DOWNLOAD PDF CONSERVING BUILDINGS

Chapter 1 : Connecticut | Building Energy Codes Program

Offers coverage pertaining to historic buildings along with the deterioration and conservation of all major building materials such as stone, ceramics, masonry, metals, paints, cement-based materials metal, glass, synthetic resins and polymers.

The city of Brasilia, designed in , was inscribed on the World Heritage List in Attempts to inscribe the Sydney Opera House began a mere eleven years after its completion in Yet despite early efforts to protect and conserve the most iconic places of the Modern era, it was not until the s that the conservation of modern heritage emerged as a distinct area of practice. That decade witnessed intense activity by a growing group of practitioners to address conservation of twentieth-century heritage, and by the beginning of the twenty-first century, a number of governmental and nongovernmental organizations were focused on this work. The large number of such groups demonstrates an interest in and comfort with identifying the recent past as important and brings together sectors of the architectural and conservation community that had not previously been closely aligned. Docomomo, formed in , has been hugely influential, creating a network of academics and practitioners that catalyzed action within and across more than sixty member countries. Founded on a different premise from that of other conservation groups, Docomomo promotes the continuum of the modernist philosophy in the practice of contemporary architecture and simultaneously aims to conserve the legacy of modernism by bringing contemporary architects and critics who are proponents of modernism together with historians and conservationists. The program included a public engagement process, which helped shift English public opinion about the architecture of the postwar period. National Park Service and English Heritage , organized conferences and workshops and issued publications on technical issues; these efforts contributed to international practice. Considering twenty-five years of practice and all that has been achieved, it would be easy to surmise that modern heritage is well loved, cared for, and conserved. However, many important twentieth-century places remain unprotected. There is still little research addressing common technical problems impeding the repair of these buildings. With the termination of the Conservation of Modern Architecture courseâ€”a partnership of various Finnish institutions and ICCROM â€”there is no dedicated training on the subject at an international level, and there are only isolated opportunities at national levels. This is the area of conservation where future and past collide, where creator and conservator may come together, and where we have better access than ever before to firsthand knowledge of why and how places were created. But despite considerable professional interest and an admirable body of conservation knowledge, there remain many challenges. Clearly we have not yet achieved widespread recognition and support for the conservation of twentieth-century places, nor have we arrived at a shared vision, approach, or methodology for doing so. It is therefore timely to reflect on how the practice of conserving modern architecture has advanced, in order to identify the areas on which future efforts should be concentrated. In considering how the GCI could contribute, preliminary research identified the most commonly cited and interrelated challenges as: The limited passage of time in which to assess the Modern Movement within the palimpsest of history impacts how conservation is approached and gives rise to the first two challenges. Nevertheless, in parts of the world, there remains nervousness about protecting anything but the icons of the Modern era. In many areas, twentieth-century structures dominate the urban landscape, and for older generations their realization is a living, but not necessarily positive, memory. These places are yet to go through the Darwinian natural selection process, after which the survivors are appreciated as heritage. Thus, questions are raised about what to protect and how to establish comparative levels of significance within existing frameworks used in the heritage identification and assessment process. Recognition of a broad range of heritage values and types of heritage places, changes in heritage management, reduced government support, and the importance of public participation have all influenced what is protected and how it is conserved. In many places, attention has shifted from expert assessments of iconic architectural buildingsâ€”a focus seen as elitist by some â€” to community-based heritage assessments that capture places expressing wide-ranging values, places appreciated across large sectors of the community. While modernism was seen as an important tool in social reform, the listing of modern heritage has been driven primarily by the architectural community, and it focused initially on architectural value. Lack of public support has sometimes hampered efforts by authorities to list modern heritage successfully. When listing efforts were designed strategicallyâ€"with education and awareness-raising components that enhanced understanding of these places and that provided conservation information to ownersâ€"controversy was reduced, and listing was more successful. Survivors will become more precious, and a level of comfort about conserving them will be achieved. In the meantime, important places will be lost unless we stimulate greater public support, assess significance in the context of a large number of survivors, and help people learn how to conserve this legacy. Conservation is seen by some practitioners as a moral enterprise, guided by well-established tenets embodied in its charters, guidelines, and legislation, and embraced by close-knit groups of professionals. Despite its earlier origins as a defined area of professional practice with shared international concepts, conservation is a largely twentieth-century movement. Modernism has a similar trajectory, although it has a larger group of international disciples. As with conservation practice, modernism and its followers strove for universal truths, reinforced through international manifestos and key texts. Both movements share ideas of contributing to a more civil societyâ€"one through retention of a connection with the past, the other through creation of a better future environment. The early period of modern heritage conservation saw these universal truths collide, and questions arose about whether the fundamental tenets of modernism conflicted with conservation practice. Traditional conservation practitioners argued for the application of existing philosophical approaches, tempered by the particular requirements of the conservation challenges at hand, while others argued for a new philosophical approach specific to the demands of modern heritage. The question that generated the greatest debate was whether accepted conservation norms could be applied to places representing the modern age, specifically with respect to material conservation. Could authentic fabric be conserved without compromising design intent, which had been driven by new social ideals? With the help of friends, Le Corbusier established the Foundation Le Corbusier in to protect his legacy through promotion and celebration of his work. Lateral thinking, creativity, and flexibility in application of the existing tenets enabled practitioners to accommodate the materiality of the Modern eraâ€"specifically and most problematically, issues arising from innovative construction methods and use of materials. The aim for some working in this area was to incorporate modern conservation into the mainstream, reduce controversy, identify a common methodology, and embed it within the continuum of conservation culture. It was recognized that some issues had already been tackled in the conservation of industrial heritage sites, cultural landscapes, and sites with predominantly social significance. Even so, the debate regularly reappears, recently prompting the creation of the aforementioned Madrid Document. Modern architecture has attracted a new generation of practitioners to its conservation. The influence of modernism is strong in contemporary architectural practice, and architects practicing in this style are also engaged in the conservation of modern heritage. The swelling of the ranks of those practicing in this areaâ€"with architects who are less familiar with conservation