriate. (If solar panels are flat or installed at a 5 degree angle there will be only a slight decrease in productivity.) Shadow tolerant panels should also be considered for use in a less visible location.

E. On pitched roofs, solar arrays shall run parallel to the original roofline and shall not rise above the roofline. On flat roofs, solar arrays shall be set back from the edge and may be set at a slight pitch if not highly visible from public streets.

F. Solar devises shall be considered part of the overall design of the structure. Color, shape and proportions of the solar array shall match the shape and proportions of the roof. Single installations on single-plane roofs are preferable to disjointed arrays or arrays on multiple roofplanes. If more than one array is needed, it shall be limited to one panel section on each side of the structure with rear location preferred. Scattered or disjointed arrays are not appropriate.

G. Roof and building color and pattern shall be coordinated as much as feasible with the color and pattern of the solar devises. Darker roofing colors are preferred as better compliments to mounted solar energy systems.

H. Solar panels shall not be mounted to project from walls or other parts of the building.

I. Skylights should be flat, not the bubble type, and shall not be mounted on primary facades.

J. Detached arrays of solar devices may be located in the rear or side yard if the arrays are not highly visible from public streets and do not detract from other major character defining aspects of the site. Visibility from adjacent properties shall be reduced to the greatest extent possible.

K. Solar greenhouses shall be treated as ancillary structures and located at least 2/3 back from the front façade of the primary structure.

L. Porch enclosures designed to be passive solar elements shall observe the guidelines for porches. Any exterior metal shall be finished to blend with surrounding building materials.

M. Wall energy conservations systems such as trombé walls and solar energy siding will be considered on a case-by-case basis for new construction or additions only.

N. COA applications for new construction are encouraged to include appropriate building integrated solar devices and other energy conservation equipment into the initial building design (while still maintaining compatibility with existing structures in the vicinity).

O. Before applying for a Certificate of Appropriateness for solar energy devises, applicants should be certain that enough sunlight is available to make the proposed system operative. Applicants are reminded to follow the rules and procedures in the Eureka Springs Municipal Code Chapter 7.56 “Tree Preservation” for all tree removals.

P. Applicants are reminded that the proposed system is subject to approval by the Building Official based on the Arkansas Mechanical Code, Chapter 14 “Solar Systems” and other applicable Codes.

Q. Application for a COA for a solar retrofit system shall follow Level III public notification procedure.

HOWARD COUNTY, MARYLAND

USE OF SOLAR PANELS AND OTHER SOLAR DEVICES IN HISTORIC DISTRICTS

The purpose of these guidelines is to allow for the use of alternative energy sources while protecting the integrity of Howard County's Historic Districts and to recognize environmental initiatives of the County, State and Federal governments. These guidelines will apply to the Ellicott City and Lawyers Hill Local Historic Districts. This policy is based upon the Guidelines as approved by the Historic District Commission on August 6, 2009.

Solar Panels and Other Solar Devices

Solar panels and other solar devices are becoming increasingly popular as the use of alternative energy sources become more readily available to the general public. In 2008, the Maryland Legislature passed a bill prohibiting Maryland Homeowners Associations from placing unreasonable limitations on the installation of solar collection panels on homeowners. Historic properties were exempted from this act, but the Howard County Historic District Commission acknowledges the desire of homeowners to use these devices and has formulated the guideline recommendations to reach a balance between historic preservation and energy conservation.

1. Recommended

- ☐ Use of solar panels should not conflict with recommendations set forth in Chapter 6.E for Roofs, Dormers, and Gutters.
- ☐ Add solar panels on roof surface not visible from a public way. However, solar shingles may be added to a roof surface visible from a public way if low or non-reflective shingles are used.
- ☐ Place solar panels or other solar devices on roofs on a non-character-defining roofline of a non-primary elevation (not readily visible from public streets). Run solar panels and devices parallel to the original roofline.
- ☐ Set solar panels and solar devices back from the edge of a flat roof to minimize visibility. Panels and devices may be set at a pitch and elevated, if not highly visible from public streets.
- ☐ Select solar panels, solar devices, mechanical equipment and mounting structures with non-reflective finishes such as an anodized finish.
- ☐ Paint mechanical equipment attached to the building fascia the same color as the fascia in order to blend into the building.
- ☐ Locate detached arrays of solar panels and solar devices at a historic site in the rear or side yard if the arrays are not highly visible from the public streets and do not detract from other major character-defining aspects of the site. The location of detached solar arrays should also consider visibility from adjacent properties, which shall be reduced to the extent possible while still maintaining solar access.
- ☐ Use solar devices in non-historic windows, walls, siding or shutters which do not face public streets.

