WBDG
WHOLE BUILDING DESIGN GUIDE

Balancing Security & Sustainability Goals to Achieve High Performance Buildings

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Washington, DC
www.SBICouncil.org

Federal Facilities Council Physical Security & Hazard Mitigation Committee

What Is a High Performance Building?

Energy Policy Act, Section 914. Building Standards

- A building that integrates & optimizes all major high-performance building attributes, including energy efficiency, durability, life-cycle performance, and occupant productivity.

Energy Independence & Security Act of 2007, Title IV, Energy Savings in Buildings and Industry, Section 401, Definitions

- A building that integrates and optimizes on a life cycle basis all major high performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.

High-Performance Buildings

- Achieve long-term value and performance
- Are enduring assets in their communities
- Support and enhance human performance
- Reduce operating costs
- Are safe, secure, accessible
- Protect the environment
- Are the result of using a whole building approach

What are we getting now?

- Building codes are minimum
- One attribute is prominent while others are overlooked or trivialized
- Low Occupant satisfaction
- Lawsuits
- Premature failures of materials & systems
- Value of investment decreases while costs of operations & maintenance increase

Rating Systems

How do you measure the performance of your building?
Who can you trust with confidence to certify critical aspects of your building?

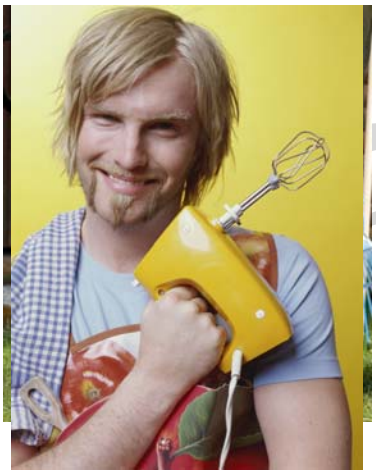
- Green Buildings
  - LEED
  - Green Globes
  - Energy Star
- Building Security
  - PLUS/BSC
- Others

Also Professional Accreditations: AIA, PE, CEM, LEED AP, BSCP, Bd Cert NCE, etc.

To Do a Job Well
It Takes the Right Tools

- Building a Home
- Planting a Garden
- Baking a Cake

- If You are planning, designing, constructing, operating or maintaining a building …



The Whole Building Design Guide (WBDG) as a Tool

Your Complete Internet Resource to Integrated, 'Whole Building', Design Information and Tools.

The WBDG condenses the vast amount of Web-based data on building design, products, & systems Into usable, up-to-date information.

Single Point Access!

What is Whole Building Design?

- It is an **Integrated Design Approach** and a
- **Integrated Team Process** to achieve high-performance buildings

Premise: All building systems are interdependent

‘Whole Building’ Approach

NREL Solar Laboratory
Golden, CO

- Materials, systems, and assemblies reviewed from many different perspectives
- Building components, sub-systems and materials are interdependent, can impact the total performance of the whole, and can perform ‘double duty’

Integrated Project Team

Mark O. Hatfield U.S. Courthouse
Portland, OR

- Comprehensive Stakeholder involvement throughout the building’s life cycle
- Evaluation for cost, quality-of-life, future flexibility, energy efficiency, overall environmental impact, productivity, creativity, and how the occupants will be enlivened

Applying the Integrated Team Process

Who needs to be at the table at the outset of your project to ensure an integrated team process?

- Architect
- Landscape Architect
- Owner, Client, Tenants
- Engineers
- Programmers
- Interior Designer
- Contractor
- Specialists (Security, Telecom, Acoustics)
- Community Members or Other Stakeholders
- Operations and Maintenance Personnel
- Others???? (Real Estate Buyer)

Building Siting Issues

- Solar Access*
- Security (Standoff Distance, CPTED)
- Stormwater Management
- Public Transportation
- Occupant Amenities
- Compatible Functions
- Disaster Avoidance

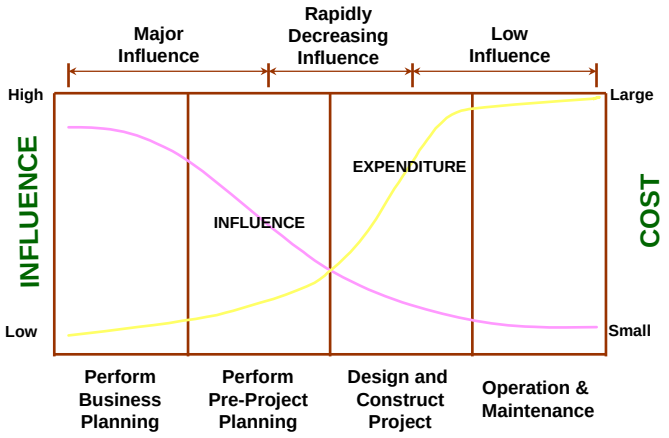
*Building orientation for passive solar heating, daylighting, natural ventilation, views, and potential impacts of future development.

*[Real Estate Purchaser **must** be informed!!!]*

Note: Applies to Selecting an Existing Building, as well!

Cost / Influence Over the Quality of a Project

Influence early for optimal design outcome and reduced life-cycle cost.