theory, methodology, and practice but who bring a deep understanding of modernist theoryâ€"continually fuels the debate and the calls for specific doctrinal texts to guide modern heritage conservation. Those familiar with conservation practice have argued that existing conservation principles are fine, and that it is counterproductive to identify modern heritage as different. The injection of new blood into the small and sometimes insular conservation fraternity has served to catalyze reevaluation of some existing manifestos and tools, highlighting areas of confusion or areas where conservation has not been interwoven into general planning, development, and architectural practice. The joining of these sectors provides opportunities to integrate conservation into architectural practice more broadly and reinforces the idea that conservation is a creative process in which design skills are as important as technical knowledge. Some architects faced with the conservation of their buildings seek to improve them; some want to evolve them, introducing new architectural ideas that they have developed over time. While it is important to engage with the creators when possible, it is also important to place their advice in a context for making conservation decisions and to recognize the different perspectives of creator and conservator. It would be helpful to move toward a shared view on approaching conservation, if only so that efforts can be directed toward solving specific conservation problems. Much has been written about the ideological confrontations, and the two areas that receive most attention are material significance and adaptive reuse. The move from craft to industrialized construction introduced many new materials, new uses for traditional materials, and component-based systems. Traditional detailing was abandoned, and it was often claimed that buildings were maintenance free. In the fiscally austere postwar era, limited budgets and shortages of materials such as steel and timber, together with the de-skilling of the building industry, meant that building quality was sometimes compromised. These factors have resulted in a building stock with a reduced life cycle. Shorter cycles of repair and higher rates of obsolescence lead to higher costs in the long term. Costs of repair versus replacement will always be an argument used against conservation. But this argument may lose steam as sustainability audits are employed in assessing the environmental impact of new development, as compared to the adaptation of existing structures. However, while energy audits often prove the environmental value of retaining traditional buildings, this may not be the case for buildings designed from midcentury onwardsâ€"designed during a time of seemingly inexhaustible, cheap energy and constructed of materials that require high energy to produce. Howden Minster in Yorkshire. Conservation practitioners face difficulties working with materials of poor durability or that are no longer available, with structures from all erasâ€"not just modern buildings. For example, the use of magnesian limestone by medieval craftsmen at Howden creates difficulties for current repair. Over the last twenty years, there have been limited advances in developing and adapting repair methods to conservation needs. It has become evident that in some cases repair is not possible, and large-scale replacement or even reconstruction may be necessary. In these instances, balancing the level of significance of the place and the cost to repair it is difficult, and the situation demands creative solutions. There is no infrastructure for modern repairâ€"as there is for traditional conservationâ€"partly because of the vast array of materials and systems used, and partly because the knowledge is still in its infancy. Early efforts challenging industry to identify new conservation repair methods and products have weakened, and leadership is needed to progress. It is also important to learn from the ways in which similar issues were addressed in the past. There are many examples of materials such as certain stones, timbers, and metals used in traditional buildings that today are unavailable, hazardous, or known to perform so poorly that replacing like for like is not an option. Research is needed to develop technical solutions for the most common and enduring problems, such as the repair of exposed concrete, cladding systems, and plastics. We need informationâ€"on the ways modern materials deteriorate and on suitable repair methodsâ€"that builds on the literature from the s. Guidance on diagnosing problems and systematically working through the repair options, as practiced in traditional conservation, and communicating this methodology to new audiences would also advance the field, as would case studies illustrating how others have arrived at balanced philosophical decisions. Materiality issues have been heavily discussed. Ultimately, conservation is case specific, and different practitioners will make different decisions. Current limitations on technical knowledge and available repair methods mean that the ability to be faithful to conservation principles may be challenged at times. When significance is at the core of decision making, balancing design and material matters becomes a rational process, although one that is still subject to individual interpretations. Transferring knowledge on the values-based conservation approach to a wider audience would assist in developing a shared methodology. This is true of most buildings, including heritage buildings. These sites, however, constitute only a small portion of protected heritage places. Conservation, in most cases, is about managing change in ways that retain significance. The scale of some modern complexes poses challenges for adaptive reuse. Conservation projects at these sites also can be challenging, but perhaps no more so than for comparable sites from earlier eras, such as the mid-nineteenth century textile mill at the Saltaire model village in West Yorkshire. These challenges can be grouped as: These issues, identified nearly twenty years ago, are still cited as problems specific to twentieth-century heritage. However, it is debatable whether functionality and therefore adaptability are any more problematic for modern buildings than for those of other eras. Adaptation for new uses or new functional requirements can pose difficulties, but it is important not to single out modern buildings as the only ones facing these issues, for to do so would likely reduce support for their protection and conservation. A heightened concern for design integrity can hinder adaptive reuse and pose dangers to mainstreaming modern conservation. We need a focus on good solutions by publicizing, in conferences and publications, examples of successful twentieth-century adaptive reuse projects and by demonstrating the ways in which difficult issues have been managed. Van Nelle Factory in the Netherlands, a site that has been adapted to new use and provides a successful case study for managing similar issues at twentieth-century sites. The initiative aims to advance practice in this area of conservation through a comprehensive research and implementation program, which includes materials-based research that investigates innovative techniques to arrest decay in these buildings while sustaining them into the future. Model field projects will be developed to demonstrate improved approaches and methods the first of these, conservation of the iconic Eames House in Los Angeles, is described in this newsletter. Other activities include developing education and training programs and didactic materials for practitioners, creating new literature, and disseminating resources. The GCI initiativeâ€”which will include a number of partnersâ€”will augment existing activities and address practical conservation challenges, for which strategic approaches and concerted efforts can enhance thinking. Shaft 12 at Zollverein Coal Mine Industrial Complex in Germany, a site that has been adapted to new use and provides a successful case study for managing similar issues at twentieth-century sites. This research phase culminated in a colloquium in March that gathered key players engaged in the conservation of modern heritage, to assess current practice in order to pinpoint immediate needs, determine how to advance this area of practice, identify priorities and organizations able to address them, and formulate an action plan. The outcomes of this colloquium will be shared on the GCI website in fall