- ☐ For new structures within the Historic District, include building-integrated solar panels and other solar devices into the initial design.
- ☐ Use solar panels and solar devices that are similar in color to roof materials.

2. Not Recommended

- ☐ Removing historic roofing materials in order to add solar panels.
- ☐ Disturbing the original roof line, dormers, chimneys or other original features to add solar panels.
- ☐ Altering character-defining elements such as historic windows, walls, siding or shutters which face public streets or contribute to the character of the building.

MONTGOMERY COUNTY, MARYLAND

Historic District Commission Guidelines
Chapter 3: General Rehabilitation Design Guidelines

9.0 Solar Panels

Solar panels should be located in unobtrusive places. If it is necessary to mount solar panels on a historic building, rather than elsewhere on the site, it is essential that the panels are installed such that they do not change the character of the building. If solar panels are placed on a roof they should be designed and positioned to have a minimal effect on the character of the structure. Placement on rear facing roof places of the primary structure should be considered first.

Design Objective
Solar panels should not adversely affect the historic character of the structure to which they are being added.

9.1 Reduce the visual impacts of solar panels as seen from the public right-of-way:

- Locate the solar panels away from public view where feasible.
- Solar panels should be mounted apart from the building or secondary structures, such as a garage, when feasible.
- Solar panels should be located on new construction, such as a new wing, where possible.
- Locate an attached solar panel in a manner such that it does not affect the primary roof façade elevations.
- Location on a primary or street facing roof plane is generally inappropriate.
- Where roof mounted, solar panels should be flush to the extent feasible.

- If not attached to the building, collectors should be located in side or rear yards. Exposed hardware, frames and piping should have a matte finish, and be consistent with the color scheme of the primary structure.
- Panels not attached to the building should be screened by landscaping to reduce their visibility. However, screening may diminish the effectiveness of the collectors to receive sunlight.
- Alternative technologies, such as photovoltaic shingles, may be appropriate in certain circumstances.

GRAND RAPIDS, MICHIGAN

Guidelines for Historic Districts and Designated Historic Properties

Topic: Windows, doors, skylights, solar systems and roof accessories.

I. Definitions: For purposes of these guidelines

These guidelines apply to all exterior windows, doors, skylights, solar systems and roof accessories. For the purpose of these guidelines the term "skylight" Is defined as any opening in the roof of a structure for the purpose of introducing natural light. "Solar systems" is defined as any passive or active device or material which are intended to collect, store and/or convert energy from the sun. "Roof accessories" are defined as chimney caps, vents, or other mechanical additions placed on or adjacent to the roof of a structure, not including decorative items such as weather vanes, flags or lighting.

II. Policy

The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic *Buildings* ***recommended against***: . . .

"Changing the configuration of a roof by adding new features such as dormer windows, vents or skylights so that the historic character is diminished;"

"Installing mechanical or service equipment so that it damages or obscures character-defining features; or is conspicuous from a public right-of-way;" and

"Locating solar collectors where they radically change the property's appearance; or damage or destroy character-defining features."

The following guidelines are provided to assist in the interpretation and application of the Secretary of the Interior's Standards and Guidelines.

III. Guidelines

D. Skylights, Solar Systems and Roof Accessories

The application of materials which will adversely alter the original roof line and/or physical character of designated historic landmark structures and structures within designated historic districts is discouraged. Owners of historic properties should explore alternative means of adding light or conserving energy before considering the use of installation of skylights and solar systems.

