

# Facilities Standards for the Public Buildings Service



March 2003

U.S. GENERAL SERVICES ADMINISTRATION  
OFFICE OF THE CHIEF ARCHITECT

**ON THE COVER**

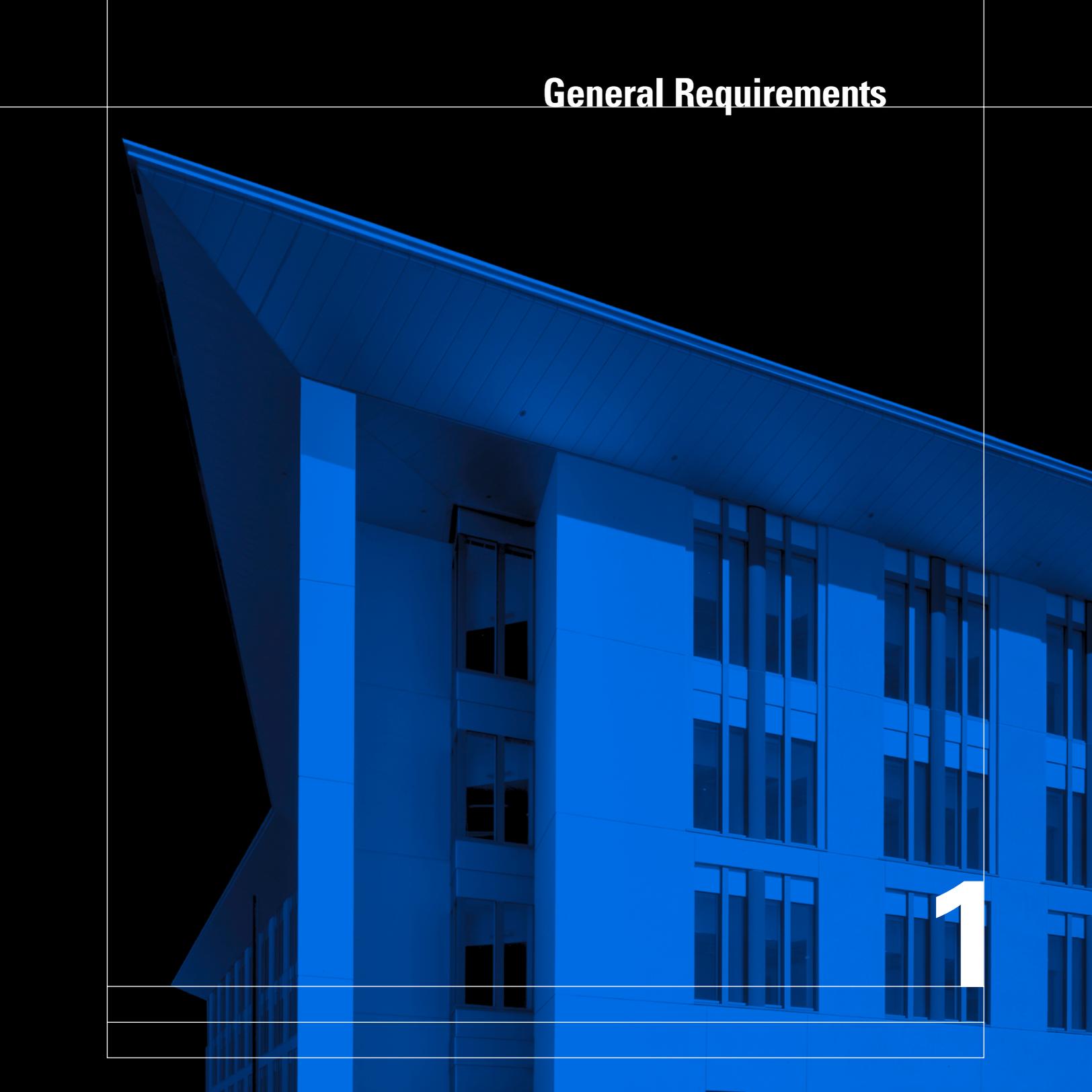
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# Table of Contents

1	<b>General Requirements</b>
2	<b>Site, Landscape and Community Design</b>
3	<b>Architectural and Interior Design</b>
4	<b>Structural Engineering</b>
5	<b>Mechanical Engineering</b>
6	<b>Electrical Engineering</b>
7	<b>Fire Protection Engineering</b>
8	<b>Security Design</b>
9	<b>Design Standards for U.S. Court Facilities</b>
A	<b>Appendix Submission Requirements</b>

# General Requirements

1



<b>1.0</b>	<b>TABLE OF CONTENTS</b>		
	<p>The <i>Facilities Standards</i> and other design standards are also located on the Internet at <a href="http://www.hydra.gsa.gov/pbs/pc/facilitiesstandards/">www.hydra.gsa.gov/pbs/pc/facilitiesstandards/</a></p>		
<b>1.1</b>	<b>Purpose of the Facilities Standards for the Public Buildings Service</b>	<b>1.6</b>	<b>Environmental Policies &amp; Practices</b>
<b>1.2</b>	<b>General Design Philosophy</b>	17	Sustainable Design
04	Design Quality	17	Energy Performance
04	Design Excellence and Construction Excellence	17	Building Materials
05	Flexibility and Adaptability	19	Indoor Air Quality
05	Sustainability and Energy Performance	19	Soil Contamination
05	Costs	20	Underground Storage Tanks (UST)
05	Operations and Building Maintenance	20	Compliance with the National Environmental Policy Act (NEPA)
06	Historic Buildings	20	Guidance
06	Art-in-Architecture	<b>1.7</b>	<b>Energy Conservation Standards</b>
07	Urban Design and Community Development	21	Performance Goals
07	First Impressions	21	Energy Goal Applications
07	Integrated Workplace/Productivity	<b>1.8</b>	<b>Life Cycle Costing</b>
<b>1.3</b>	<b>Codes and Standards</b>	22	Purpose
<b>1.4</b>	<b>Commissioning</b>	22	Applications
<b>1.5</b>	<b>Guides</b>	22	Methodology
		22	Procedures and Approach
		<b>1.9</b>	<b>Metric Standards</b>
		27	English and Metric Measurement Reference
		<b>1.10</b>	<b>Accessibility Design Guidelines</b>
		29	Federal Office Space
		31	Special Occupancies
	<p>Harvey W. Wiley Federal Building College Park, Maryland Architect: Kallmann McKinnell &amp; Wood Architects, Inc. GSA Project Manager: Harry W. Debes Photo: Robert Benson</p>		

# 1.1 Purpose of the Facilities Standards for the Public Buildings Service

The *Facilities Standards for the Public Buildings Service* establishes design standards and criteria for new buildings, major and minor alterations, and work in historic structures for the Public Buildings Service (PBS) of the General Services Administration (GSA). This document applies to all new facilities or alterations of GSA owned, or lease construction with Government Option to Purchase (See Section 1.3) buildings. It is recommended that the *Facilities Standards* apply to significant build-to-suit lease buildings. This document contains policy and technical criteria to be used in the programming, design, and documentation of GSA buildings. It is intended to be a building standard; it is not a textbook, handbook, training manual or substitute for the technical competence expected of a design or construction professional.

The *Facilities Standards* shall be used in conjunction with the specific building program for each project, which delineates all project information, such as number and sizes of building spaces, and requirements for mechanical, electrical and other operating systems. It is imperative that each building be designed so that all components comprise an integrated solution, so that operation of the facility, energy usage and other criteria may be maximized.

Since the *Facilities Standards* contain general criteria, there may sometimes be conflicts between the *Facilities Standards* and specific project requirements. The Office of the Chief Architect, Public Buildings Service, General Services Administration, Washington, DC 20405, (202) 501-1888, may be contacted for clarification of any particular requirement.

The provisions of this document are not intended to prohibit the use of alternative systems, methods, or devices not specifically prescribed by this document, provided GSA has approved such alternatives. All technical documentation shall be submitted to the GSA Project Manager. The technical documentation submitted shall demonstrate that the proposed alternative design is at least equivalent or superior to the prescribed requirements in this document with regard to quality, strength, effectiveness, fire resistance, durability, and safety. It is not to be considered a waiver or deletion of a requirement, but shall be recognized as being equivalent protection and in compliance with the technical requirements of this document. The alternative system, method, or device shall be approved when the GSA technical design professional determines that the proposed alternative design is deemed equivalent or superior to the intent of the prescribed requirements of this document for the intended purpose.



U.S. Census Bureau, Bowie, MD.

## 1.2 General Design Philosophy

As addressed in Appendix A2, all program goals shall be developed with integrated design practices. The following objectives are to be reflected in project programming and design:

### Design Quality

GSA is committed to excellence in the design and development of its sites and buildings. For GSA, this means an integrated approach that achieves the highest quality of aesthetics in meeting the requirements of the building's users and accomplishing the mission of the Federal client agency, while at the same time delivering a building that is cost effective to maintain throughout its useful life and is a lasting architectural legacy that will serve the American people for many decades.

Most of the interaction between the Government and its citizens occurs in GSA buildings. Federal buildings express the image of the Government to the public. The Guiding Principles for Federal Architecture, written in 1962 by Senator Daniel Patrick Moynihan, then Special Assistant to the Secretary of Labor, and issued by the Kennedy Administration, embody GSA's commitment to produce quality design and construction. See Figure 1-1.

### Design Excellence and Construction Excellence

The GSA Design Excellence Program was formally initiated in 1994 and the Construction Excellence Program in 1998. These programs ensure GSA's long-term commitment to excellence in public architecture, engineering, and construction. The selection of private sector architects and engineers who design GSA facilities is based foremost on their talent, creativity, and ingenuity. The entire architect/engineer (A/E) design team must demonstrate its ability to satisfy the comprehensive

project development and management requirements of the Federal Acquisition Regulations (FAR). The Design Excellence Program incorporates peer professional in the selection of A/E design teams and the review of proposed designs. The peer professionals are distinguished architects, engineers, landscape architects, urban designers, public arts administrators, design educators and critics from across the Nation. The main goal of the Design Excellence Program is to realize the objectives of the Guiding Principles of Federal Architecture.

The main goal of the Construction Excellence Program is to ensure that GSA's construction program delivers exceptionally well-built facilities economically, efficiently, and professionally. Like the Design Excellence Program, the Construction Excellence Program depends on a strong working relationship with the private sector design and construction community.

### **Flexibility and Adaptability**

Federal buildings undergo many changes during their lifetime. As government missions change and priorities change, Federal agencies are created, expanded, and abolished. As a consequence, requirements for space and services change frequently, and space must be reconfigured often. The flexibility to accommodate continual change needs to be “built in” to the building design from the outset and respected in subsequent alterations. Systems flexibility is necessary in GSA buildings.

### **Sustainability and Energy Performance**

GSA is committed to incorporating principles of sustainable design and energy efficiency into all of its building projects. Sustainable design seeks to design, construct and operate buildings to reduce negative impact on the environment and the consumption of natural resources. Sustainable design improves building performance while keeping in mind the health and comfort of building

occupants. It is an integrated, synergistic approach, in which all phases of the facility lifecycle are considered. The result is an optimal balance of cost, environmental, societal and human benefits while meeting the mission and function of the intended facility or infrastructure.