WBDG Goal

WBDG Whole Building Design Guide

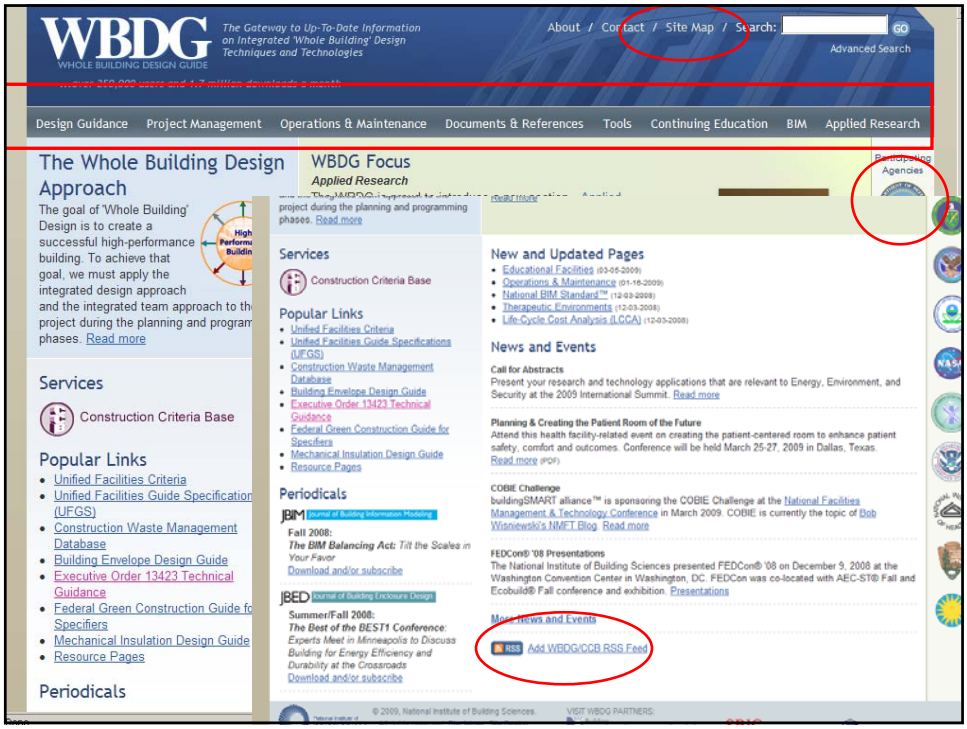
... to provide centralized access and use of facility information in a knowledge based management environment, from a 'whole building' perspective.

WBDG Building Type Page on Research Laboratory
w/ direct links to: Govt. Lab; Vivarium; Therapeutic Envi. RP; **Sustainable Lab Design RP**, Security & Safety in Labs RP, etc.

w/ DIRECT LINKS to Other Resources & Pubs.
Labs21
Design and Planning of Research and Clinical Laboratory Facilities

CCB Documents
VA Research Laboratory Des. Guide
NIH Design Policy and Guidelines
HHS Biosafety in Microbiological and Biomedical Laboratories

NGS
ISEA Z358.1—Emergency Eyewash and Shower Equipment
ANSI/AIHA—Z9.5 for Laboratory Ventilation
NFPA 45—Fire Protection for Laboratories using Chemical



Design Objectives

- Accessible
- Aesthetic
- Cost-Effective
- Functional/Operational
- Historic Preservation
- Productive
- Secure/Safe
- Sustainable