Where owners apply to install skylights or solar systems to the structure the Commission will evaluate each application on its merits. Factors which will be considered included the following:

The historic character and architectural importance of the structure and surrounding environment;

i. *The intended purpose of the installation;*
ii. *Other alternative means explored for introducing natural light to the structure's interior and/or conserving heat energy, and the reasons for their rejection;*
iii. *The visibility of the skylights and/or solar system from adjacent public streets and adjoining properties; and,*
iv. *The design and replacement of the skylight and/or solar system and their compatibility with the structure's roof line, color, texture, and shape.*

Generally, utilitarian roof accessories will be reviewed by the staff and given administrative approval. Where the proposed installation will have a significant impact on the roof line or other feature of the structure, such as the installation of large turbine vents or other obtrusive accessories, the proposal will be referred to the Commission.

These guidelines were approved by the Michigan Bureau of History as of October 25, 1995 pursuant to Section 5.(3) of Act 169 of 1970, as amended (Local Historic Districts Act).

YPSILANTI, MICHIGAN

ALTERNATIVE ENERGY SYSTEMS

THE FOLLOWING APPLIES TO ALL PROPERTIES IN THE HISTORIC DISTRICT

The term "alternative energy" covers a range of technologies; for example, the National Renewable Energy Laboratory conducts research into biomass, geothermal, wind, and solar power. But, practically speaking, at present (2007) the only alternative energy systems technically feasible for most properties within historic districts are solar collectors to provide heat and electrical power; therefore any specific examples given in this fact sheet will refer to solar power systems.
However, the general principles of review set out here apply equally to all types of alternative energy installations. Because modern mechanical systems were not part of the original form of structures in the historic district, and the range of potential configurations is wide, it is not possible to provide a "cookbook" type fact sheet for alternative energy installations. The purpose of the fact sheet, instead, is to summarize the general standards against which any proposal must be reviewed.

RULES THAT GOVERN HDC REVIEW
Ypsilanti's Historical Preservation ordinance guides the decisions made by the HDC and also requires the HDC to apply the Standards for Rehabilitation established by the U.S. Secretary of the Interior when reviewing any work proposed in the district.

The Secretary's Standards define "rehabilitation" as the "process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values." In other words, both the Ypsilanti ordinance and the Secretary of the Interior Standards recognize that the long-term preservation of historic properties depends in part on the ability to adapt them to changing circumstances.

But, both sets of rules also require that any alteration be appropriate. The function of the Standards for Rehabilitation is to provide guidelines by which to determine what types and methods of repair and alteration are appropriate and permissible, and what are inappropriate.

HOW THE SECRETARY OF INTERIOR STANDARDS APPLY
Standard 2. *"The historic character of a property will be retained and preserved. The removal of historic materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided."* The Standards refer to "character-defining features" of a property: examples include doors, windows, porches, transoms, and the like. Both the materials and the arrangement of these features define a property's historic character, which must not be obscured, radically changed, damaged, or destroyed in making a property more energy efficient.

Example: A business owner whose building faces south wants to install an array of solar panels. Because any significant alteration to the primary facade would obscure character-defining features, the HDC could not approve installation of the south-facing wall, and the owner would have to propose an alternative location for the solar array – e.g., on the roof.

Standard 5. *"Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved."*

Example: A homeowner proposes to install solar panels on a stucco wall. HDC would be required to review the effect of the installation on the stucco finish. If the likely consequence would be to cause the finish to deteriorate, the HDC would have to deny the application.

Standard 9. *"New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and it environment."* Alterations to the exterior must not be so intrusive that they destroy the integrity of the building's character by their very presence. Repairs or alterations must not damage or destroy historic materials directly or indirectly.

Example: A business owner proposes to install a solar array on the rear wall of a building. Although the proposed installation would not obscure or damage character-defining features, and no historic material would be destroyed, it is not clear what effect the weight of the new equipment would have on the structural integrity of the wall. The HDC might then require the owner to obtain a professional structural analysis of existing physical conditions to demonstrate that the installation will do no long-term damage to the building.
Example: A homeowner proposed to install a row of solar panels on the south-facing rear roof of her house. The panels would be fixed at a 69-degree angle from the horizontal, while the roof lies at a 45-degree angle. Because the HDC must consider the effect of the proposed work on the massing of the house – that is, the outline of the building – the Commission might require that the panels be fixed at the same angle as the surface on which they are installed, even if that were not the optimal angle.