### **Costs**

It is imperative that Federal Facilities be designed with the objective of achieving lowest life cycle cost for the taxpayer. To do so, a project's design program must comprehensively define reasonable scope and performance requirements, and must match those needs to an appropriate overall budget. Consistent with programming and budgetary constraints, designed building systems/features that influence operating costs must then be analyzed and selected to achieve lowest overall life cycle cost.

Life cycle costing will always require the application of professional judgement. While life cycle cost assessments can often be based upon the merits of single system/feature comparisons, the A/E is expected to expand the analysis to include other systems/features when necessary to establish synergistic effects and first cost trade-offs. There will also be instances where involved life cycle cost elements are not well defined within the industry, defying credible inclusion with known cost impacts. In such cases, life cycle cost comparisons must be weighed with qualitative issues when making design decisions.

### **Operations and Building Maintenance**

Systems and materials should be selected on the basis of long-term operations and maintenance costs as those costs will be significantly higher over time than first costs. The design of the facility operating systems should ensure ease and efficiency of operation and allow for easy and cost effective maintenance and repair during the facility's useful life.

The designer should obtain constant feedback from the building manager and other maintenance personnel during design. This collaboration will allow the facility to be designed with adequate understanding by both the designer and the building manager as to what is required for optimal life-cycle performance.

GSA requires detailed instructions from the designer stating the operational/maintenance procedures and design intent for all building systems. These instructions will be developed during the design phase and incorporated into the comprehensive training for operation and maintenance personnel.

### **Historic Buildings**

The Historic Buildings program was formally initiated in 1998 as part of the Historic Buildings and the Arts Center of Expertise, established in 1997. The Historic Buildings program provides strategic and technical support to GSA business lines and regional project teams to promote the reuse, viability, and architectural design integrity of historic buildings GSA owns and leases. This mission requires GSA to be on the cutting edge in developing innovative design solutions that are affordable, extend the useful life of historic structures, and minimize the negative effects of changes needed to keep buildings safe, functional, and efficient.

The National Historic Preservation Act of 1966 mandates that Federal agencies use historic properties to the greatest extent possible and strive to rehabilitate them in a manner that preserves their architectural character, in accordance with the Secretary of the Interior's Standards

for Rehabilitation. Nearly one-fourth of the space in GSA's owned inventory is in historic buildings. Regional Historic Preservation Officers coordinate external design reviews required under the Act and serve as first points of contact within each region to ensure that projects follow the Secretary's Standards while satisfying GSA's functional requirements.

Principal goals of the Historic Buildings program are to realize the objectives of the National Historic Preservation Act by: a) developing strategies that enable reuse of GSA's historic buildings and b) developing creative design solutions to resolve conflicts between preservation, codes, and functional requirements of modern office use. The program depends on the integral involvement of preservation design professionals in the A/E team throughout design development and project execution and on effective coordination between the design team, GSA preservation staff, and outside review groups.

### **Art-in-Architecture**

GSA has a policy of incorporating fine art into the design of new Federal buildings and in major repair and alterations of existing Federal buildings. One half of one percent of the estimated construction cost is reserved for commissioning works by living artists. These works are acquired through a commissioning process that involves public participation by art professionals, community representatives (including the primary client), and the architect of the building. The A/E team has a responsibility to work with GSA to ensure that the art is an integral component of the building.

## Urban Design and Community Development

GSA is committed to maximizing the returns on its Federal real estate investment and to leveraging its investments in ways that support communities, wherever possible. Collaboration with local officials, neighboring property owners, residents, and appropriate interest groups is essential to shape the project in ways that provide positive benefits to the surrounding neighborhood and community.

Project teams should seek out potential issues and collaborate with local partners to solve them. Aggressive identification of issues and opportunities is necessary to minimize project risk and delay, strategize the long term use and maintenance of the facility, maximize the project's positive impact on the community, and bring local resources to bear on delivering the best final product to GSA clients.

Issues of common interest, such as facility location, architectural and urban design, parking, transportation, and security provide significant opportunities to work to address issues. Partners should include not only city officials but other entities with relevant knowledge, concerns, or resources. Formal planning and consultation processes, such as NEPA, zoning, or Section 106, are important. But less formal planning, information sharing, and problem solving activities can be equally valuable to the project team.

## First Impressions

The GSA First Impressions Program is a comprehensive, nationwide effort to improve the appearance of our public spaces. The main goal of First Impressions is to ensure that programs like GSA's Design Excellence, Construction Excellence and routine facilities repairs and alterations incorporate the interdependence between design, function and visual appeal of the buildings' common elements.

## Integrated Workplace/Productivity

To provide physical work environments that will enhance work flow, GSA uses the concept of the Integrated Workplace. As defined by Franklin Becker of Cornell University and Michael Joroff of the Massachusetts Institute of Technology:

*It is a system that creatively combines wisdom about the nature of physical settings (where the work is conducted); the information technologies used in the performance of work (how data, opinions, and ideas are accessed, processed, and communicated); the nature of work patterns and processes (when and how tasks must be performed to achieve business objectives); and finally organizational culture and management (the formal and informal values, exceptions, policies, and behaviors that influence all the other factors).*

Productivity (individual and group performance) is greatly affected by the working environment. GSA strives to provide workplace environments that physically and psychologically enhance work performance.

Figure 1-1

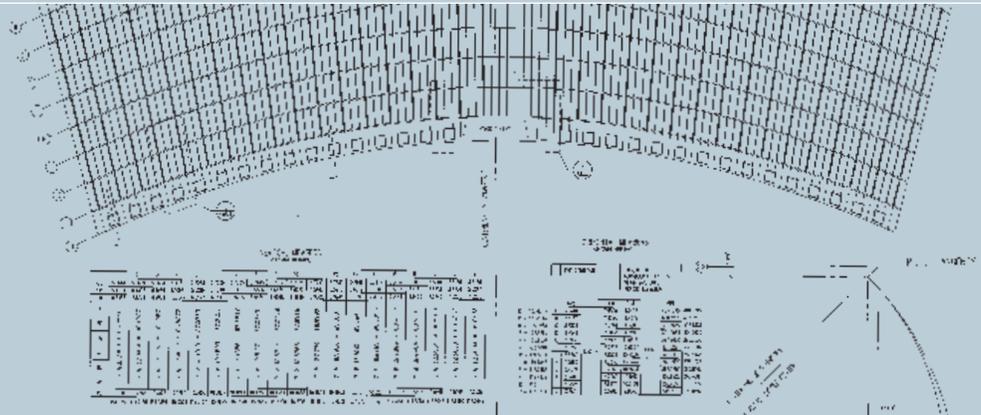
## Guiding Principles for Federal Architecture

In the course of its consideration of the general subject of Federal office space, the committee has given some thought to the need for a set of principles which will guide the Government in the choice of design for Federal buildings. The committee takes it to be a matter of general understanding that the economy and suitability of Federal office design space derive directly from the architectural design. The belief that good design is optional, or in some way separate from the question of the provision of office space itself, does not bear scrutiny, and in fact invites the least efficient use of public money.

The design of Federal office buildings, particularly those to be located in the nation's capital, must meet a two-fold requirement. First, it must provide efficient and economical facilities for the use of Government agencies. Second, it must provide visual testimony to the dignity, enterprise, vigor and stability of the American Government.

It should be our object to meet the test of Pericles' evocation to the Athenians, which the President commended to the Massachusetts legislature in his address of January 9, 1961: "We do not imitate – for we are a model to others."

The committee is also of the opinion that the Federal Government, no less than other public and private organizations concerned with the construction of new buildings, should take advantage of the increasingly fruitful collaboration between architecture and the fine arts. With these objects in view, the committee recommends a three point architectural policy for the Federal Government.



The policy shall be to provide requisite and adequate facilities in an architectural style and form which is distinguished and which will reflect the dignity, enterprise, vigor and stability of the American National Government. Major emphasis should be placed on the choice of designs that embody the finest contemporary American architectural thought. Specific attention should be paid to the possibilities of incorporating into such designs qualities which reflect the regional architectural traditions of that part of the Nation in which buildings are located. Where appropriate, fine art should be incorporated in the designs, with emphasis on the work of living American artists. Designs shall adhere to sound construction practice and utilize materials, methods and equipment of proven dependability. Buildings shall be economical to build, operate and maintain, and should be accessible to the handicapped.

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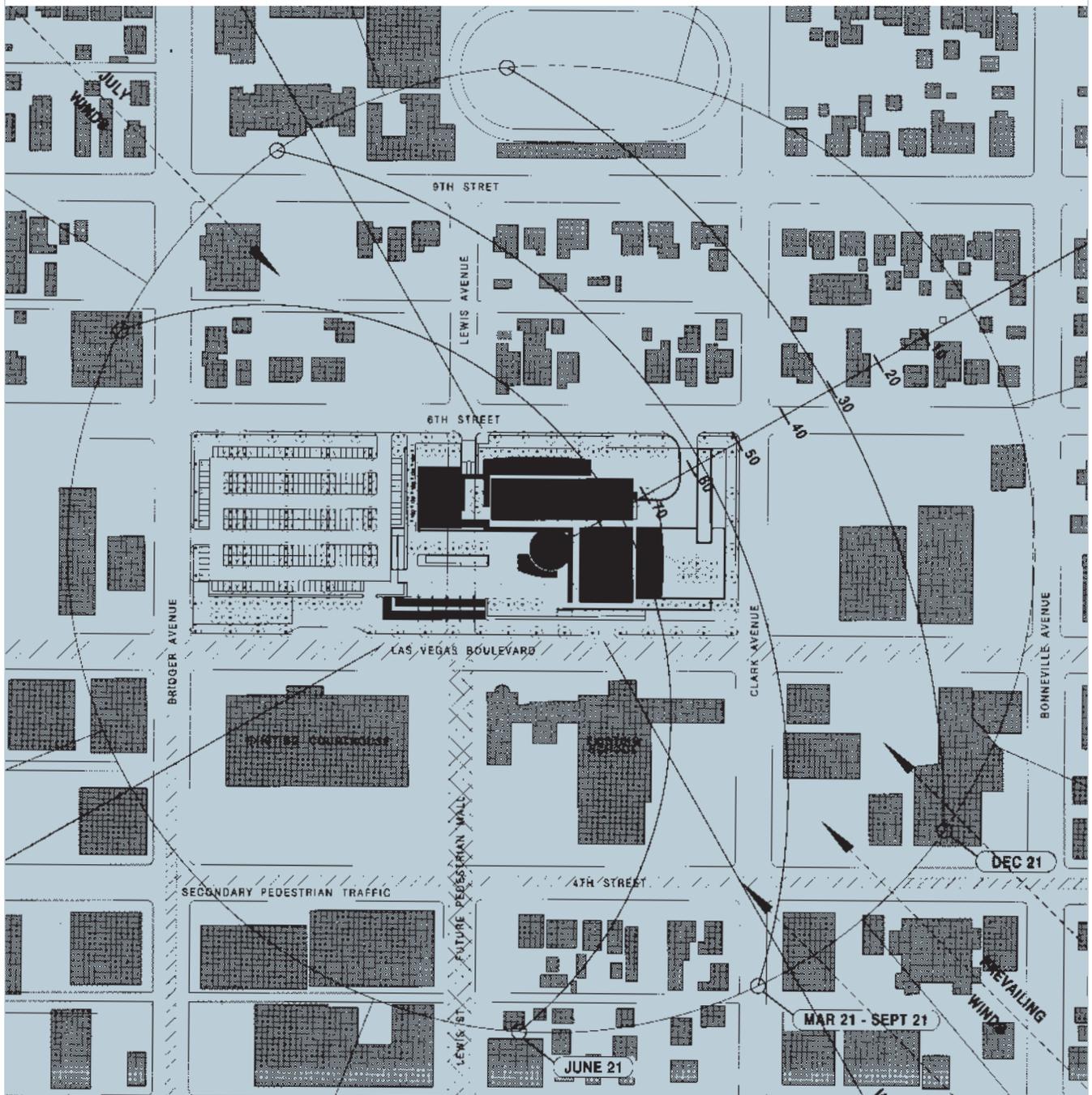
The development of an official style must be avoided. Design must flow from the architectural profession to the Government, and not vice versa. The Government should be willing to pay some additional cost to avoid excessive uniformity in design of Federal buildings. Competitions for the design of Federal buildings may be held where appropriate. The advice of distinguished architects, as a rule, ought to be sought prior to the award of important design contracts.