Secure/Safe Branch

Sustainability- and Security/Safety-Related Pages in WBDG

- Achieving Sustainable Site Design through Low Impact Development
- Air Barrier Systems in Buildings
- Air Decontamination
- Balancing Security/Safety & Sustainability Objectives
- Building Integrated Photovoltaics
- Cost Impact of the ISC Security Criteria
- Daylighting
- Designing Buildings to Resist Explosive Threats
- Distributed Energy Resources
- Electric Lighting Controls
- Energy Efficient Lighting
- Blast Safety of the Building Envelope
- CBR Safety of the Building Envelope
- Glazing Hazard Mitigation
- High-Performance HVAC
- Mold and Moisture Dynamics
- Retrofitting Buildings to Resist Explosive Threats
- Security and Safety in Laboratories
- Sun Control and Shading Devices
- Sustainable Laboratory Design
- Sustainable O&M Practices
- Threat/Vulnerability Assessments and Risk Analysis
- Water Conservation
- Windows and Glazing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Security and Safety in Laboratories
Seismic Design Principles
Seismic Safety of the Building Envelope
Solar Water Heating
Style
Sun Control and Shading Devices
Sustainability of the Building Envelope
Sustainable Historic Preservation
Sustainable Laboratory Design
Sustainable O&M Practices
Therapeutic Environments
Threat/Vulnerability Assessments and Risk Analysis
Trends in Lab Design
UFC/ISC Security Design Criteria Overview and Comparison
Using LEED on Laboratory Projects
Home > UFC/ISC Security Design Criteria Overview and Comparison
UFC/ISC Security Design Criteria Overview and Comparison
by Joseph L. Smith, PSP and Dan E. Kelley
Applied Research Associates, Inc.
Last updated: 03-31-2009
Introduction
In an effort to minimize the likelihood of mass casualties from terrorist attacks, two similar, yet distinct, sets of criteria have been established by different branches of the federal government to guide owners and responsible parties in the implementation of suitable measures that appropriately balance facility construction and use with improved safety and security of the facility occupants.
The federal government has implemented the Interagency Security Committee (ISC) Security Design Criteria. The ISC Security Design Criteria was developed to ensure that security issues are addressed during the planning, design, and construction of all new Federal Courthouses, new Federal Office Buildings, and major renovations. This federal criteria has been extended to also cover leased facilities.
Similarly, the Department of Defense (DoD) has implemented antiterrorism security requirements to meet its specific needs. Contained within the Unified Facilities Criteria (UFC) and Unified Facilities Guide Specification (UFGS) are the 4-xxx series of security engineering UFC that deal with antiterrorism and physical security. In general, the UFC and UFGS criteria are designed for use by the three services and other DoD agencies. The UFC documents establish procedures to be used for the design, construction, operation, maintenance, and modernization of all DoD facilities. The UFCs are comprehensive and address all major aspects of facility construction and operation.
WITHIN THIS PAGE
Introduction
Description
Application
Emerging Issues
Relevant Codes and Standards
Additional Resources
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EMAIL THIS PAGE
RELATED RESOURCE PAGES
Achieving Sustainable Site Design through Low Impact Development Practices
Aesthetic Challenges
Aesthetic Opportunities
Air Decontamination
Balancing Security/Safety and Sustainability Objectives
VIEW ALL RELATED (25)
VIEW RESOURCE PAGE INDEX
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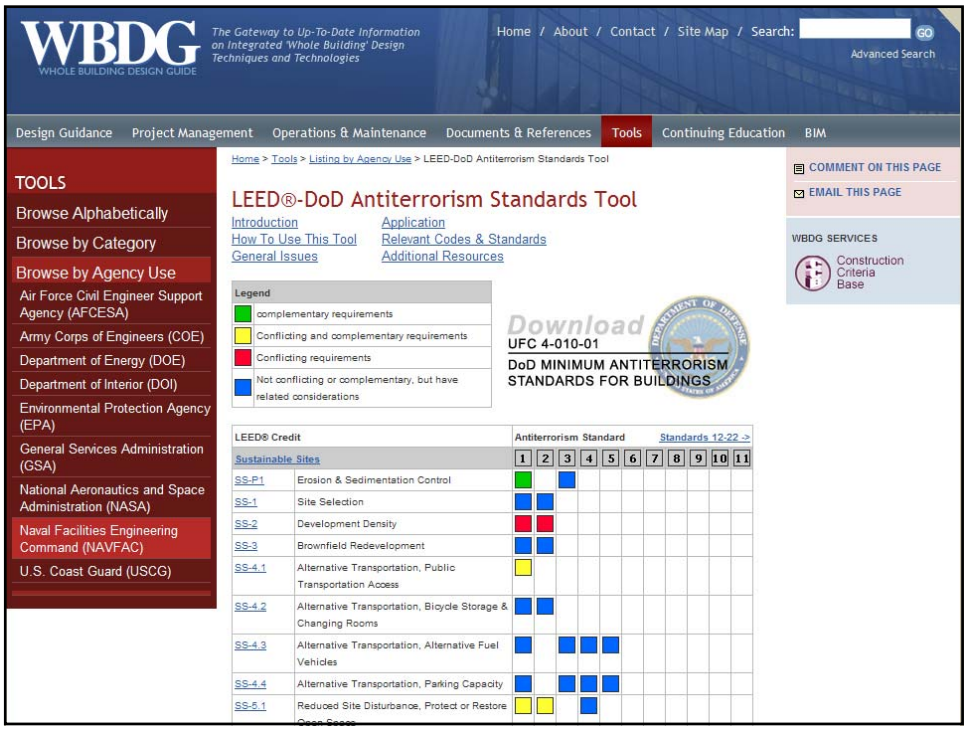
Construction Criteria Base
Done
Internet
100%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Army Corps of Engineers (COE)
Department of Energy (DOE)
Department of Interior (DOI)
Environmental Protection Agency (EPA)
General Services Administration (GSA)
National Aeronautics and Space Administration (NASA)
Naval Facilities Engineering Command (NAVFAC)
U.S. Coast Guard (USCG)
Home > Tools > Listing by Agency Use > LEED-DoD Antiterrorism Standards Tool
LEED®-DoD Antiterrorism Standards Tool
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How To Use This Tool
General Issues
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Relevant Codes & Standards
Additional Resources
Legend
complementary requirements
Conflicting and complementary requirements
Conflicting requirements
Not conflicting or complementary, but have related considerations
Download
UFC 4-010-01
DoD MINIMUM ANTITERRORISM STANDARDS FOR BUILDINGS
LEED® Credit
Antiterrorism Standard
Standards 12-22 ->
Sustainable Sites
1 2 3 4 5 6 7 8 9 10 11
SS-P1 Erosion & Sedimentation Control
SS-1 Site Selection
SS-2 Development Density
SS-3 Brownfield Redevelopment
SS-4.1 Alternative Transportation, Public Transportation Access
SS-4.2 Alternative Transportation, Bicycle Storage & Changing Rooms
SS-4.3 Alternative Transportation, Alternative Fuel Vehicles
SS-4.4 Alternative Transportation, Parking Capacity
SS-5.1 Reduced Site Disturbance, Protect or Restore
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Impact of WBDG as a Tool