Standard 10. *"New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired."* The HDC must consider not only the details of installation of a system, but also how it will be uninstalled and what effect that would have on the physical integrity of the structure. The method of eventual removal and repair of any resulting damage to the structure shall be clearly identified in any work permit application

ADDITIONAL CONSIDERATIONS

Installation – attachment
The proposed method and materials for attachment shall be clearly identified in any work permit application.

Cost versus benefit

Energy conservation measures (additional insulation, weather stripping, caulking, new or repaired storm windows, etc.) are the most cost-effective methods of cutting energy costs for any property, historic or otherwise.

Although the HDC has no role to play in how an individual property owner calculates the cost versus the potential benefit of installing an alternative energy system, the HDC will consider whether the applicant has taken all available measures to achieve maximum energy efficiency.

And, because the justification for altering a historic property requires that the alteration be necessary to "[make] possible an efficient contemporary use", the presumption must be that if a property owner has not already taken all available energy conservation measures, the proposed alteration is not necessary.

OTHER INFORMATION
The Secretary of the Interior Standards for Rehabilitation are online at www.nps.gov/history
The HDC review criteria are online at www.cityofypsilanti.com/boards

Further information: e-mail hdc@cityofypsilanti.com or call the Planning & Development Department at 734-483-9646

PORTLAND, OREGON

33.218 Community Design Standards

33.218.010 Purpose

Design review and historic design review ensure that development conserves and enhances the recognized special design values of a site or area, and promote the conservation, enhancement and continued vitality of special area of the City.

The Community Design Standards provide an alternative process to the design review and historic design review for some proposals. Where a proposal is eligible to use this chapter, the applicant may choose to go through the discretionary design review process set out in Chapter 33.825, Design Review, and Chapter 33.846, Historic Reviews, or to meet the objective standards of this chapter. If the applicant chooses to meet the objective standards of this chapter, no discretionary review process is required.

33.218.100 Standards for Primary and Attached Accessory Structure in Single-Dwelling Zones

The standards of this section apply to development of new primary and attached accessory structures in single-dwelling zones.

N. Rooftop solar energy systems

1. Rooftop solar energy systems must not increase the footprint of the structure, must not increase the peak height of the roof, and the systems must be parallel to the slope of the roof;
2. Photovoltaic roofing shingles or tiles may be directly applied to the roof surface
3. Photovoltaic glazing may be integrated into windows or skylights

P. Additional standards for historic resources. The following standards are additional requirements for conservation districts and conservation landmarks.

7. Rooftop solar energy systems.
    a. Rooftop solar energy systems must not increase the footprint of the structure, must not increase the peak height of the roof, and the system must be parallel to the slope of the roof;
    b. Solar energy systems may not be installed on a conservation landmark.

8. Photovoltaic glazing, roofing shingles, or tiles may not be installed on a conservation landmark.

33.218.110 Standards for Primary and Attached Accessory Structures in R3, R2, and R1 Zones

The standards of this section apply to development of new primary and attached accessory structures in the R3, R2, and R1 zones. The addition of an attached accessory structure to a primary structure, where all the uses on the site are residential, is subject to Section 33.218.130, Standards for Exterior Alteration of Residential Structures in Residential Zones.

N. Rooftop solar energy systems

1. Rooftop solar energy systems must not increase the footprint of the structure, must not increase the peak height of the roof, and the systems must be parallel to the slope of the roof;
2. Photovoltaic roofing shingles or tiles may be directly applied to the roof surface
3. Photovoltaic glazing may be integrated into windows or skylights

R. Additional standards for historic resources. The following standards are additional requirements for conservation districts and conservation landmarks.

8. Rooftop solar energy systems.
    a. Rooftop solar energy systems must not increase the footprint of the structure, must not increase the peak height of the roof, and the system must be parallel to the slope of the roof;
    b. Solar energy systems may not be installed on a conservation landmark.