2

The choice and development of the building site should be considered the first step of the design process. This choice should be made in cooperation with local agencies. Special attention should be paid to the general ensemble of streets and public places of which Federal buildings will form a part. Where possible, buildings should be located so as to permit a generous development of landscape.

3

— *Daniel Patrick Moynihan*



## 1.3 National Codes and Standards

**Federal Law.** The Public Buildings Amendments of 1988, 40 U.S.C. 3312 (formerly section 21 of the Public Buildings Act of 1959, 40 U.S.C. 619), require that each building constructed or altered by GSA or any other federal agency shall, to the maximum extent feasible, be in compliance with one of the nationally recognized model building codes and with other applicable nationally recognized codes.

**Nationally Recognized Codes.** For all design and construction work performed on Federal Buildings by GSA or those functions under GSA's construction authority, GSA has adopted the technical requirements of the following nationally recognized codes referred to in this subsection. The technical requirements of these nationally recognized codes will supplement other GSA requirements mandated by Federal Laws and Executive Orders, as well as other GSA criteria noted within this document that has been established to meet our customers needs and their unique requirements. In addition, the latest edition of the nationally recognized codes, including the current accumulative supplements, in effect at the time of design contract award shall be used throughout design and construction of that project.

*Building Code.* The International Code Council (ICC) is a consolidated organization that is comprised of what was formerly the Building Officials and Code Administrators International, Inc. (BOCA), the International Conference of Building Officials (ICBO), and the Southern Building Code Congress International, Inc. (SBCCI). Based upon this consolidation and consistent with GSA's established national policy, the GSA will utilize the technical requirements of the family of codes issued by ICC in lieu of the National Building Code (published by BOCA), the

Uniform Building Code (published by ICBO), and the Standard Building Code (published by SBCCI).

The ICC family of codes includes, but is not limited to: International Building Code (IBC), International Fire Code (IFC), International Plumbing Code (IPC), International Mechanical Code (IMC), and the International Energy Conservation Code (IECC). The ICC family of codes is available through [www.intlcode.org/](http://www.intlcode.org/).

Furthermore, the National Fire Protection Association (NFPA) has established its own family of national model codes and standards. Consistent with GSA's long-standing policy to comply with local codes and standards to the maximum extent practicable, NFPA codes may be used (to the maximum extent practicable) in jurisdictions where NFPA codes have been duly adopted by that locality.

*Life Safety Code.* GSA has adopted the technical egress requirements of the NFPA, Life Safety Code (NFPA 101), in lieu of the technical egress requirements of the IBC. NFPA 101 is available through [www.nfpa.org/](http://www.nfpa.org/).

*National Electric Code.* GSA has adopted the technical electrical requirements of the NFPA, National Electric Code (NFPA 70), in lieu of the technical electrical requirements of the ICC Electrical Code. The National Electrical Code is available through [www.nfpa.org/](http://www.nfpa.org/).

**State and Local Codes.** GSA recognizes that the national building codes are typically the foundation of state and local building codes. However, state and local codes also represent important regional interests and conditions. As such, State and Local building codes shall also be followed to the maximum extent practicable.

Legally, however, buildings built on Federal property are exempt from State and local building codes. Notwithstanding, it is GSA's policy to comply with State and local building codes to the maximum extent practicable.

**National Standards.** The latest edition of the nationally recognized standards herein, in effect at the time of design contract award shall be used during design and construction.

**Lease Construction.** Lease construction is defined as new construction of a building for Government use in response to GSA's formal solicitation for offers. The construction may be either on a pre-selected site assigned by GSA to the successful offeror or on the offeror's site. Therefore, the building will be developed on private land and the building will be leased to GSA. In these cases, the applicable State and local government codes apply. The developer/owner (i.e., offeror) must also obtain the necessary building permits and approvals from the appropriate State and/or local government officials. The Facilities Standards do not apply to Lease Construction, it does, however, apply to Lease Construction with Government Option to Purchase and is recommended for significant build-to-lease buildings. For requirements for Lease Construction see SFO specific program, i.e. seismic, environmental, fire safety, accessibility, etc.

**Lease Construction with Government Option to Purchase.** In cases where GSA's formal solicitation for offers has an option for GSA to purchase the building at a future date, the GSA adopted nationally recognized codes and requirements apply as well as the applicable State and local government codes. Should a conflict exist between applicable State and local government codes and the GSA requirements, the GSA requirements take precedence. However, GSA shall carefully consider each conflict based on adequacy, cost, and nationally accepted practice. In addition, the developer/owner must also obtain the

necessary building permits and approvals from the appropriate State and/or local government officials as well as from GSA.

**Conflicts between Nationally Recognized Codes and GSA Requirements.** To ensure flexibility, it is GSA policy to make maximum use of equivalency clauses in all nationally recognized codes. Should a conflict exist between GSA requirements and the GSA adopted nationally recognized codes, the GSA requirement shall prevail. All code conflicts shall be brought to the attention of the GSA Project Manager for resolution.

**Code Requirements for Alterations.** Generally, involved building systems need only be upgraded to correct deficiencies identified by GSA, unless the entire building is being renovated. All new work is required to meet the applicable nationally recognized codes adopted by GSA and interpreted by the specific GSA Region. If only a portion of the building is being renovated, the IBC shall be evaluated to determine if the entire building must be brought up to code compliance. Any questions or concerns should be discussed with the GSA Project Manager.

**Zoning Laws.** During the planning process and development of associated environmental documentation for new construction and renovation projects, GSA shall consider all requirements (other than procedural requirements) of zoning laws, design guidelines, and other similar laws of the State and/or local government. This includes, but is not limited to, laws relating to landscaping, open space, building setbacks, maximum height of the building, historic preservation, and aesthetic qualities of a building. The project design team is to fully address such laws and requirements in their planning and design documents. Any proposed deviations from such laws are to be documented, fully justified, and brought to the attention of the GSA Project Manager for resolution.

Local regulations must be followed without exception in the design of systems that have a direct impact on off-site terrain or utility systems (such as storm water run-off, erosion control, sanitary sewers and storm drains and water, gas, electrical power and communications, emergency vehicle access, and roads and bridges).

With respect to the number of parking spaces, the requirements stated in the building program take precedence over zoning ordinances in all cases. Although GSA may not be able to directly compensate for displaced parking (as a result of site acquisition), the project team should seek creative alternatives and partnerships to address parking concerns brought about by GSA's development. Considerations may include shared parking facilities and strategies to encourage transit use.

In the case of leased facilities built on private land, all local zoning ordinances apply.

**State and Local Government Consultation, Review, and Inspections.** The GSA project manager shall provide to the appropriate State and/or Local Government officials the opportunity to review the project for compatibility with local plans, zoning compliance, building code compliance, and construction inspections. This must occur early in project design so that the design can easily respond to appropriate recommendations. This includes, but is not limited to the review of drawings and specifications, any on-site inspections, issuing building permits, and making recommendations for compliance with local regulations and compatibility with local fire fighting practices. **The GSA Project Manager shall also inform the State and local government officials that GSA and its contractors will not be required to pay any amount for any action taken by the State and/or local government officials to carry out their mission. However, GSA shall review all recommendations made by State and local government officials. Each recommendation shall be carefully consid-**

**ered based on adequacy, cost, and nationally accepted practice. However, GSA has the final authority to accept or reject any recommendation from State and/or local government officials.**

*Zoning and other considerations relating to urban design issues.* The design team should offer local officials an opportunity to informally review and comment on the design concept, for compatibility with local plans, zoning, and design guidelines. Key design milestones, such as at initial concepts and around the project's peer review sessions, offer logical timeframes for these reviews and can be especially helpful to the designers. If local officials choose to review the concept, the GSA project manager should establish a concise window in which comments can be accepted (e.g., no longer than 30 days), and this should be coordinated with the project design schedule. If local officials choose not to review the design concept, this should be noted in the project file.

*Design review for code compliance.* If the State and local government officials elect to review building designs for code compliance (i.e., final concepts, preliminary designs, and final working drawings), such design submissions will be officially forwarded to the appropriate local officials by the GSA Project Manager. Local officials will be provided 30 days for their review and comment in writing for each proposed design submission, with no time extensions. If comments are not received after the commenting period is over, the GSA Project Manager will proceed with project execution.

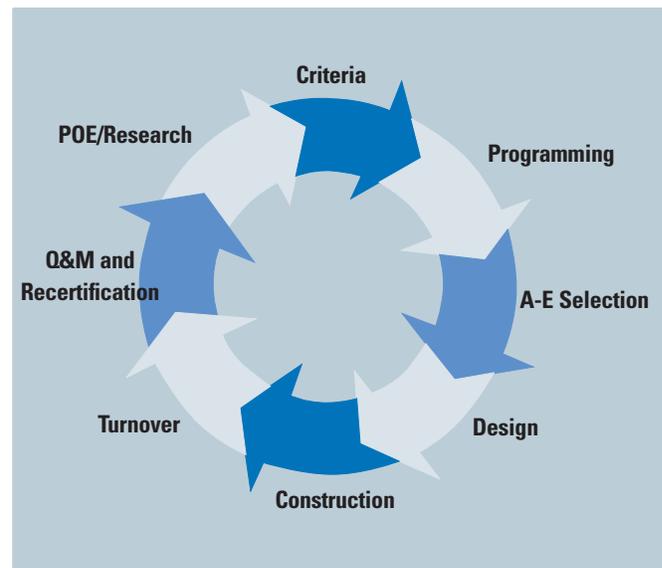
*Construction Inspections.* If the State and local government officials elect to perform code compliance construction inspections, the GSA Project Manager shall include special provisions in the A/E's and each contractor's contract to handle the additional requirement of coordinating their work with State and local government officials. Any findings resulting from such inspections by the State and

local government officials shall be immediately communicated to the GSA Project Manager for consideration. It is to be clearly understood by all parties (e.g., State and local government officials, construction contractors, GSA, etc.) that the State and local government officials do not have the authority to reject, accept, or make changes to the work and is there only to assist GSA in achieving code compliance. *State and local government recommendations.* The GSA Project Manager should make an effort to incorporate State and local government recommendations when reasonable and when in the best interest of the Government. Notwithstanding, it is GSA's policy to comply with State and local building codes to the maximum extent practicable. GSA shall review all recommendations made by State and local government officials. Each recommendation shall be carefully considered based on adequacy, cost, and nationally accepted practice. However, GSA has the final authority to accept or reject any recommendation. The GSA Project Manager shall maintain a record of all recommendations and comments from State and local government officials for the duration of the project.