In 2008, WBDG had 2,400,000 visitors
[average of 250,000 visitors a month]

For 2009 – averaging 300,000 v/m

And 20,800,000 downloads
[1.7 million pdf downloads a month]

For 2009 – averaging 2.1 million d/m

Interaction Between Security/Safety & Sustainability Objectives

- These objectives appear in every Federal project to varying degrees
- Conflicting requirements lead to compromises and tradeoffs
- Synergies can be found when considered early in the project development process

SITE WATER ENERGY
MATERIALS IEQ

Site Tradeoffs

A facility's risk can be increased and security can be compromised by:

- siting it in an urban area to protect greenfields and preserve habitat and natural resources;
- locating carpool/vanpool parking and bike racks nearby to promote alternative transportation;
- constructing under-building parking to minimize habitat disturbance; and
- installing covered walkways and landscaping to reduce heat islands and control erosion.

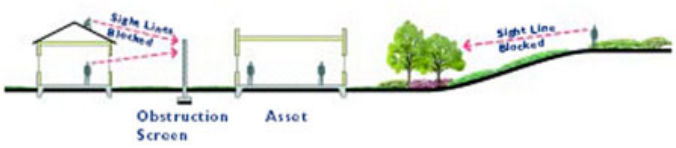
Site Tradeoffs

On the other hand, security measures such as

- building setbacks, or standoff distances, to create protective building perimeters and to restrict access;
- installing barriers (e.g., bollards, reinforced planters, and site furnishings) to withstand assaults by moving vehicles; and
- locating parking areas in remote areas and/or eliminating under-building parking areas to minimize blast effects from potential vehicle bombs

usually result in increased development of open space, habitat disturbance, and possibly erosion.

Site Synergies



- Landscaping elements such as retention ponds and berms can be used to control erosion, manage stormwater, and reduce heat islands while also serving as physical barriers to control access to a building and to deflect the effects of a blast.
- Crime Prevention Through Environmental Design (CPTED) is a strategy that uses natural access control, natural surveillance, and territoriality & boundary definition to reduce the opportunities & fear of predatory stranger to stranger crime & improve the quality of life.
- Early coordination of sustainable site design with CPTED is critical to avoid conflicts between the two strategies.

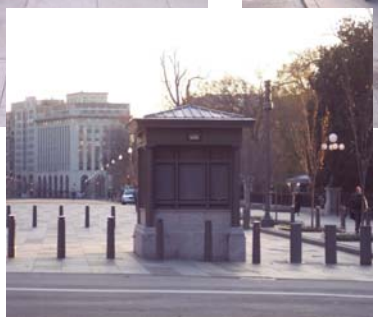
Site Considerations
Security, Sustainability, Acoustics

Provide noise barriers that can also comply with sustainable development principles and can meet security requirements for standoff distance from buildings

Earth berms w/low-growth, drought tolerant plants

Consider sound walls made of recycled content material to achieve noise control and sustainable development goals

Physical Barriers – Secure & Aesthetic



Top Photos:
IMF Bldg
Penn. Ave.

Penn. Ave.
@ White House

Tiger Traps, Ha-has, and NoGos protect without a visually overwhelming security presence

Security Design Strategies

- Security Issues must be addressed in concert with other design objectives and integrated into the overall building design early in the process to ensure a high-performance building [and site] with effective security.

Multi-Hazard Design

Look at impact of all hazards on project: Natural, Criminal, Terrorist, Accidental

Site Security's Importance in the Integrated Design Process

- Access roads, Parking, Vehicle barriers, Emergency vehicle access, Loading dock ramps
- Standoff Distance
- Perimeter & Building Entrance lighting
- Landscaping
- Balance with Project's Accessibility & Sustainability Requirements

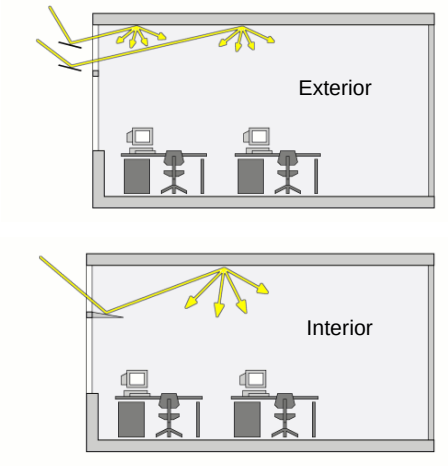
Passive Survivability

The ability of a building to provide shelter during or after a major disaster event without electric power.