10. Photovoltaic glazing, roofing shingles, or tiles may not be installed on a conservation landmark

33.218.120 Standards for Detached Accessory Structures in Single Dwelling, R3, R2 and R1 Zones

The standards of this section are applicable to development of new detached accessory structures in single dwelling, R3, R2, and R1 zones.

H. Solar energy systems.

1. Solar energy systems on detached accessory buildings are subject to the same standard as would apply to new primary and attached accessory structures. See applicable solar standards in Sections. 33.218.100 and .110.

2. Ground or pole mounted solar panels systems are subject to the following standards:
    a. The tallest part of the system may not exceed 8 feet in height;
    b. The system may not be located closer than the primary street-facing building façade.

J. Additional standards for historic resources. The following standards are additional requirements for conservation districts and conservation landmarks.

5. Photovoltaic glazing, roofing shingles, or tiles may not be installed on a conservation landmark.

33.218.130 Standards for Exterior Alterations to Residential Structures in Single Dwelling, R3, R2 and R1 Zones

The standards of this section apply to exterior alterations of primary structures and both attached and detached accessory structures in residential zones. These standards apply to proposals where there will be only residential uses on the site.

F. Rooftop solar energy systems.

1. Rooftop solar energy systems must not increase the footprint of the structure, must not increase the peak height of the roof, and the systems must be parallel to the slope of the roof;
2. Photovoltaic roofing shingles or tiles may be directly applied to the roof surface.
3. Photovoltaic glazing may be integrated into windows or skylights.

H. Additional standards for historic resources. The following standards are additional requirements for conservation districts and conservation landmarks.

6. Rooftop solar energy systems

    a. Rooftop solar energy systems in conservation districts must not increase the footprint of the structure, must not increase the peak height of the roof, and the system must be parallel to the slope of the roof;
    b. Solar energy systems may not be installed on a conservation landmark.

6. Photovoltaic glazing, roofing shingles, or tiles may not be installed on a conservation landmark.

33.218.140 Standard for All Structures in the RH, RX, C and E Zones

The standards of this section apply to development of all structures in RH, RX, C and E Zones. These standards also apply to exterior alterations in these zones.

For proposals where all uses on the site are residential, the standards for the R3, R2, and R1 zones may be met instead of the standards of this section. Where new structures are proposed, the standards of Section 33.218.110, Standards for R3, R2, and R1 Zones, may be met instead of the standards of this section. Where exterior alterations are proposed, the standards of Section 33.218.130, Standards for Exterior Alteration of Residential Structures in Residential Zones, may be met instead of the standards of this section.

K. Rooftop solar energy systems.

1. Rooftops solar energy systems must not increase the footprint of the structure, must not increase the peak height of the roof, and the system must be parallel to the slope of the roof;
2. Photovoltaic roofing shingles or tiles may be directly applied to the roof surface
3. Photovoltaic glazing may be integrated into windows or skylights
4. Ground pole mounted solar energy systems are subject to the following additional standard: On sites that abut an RF through R2 zone, the system must be set back one foot for every foot of height, from the lot line abutting the RF through R2 zone.

Q. Additional standards for historic resources. The following standards are additional requirements for conservation districts and conservation landmarks.

13. Rooftop solar energy systems

    a. Rooftop solar energy systems in conservation districts must not increase the footprint of the structure, must not increase the peak height of the roof, and the system must be parallel to the slope of the roof;
    b. Solar energy systems may not be installed on a conservation landmark.

33.218.150 Standards for I Zones

These standards of this section apply to development of all structures in the I zones. These standards also apply to exterior alterations in these zones.

I. Rooftop solar energy systems.

1. Rooftops solar energy systems must not increase the footprint of the structure, must not increase the peak height of the roof, and the system must be parallel to the slope of the roof;
2. Photovoltaic roofing shingles or tiles may be directly applied to the roof surface
3. Photovoltaic glazing may be integrated into windows or skylights
4. Ground pole mounted solar energy systems are subject to the following additional standards:
    a. On sites that abut an RF through R2 zone, the system must be set back one foot for every foot of height, from the lot line abutting the RF through R2 zone;
    b. The system may not be located closer to the street than the portion of the street-facing façade that is closest to the street.