## 1.4 Commissioning

**Definition.** All GSA capital construction projects shall employ Total Building Commissioning (TBC) practices to assure delivery of program goals and related performance requirements. TBC practices shall be applied as described herein and within ASHRAE Guideline 0P, entitled “The Commissioning Process.”

As represented in the diagram below, GSA's commissioning process begins with design criteria (as contained within P-100) and client driven design programming requirements, reflected in design A/E selection factors, carried into design through technical submissions/reviews, followed by construction quality control/inspections and tests, leading to turnover practices for facility operations and subsequent recertification testing. This is then followed by extended operating practices and a Post Occupancy Evaluation that provides the necessary lessons-learned to both define research needs and subsequent criteria enhancement.



**Commissioning Team.** For GSA, commissioning is the responsibility of the entire delivery team. Each member must do their part to ensure that all decisions reflect programmed goals, that submissions/constructed features are reviewed/tested for effectiveness, and that proper documentation is made to certify and support the maintenance of expectations.

**Architect-Engineer Role.** The design Architect-Engineer shall identify all functional and performance testing/certification requirements for designed features, systems, components, equipment, and materials, necessary to assure programmed performance goals. Commissioned parameters are to address functional/performance issues, not incidental quality control testing. Performance goals that involve construction contractor testing and certifications shall be reflected within construction specifications. Construction specification references shall also define any required permanent testing and research equipment/provisions.

Procedurally, the A/E is responsible for initiating Program Review Workshops at the beginning of each design submission stage, to review expectations and to identify delivery team concerns. The A/E shall coordinate with the Construction Manager and, if contracted separately, the Commissioning Authority, to fully define commissioning based issues and testing procedures.

**Identifying Commissioning Requirements.** Selected performance goals must balance the critical nature of expectations with inspection/testing and certification costs. The A/E shall coordinate with GSA's Project Manager and the project's involved Commissioning Authority in identifying appropriate development, inspection, and testing practices. Commissioning practices and certifications are addressed within individual chapters of this document.



# 1.5 Guides

The *Facilities Standards* and the noted guides apply to the GSA building program.

*(In case of conflict between the Facilities Standards and a specific building guide, the guide takes precedence.)*

<b>Federal Courthouses</b>	See also: <i>U.S. Courts Design Guide; U.S. Marshals Service Requirements and Specifications for Special Purpose and Support Space Manual - sections 1,2 &amp; 3</i>
<b>Border Stations</b>	See also: <i>United States Border Station Design Guide (PBS – PQ130)</i>
<b>Child Care Centers</b>	See also: <i>Child Care Center Design Guide (PBS – P140)</i>
<b>Design Excellence</b>	GSA PBS <i>The Design Excellence Program Guide, Building a Legacy.</i> GSA PBS <i>Design Excellence in Leasing.</i>
<b>Fine Arts</b>	GSA PBS <i>Fine Arts Program Desk Guide 2002.</i>

## Other Building Types

*Facilities Standards* generally apply, within specific building functional requirements

Libraries  
Warehouses  
Laboratories  
Archives  
Museums  
Others

## Historic Buildings

See also: Secretary of the Interior's *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (36 CFR67)*.

## Landscape

See also: local standards. Also use *American Association of Nurserymen: ANSI Z60.1* in addition as a design guide.

## Security

Interagency Security Committee's *Security Design Criteria.*  
GSA PBS *Design Notebook for Federal Lobby Security.*

## Site Selection

GSA PBS *Site Selection Guide.*

## 1.6 Environmental Policies & Practices

GSA is committed to being a responsible environmental steward through the consideration of the environment in all our business practices, compliance with environmental laws and regulation, using environmentally beneficial products and services, and using resources in a sustainable manner.

### Sustainable Design

GSA is committed to incorporating principles of sustainable design and energy efficiency into all of its building projects. Sustainable design seeks to locate, design, construct and operate buildings to reduce negative impact on the environment and the consumption of natural resources. Sustainable design improves building performance while keeping in mind the health and comfort of building occupants. It is an integrated, synergistic approach, in which all phases of the facility lifecycle are considered. The result is an optimal balance of cost, environmental, societal and human benefits while meeting the mission and function of the intended facility or infrastructure. Further information can be obtained on the Internet through the Whole Building Design Guide [www.wbdg.org](http://www.wbdg.org).

The essential principles of sustainable design and development for Federal agencies address:

- Site – Optimize site potential
- Energy – Minimize non-renewable energy consumption
- Materials – Use environmentally preferable products
- Water – Protect and conserve water
- Indoor Environmental Quality – Enhance indoor environmental quality
- Operations and Maintenance – Optimize operational and maintenance practices

These principles shall serve as the basis for planning, programming, budgeting, construction, commissioning, operation, maintenance, decommissioning of all new GSA facilities, and for major renovation and alteration of existing buildings and facilities.

**LEED Certification.** As a means of evaluating and measuring our green building achievements, all GSA new construction projects and substantial renovations must be certified through the Leadership in Energy and Environmental Design (LEED) Green Building Rating System of the U.S. Green Building Council. Projects are encouraged to exceed basic LEED green building certification and achieve the LEED “Silver” Level.

### Energy Performance

By Executive Order mandate, GSA’s overall building inventory has an energy performance goal of 55,000 BTU/GSF/year. For new construction, GSA must achieve better energy performance. Therefore, each new facility shall have specific energy targets (BTU/GSF/ year) as established by the Office of the Chief Architect. The A/E shall design to these targets. For additional information see section 1.7, *Energy Conservation Standards*.

### Building Materials

**Prohibited Materials.** The use of the following materials is prohibited on all GSA projects:

- Products containing asbestos.
- Products containing urea formaldehyde.
- Products containing polychlorinated biphenyls.
- Products containing chlorinated fluorocarbons. (See Chapter 5 for replacements.)
- Solder or flux containing more than 0.2 percent lead and domestic water pipe or pipe fittings containing more than 8 percent lead.
- Paint containing more than 0.06 percent lead.



Ronald Reagan Building, Washington, D.C.

**Recycled-Content Products.** GSA is required to buy recycled-content products as designated by EPA through the Comprehensive Procurement Guidelines (CPG). Architects and engineers should always make environmentally responsible choices regarding new building materials and the disposal of discarded products. Buying recycled-content products ensures that the materials collected in recycling programs will be used again in the manufacture of new products.

Section 6002 of the Resource Conservation and Recovery Act (RCRA) requires EPA to designate products that are or can be made with recovered materials, and to recommend practices for buying these products. Once a product is designated, procuring agencies are required to purchase it with the highest recovered material content level practicable.

EPA also issues guidance on buying recycled-content products in Recovered Materials Advisory Notices (RMANs). The RMANs recommend recycled-content ranges for CPG products based on current information on commercially available recycled-content products. RMAN levels are updated as marketplace conditions change.

Architects and engineers must maximize the opportunity for contractors to bid recycled-content materials by including CPG items in the design specifications. Exceptions will only be permitted if written justification is provided when a product is not available competitively, not available within a reasonable time frame, does not meet appropriate performance standards, or is only available at an unreasonable price.

Examples of CPG construction products are included in Chapter 3, *Architectural and Interior Design*, and Chapter 4, *Structural Engineering*. Information can be obtained about EPA's list of designated products and the accompanying recycled-content recommendations on the Internet at [www.epa.gov/cpg](http://www.epa.gov/cpg).

**Lead-Based Paint.** Paint will be tested for lead content when alteration or demolition requires sanding, burning, welding or scraping painted surfaces. When lead is found, implement the controls required by OSHA in 29 CFR 1926.62. Do not abate lead-based paint when a painted surface is intact and in good condition, unless required for alteration or demolition. In child care centers, test all painted surfaces for lead and abate surfaces containing lead-based paint.

**Asbestos-Containing Materials.** Prior to design in a facility to be renovated, a building evaluation by a qualified inspector will be performed. This evaluation will include review of inspection reports and a site

inspection. If asbestos damage or the possibility of asbestos disturbance during construction activity is discovered, one of the following four corrective actions must be taken: removal, encapsulation, enclosure or repair.

All design drawings and specifications for asbestos abatement must be produced by a qualified specialist. The guiding standards for this work are the GSA PBS IL-92-8 and OSHA and EPA regulations, in particular 29 CFR 1926.58, 40 CFR 61.140-157 and 49 CFR 171-180. In general, projects should be designed to avoid or minimize asbestos disturbance. The environmental standards will be supplied by the regional office of GSA.

All GSA construction work that disturbs asbestos must be performed using appropriate controls for the safety of workers and the public.

Regular inspection of the abatement work area and surrounding areas should be performed on behalf of GSA to protect the interests of GSA, the building occupants and the public. Such inspections should include visual and physical inspection and air monitoring by phase contrast microscopy and/or transmission electron microscopy, as appropriate. Inspections should be performed under the supervision of a Certified Industrial Hygienist, or individuals accredited under the Asbestos Hazard Emergency Response Act (AHERA) for asbestos abatement supervision.

Laboratories analyzing samples for asbestos must be accredited by the American Industrial Hygiene Association (AIHA) or the National Institute for Standards and Technology's Voluntary Laboratory Accreditation Program. Laboratories analyzing air samples by phase contrast

microscopy must have demonstrated successful participation in the National Institute for Occupational Safety and Health (NIOSH) Proficiency in Analytical Testing program for asbestos.

On-site analysis by phase contrast microscopy may be performed as required, provided that the analyst is board-approved in the AIHA Asbestos Analysis Registry and provided that a quality assurance program is implemented, including recounting of a fraction of samples by a qualified laboratory. All final clearance transmission electron microscopy air samples must be analyzed in accordance with the EPA AHERA protocol in 40 CFR 763, Appendix A of subpart E.

### **Indoor Air Quality**

All products to be incorporated into the building, including finishes and furniture, should be researched regarding characteristics of off-gassing and noxious odors that will affect indoor air quality.

### **Soil Contamination**

The Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA or Superfund) provides authority and distributes responsibility for cleanup of contaminated soil, surface water and groundwater from inactive hazardous substance disposal sites and from hazardous substances released into the environment that facility permits do not cover. If soil or water contamination is a concern during construction of new buildings, major and minor alterations, and work in historic structures, then the EPA regulations under 40 CFR should be followed.