- Highly efficient thermal envelope
- Natural ventilation
- Overhangs (sun shades)
- Daylighting (light shelves)
- On-site potable water storage
- Renewable energy (PV, wind) (optional)

Light Shelves / Shading Devices

- When blast or snow loading are concerns, consider interior light shelves.
- Otherwise, light shelves & shading devices must be hardened.



From Schorsch

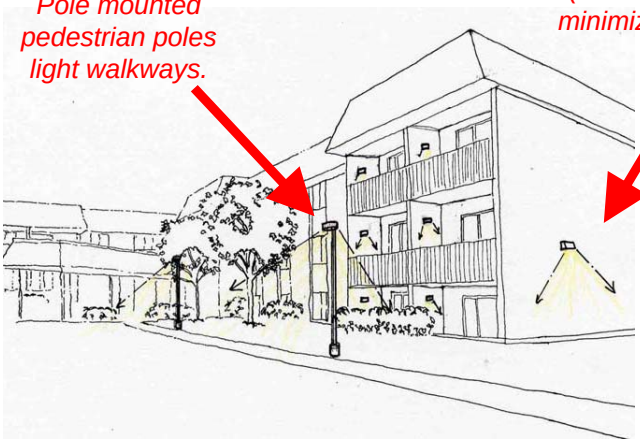
Security Lighting

- Design to minimize light pollution / light trespass
- Use energy-efficient lamps & ballasts
- Employ shielded or full cutoff luminaires
- Results: increased visibility, reduced glare & minimum impact on the night sky
- For further energy savings, consider parking lot occupancy sensors

Exterior Lighting Example

The use of cut-off wall sconces and area lights and downlighting on the façade (rather than uplighting) minimizes light pollution.

Pole mounted pedestrian poles light walkways.



From: UFC 3-530-01, Design: Interior & Exterior Lighting & Controls

Crime Prevention Through Environmental Design (CPTED)

"The proper design and effective use of the built environment can lead to a reduction in the fear and incidence of crime, and an improvement of the quality of life."

CPTED *as defined by the National Crime Prevention Institute*

Strategy: Design security into the architecture!

Crime Prevention Through Environmental Design (CPTED)

There are four overlapping CPTED strategies.

1. *Natural Surveillance*
2. *Territorial Reinforcement*
3. *Natural Access Control*
4. *Target Hardening*

Employ CPTED as a process to reduce architectural vulnerability.