L. Additional standards for historic resources.

9. Rooftop solar energy systems
    a. Rooftop solar energy systems in conservation districts must not increase the footprint of the structure, must not increase the peak height of the roof, and the system must be parallel to the slope of the roof;
    b. Solar energy systems may not be installed on a conservation landmark.

10. Photovoltaic glazing, roofing shingles, or tiles may not be installed on a conservation landmark.

PORTLAND, OREGON

Historic Resource Protection Overlay Zone

Historic Districts

33.445.010 Purpose

This chapter protects certain historic resources in the region and preserves significant parts of the region's heritage. The regulations implement Portland's Comprehensive Plan policies that address historic preservation. These policies recognize the role historic resources have in t promoting education and enjoyment of those living in and visiting the region. The regulations foster pride among the region's citizens in their city and its heritage. Historic preservation beautifies the city, promotes the city's economic health, and helps preserve and enhance the value of historic properties.

33.445.320 Development and Alterations to Historic Districts

Building new structure or altering an existing structure in a Historic District requires historic design review. Historic design review ensures the resource's historic value is considered prior to or during the development process.

B. Exempt from historic design review

8. Solar energy systems that meet the following requirements. When solar energy systems are proposed as part of a project that includes elements subject to historic design review, the solar system is not exempt:

a. On a flat roof, the horizontal portion of a mansard roof, or roofs surrounded by a parapet that is at least 12 inches higher than the highest part of the roof surface. The solar energy system must be mounted flush or on racks, with the system or rack extending no more than 5 feet above the highest point of the roof. Solar energy systems must also be screened from the street by:
   (1) An existing parapet along the street-facing façade that is as tall as the tallest part of the solar-energy system, or
   (2) Setting the solar energy system back from the roof edges facing the street 4 feet for each foot of the solar energy system height
b. On a pitched roof. Solar energy systems may be on a pitched roof facing a rear lot or on a pitched roof facing within 45 degrees of the rear lot. See figure 445-1 The system must be mounted flush, with the plane of the system parallel with the roof surface, with the system no more than 12 inches from the surface of the roof at any point, and set back 3 feet from the roof edge and ridgeline. See Figure 445-2