## Underground Storage Tanks (USTs)

The EPA finalized regulations USTs in 40 CFR Parts 280 and 281. These regulations apply to all tanks containing petroleum products and hazardous substances as defined by the EPA. The regulations direct facilities to implement technical standards and corrective actions for the management of and releases from USTs. If USTs are a concern during construction of new buildings, major and minor alterations, and work in historic structures, then the EPA regulations should be followed. If a leaking UST is detected/discovered, contact EPA.

## Compliance with the National Environmental Policy Act (NEPA)

GSA conducts an environmental review of each project prior to the start of design as required by the National Environmental Policy Act (NEPA). The review identifies environmental impacts and alternative courses of action that may have less impacts. The review can result in:

- A Categorical Exclusion (CATEX) from the requirement to prepare an Environmental Impact Statement (EIS),
- The preparation of an Environmental Assessment that results in a finding of No Significant Impact (FONSI),
- The preparation of an Environmental Assessment that identifies significant impacts, followed by preparation of an Environmental Impact Statement (EIS), or
- The preparation of an EIS.

If an Environmental Assessment or EIS has been prepared, it will constitute the primary guideline for environmental design issues. In those instances where GSA has committed to implementing specific mitigation measures, programmers and designers must ensure that those measures are carried out in the design.

## Guidance

The following documents contain specific design requirements or may influence design decisions:

- Council of Environmental Quality (CEQ), Code of Federal Regulations (CFR) Title 40, Parts 1500 - 1508: *Regulations for Implementing the National Environmental Policy Act.*
- GSA ADM 1095.1F: *Environmental Considerations in Decision Making.*
- GSA ADM 1095.2: *Considerations of Flood Plains and Wetlands in Decision Making.*
- GSA PBS *NEPA Desk Guide.*
- Environmental Protection Agency (EPA), 10 CFR 40, 1.23, 1-4, 1-16: *Procedures for Implementing the Clean Air Act and the Federal Water Pollution Control Act.*
- EPA, 40 CFR 50: *National Primary and Secondary Ambient Air Quality Standards.*
- EPA, 40 CFR 60: *New Source Performance Standards.*
- EPA, 40 CFR 61: *National Emission Standards for Hazardous Air Pollutants.*
- EPA, 40 CFR 82: *Protection of Stratospheric Ozone.*
- EPA, 40 CFR 260-299: *Solid Wastes.*
- EPA, 40 CFR 300-399: *Superfund, Emergency Planning and Community Right-to-Know Programs.*
- EPA, 40 CFR 401-403: *Effluent Guidelines and Standards.*
- LEED™ (*Leadership in Energy & Environmental Design*) *Green Building Reference Guide*, developed by the U.S. Green Building Council.

# 1.7 Energy Conservation Standards

## Performance Goals

Legislation directs the Federal Government to adhere to voluntary Commercial Energy Standards, reflected within the Code of Federal Regulations, 10-CFR 434. ASHRAE Standard 90.1 meets or exceeds 10-CFR 434, and may be substituted as a reference (with exceptions in lighting system performance as addressed in Chapter 6).

Executive Order 13123 establishes a national program goal to reduce building annual energy consumption by 35 percent, using a 1985 baseline. To achieve this goal, GSA's inventory must reach a metered (boundary) annual energy consumption of approximately 55,000 BTU/GSF.

GSA's sustainability objective for LEED certification will likely be associated with trying to beat ASHRAE 90.1 energy performance by defined percentage levels, (e.g. 2 points toward certification for new construction projects with every 20% increment, and for alterations projects with every 10% increment).

GSA also fully supports the Government's Energy Star Buildings Program for its existing inventory, achieving metered consumption within the top 25% of involved building categories.

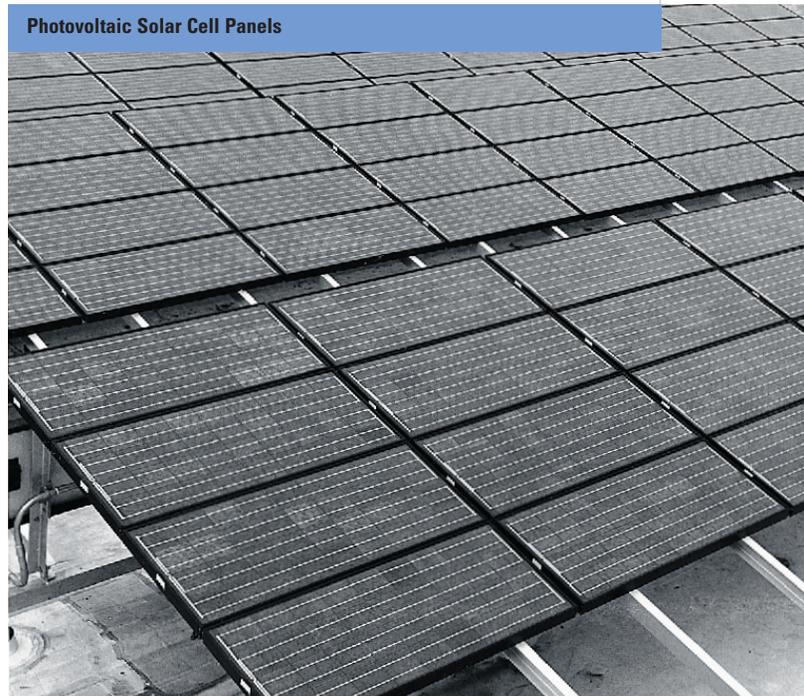
## Energy Goal Applications

For New Construction and building modernizations, designs shall achieve the project's individually assigned annual energy goal, established by the Office of the Chief Architect. Generally, this goal will be below the 55,000 BTU/GSF-YR target of the above referenced Executive Order.

For new construction and building modernizations, certification shall be based upon computer simulations of the overall building's annual energy consumption. Computer programs must be approved by the Project Manager, represented by the designer as being capable of simulating weather variations, envelope heat transmission, internal load fluctuations, ventilation and air infiltration impacts, HVAC equipment part-load efficiencies, and considered control strategies.

For Major Renovation/Alterations projects, that do not involve total building modernization, involved system performance shall be certified to achieve at least a 10 percent better peak load energy efficiency, compared to ASHRAE 90.1-1999. Involved equipment efficiencies shall also be within the top 25% of manufactured product lines. Certification shall include side-by-side performance comparisons of each involved system/feature.

Photovoltaic Solar Cell Panels



## 1.8 Life Cycle Costing

### Purpose

Life Cycle Costing (LCC) is an important economic analysis used in the selection of alternatives that impact both pending and future costs. It compares initial investment options and identifies the least cost alternatives for a twenty year period. As applied to building design energy conservation measures, the process is mandated by law and is defined in the Code of Federal Regulations (CFR), Title 10, Part 436, Subpart A: *Program Rules of the Federal Energy Management Program*.

The A/E shall contact local utility companies to determine available demand-side management programs and no-cost assistance provided by these companies to designers and owners.

### Applications

Basic applications of LCC are addressed within the individual chapters herein and may be further defined within an A-E's design programming scope requirements. In general, LCC is expected to support selection of all building systems that impact energy use: thermal envelope, passive solar features, fenestration, HVAC, domestic hot water, building automation and lighting. However, LCC can also be applied to building features or involve costs related to occupant productivity, system maintenance, environmental impact and any other issue that impacts costs over time. It is very important to recognize the significance of integrated building systems design in the overall efficiency of the design.

### Methodology

There are many established guidelines and computer-based tools that effectively support Present Value LCC analyses. The National Institute of Standards and Technology (NIST) has prepared the Life Cycle Costing Manual for the Federal Energy Management Program (NIST Handbook 135), and annually issues real growth Energy Price Indices and Discount Factors for Life Cycle Cost Analysis. As a companion product, NIST has also established the Building Life Cycle Cost (BLCC) computer program to perform LCC analyses. The latest versions of the BLCC program not only structure the analysis, but also includes current energy price indices and discount factor references. These NIST materials define all required LCC methodologies used in GSA design applications.

It is recommended that the A/E obtain the BLCC software and update from NIST. (The latest information on the BLCC software is available on the Internet at: [www.eren.doc.gov.femp](http://www.eren.doc.gov.femp).)

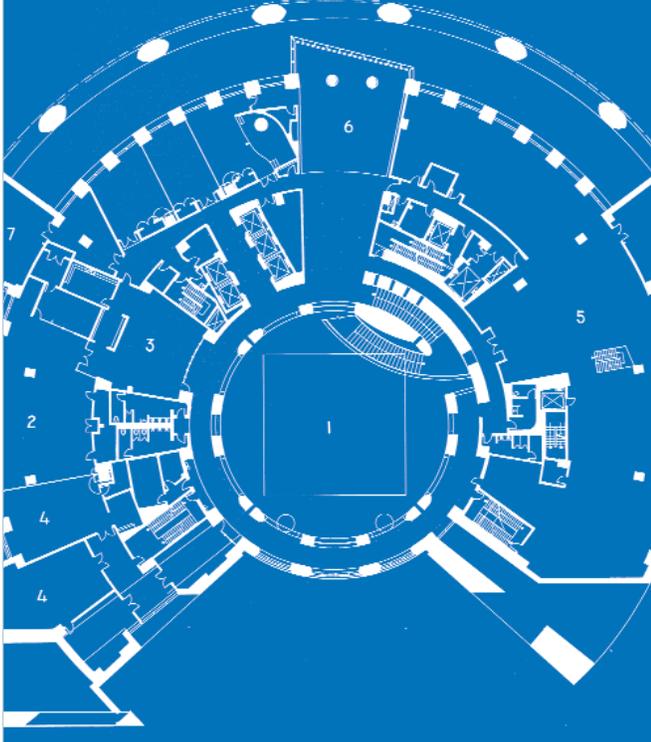
### Procedures and Approach

The most effective approach to LCC is to appropriately integrate it into the design process.

The building design evolves from general concepts to detailed analysis. LCC needs to follow the same approach paralleling the focus to the current level of detail study.

It is extremely important for the effective development of the project that commitments are made and retained on the building systems, in a general sense, during the Conceptual Phase.

The building systems should be analyzed for appropriateness during the first stages of the Design Development Phase. A commitment on direction for the systems needs to be made at this time, and any further LCC studies focused on detail within each system.



Charles Evans Whittaker U.S. Courthouse, Kansas City, MO

All LCC effort should be completed in the Design Development Phase of the project.

The following practices are typically required when conducting LCC analyses for building design. They are listed here to address common concerns and frequently asked questions.

- When defining alternatives for life cycle costing, an acceptable level of overall building services must be assured throughout the analysis period.
- Design alternatives must be compared against a baseline reference alternate that is the lowest first cost of the alternatives being considered. The baseline alternate must offer a viable system, employing state-of-the-art design features, and be in compliance with all project requirements. Where existing conditions

form part of the baseline alternate, the analysis must not only include intended project work, but also the additional costs necessary to achieve code compliance and reliable operation over the analysis period.