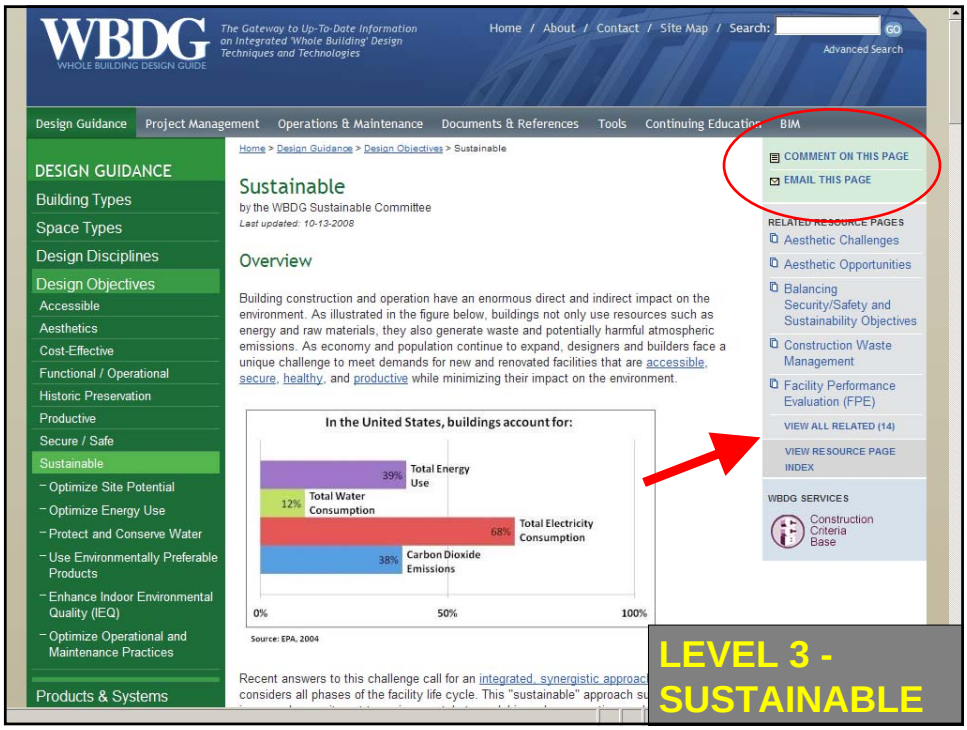
Green Walls & CPTED

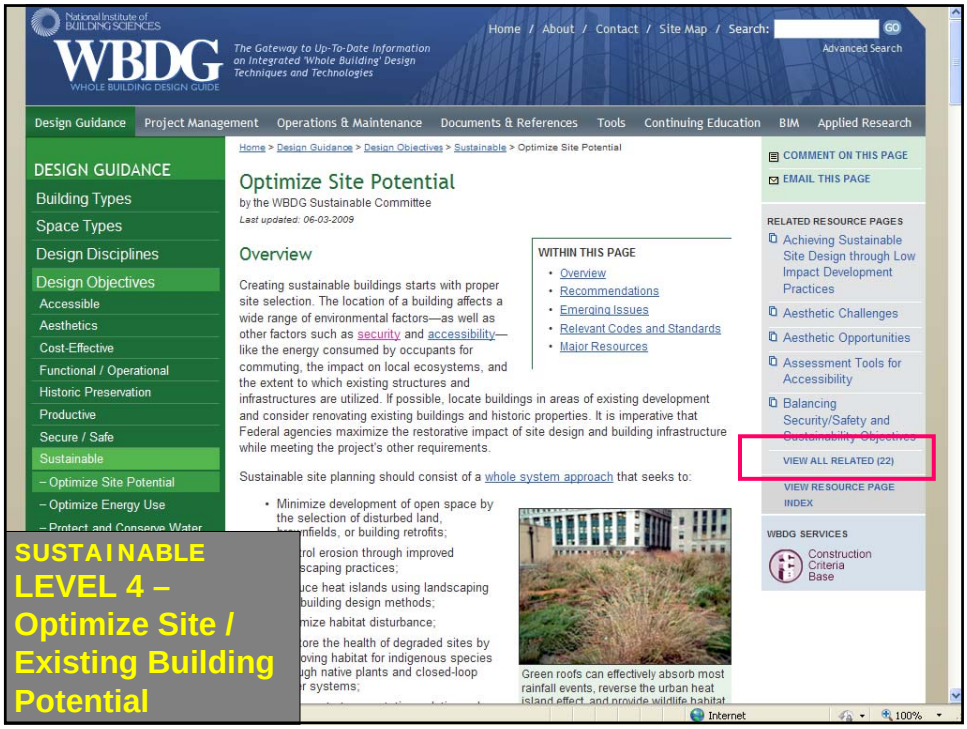
- Vertical Gardens called “Vegitecture” can defeat natural surveillance
- If being considered for your project, be sure green walls do not block site lines or provide hiding places

Patrick Blanc's green wall
on the Hotel du Department
in Hauts-de-Seine, France

Signage

- Include aesthetic signage that directs people to authorized locations on site & in buildings, but …
- Don't tell them more than they need to know!





SUSTAINABLE
LEVEL 4 – Optimize Site / Existing Building Potential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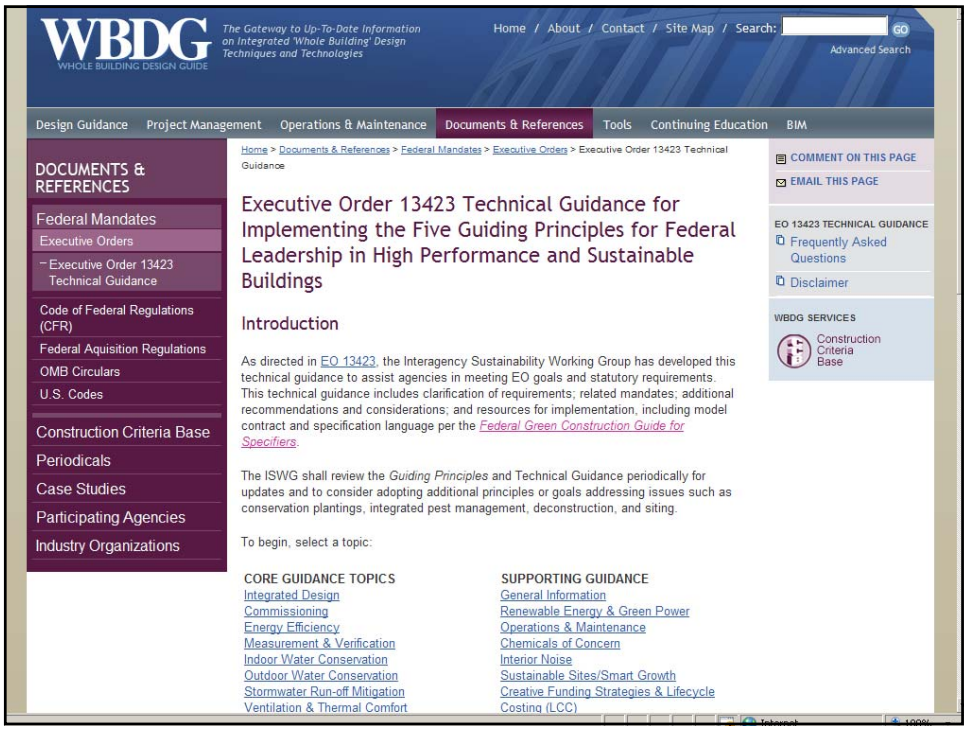
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Executive Order 13423 Technical Guidance for Implementing the Five Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings
Introduction
As directed in EO 13423, the Interagency Sustainability Working Group has developed this technical guidance to assist agencies in meeting EO goals and statutory requirements. This technical guidance includes clarification of requirements; related mandates; additional recommendations and considerations; and resources for implementation, including model contract and specification language per the Federal Green Construction Guide for Specifiers.
The ISWG shall review the Guiding Principles and Technical Guidance periodically for updates and to consider adopting additional principles or goals addressing issues such as conservation plantings, integrated pest management, deconstruction, and siting.
To begin, select a topic:
CORE GUIDANCE TOPICS
Integrated Design
Commissioning
Energy Efficiency
Measurement & Verification
Indoor Water Conservation
Outdoor Water Conservation
Stormwater Run-off Mitigation
Ventilation & Thermal Comfort
SUPPORTING GUIDANCE
General Information
Renewable Energy & Green Power
Operations & Maintenance
Chemicals of Concern
Interior Noise
Sustainable Sites/Smart Growth
Creative Funding Strategies & Lifecycle Costing (LCC)
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EO 13423 TECHNICAL GUIDANCE
Frequently Asked Questions
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E.O. 13423 Technical Guidance Five Guiding Principles