Chapter 2 : References â€“ Heritage Conservation Info

Our principal work sector ranges from insurance loss mitigation and complete reinstatement for historic buildings, town centre schemes, rural & agricultural buildings and the conservation and repair of great houses.

Add insulation to wood-frame walls. Add insulation to masonry walls. Install cool roofs and green roofs. The treatments listed first have less potential to negatively impact the historic fabric of a building. They tend to be less intrusive, are often reversible, and offer the highest potential for energy savings. Undertaking any of the treatments in the second group, however, may pose technical problems and damage to historic building materials and architectural features. Their installation costs may also outweigh the anticipated energy savings and must be evaluated on a case-by-case basis with advice from professionals experienced in historic preservation and building performance. Requires Minimal Alteration Reduce air leakage. Reducing air leakage infiltration and exfiltration should be the first priority of a preservation retrofit plan. Leakage of air into a building can account for 5 to 40 percent of space-conditioning costs, which can be one of the largest operational costs for buildings. Air infiltration can be especially problematic in historic buildings because it is closely linked to increased moisture movement into building systems. Air infiltration and exfiltration. Air flow into and out of buildings is driven by three primary forces: Cold outside air that infiltrates the building through big holes, as well as through loose windows, doors, and cracks in the outer shell of the building, causes the heating system to work harder and consume more energy. In a multi-story building, cold air that enters the building at lower levels, including the basement or crawlspace, will travel up through the building and exit out leaky windows, gaps around windows and the attic as a result of temperature and pressure differential. Adding weatherstripping to doors and windows, sealing open cracks and joints at the base of walls and around windows and doors, sealing off recessed lighting fixtures from above, and sealing the intersection of walls and attic, will substantially reduce air leakage. When using exterior caulk to seal the intersection of siding and doors or windows, do not caulk the underside of clapboards or below windows to allow any liquid water to escape. Add attic or roof insulation. Therefore, reducing heat transfer through the roof or attic should be one of the highest priorities in reducing energy consumption. Adding insulation in unoccupied, unfinished attics is not only very effective from an energy-savings perspective, but it is also generally simple to install and causes minimal disruption to historic materials. Department of Energy DOE provides a recommended R-value chart based on climate zones to help determine the optimal amount of insulation that should be installed in a particular project. Local codes may also have specific insulation requirements. Insulating trap or access doors should not be overlooked. Even though they may be small, attic doors can be responsible for substantial heat loss and should be addressed as part of any attic insulation project. The information contained in this document is based primarily on the available data for the Northeast and Mid-Atlantic regions. In unfinished and unheated attics, the insulation material is typically placed between the floor joists using blown-in, batt, or rigid foam insulation. When using fiberglass batts faced with a vapor retarder, the vapor retarder should be face down towards the heated interior. However, the use of a vapor retarder is not necessary in attic applications. If additional batt insulation is being added over existing insulation that is near or above the top of the joists, new un-faced batts should be placed perpendicular to the old ones to cover the top of the joists and reduce thermal bridging through the frame members. In low-pitched roofs, or where installing batt insulation is difficult, a more complete coverage of the attic floor may be achieved by using blown-in insulation. Unfinished attics must be properly ventilated to allow excess heat to escape. Radiant barriers may be used in attics to reduce thermal radiation across the air space between the roof deck and the attic floor in order to reduce summer heat gain. They are most beneficial in reducing cooling loads in hot climates and consist of a highly reflective sheet or coating, usually aluminum, applied to one or both sides of a flexible material. They are effective only when the foil surface faces an air space, and as long as the surface remains shiny â€” that is, free from dirt, dust, condensation and oxidation. Radiant barriers should not be installed directly over insulation on the attic floor, as they can act as vapor retarders and trap moisture in the insulation unless they are perforated. Their placement should be ventilated on both sides. Insulating the underside of the roof rather than the attic floor increases the volume of the thermal envelope of the building, thus making this treatment inherently less energy efficient. This treatment allows the equipment to operate more efficiently and can prevent moisture-related problems caused by condensation on the mechanical equipment. Sample installation of a radiant barrier. Sample installation of rigid foam insulation, tapered at the edge to avoid altering the appearance of the roof. When insulation is placed under the roof, all vents in the attic and the intersection between the walls and roof rafters must be sealed. Rigid foam or batt insulation placed between the roof rafters is a common method of insulating the underside of a roof. Open cell spray foam. Also, if roof leaks do occur, they may go undetected until after major damage occurs. Consideration must also be given to the irreversibility of this procedure because the foam enters the pores of the wood. It may be more advisable to install a breathable layer of material that will allow for future removal without leaving a residue. When total roof replacement is required because of deterioration, installing rigid foam insulation on top of the roof deck before laying the new roofing material can be simple and effective, particularly on low-pitched or flat roofs. However, the added thickness of the roof caused by installing rigid foam can alter the appearance of projecting eaves, dormers, and other features. If this application would significantly alter the appearance of these features, consider other methods. The addition of metal or wood exterior or interior storm windows may be advisable to increase the thermal performance of the windows in ways that weatherstripping and caulking cannot address. It will make a noticeable contribution to the comfort level of the building occupant, with the added benefit of protecting the historic window from weathering. Using clear, non-tinted, low-e glass in the storm window can further increase the thermal performance of the window assembly without the loss of historic fabric. Studies have shown that the performance of a traditional wood window with the addition of a storm window can approach that of a double-glazed replacement window. Furthermore, a storm window avoids the problem of irreparable seal failure on insulated glass units IGUs used in modern replacement windows. While the lifespan of the IGU depends both on the quality of the seal and other factors, it is unreasonable to expect more than 25 years. Once the seal fails, the sash itself will usually need to be entirely replaced. By providing an additional insulating air space and adding a barrier to infiltration, storm windows improve comfort and reduce the potential for condensation on the glass. To be effective and compatible, storm windows must be tight fitting; include a sealing gasket around the glass; align with the meeting rail of the primary sash; match the color of the sash; and be caulked around the frame to reduce infiltration without interfering with any weep holes. Whether a storm window or the historic window itself, the interior window must be the tighter of the two units to avoid condensation between the windows that can occur in a cold climate that requires indoor heating. Condensation is a particular concern if it collects on the historic window, as can easily happen with a loose-fitting, storm window. While interior storm windows can be as thermally effective as exterior storm windows, appropriate gaskets must be used to ensure that damage-causing condensation does not form on the inside face of the historic window. Opening or removing the interior storm windows during non-heating months also helps to avoid the negative effects of moisture build-up. Original steel windows were retained and made operable during the rehabilitation of this historic mill complex. Insulated sliding windows were added on the interior to improve energy efficiency. For large, steel industrial windows, the addition of interior, insulated sliding glass windows that align with the primary vertical mullions has proven to be a successful treatment that allows the primary window to remain operable. Insulate basements and crawlspaces. The first step in addressing the insulation of basements and crawl spaces is to decide if they are to be part of the conditioned space and, therefore, within the thermal envelope of the building. If these areas are kept outside the thermal envelope of the building and treated as unconditioned areas, insulating between the floor joists on the underside of the subfloor is generally recommended. Alternatively, rigid foam insulation installed over the bottom of the floor joists on the basement or crawlspace side may also be used. All gaps between the unconditioned and conditioned areas of the building, including the band joists, should be air sealed to prevent air infiltration into the upper levels of the building. If the crawlspace contains mechanical equipment, or if high levels of moist air enter the crawlspace through vents during the summer months, it is advisable to include the crawlspace within the thermal boundary of the building. As in attics, water vapor can condense on ducts and other equipment located in unconditioned basements and crawlspaces. In the past, building codes routinely required that crawlspaces be treated as non-conditioned spaces and be ventilated. However, this has not proven to be a best practice in all cases. Ventilation through crawlspace vents does not keep the space dry during humid summers. All vents should be sealed and access doors weather-stripped. Rigid foam insulation installed on the interior face of the wall is recommended for basement and crawlspace foundation walls, only after all drainage issues have been addressed. Special attention should be given to ensure that all the joints between the insulation boards are sealed. A moisture barrier on exposed dirt in a crawlspace is strongly recommended to prevent ground moisture from entering the building envelope. Whenever feasible, pouring a concrete slab over a moisture barrier in crawlspaces or basements with exposed dirt floors should be considered. Seal and insulate ducts and pipes. A surprisingly enormous amount of energy is wasted when heated or cooled air escapes from supply ducts or when hot attic air leaks into air conditioning return ducts. Based on data collected in energy audits, as much as 35 percent of the conditioned air in an average central air conditioning system may escape from the ducts. This loss of energy is another reason to treat attics, basements and crawlspaces as conditioned spaces. Ducts located in unconditioned spaces should be insulated based on the recommendations for the appropriate climate zone. Hot water pipes and water heaters should be insulated in unconditioned spaces to retain heat, and all water pipes insulated to prevent freezing in cold climates. Weather strip doors and add storm doors. Historic wood doors are often significant features and should always be retained, rather than replaced. While an insulated replacement door may have a higher R-value, doors represent a small area of the total building envelope, and the difference in energy savings after replacement would be insignificant. The doors and frames should, however, have proper maintenance including regular painting, and the addition or renewal of weatherstripping. Storm doors can improve the thermal performance of the historic door in cold climates and may be especially recommended for a door with glazing. The design of the storm door should be compatible with the character of the historic door. A fully glazed storm door with a frame that matches the color of a historic door is often an appropriate choice because it allows for the historic door to remain visible. Storm doors are recommended primarily for residential buildings. They are not appropriate for commercial or industrial buildings. These buildings never had storm doors, because the doors were opened frequently or remained open for long periods. It may also not be appropriate to install a storm door on a highly significant entrance door. In some instances, the addition of a storm door could add significant heat gain on certain exposures or in hot climates, which could degrade the material or finish of the historic door. Add awnings and shading devices.