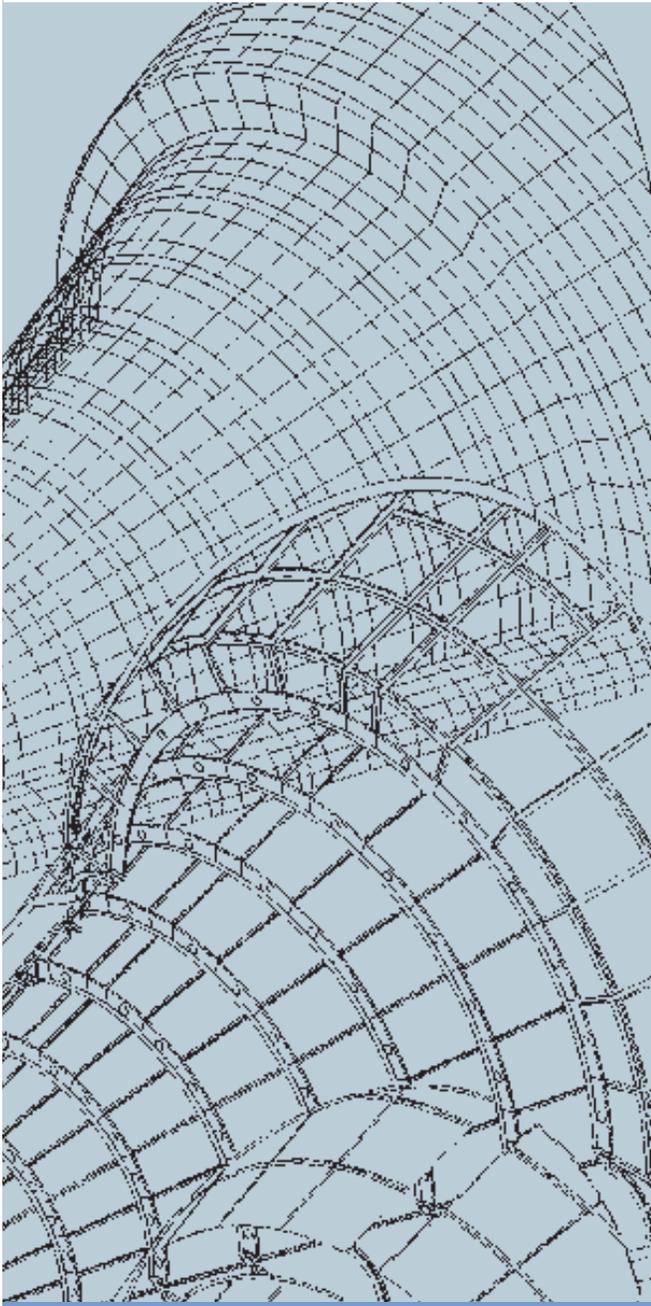
- The analysis period should be chosen to fully represent all costs. When optimizing the design of a single system, all compared alternatives must be considered over the same analysis period. Where possible, the analysis period should be the smallest whole multiple of the service lives for the major systems involved in the analysis. Service lives of HVAC equipment can be found in the ASHRAE Applications manual. In any case, the analysis period should not be over 25 years unless otherwise directed by GSA.
- Costs that have already been incurred or must be incurred, regardless of the chosen alternative, can be deemed “sunk” and excluded from the analysis. Costs that must be incurred during the period from design decisions to construction award should be deemed sunk.
- Baseline and alternative first costs are typically those estimated for the construction award date. The life cycle cost analysis can assume that the award date can be considered the zero point in time for the analysis period, with all other event times referenced to the construction award date. For greater simplicity, the year of design decision can also be considered as the zero point in time, and it can be assumed that the construction award will occur in that year.
- Salvage values for alternatives are typically zero. However, in those cases where scrap values could impact decisions, the present value is calculated as its future value (scrap value) discounted back to the present from the year of occurrence. The formula for this is shown in the LCC Formulas **Table 1-1**.

## Table 1-1 LCC Formulas

Type of Cost	Cost Examples	Present Value Relationships	Comments
<b>Sunk</b>	<ul style="list-style-type: none"> <li>• Design Fees</li> <li>• Funds irrevocably committed</li> </ul>	Not Applicable	Costs are not included in the Analysis
<b>First</b>	<ul style="list-style-type: none"> <li>• Investment Costs</li> <li>• Construction Costs</li> <li>• Purchase Price</li> </ul>	$PV = TV$	For those investment costs that begin at the start of the analysis period
<b>Salvage Value</b>	<ul style="list-style-type: none"> <li>• Scrap value of equipment at the end of its service life</li> </ul>	$PV = \frac{FV}{(1+d)^n}$ <p>where <math>FV=TV(1+e)^n</math></p>	Present value equals the future value at the end of the service life, discounted by n service years
<b>Future Investment</b>	<ul style="list-style-type: none"> <li>• One time investments occurring after the start of the analysis period</li> <li>• Non-Annual maintenance or repair</li> <li>• Major alterations to initial investment work</li> </ul>	$PV = TV \frac{(1+e)^n}{(1+d)^n}$ <p>Where FV is the time pro-rated amount that separates investment value to the end of service life salvage value.</p>	Discount the future value (Today's Value escalated at rate e to year n) back to the present.
<b>Residual Value</b>	<ul style="list-style-type: none"> <li>• Equipment with a service life extending beyond the analysis period</li> </ul>	$PV = \frac{FV}{(1+d)^n}$	Residual value equals the future value at the end of the analysis period, discounted to the present.
<b>Annually Recurring Fixed</b>	<ul style="list-style-type: none"> <li>• Fixed payment service contracts with inflation adjustments</li> <li>• Preventative maintenance</li> </ul>	$PV = TV(UPW)$ <p>where</p> $UPW = \frac{(1+d)^n - 1}{d(1+d)^n}$	Annually Recurring Cost, relating to today's value, which increase in price at the same rate as general inflation. The UPWn factors are within the NIST BLCC program.

Type of Cost	Cost Examples	Present Value Relationships	Comments
<b>Annually Recurring Escalating</b>	<ul style="list-style-type: none"> <li>• Service or maintenance which involve increasing amounts of work</li> <li>• Frequent replacements that escalate at a rate different than inflation</li> </ul>	$PV = TV(UPW^*)$ <p>where</p> $UPW^* = \frac{\left[ \frac{(1+e)}{(1+d)} \right]^n - 1}{1 - \frac{(1+d)}{(1+e)}}$ <p>or <math>UPW^* = \left( \frac{1+e}{d-e} \right) \cdot \left[ 1 - \left( \frac{1+e}{1+d} \right)^n \right]</math></p>	The present value of such costs are calculated by using a modified version of the UPW formula (UPW*) which allows for cost escalation.
<b>Energy</b>	<ul style="list-style-type: none"> <li>• Fuel related costs, such as fuel oil, natural gas or electricity</li> </ul>	$PV = TV(UPW^*)$	Energy related UPW* factors are found in the NIST BLCC program.
<b>Escalation Rates</b>	<ul style="list-style-type: none"> <li>• Relating Budgetary Escalation to Real Growth Escalation</li> </ul>	$E = e + I + eI$ <p>or <math>e = \frac{E - I}{1 + I}</math></p>	Needed to convert budgetary escalation to real growth escalation.
<b>Definitions</b>	<p>FV = future value</p> <p>PV = present value</p> <p>TV = today's value</p> <p>d = real discount rate</p> <p>e = real growth escalation rate (the differential escalation rate that exists after removing the influence of general inflation)</p> <p>n = number of years to occurrence or the analysis period, as appropriate</p> <p>E = Budgetary Escalation</p> <p>I = Inflation Rate</p> <p>UPW = Uniform Present Worth factor for fixed recurring costs</p> <p>UPW* = Modified Uniform Present Worth factor for escalating recurring costs</p>		

- Future one-time costs, such as replacement costs, are established by escalating a known today's value (using real growth rate) to its future value in the year it occurs, then discounting that value back to its present value (using a real discount rate). The formula for this is shown in the LCC Formulas Table 1-1.
- For instances where an alternative has service life beyond the analysis period, allowance shall be made for the associated residual service worth. This calculation involves identifying the future residual value at the end of the analysis period, then discounting the amount back to the present. The future residual value can be approximated by multiplying the future investment value (less future salvage value at the end of its service life) by the proportion of time remaining in the analysis period, compared to its service life.
- Annually recurring fixed costs include those costs where increases have no real growth, such as costs that increase at the general inflation rate. They can be represented by the formula shown in the LCC Formulas Table 1-1. Also in this table is the formula for recurring costs where recurring costs escalate. Both formulas involve multiplying a known cost (in today's value) by a uniform present worth value.
- Fuel costs represent a special case of recurring escalating costs. Uniform present worth values are available from NIST data, correlating specific fuel types by sector/location for a defined analysis period. For simplicity, demand charges may be assumed to escalate at the same rate as consumption charges.
- Investment and replacement actions over time may impact recurring costs. For simplicity, unless otherwise directed, fluctuating recurring cost savings may be assumed to be proportionate to the savings realized at the start of the analysis period.
- Calculate the savings to investment ratio (SIR) for comparisons of dissimilar alternatives, such as comparing an HVAC alternative to a lighting alternative. Calculate net savings for comparisons of similar alternatives, such as optimizing insulation thickness in a wall.
- A sensitivity analysis is required whenever assumptions may be considered questionable. This simply requires conducting multiple LCC analyses using extremes of cost parameters in question.
- Due to possible margins of error in estimating costs, alternatives with a life cycle cost differential of less than 10 percent can be judged inconclusive by GSA.
- To define energy related cost impacts for alternatives that are influenced by weather and/or varying loads/schedules, the energy use modeling program DOE2 or other approved software shall be used.



Ronald Reagan Federal Building atrium skylight isometry, Washington, D.C.

## 1.9 Metric Standards

All projects will be produced using the International System (SI) unless otherwise directed by the Chief Architect. A project is "metric" when:

- Specifications show SI units only.
- Drawings show SI units only.
- Construction takes place in SI units only.
- Inspection occurs in SI units only.
- Cost estimating is based on SI units only.

Reference *Metric Design Guide* (PBS-PQ260).

### English and Metric Measurement Reference

A majority of dimensions set by standards and codes currently remain in the English measure system. It is the intent of GSA to support the conversion to metric. Therefore, when a dimensional requirement is stated in this document, the designated dimension by code or regulation will be placed in parenthesis and the corresponding representation in the other measurement system will be placed adjacent to it.

Example: (5') 1.52M diameter clearance for navigation of a wheeled chair in an accessible toilet room.



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## 1.10 Accessibility Design Guidelines

It is GSA policy to make all Federal buildings accessible without the use of special facilities for the disabled. The intent of this policy is to use standard building products set at prescribed heights and with prescribed maneuvering clearances to allow easy use by disabled employees and visitors. Building elements designated specifically for use by disabled persons should be kept to a minimum.