The five Guiding Principles address:

- Employing integrated design;
- Optimizing energy performance;
- Protecting and conserving water;
- Enhancing indoor environmental quality; and
- Reducing the environmental impact of materials.

To build from this and other accomplishments and to pave the way for future success, the President signed **Executive Order 13423 "Strengthening Federal Environmental, Energy and Transportation Management"** on January 24, 2007.

In the area of sustainable design and high performance buildings, **the new EO makes mandatory the five Guiding Principles of the MOU for all new construction and major renovations** and sets an aggressive goal for applying these practices to existing capital assets over the next decade.

Avoid conflict of choosing between Sustainable & Security* Goals

- Dollars are tight
- Regulations, laws, mandates, directives must be met

How to decide which way to go?

- Employ a single design strategy to achieve multiple design goals
- Use the integrated 'whole building' design approach

See WBDG.org: Balancing Security/Safety & Sustainability Objectives

Sustainable Site Design

The main objectives of sustainable design are:

- to avoid resource depletion of energy, water, and raw materials;
- prevent environmental degradation caused by facilities and infrastructure throughout their life cycle;
- Restore the site to predevelopment conditions;
- and create built environments that are livable, comfortable, safe, and productive.

Creating Sustainable Buildings Starts with Proper Site Selection

- Before deciding to build new, consider the reuse or rehabilitation of an existing building.
- The location, orientation, and landscaping of a building affect the local ecosystems, transportation methods, and energy use.

Beyond the patch of ground the building sits on, effective Sustainable Design considers the impact of the building on the campus/military base, the surrounding community, and the region.

Goals of Sustainable Site Planning
Employing the 'whole systems approach'

- Minimize development of open space by the selection of disturbed land, brownfields, or building retrofits;
- Control erosion through improved landscaping practices;
- Reduce heat islands using landscaping and building design methods;
- Minimize habitat disturbance;

Goals of Sustainable Site Planning
Employing the 'whole systems approach'

- Restore the health of degraded sites by improving habitat for indigenous species through native plants and closed-loop water systems;
- Incorporate transportation solutions along with site plans that acknowledge the need for bicycle parking, carpool staging, and proximity to mass transit. Encourage alternatives to traditional commuting; and
- Consider site security concurrently with sustainable site issues. Location of access roads, parking, vehicle barriers, and perimeter lighting, etc. are key issues that must be addressed.

Sustainable Site Design Considerations

"Low Impact Development" -- Water / stormwater management strategies:

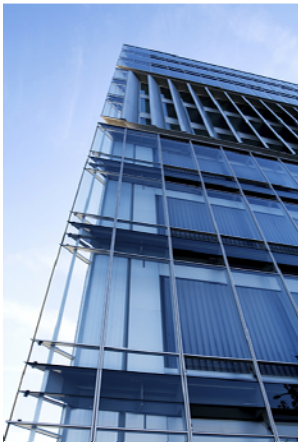
- Storm Water Runoff Distribution
- Hardscape Materials and Curbs
- Recycling Rainwater and Runoff
- Predevelopment Hydrology

Source: Millennium Energy

Site Security Design

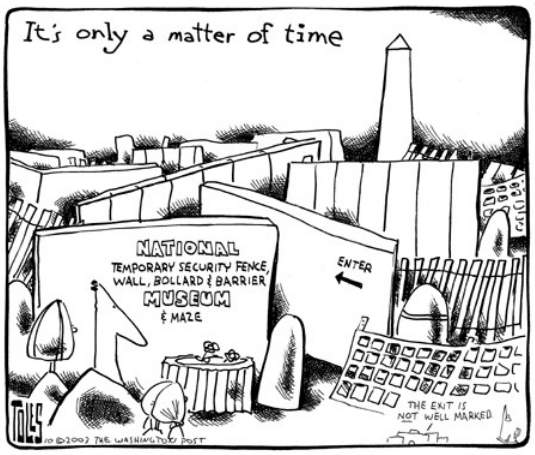
The next generation of design excellence

LEARNING OBJECTIVES



- Understand the overall intent and focus of the *Site Security Design Guide*
- Describe the intent of the Vision and Hallmarks of effective site security
- Identify resources within the *Guide* to support effective site security design

Public Space Aesthetics – Function - Viability



Vision & Hallmarks

Only by integrating security throughout the design process can the Project Team strike a responsible balance between consideration of risk, available resources, and appropriate mitigation measures.