Chapter 3 : Preservation Brief 3: Improving Energy Efficiency in Historic Buildings

ConServ Building Services, LLC provides HVAC repairs, preventative maintenance, and hour emergency service throughout the southeastern United States. When you need service, we have the manpower to respond quickly, dispatching trained, licensed, and experienced technicians.

This property has the distinction of being the first-ever property designated and operated as a historic site by a U. The Society operated as a national organization to: Peterson was an influential figure in the midth century establishing the Historic American Buildings Survey HABS , advising on the establishment of Independence National Historical Park , helping with the first graduate degree program in historic preservation in the United States at Columbia University , and author. In the Trust assumed responsibility for its first museum property, Woodlawn Plantation in northern Virginia. Twenty-eight sites in all have subsequently become part of the National Trust, representing the cultural diversity of American history. In New York City, the destruction of Pennsylvania Station in shocked many nationwide into supporting preservation. The s proved advantageous with new laws and international agreements extending preservation "from ancient monuments to whole districts and buildings a few decades old. Under the direction of James Marston Fitch , the first advanced-degree historic preservation program began at Columbia University in James Marston Fitch also offered guidance and support towards the founding of the Master of Preservation Studies Degree within the Tulane School of Architecture [28] in The first undergraduate programs B. Heritage conservation in Canada In Canada , the phrase "heritage preservation" is sometimes seen as a specific approach to the treatment of historic places and sites, rather than a general concept of conservation. Historic objects in Canada may be granted special designation by any of the three levels of government: The Netherlands[edit] Victor de Stuers is widely considered the man who started historic preservation in the Netherlands. In the first national department for conservation was established [32] and de Stuers was appointed as the first legal secretary at the Ministry of Home Affairs as chief of the brand new Department of Arts and Sciences. As the majority of the historic preservation programs in the Netherlands, this program is decentralized, managed on the provincial level. The costs are covered through a combination of national and provincial subsidies. For example, according to Sarah Dromgoole, [42] shipwrecks from The Dutch East India Company are found all around the world, which are still property of the Netherlands, but the Dutch government rarely takes responsibility for this property that is found outside of their territory. According to this law, which the Macedonian Parliament approved in March , there are three types of cultural heritage: Historical preservation is represented by the protection of monuments and monumental entireties under immovable cultural heritage, and historical items under movable cultural heritage. The guiding principles of the Macedonian National Committee of ICOMOS are raising the national consciousness about the importance of historic and cultural heritage, decentralization of the discourse about heritage, and effective monitoring of the status of cultural and historic heritage in the country. In the Institute was granted authority to protect movable and immovable cultural and historic heritage in the Ohrid region. The Institute has since executed numerous efforts for historic preservation, most notably aiding the recognition of the city of Ohrid as a UNESCO site of cultural heritage in The Office is an independent governmental organization under the Ministry of Culture, divided into three departments: However, these laws are not comprehensive and limited in scope: So while efforts discovering and protecting anything older than BC are well protected, anything from later historical periods is not under the protection of this law. The Planning and Building Law discusses the overall management and regulation of land use in Israel. During the s, the issue of preservation was gaining public awareness, and as a response to the destruction of Herzliya Hebrew Gymnasium one of the first educational institutions in Israel in , a wave of shock and anger led to extensive public debate. Today, it is the organization responsible for the most historical preservation endeavors as well as efforts to add amendments to existing laws to provide a comprehensive and effective framework for preservation in Israel. The IDF surveyed 94 military bases and found that about 80 of them include sites worth preserving, and for each of these bases there is a preservation plan. Buildings include Knights Templar sites, old military bases used by the British or German or buildings from the Ottoman period.

National Register of Historic Places[edit].

Chapter 4 : Basic Information | Green Building |US EPA

Chinese city sees its heritage buildings as prestigious assets that can attract some of the world's leading companies, while Hong Kong turns a 19th century police station into a supermarket and.

Environmental Protection Agency, contains best management practices, and study references for the effective design of storm water management systems. Related Issues Dry Fire Hydrants One of the synergistic technologies for achieving water conservation and fire safety is a dry fire hydrant. Dry hydrants are non-pressurized suction pipe systems that are permanently installed in ponds or lakes and use the untreated water, instead of municipal water, to fight fires. Utilized in areas that lack conventional fire protection; areas that cannot handle the large volumes of water due to antiquated systems; or during peak use seasons when there is low water pressure, dry hydrants allow fire departments to be much more efficient by providing close water sources to fire risks. Since dry hydrants are installed below frost line and do not require electricity, they are capable of supplying water in the case of natural disasters such as hurricanes and tornadoes when electricity lines are knocked down, or during extreme cold or hot weather where conventional hydrant pipes can freeze or break. Also, dry fire hydrants help to save drinking water and conserve energy by using rainwater that does not need to be processed to be used for fighting fires. More Graywater Graywater use can significantly reduce the amount of potable water needed for landscaping irrigation, toilet flushing and other non-drinking water applications. To increase graywater recovery and use, coordinate with local water authorities to explain the value of graywater recovery and the benefits to them and their community. Note that as of , many jurisdictions will require a variance to source plumbing fixtures with non-potable water. Passive Survivability Passive survivability is a fairly new approach to disaster recovery and continuity of operations. Ensuring that an on-site water storage system can survive a natural disaster would allow a facility to operate through the disaster or restart operations soon after a disaster. Extreme Weather Extreme weather has taxed water supply systems and caused major damage to facilities along coastlines and rivers. Before rebuilding after extreme weather events, apply sustainable development principles to rebuilding water supply systems and stormwater management. Continual drought conditions plague some parts of the country. Design water infrastructure systems and facility water use systems to minimize water use in these areas. Impact of Waste Water Reduction for Combined Storm and Sanitary Systems Many older urban areas are left with a legacy of combined storm and sanitary sewer systems, which can easily overwhelm sewage treatment facilities during storm events. Raw sewage may be required to be discharged directly into waterways when such systems are overwhelmed. Reducing use of water and recycling greywater in buildings can help reduce the sewage load on the treatment facilities. Reduce Electrical Power Consumption Large amounts of water are used in the process of electrical power production; reducing use of electricity will also result in water reduction at the power plant. Conversely, electricity is used for water pumping, extraction, transfer, distribution, irrigation, manufacturing and wastewater treatment. Reducing the use of water thus results in a reduction of the amount of electricity required to be produced by the power plant.

Chapter 5 : Modern Matters: Breaking the Barriers to Conserving Modern Heritage (Article)

Architectural conservation is the process by which individuals or groups attempt to protect valued buildings from unwanted change. [2] History of the architectural conservation movement [edit].