### Uniform Federal Accessibility Standards (UFAS)

is mandatory on all GSA projects. Current GSA policy also encourages compliance with the requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG) where those requirements are stricter than UFAS. The A/E is responsible for checking whether there are local accessibility requirements. If they exist, the most stringent will prevail between local and UFAS/ADA.

The criteria of these standards should be considered a minimum in providing access to the physically disabled. Where dimensions for clearances are stated, allowance should be made in the design for construction tolerances to ensure the finished construction is in full compliance. (Compliance demonstration is mandatory.)

The following information lists provisions where UFAS is more stringent or contains different requirements than ADAAG. The bold type designates which standard should be used.

### Federal Office Space

In office space the following two conditions apply:

- a. Those where UFAS provisions are clearly more stringent than ADAAG
- b. Those where differences are “de minimis,” or where provisions result in an equivalent level of access, do not significantly impact accessibility, or are outdated and no longer serve the intended purpose. In these cases, GSA has the option to choose between relevant options.

### Where UFAS Clearly is More Stringent:

**Work Areas.** UFAS requires that all areas which may result in employment of physically disabled persons be accessible. ADAAG requires only that people with disabilities be able to approach, enter, and exit a work area (**UFAS 4.1.4**; ADAAG 4.1.1(3)).

**Work Surface Scoping.** UFAS requires that 5 percent of all fixed or built-in employee work surfaces be accessible. ADAAG does not require work surfaces in work areas to be accessible. Both UFAS and ADAAG require that 5 percent of fixed tables in public or common use areas be accessible (**UFAS 4.1.2(17) and 4.32**; ADAAG 4.1.1(3) and 4.1.3(18)).

**No Elevator Exception.** UFAS has no exception to the elevator requirement and requires elevators in all multi-story buildings and facilities. ADAAG provides an exception to the elevator requirement in certain buildings that are under three stories or have less than 3000 square feet per story (**UFAS 4.1.2(5)**; ADAAG 4.1.3(5) Exception 1).



U.S. Courthouse, White Plains, NY

**Entrances in Multi-Grade Buildings.** UFAS requires at least one principal entrance at each grade floor level to a building to be accessible. ADAAG requires: (1) that at least 50% of all public entrances be accessible; and (2) that the number of exits required by the applicable building/ fire code be used in determining the total number of accessible entrances required in a building or facility. UFAS would require more accessible entrances in certain “multi-grade” buildings (UFAS 4.1.2(8); ADAAG 4.1.3(8)).

**Elevator Controls.** UFAS requires elevator controls to be mounted no higher than 48 inches “unless there is a substantial increase in cost,” in which case 1400 mm (54 inches) is allowed. ADAAG allows 1400 mm (54 inches) whenever a parallel approach is provided (UFAS 4.10.12(3); ADAAG 4.10.12(3)).

## UFAS/ADAAG Differences “De Minimis”

**Entrance Signage.** UFAS always requires the International Symbol of Accessibility (ISA) at accessible entrances. ADAAG requires the ISA at accessible entrances only when there are inaccessible building entrances in the facility. If all entrances are accessible the ISA is not required under ADAAG (UFAS 4.1.1(7); ADAAG 4.1.2(7)).

**Stairs Exception.** UFAS exempts stairs from complying with 4.9 only if an elevator connects the same levels the stairs do. ADAAG exempts stairs from section 4.9 when there is any accessible means of vertical access connecting the same levels that are connected by the stairs (UFAS 4.1.2(4); ADAAG 4.1.3(4)).

**Handrail Height.** UFAS requires that handrails at stairs and ramps be placed with the gripping surface between 800 mm and 900 mm (30 and 34 inches) above the surface of the stair or ramp. ADAAG requires that such gripping surfaces be placed between 900 mm and 1000 mm (34 and 38 inches) (UFAS 4.8.5(5) and 4.9.4(5); ADAAG 4.8.5(5) and 4.9.4(5)).

**Tactile Warnings.** UFAS requires that doors to hazardous areas be equipped with tactile warnings. This provision is reserved in ADAAG (UFAS 4.1.2(14), 4.13.9, 4.29.3, 4.29.7; ADAAG 4.13.9, 4.29.3).

**Pictograms.** UFAS requires pictogram symbols to be tactile and does not allow tactile simple serif characters. ADAAG does not require pictogram (pictorial symbols signs) to be raised and does allow the use of simple and sans serif tactile characters. UFAS only allows sans serif characters (UFAS 4.30.4; ADAAG 4.30.4).

# Special Occupancies

## Assembly Areas

**Scoping for 101 or More Fixed Seats.** UFAS requires a greater number of wheelchair locations than ADAAG in larger assembly areas where the number of fixed seats exceeds 101 (UFAS 4.1.2(18); ADAAG 4.1.3(19)(a)).

**Dispersion for 300 or Fewer Fixed Seats.** UFAS requires that wheelchair spaces be dispersed throughout the seating area, regardless of seating capacity. ADAAG requires that wheelchair spaces be provided in more than one location when seating capacity exceeds 300 (UFAS 4.33.3; ADAAG 4.33.3).

## Transient Lodging

**Scoping.** UFAS requires 5 percent of transient lodging facilities to be accessible to persons with mobility impairments which, in very large facilities, would result in a higher number of accessible units than ADAAG would require. As required by the ADA, ADAAG provides for an exception for facilities with five or fewer units that contain the residence of the proprietor. UFAS does not provide for such an exception (UFAS 4.1.4(11); ADAAG 9.1.1 Exception, 9.1.2).

**Scoping and Technical Provisions.** UFAS has scoping and technical provisions for housing. Section 13 Housing of the ADAAG interim final rule has not been adopted as a standard by the Department of Justice. The Board is considering reserving Section 13 in its entirety when the



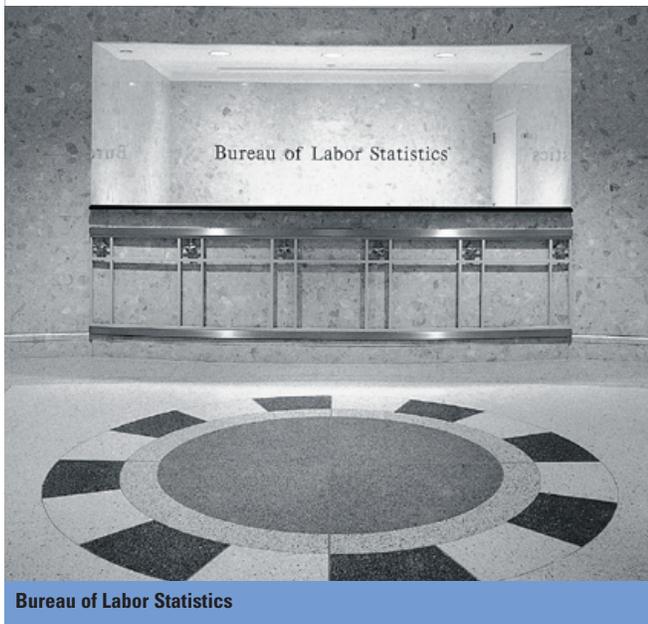
Ronald Reagan Building, Washington, D.C.

final guidelines for State and local government facilities is issued (UFAS 4.1.1(5)(d), 4.1.4(11), 4.34; ADAAG – proposes to reserve housing).

## Restaurants and Cafeterias

**Table Aisles.** UFAS requires that there be access aisles between tables in restaurants and cafeterias which comply with 4.3 Accessible Routes. ADAAG requires that all accessible fixed tables shall be accessible by means of an access aisle at least 900 mm (36 inches) clear between parallel edges of tables or between a wall and the table edges (UFAS 5.1; ADAAG 5.3).

**Vending Machine Controls.** UFAS requires that the controls and operating mechanisms of vending machines in restaurants and cafeterias comply with all of 4.27. ADAAG only requires that the spaces where vending machines are located comply with the space allowances and reach ranges requirements (UFAS 5.4; ADAAG 5.8).



Bureau of Labor Statistics

## Health Care

**Canopy at Passenger Loading Zone.** The application of the term “Health Care buildings and facilities” in UFAS, which is not expressly defined, may require more facilities to provide a canopy or roof overhang and a passenger loading zone at their entrances. ADAAG specifically defines “Medical care facilities” which must have a roof canopy or overhang and a passenger loading zone at an accessible entrance (UFAS 6.1; ADAAG 6.1).

**Patient Bed Spacing.** UFAS requires that there be 900 mm (36 inches) along each side of a bed in patient bedrooms, 1200 mm (48 inches) between beds, 1100 mm (42 inches) between the foot of a bed and the wall, and 1200 mm (48 inches) between the foot of a bed and the foot of the opposing bed. UFAS separately identifies requirements for one-bed rooms, two-bed rooms, and four-bed rooms. ADAAG treats beds in all rooms the same and requires that there be 900 mm (36 inches) along each side of a bed (UFAS 6.3; ADAAG 6.3).

## Mercantile

**Service Counters.** UFAS requires that “a portion” of service counters in mercantile facilities be between 700 mm and 860 mm (28 and 34 inches) high. ADAAG requires a 36 inch length of service counter which is a maximum of 900 mm (36 inches) high (UFAS 7.2; ADAAG 7.2).

**Check-Out Counter Height.** UFAS requires at least one check-out counter to be no higher than 900 mm (36 inches). ADAAG requires that a specific number of check-out counters be no higher than 970 mm (38 inches) and that the top of the lip of the counter not exceed 1000 mm (40 inches) (UFAS 7.3(2); ADAAG 7.3(2)).

## Libraries

**Knee Space at Check-Out Area.** UFAS requires that at least one lane at each check-out area provide a counter surface that is between 700 mm and 860 mm (28 to 34 inches) high with knee clearances that is 700 mm (27 inches) high, 800 mm (30 inches) wide and 500 mm (19 inches) deep in libraries. ADAAG requires that at least one lane at each check-out area provide a 900 mm (36-inch) length of counter which is a maximum of 900 mm (36 inches) high. ADAAG does not require knee space (UFAS 8.3; ADAAG 8.3).

## Postal Facilities

**Customer Service Counters.** UFAS requires that the aisles in front of customer service counters in postal facilities be at least 1200 mm (48 inches) wide. ADAAG requires services counters to be on an accessible route 900 mm (36 inches minimum width) (UFAS 9.2; ADAAG 7.2).

**Partitions.** UFAS requires that in postal facilities all fixed partitions withstand 372 kg/m (250 lb/f) from any direction. ADAAG does not have a similar provision (UFAS 9.2(1); ADAAG – no provision).

**Handrails.** UFAS requires that in postal facilities, where handrails are provided (regardless of whether they are required or not), the walls must be capable of supporting 372 kg/m (250 lb/f) in any direction. ADAAG requires the support only where handrails are required (UFAS 9.2(2); ADAAG 4.26.3).

**Lockers.** UFAS has technical requirements for lockers in postal facilities. The scoping in UFAS is vague, providing that “lockers in easily accessible areas must be provided for use by physically disabled people.” ADAAG does not have a similar provision (UFAS 9.5; ADAAG – no provision).