Figure 445-1
Solar Energy System Location on a Rooftop

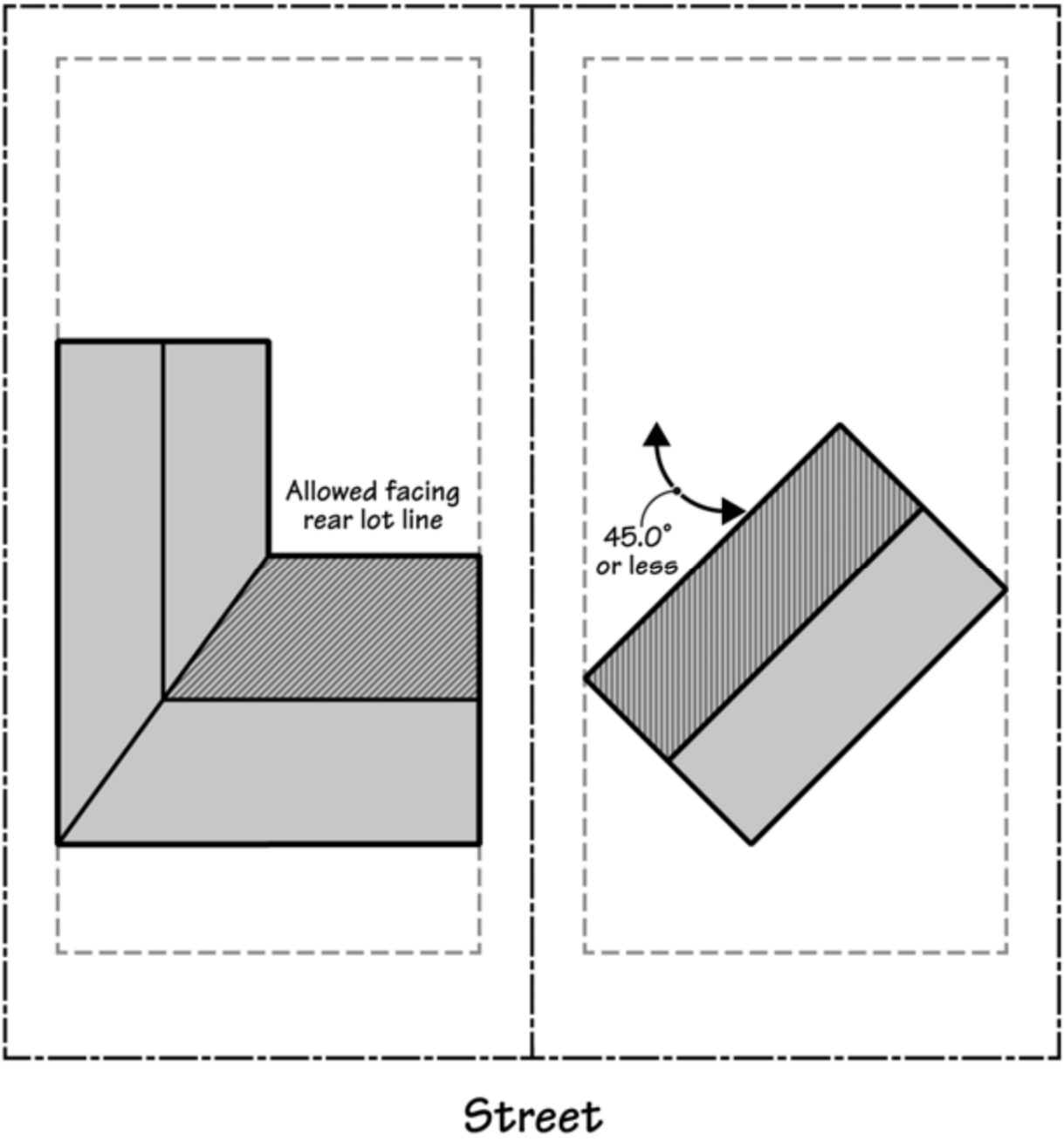
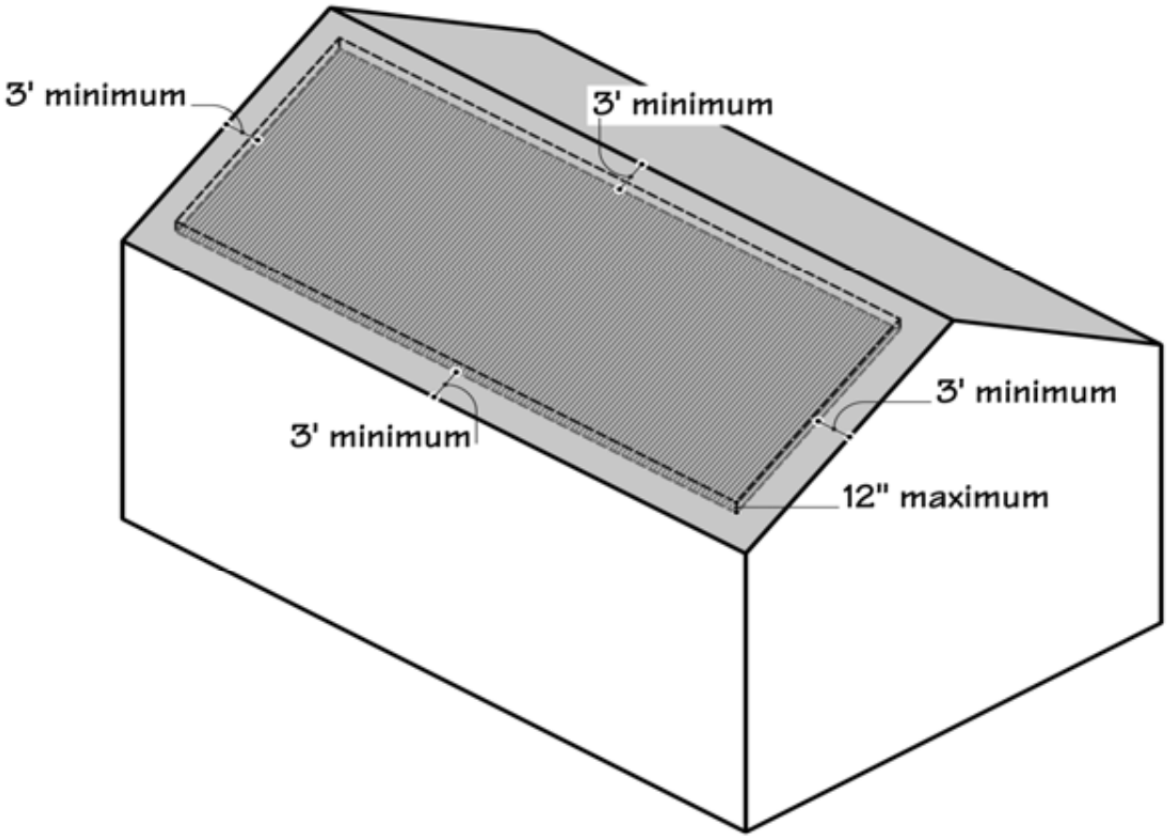