In this sense, the term refers to the "professional use of a combination of science, art, craft, and technology as a preservation tool" [1] and is allied with - and often equated to - its parent fields, of historic environment conservation and art conservation. This broader scope recognizes that society has mechanisms to identify and value historic cultural resources, create laws to protect these resources, and develop policies and management plans for interpretation, protection, and education. Functional definition[edit] Architectural conservation is the process by which individuals or groups attempt to protect valued buildings from unwanted change. It was a response to Modernism and its corresponding architectural perspective, which eschewed sentimental attachment to old buildings and structures in favor of technological and architectural progress and change. Prior to this time most of the ancient buildings that were still standing had only survived because they either had significant cultural or religious import, or they had yet to be discovered. Those educated in the field began to see various examples of architecture as either being "correct" or "incorrect". This school of thought saw the original design of old buildings as correct in and of themselves. Two of the main proponents of preservation and conservation in the 19th century were art critic John Ruskin and artist William Morris. Restoration was the conservationist school of thought that believed historic buildings could be improved, and sometimes even completed, using current day materials, design, and techniques. Victorian restoration of medieval churches was widespread in England and elsewhere, with results that were deplored at the time by William Morris and are now widely regretted. Current treatments[edit] The Department of the Interior of the United States defined the following treatment approaches to architectural conservation: Preservation, "places a high premium on the retention of all historic fabric through conservation, maintenance and repair. Both Preservation and Rehabilitation standards focus attention on the preservation of those materials, features, finishes, spaces, and spatial relationships that, together, give a property its historic character. Canada recognizes preservation, rehabilitation, and restoration. The Burra Charter , for Australia, identifies preservation, restoration, and reconstruction. Unfortunately, the organic materials used were also very susceptible to the two most significant impediments to preservation and conservation: Ancient buildings such as the Egyptian pyramids, the Roman Colosseum, and the Parthenon face common preservation issues. The most prominent factors affecting these structures are the environment, pollution, and tourism. For example, the Colosseum has already faced lightning, fire, and earthquakes. The salt crystals further contribute to the black effect that man-made pollution has on these buildings. The third factor affecting ancient building conservation is tourism. While tourism provides both economical and cultural benefits, it can also be destructive. The Egyptian tomb of Seti the 1st is currently off limits to the public due to the deterioration that has been caused by tourists.

DOWNLOAD PDF CONSERVING BUILDINGS

Chapter 6 : Conserving Buildings

Conserving Heritage Buildings in a Green and Growing Vancouver 3 FORWARD FROM VHF Diane Switzer Executive Director Heritage building conservation today is less about.

Please visit our website periodically for updates. Complete applications are those that meet the submittal requirements of Buildings Bulletin and include a complete energy analysis. Once available, a published hard copy version can be purchased at the City Store will be available for purchase, and will also be viewable on this webpage. Contact the Codes Division of the Department of State for an application for variance at or by email at codes dos. The New York City version must be used. For more complex energy modeling, including where trade-offs among disciplines or renewable energy sources are used, a DOE2-based software should be used. Such software, including updates, may include DOE2. Other energy modeling programs must be approved by the Secretary of State of New York and the Buildings Commissioner prior to submission. The progress inspector must certify that all Progress Inspections noted on the original TR8 and on TR8s filed with in any post-approval amendments PAAs have been satisfied. The progress inspector must sign and seal the TR8, certifying that inspected work complies with the approved drawings EN2: The progress inspector s must certify on this form that the as-built values for energy in the building match the values in the last-approved Energy Analysis. The as-built energy analysis must be professionally certified and submitted with the EN2 form at sign-off. When Construction has Changed from the Approved Drawings Design applicants are required to update their drawings, including the energy analysis, when conditions result in a design change during construction Section ECC These drawings, including the energy analysis, must be submitted to the Department for approval. If construction differs from the last-approved energy analysis prior to sign-off, the original preparer of the energy analysis must prepare an as-built energy analysis using the values actually used in the construction. The energy analysis must demonstrate compliance with the NYCECC and the preparer must sign and seal the analysis, certifying that the work is in compliance. The progress inspector must then certify in the EN2 form that the values in the professionally certified energy analysis match the existing construction. If the construction changes result in a building no longer complying with the NYCECC, as demonstrated by a failed energy analysis, the progress inspector cannot certify on the EN2 Form that the work is in compliance and the application cannot be signed-off. To correct a violating condition in accordance with the approved plans Email energycodeinspections buildings. The body of the email should include the violation , complaint , property address, the intended date of completion, and a contact name and phone number When ready for re-inspection, email ESWO2 buildings. Include any supporting documentation for the explanation.

Chapter 7 : Historic preservation - Wikipedia

Water conservation technologies and strategies are often the most overlooked aspects of a whole-building design strategy. However, the planning for various water uses within a building is increasingly becoming a high priority.

Moller Villa is a rather gaudy edifice built in in the former French Concession for the British shipping magnate and equestrian sports aficionado Eric Moller, who had the fairy-tale mansion designed to suit the tastes of his young daughter. Shanghai grasped this concept around 10 years ago; it successfully uses its heritage to highlight its competitive advantage as a vibrant and attractive place to live. In collaboration with the World Heritage Institute for Training and Research in Asia and the Pacific, based at Tongji University in Shanghai, they used the latest Unesco urban landscape protocols and made some astounding discoveries. Even though the old buildings were not necessarily of outstanding architectural value, if the benefits were found to include longer-term cultural, social and environmental factors, their value could merit conservation. In addition to increased tourism revenue, he lists job creation in a high skills sector, income circulation, increased property values, and the economic efficiency of rehabilitation over demolition and disposal into landfill. The biggest economic benefit for any aspiring world-class city, though, is the attraction urban heritage presents to highly educated and creative talent. Lee recalls seeing a 20th century house that had been adapted to serve as a Nike flagship store. He contrasts it with the old police station in the seaside Hong Kong village of Stanley, built in , now used as a Wellcome supermarket, which, he says, makes no attempt to take advantage of the unique heritage of the building. At the northern end of Waitanyuan is the magnificent former British consulate complex set amid expansive lawns and gardens. Most of the red-brick colonnaded building is used for high-end functions and dining by the adjacent Peninsula hotel, and one annexe of the complex serves as a flagship store for a prestigious watch manufacturer. Despite the opulent air, like any historic landmark in Shanghai, anyone is free to wander around and take a look. A heritage conservation conference held in the city last year estimated Shanghai has 4, historic buildings, zones, monuments, sites, districts and alleys. Professionally conserving and managing them all has become a growth industry for planners, artisans, architects, conservators and archaeologists. In practice this has often meant demolition, as was the case in July when the distinctive grade-three listed Tung Tak Pawn Shop in Wan Chai was torn down. One perfectly restored example has been retained as a museum, and many of the patrons of the upmarket cafes, restaurants, galleries and designer boutiques appear to be well-heeled foreign visitors and expatriate residents. Financial incentives were made available to attract private developers or subsidise public-private partnerships. Fears of demolition for historic State Theatre building in North Point: A distinctive built environment that reflects the evolution of a city is a highly significant quality-of-life variable, he adds. This article appeared in the South China Morning Post print edition as: The future of the past.