1. Strategic Reduction of Risk
   Priorities. Choices. Flexibility. Realism.
2. Comprehensive Site Design
   Multifaceted Opportunities. Community.
3. Collaborative Participation
   Multi-Disciplinary. Internal/External.
4. Long-Term Strategy
   Opportunistic Implementation. Vision.

Balancing Objectives

Only by integrating security throughout the design process can the Project Team strike a responsible balance between consideration of risk, available resources, and appropriate mitigation measures.

To strike a successful balance, creating public buildings that attain both security and openness, designers must consider the following:

- Carefully design a site for its daily functions
- Incorporate security elements as seamlessly as possible
- Allow for adjustments in protection in response to varying levels of threat

Comprehensive Site Design

This ensures a consistent approach, whether the plan is implemented in one or many stages.

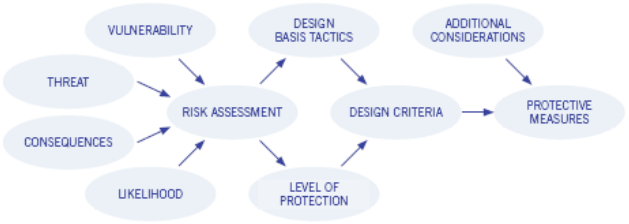
The result is a thoughtful, **holistic** solution.

- Develop an approach for the entire property that enhances both security and daily use
- Create a design palette and program of security and site elements
- Maximize multipurpose features that accomplish a security purpose and provide a visual & use amenity
- Offer windows of opportunity to coordinate with public works, neighboring projects, and future GSA investment
- Achieve wider goals for the property

ISC Security-Decision Making Process

This flow chart illustrates the main inputs and outputs in the security decision-making process, as outlined by the Interagency Security Committee.

These outputs serve as the basis for additional analyses by the Project Team and the subsequent design of protective measures.



SSDG – WBDG Resource Pages

- Effective Site Security Design
- The Site Security Design Process
- Site Security – A Physical Security Specialist's View
- Site Security – A Landscape Architect's View
- Case Study

Early Security Measures – Moats

Built by Sir John Delamere in 1373. Supposedly modeled on the Bastille, Nunney Castle has one of the deepest moats in England

Why Did Moats Disappear?

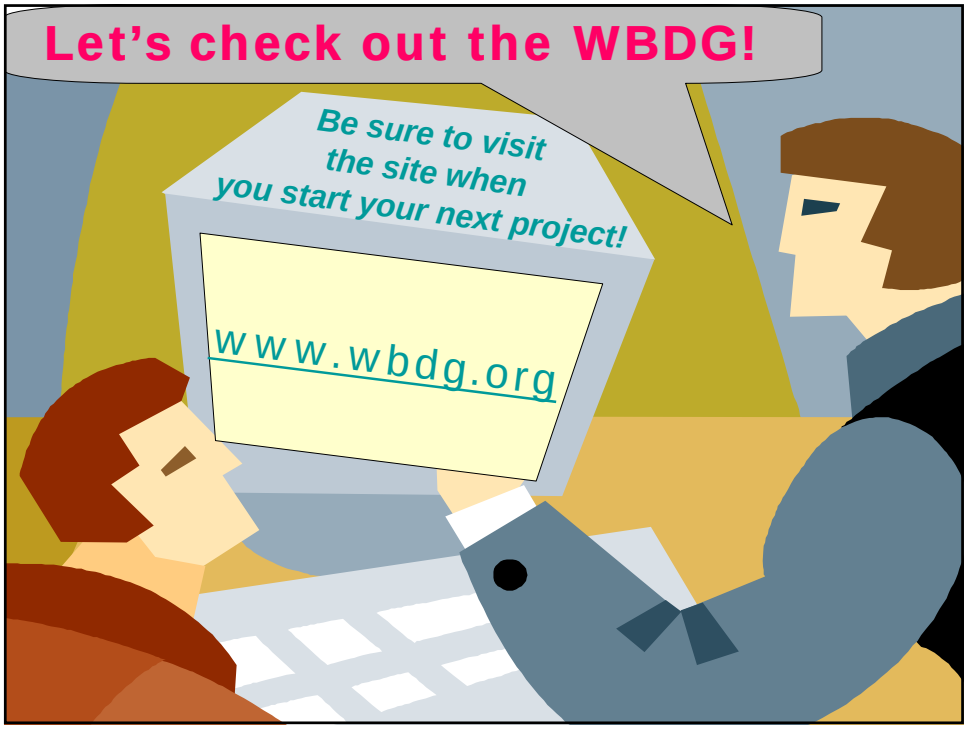
Answer: Medieval War Engines

Trebuchets And Mangonel at Middelaldercentret Denmark

Defense Intelligence Analysis Center
Bolling AFB, Washington, DC

- Integrates security & sustainable features
- Bio-retention pond – AT setback & reduces storm water runoff
- Force protection wall – local stone & earth berm

Moats Are Making A Comeback!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