Figure 445-2
Solar Energy Systems on a Pitched Roof



ALEXANDRIA, VIRGINIA

SOLAR COLLECTORS

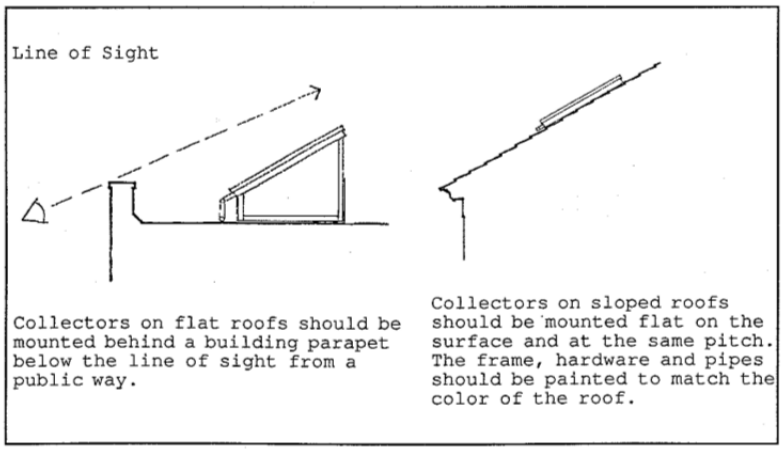
INTRODUCTION

Solar collectors or panels either on residential or commercial buildings that are visible from a public way require the approval of a certificate of appropriateness by the Boards of Architectural Review and must also comply with the Zoning Ordinance requirements for heights of structures.

Since the mid-1970s, the use of solar collectors as a source of energy for hot water and electricity has increased throughout the country. Generally, solar collectors are mounted on the roof of a structure. On historic structures where a roof mounted solar collector would create a visual intrusion, solar collectors can be mounted on the roofs of accessory buildings such as a shed or outbuilding. While there are a number of properties with rooftop solar collectors in the historic districts, the installation of solar collectors is generally discouraged as not compatible with the architectural character of the historic districts. In certain instances, however, solar collectors can be mounted on the ground so that they are not visible from a public way.

REQUIREMENTS

- Solar collectors must meet the requirements of the Uniform Statewide Building Code (USBC).
- A building permit is required for the construction of solar collectors.
- Existing buildings must have the structural capacity to support rooftop solar collector equipment. If additional structural capacity is needed, it must be designed by a professional engineer.
- On residential properties, solar collectors must meet all the front, rear and sideyard setback requirements of the Zoning Ordinance.
- Roof mounted solar collectors cannot exceed the established building height limitation in the historic districts.



Collectors on flat roofs should be mounted behind a building parapet below the line of sight from a public way.

Collectors on sloped roofs should be mounted flat on the surface and at the same pitch. The frame, hardware and pipes should be painted to match the color of the roof.

City of Alexandria, Virginia
Design Guidelines

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