Chapter 8 : San Francisco Public Utilities Commission : Commercial Water Conservation

Energy Conservation Code. The New York City Energy Conservation Code (NYCECC) is comprised of New York City local laws and the current Energy Conservation Construction Code of New York State (ECCCNYS).

The conservation of heritage assets in a manner appropriate to their significance is a core planning principle. Heritage assets are an irreplaceable resource and effective conservation delivers wider social, cultural, economic and environmental benefits. Conservation is an active process of maintenance and managing change. It requires a flexible and thoughtful approach to get the best out of assets as diverse as listed buildings in every day use to as yet undiscovered, undesignated buried remains of archaeological interest. In the case of buildings, generally the risks of neglect and decay of heritage assets are best addressed through ensuring that they remain in active use that is consistent with their conservation. Ensuring such heritage assets remain used and valued is likely to require sympathetic changes to be made from time to time. In the case of archaeological sites, many have no active use, and so for those kinds of sites, periodic changes may not be necessary. Where changes are proposed, the National Planning Policy Framework sets out a clear framework for both plan-making and decision-taking to ensure that heritage assets are conserved, and where appropriate enhanced, in a manner that is consistent with their significance and thereby achieving sustainable development. Part of the public value of heritage assets is the contribution that they can make to understanding and interpreting our past. In line with the National Planning Policy Framework, local authorities should set out their Local Plan a positive strategy for the conservation and enjoyment of the historic environment. Such as a strategy should recognise that conservation is not a passive exercise. In developing their strategy, local planning authorities should identify specific opportunities within their area for the conservation and enhancement of heritage assets. This could include, where appropriate, the delivery of development within their settings that will make a positive contribution to, or better reveal the significance of, the heritage asset. The delivery of the strategy may require the development of specific policies, for example, in relation to use of buildings and design of new development and infrastructure. Local planning authorities should consider the relationship and impact of other policies on the delivery of the strategy for conservation. Policy on this is set out in paragraph of the National Planning Policy Framework. While there is no requirement to do so, local planning authorities are encouraged to consider making clear and up to date information on their identified non-designated heritage assets, both in terms of the criteria used to identify assets and information about the location of existing assets, accessible to the public. In this context, the inclusion of information about non-designated assets in Local Plans can be helpful, as can the identification of areas of potential for the discovery of non-designated heritage assets with archaeological interest. Further information on Local Plans. Where it is relevant, neighbourhood plans need to include enough information about local heritage to guide decisions and put broader strategic heritage policies from the Local Plan into action at a neighbourhood scale. Where it is relevant, designated heritage assets within the plan area should be clearly identified at the start of the plan-making process so they can be appropriately taken into account. In addition, and where relevant, neighbourhood plans need to include enough information about local non-designated heritage assets including sites of archaeological interest to guide decisions. The local planning authority heritage advisers should be able to advise on local heritage issues that should be considered when preparing a neighbourhood plan. The local Historic environment record and any local list will be important sources of information on non-designated heritage assets. Neighbourhood planning generally can be found in the neighbourhood planning section Heritage specific issues and neighbourhood planning is provided by Historic England. Some of the more recent designation records are more helpful as they contain a fuller, although not exhaustive, explanation of the significance of the asset. Further commentary on the significance of World Heritage Sites. Heritage assets may be affected by direct physical change or by change in their setting. Being able to properly assess the nature, extent and importance of the significance of a heritage asset, and the contribution of its setting, is very important to understanding the potential impact and acceptability of development proposals see How to assess if there is substantial harm. In most cases the assessment of the significance of the heritage asset by the local planning authority is likely to need expert advice in addition to the information provided by the historic environment record, similar sources of information and inspection of the asset itself. Advice may be sought from appropriately qualified staff and experienced in-house experts or professional consultants, complemented as appropriate by consultation with National Amenity Societies and other statutory consultees. Historic environment records are publicly-accessible and dynamic sources of information about the local historic environment. They provide core information for plan-making and designation decisions such as information about designated and non-designated heritage assets, and information that helps predict the likelihood of current unrecorded assets being discovered during development and will also assist in informing planning decisions by providing appropriate information about the historic environment to communities, owners and developers as set out in the National Planning Policy Framework. A Design and Access Statement is required to accompany certain applications for planning permission and applications for listed building consent. Design and Access Statements provide a flexible framework for an applicant to explain and justify their proposal with reference to its context. In cases where both a Design and Access Statement and an assessment of the impact of a proposal on a heritage asset are required, applicants can avoid unnecessary duplication and demonstrate how the proposed design has responded to the historic environment through including the necessary heritage assessment as part of the Design and Access Statement. A thorough assessment of the impact on setting needs to take into account, and be proportionate to, the significance of the heritage asset under consideration and the degree to which proposed changes enhance or detract from that significance and the ability to appreciate it. Setting is the surroundings in which an asset is experienced, and may therefore be more extensive than its curtilage. All heritage assets have a setting, irrespective of the form in which they survive and whether they are designated or not. The extent and importance of setting is often expressed by reference to visual considerations. Although views of or from an asset will play an important part, the way in which we experience an asset in its setting is also influenced by other environmental factors such as noise, dust and vibration from other land uses in the vicinity, and by our understanding of the historic relationship between places. For example, buildings that are in close proximity but are not visible from each other may have a historic or aesthetic connection that amplifies the experience of the significance of each. The contribution that setting makes to the significance of the heritage asset does not depend on there being public rights or an ability to access or experience that setting. This will vary over time and according to circumstance. When assessing any application for development which may affect the setting of a heritage asset, local planning authorities may need to consider the implications of cumulative change. Disrepair and damage and their impact on viability can be a material consideration in deciding an application. However, where there is evidence of deliberate damage to or neglect of a heritage asset in the hope of making consent or permission easier to gain the local planning authority should disregard the deteriorated state of the asset National Planning Policy Framework paragraph Local planning authorities may need to consider exercising their repair and compulsory purchase powers to remedy deliberate neglect or damage. The vast majority of heritage assets are in private hands. Thus, sustaining heritage assets in the long term often requires an incentive for their active conservation. Putting heritage assets to a viable use is likely to lead to the investment in their maintenance necessary for their long-term conservation. By their nature, some heritage assets have limited or even no economic end use. A scheduled monument in a rural area may preclude any use of the land other than as a pasture, whereas a listed building may potentially have a variety of alternative uses such as residential, commercial and leisure. In a small number of cases a heritage asset may be capable of active use in theory but be so important and sensitive to change that alterations to accommodate a viable use would lead to an unacceptable loss of significance. It is important that any use is viable, not just for the owner, but also the future conservation of the asset. It is obviously desirable to avoid successive harmful changes carried out in the interests of repeated speculative and failed uses. If there is only one viable use, that use is the optimum viable use. If there is a range of alternative viable uses, the optimum use is the one likely to cause the least harm to the significance of the asset, not just through necessary initial changes, but also as a result of subsequent wear and tear and likely future changes. The optimum viable use may not necessarily be the most profitable one. It might be the original use, but that may no longer be economically viable or even the most compatible with the long-term conservation of the asset. However, if from a conservation point of view there is no real difference between viable uses, then the choice of use is a decision for the owner. Harmful development may sometimes be justified in the interests of realising the optimum viable use of an asset, notwithstanding the loss of significance caused provided the harm is minimised. The policy in addressing substantial and less than substantial harm is set out in paragraphs â€" of the National Planning Policy Framework. Appropriate marketing is required to demonstrate the redundancy of a heritage asset in the circumstances set out in paragraph , bullet 2 of the National Planning Policy Framework. The aim of such marketing is to reach all potential buyers who may be willing to find a use for the site that still provides for its conservation to some degree. If such a purchaser comes forward, there is no obligation to sell to them, but redundancy will not have been demonstrated. What matters in assessing if a proposal causes substantial harm is the impact on the significance of the heritage asset. Whether a proposal causes substantial harm will be a judgment for the decision taker, having regard to the circumstances of the case and the policy in the National Planning Policy Framework. In general terms, substantial harm is a high test, so it may not arise in many cases. For example, in determining whether works to a listed building constitute substantial harm, an important consideration would be whether the adverse impact seriously affects a key element of its special architectural or historic interest. The harm may arise from works to the asset or from development within its setting. While the impact of total destruction is obvious, partial destruction is likely to have a considerable impact but, depending on the circumstances, it may still be less than substantial harm or conceivably not harmful at all, for example, when removing later inappropriate additions to historic buildings which harm their significance. Similarly, works that are moderate or minor in scale are likely to cause less than substantial harm or no harm at all. However, even minor works have the potential to cause substantial harm. Policy on substantial harm to designated heritage assets is set out in paragraphs and to the National Planning Policy Framework. An unlisted building that makes a positive contribution to a conservation area is individually of lesser importance than a listed building paragraph of the National Planning Policy Framework. If the building is important or integral to the character or appearance of the conservation area then its demolition is more likely to amount to substantial harm to the conservation area, engaging the tests in paragraph of the National Planning Policy Framework. However, the justification for its demolition will still be proportionate to the relative significance of the building and its contribution to the significance of the conservation area as a whole. A clear understanding of the significance of a heritage asset and its setting is necessary to develop proposals which avoid or minimise harm. Early appraisals, a conservation plan or targeted specialist investigation can help to identify constraints and opportunities arising from the asset at an early stage. Such studies can reveal alternative development options, for example more sensitive designs or different orientations, that will deliver public benefits in a more sustainable and appropriate way. Public benefits may follow from many developments and could be anything that delivers economic, social or environmental progress as described in the National Planning Policy Framework paragraph 7. Public benefits should flow from the proposed development. They should be of a nature or scale to be of benefit to the public at large and should not just be a private benefit. However, benefits do not always have to be visible or accessible to the public in order to be genuine public benefits. Public benefits may include heritage benefits, such as: The Department for Digital, Culture, Media and Sport is responsible for the identification and designation of listed buildings, scheduled monuments and protected wreck sites. Historic England identifies and designates registered parks, gardens and battlefields. In most cases, conservation areas are designated by local planning authorities. Historic England administers all the national designation regimes. A listed building is a building which has been designated because of its special architectural or historic interest and unless the list entry indicates otherwise includes not only the building itself but also: A conservation area is an area which has been designated because of its special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance. Local planning authorities need to ensure that the area has sufficient special architectural or historic interest to justify its designation as a conservation area. Local planning authorities must review their conservation areas from time to time section 69 2 of the Planning Listed Buildings and Conservation Areas Act A conservation area appraisal can be used to help local planning authorities develop a management plan and appropriate policies for the Local Plan. A good appraisal will consider what features make a positive or negative contribution to the significance of the conservation area, thereby identifying opportunities for beneficial change or the need for planning protection. England protects its World Heritage Sites and their settings, including any buffer zones or equivalent, through the statutory designation process and through the planning system. The Outstanding Universal Value of a World Heritage Site, set out in a Statement of Outstanding Universal Value, indicates its importance as a heritage asset of the highest significance to be taken into account by: The National Planning Policy Framework sets out detailed policies for the conservation and enhancement of the historic environment, including World Heritage Sites, through both plan-making and decision-taking.

Chapter 9 : Conservation Programs

The concept of energy conservation in buildings is not new. Throughout history building owners have dealt with changing fuel supplies and the need for efficient use of these fuels. Gone are the days of the cheap and abundant energy of the 's.

Additional Resources Water conservation technologies and strategies are often the most overlooked aspects of a whole-building design strategy. However, the planning for various water uses within a building is increasingly becoming a high priority. This water savings potential is enormous with relatively low cost expenditures. There are also significant energy cost savings associated with water efficiency measures. For example, federal facilities use approximately 60 billion Btu of energy annually to process and use water. A general definition of water efficiency planning is as follows: Water efficiency is the planned management of water to prevent waste, overuse, and exploitation of the resource. Effective water efficiency planning seeks to "do more with less" without sacrificing comfort or performance. Water efficiency planning is a resource management practice that incorporates analysis of costs and uses of water; specification of water-saving solutions; installation of water-saving measures; and verification of savings to maximize the cost-effective use of water resources. Water Conservation Strategies There are a number of strategies that can be employed to reduce the amount of water consumed at a facility. In general terms, these methods include: More specifically, a wide range of technologies and measures can be employed within each of these strategies to save water and associated energy consumption. Water-efficient plumbing fixtures ultra low-flow toilets and urinals, waterless urinals, low-flow and sensored sinks, low-flow showerheads, and water-efficient dishwashers and washing machines Irrigation and landscaping measures water-efficient irrigation systems, irrigation control systems, low-flow sprinkler heads, water-efficient scheduling practices, and Xeriscape Water recycling or reuse measures Gray water and process recycling systems , and Methods to reduce water use in HVAC systems. The following list of measures describes the technologies, strategies, and techniques that can be specified in the design phase of a new construction project to reduce facility water use. The measures are commensurate with the U. Best Management Practices 1. Public Information and Education Programs U. Department of Energy, Federal Energy Management Program While not a design specification or technology option, obtaining the participation of building inhabitants in the water conservation program is a key to achieving water use reduction goals, and is often one of the simplest and most cost-effective strategies to employ. For example, double flushing of ultra-low flush toilets may result in more water consumption than older, conventional devices. The following bullets summarize some of the activities that can be incorporated into a public information and education program: The human factor is critical to obtaining the desired results from water conserving strategies, and development of an information and education campaign can help your facility in making the human factor work in favor of water conservation initiatives. Distribution System Audits, Leak Detection, and Repair Performance of a water distribution system audit is not limited to existing, aged buildings. Water system leaks can occur in new construction from improper installation of piping and fixtures, or impacts to piping systems during the construction process. Therefore, during the design process it is essential to develop a water budget for the new building, and commission the water distribution system as part of the overall building commissioning process. Contact your local water utility for assistance, as many perform the service for free or a minimal fee. Water system leaks that are not repaired immediately can damage building structures, since even a small leak can result in the loss of large quantities of water over time. In addition, un-repaired leaks will result in increased water bills. Metering of individual facilities is a water saving measure that should be given serious consideration. With un-metered service, leaks go undetected; water is wasted; and there is no accountability and therefore, no incentive to save. There are three major components to designing a water-efficient landscape for a new facility: Reducing the amount of turf grass and overall irrigated areas will reduce water consumption and associated costs, and will result in time and dollar savings from mowing, fertilizing, waste removal, and maintenance. Remaining landscape areas that require irrigation should utilize water-efficient irrigation systems low-flow sprinkler heads, efficient system design and layout, and optimized irrigation schedules and controls to minimize water use and maximize plant health. Utilizing Xeriscape strategies whenever practicable will save on water, fertilizer, pruning, maintenance, labor, and overall costs. Colorado Springs Utilities, Xeriscape Demonstration Garden Colorado State University Cooperative Extension Xeriscape is the use of native or climate appropriate plants that are adapted to the local climate, and thus require less water, are more likely to survive drought conditions, and are more pest and disease tolerant. Federal law requires that commercial toilets manufactured after January 1, must use no more than 1. Some earlier versions of ultra-low flush ULF toilets designed to meet this standard did have some operational problems and were prone to clogging or required double flushing. ULF toilet products are offered in three classifications: In general, the flush valve and pressure-assisted ULF toilets perform better than gravity toilets since they use the water system pressure to assist in their operation. ULF urinal products are typically offered in four categories: Waterless urinals have gained widespread acceptance, as they are made of a urine-repellent surface; have no flush handles or moving parts; and virtually require no water. They do utilize a trap containing liquid that separates the urine from indoor environment which requires periodic replacement. Additional savings in the area of toilets and urinals can be achieved by utilizing non-potable water for flushing, or utilizing composting or incinerator toilets where sewer service is not available. Through the specification of water-using fixtures that meet or exceed these standards, significant amounts of water and the associated energy used to heat water can be saved. New showerheads that are designed to the federal standards typically incorporate a narrower spray area and a greater mix of air and water than older showerheads. As a result, less water is used while no discernible difference in quality or comfort is perceivable by the user. Newer models and features of these low-flow showerheads include: Low-flow faucets also employ the use of aeration technology, as well as sensors, to achieve water savings at equivalent comfort levels to older, more consumptive fixtures. Examples of newer low-flow faucet technologies include: It is important to note that with each of these technologies the water system pressure should be between PSI; pressures below this range will result in low-flow devices not operating properly, and pressures above this range will result in reduced water savings. Boilers and Steam Systems Boilers and steam generators are used in large heating systems, institutional kitchens, and in facilities that require large amounts of processed steam. Water consumption rates vary for boiler and steam systems depending on system size, steam requirements and amount of condensate return, and the cost of make up water is relatively small compared to the cost of energy and chemicals required to heat and treat the water. However, these ancillary savings can be significant in themselves. Strategies to achieve water and cost savings from boiler and steam systems are highly site specific, but may include: Single-Pass Cooling Equipment Single-pass, or "once-through", cooling equipment circulates water one time through a piece of equipment to cool it, then the water is discharged often to the sewer line. Single pass cooling equipment is often specified for such end-uses as: CAT scanners, degreasers, hydraulic equipment, condensers, air compressors, welding machines, vacuum pumps, ice machines, x-ray equipment and air conditioners. Using water for only one cycle and then discharging it results in significant waste, and this process can be avoided in many instances. Strategies to reduce waste from single-pass cooling include: Cooling Tower Management Cooling towers assist in regulating indoor air temperature of a building by either rejecting heat from air-conditioning systems or by cooling hot equipment, and require vast amounts of water to perform these functions. The thermal efficiency, proper operation, and longevity of the water cooling system all depend on the quality of water and its reuse or recycling potential. Cooling tower water is lost through evaporation, bleed-off, and drift. To replace this lost water more make-up water must be added. To displace the use of potable water used in cooling towers, sometimes water used for other purposes within a facility can be recycled and reused as make-up water with little or no pre-treatment, including: Additional measures that improve the efficient utilization of water in cooling towers include: Installing a sidestream filtration system composed of a rapid sand filter or high-efficiency cartridge filter to cleanse the water. These systems draw water from the sump, filter out sediment, and return the filtered water to the tower, enabling the system to operate more efficiently with less water and chemicals. Installing covers to block sunlight penetration and inhibit algae growth Installing automated chemical feed systems on large cooling tower systems over tons. These systems minimize water and chemical use while optimizing control against scale, corrosion, and biological growth. While potable water savings may be significant through implementation of these measures, additional cost savings may also be accrued through ancillary reductions in energy and chemical usage. Miscellaneous High Water-Using Processes Numerous site-specific processes requiring high water use are found within federal facilities. Each of these end uses and their application within federal facilities presents site-specific opportunities and challenges for reducing water usage. For new facility design, each high water-using process should be identified and estimated usage quantifiedâ€”and then reviewed and analyzed for potential energy and water savings measures. Some processes may require outside expert assistance to identify the most applicable and beneficial water savings options. Water Reuse and Recycling Many facilities have water use requirements that may be met with non-potable water. Using non-potable water to meet these requirements can result in significant water and dollar savings from avoidance of potable water purchases and sewerage costs. The use of non-potable water resources is often more cost-effective if applicable end-uses are identified early on in the building design process. There are four general strategies that can be employed for utilizing reused or recycled water. On-site water reuse or recycling: Examples include rinse water that is filtered from car washing and laundry uses and then used in the next wash cycle. This strategy can be costly, but may still be cost-effective due to offsets of potable water purchases and sewerage costs. Non-potable water meeting wastewater treatment standards can be used for end uses such as landscape irrigation, decorative fountains, cooling tower makeup water, toilet flushing, fire sprinkler systems, and other on-site industrial processes. Gray water may be used to serve such end uses as landscape irrigation preferably subsurface and toilet flushing. Rooftop rainwater collection systems are becoming increasingly popular, and the captured water can be stored in architecturally aesthetic cisterns. End uses that can be served by this resource include landscape irrigation, single pass cooling, and toilet flushing. For each of the strategies described above, it is imperative to review all applicable federal, state, and local standards and permitting requirements for treating and utilizing non-potable water resources. For example, many jurisdictions do not allow gray water use due to health concerns. Planters with copper piping beneath delivering gray water at the Society for the Protection of New Hampshire Forests. Accessible With the exception of plumbing fixtures, none of the strategies described in this section fall under ADA requirements. Applicable plumbing fixtures are available in ADA compliant models. Aesthetics All of the strategies detailed in this section are equally or more aesthetic than conventional options. Many water conservation options may be aesthetically superior to conventional water-using strategies i. Cost-Effective Cost savings are provided by the reduction of utility potable water purchases and sewerage costs. Some strategies can be cost-effective based on these ancillary savings alone. Reducing water requirements also provides greater predictability of utility water and sewer costs, and reduced vulnerability to utility price volatility. Through the reduction of end-use water use requirements it may be possible to reduce the diameter of piping systems or eliminate some piping runs altogether i. In addition, some water utilities charge customers based upon the diameter of the distribution line at the meter; if this line size can be reduced, further reductions in utility water bills may be achievable. Durable All of the strategies discussed in this section are of equal or greater durability than conventional technologies. Some water conserving technologies may be even more durable and last longer than conventional technologies. Functional All strategies and technologies provide equal or greater levels of functionality compared to conventional methods.