**Attendance Recording Equipment.** UFAS requires that attendance recording equipment (i.e. time clocks, etc.) be mounted no higher than 1200 mm (48 inches) in postal facilities and that counter space at these check-in areas be no higher than 900 mm (36 inches) above the floor. ADAAG does not have a similar provision (UFAS 9.6; ADAAG – no provision).

## Detention and Correctional Facilities

**Scoping.** UFAS requires 5 percent of residential units in detention and correctional facilities to be accessible. This figure is greater than the percentage proposed in Section 12 of the final rule on ADAAG for State and local government facilities (UFAS 4.1.4(9); ADAAG 12.4.1). The UFAS and ADA Title III standards do not cover clearly, nor in great detail, many of the facilities which the GSA constructs such as courthouses and detention facilities. These facilities are, however, covered in detail in the Interim Final Guidelines proposed for Title II of the ADA which apply to State and local government facilities.

## Federal Courthouses

It is GSA design policy that all Federal courtroom designs have the witness stand and jury box accessible, and the judge’s bench, clerks’ station, etc., to be adaptable.

## Additions and Alterations

*UFAS is more stringent or different than ADAAG.*

**Additions.** UFAS requires that if an addition to a building or facility does not provide an accessible route, an accessible entrance, or accessible toilet facilities, and such facilities are provided in the existing building then at least one of each shall be made accessible. ADAAG may require these items to be accessible under the path of travel obligation, depending on the amount of money required to build the addition (UFAS 4.1.5; ADAAG 4.1.5).

**Substantial Alterations.** UFAS requires greater accessibility when substantial alterations are made to a facility depending on the amount of money spent on the alteration and the size of the building or site. ADAAG requires that when an alteration is made to an area containing a primary function that the path of travel to that altered area and the restrooms, telephones, and drinking fountains that serve that area be made accessible unless the additional cost of doing so would be disproportionate to the overall cost and scope of the original alteration to the primary function area. The level of disproportionality is set at 20 percent of the cost of the original alteration to the primary function area (UFAS 4.1.6(3); ADAAG 4.1.6(2)).

**Alterations.** ADAAG provides that in alterations, the requirements of 4.1.3(9), 4.3.10 and 4.3.11 concerning egress and areas of rescue assistance do not apply. UFAS does not have a similar exception (UFAS – no exception; ADAAG 4.1.6(g)).

Both the UFAS and ADAAG references used for this comparison were current as of the date of publication. (The A/E should check all updates to the respective requirements before proceeding with the building design.)



NASA Auditorium, Washington, D.C.



**Site, Landscape,  
and Community Design**

**2**

<b>2.0 TABLE OF CONTENTS</b>			
<b>2.1</b>	<b>Goals and Objectives</b>	<b>2.9</b>	<b>Sustainable Landscape Design</b>
<b>2.2</b>	<b>Codes and Standards</b>	46	Maintenance Considerations
<b>2.3</b>	<b>Site Analysis</b>	46	General Design Principles
<b>2.4</b>	<b>General Site Planning Criteria</b>	47	Landscape Elements
<b>2.5</b>	<b>Grading</b>	<b>2.10</b>	<b>Plant Materials</b>
<b>2.6</b>	<b>Site Utilities</b>	48	Species Selection
41	Utilities/Services	49	Placement
41	Water	49	Planting Practices
42	Sanitary Sewer	<b>2.11</b>	<b>Irrigation for Landscaping</b>
42	Storm Drainage	50	System Design
<b>2.7</b>	<b>Site Circulation Design</b>	<b>2.12</b>	<b>Landscape Lighting</b>
43	Urban Site with Structured Parking	<b>2.13</b>	<b>Site Furniture</b>
44	Fire Apparatus Access	<b>2.14</b>	<b>Site Signage</b>
44	Vehicular Drives, Parking Lots and Service Areas	53	Construction Signs
<b>2.8</b>	<b>Pavements and Curbs</b>	<b>2.15</b>	<b>Flagpoles</b>
<p>Pacific Highway United States Port of Entry Blaine, Washington Architect: Thomas Hacker Architects, Inc. GSA Project Manager: Kelly Sarver-Lenderink Photo: James Fred House!</p>			

## 2.1 Goals and Objectives



Southeast Federal Center Master Plan, Washington, D.C.

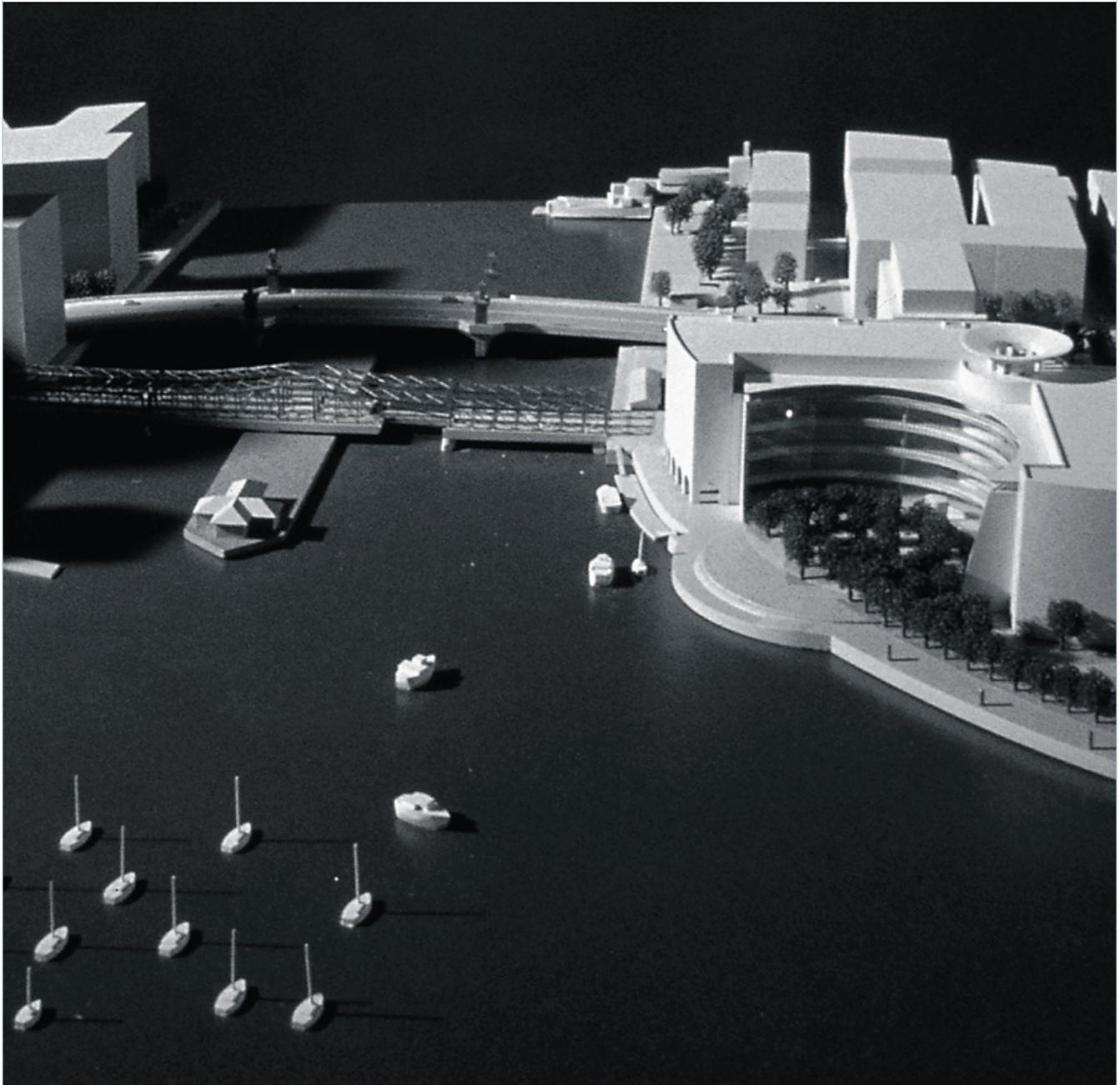
The quality of the site design and its design will be a direct extension and integration of the building design intent. It represents significant Federal investment and should, wherever possible, make a positive contribution to the surrounding urban, suburban or rural landscape in terms of conservation, community design and improvement efforts, local economic development and planning, and environmentally responsible practices.

## 2.2 Codes and Standards

See Chapter 1: *General Requirements* for a complete discussion of model codes and standards adopted by GSA. This section highlights regulations and standards that apply to site design.

**Site Design.** Building entrances shall be designed to make it impossible for cars to drive up and into the lobby. Planters can be provided as barriers; bollards are also acceptable if well integrated with the design of the building entrance. Barriers to vehicle access should be visually punctuated and as unobtrusive as possible to pedestrians. Consideration should be given to incorporating security features that allow for flexible use of the site. If addressed skillfully, planters, trees, or sculpted bollards can be employed to provide amenities while meeting vehicle barrier requirements. High blank walls should be avoided; lower walls with sitting edges are preferable, but should be designed to discourage skateboarders.

**Building Entrances.** GSA buildings typically should have *one* main entrance for staff, visitors and the public. In large buildings a second entrance may be designated for employees only. Buildings may have additional doors used for egress or access to service areas. These doors should not be used as entrances. Original primary entrances at historic buildings should be retained as such. Closure of ceremonial entrances and redirecting public access to below grade and other secondary entrances for security or accessibility purposes is discouraged. Wherever possible, access for the disabled to historic buildings should be provided at, or nearby original ceremonial entrances. See Chapter 8 for access controls and intrusion detection systems.



Architectural model, U.S. Courthouse and Harborpark, Boston, MA

## 2.3 Site Analysis

Successful site planning and design depends on a thorough review and understanding of existing conditions on and around the site. An on-site investigation must be carried out prior to any design effort.

**Site Survey.** A complete site survey is required for all new construction projects and for alterations that involve work outside the existing building lines. Survey requirements are listed in Appendix A: *Submission Requirements*.

**Geotechnical Investigation.** Requirements for all geotechnical investigations are listed in Appendix A: *Submission Requirements*.

**Archeological Testing.** In some cases, GSA requires specialized testing by a contractor to determine whether archeological sites are present, and if so, to determine their extent, character and significance. If such testing is required, it should be coordinated with geotechnical testing to ensure that such testing does not inadvertently damage archeological resources. The GSA Project Manager will inform the architects and engineers when such archeological investigations may affect the project.

## 2.4 General Site Planning Criteria

**Existing Site Features and Existing Vegetation.** Existing natural features on the site should generally be preserved and be used as a starting point for the overall site design. Efforts should be made to preserve existing vegetation, particularly healthy trees and plant specimens. GSA promotes the protection and integration of existing vegetation and natural terrain into site design.

**Energy Conservation.** The use of site design to aid energy conservation and sustainability is encouraged. Solar orientation of the building and well placed plant material can be used to increase heat gain in the winter and reduce heat gain during the summer.

**Environmentally Safe Practices.** GSA promotes practices that are friendly to the environment and conserve resources, such as low water and minimum chemical usage, etc. Plant material and landscape designs should reflect regional environmental concerns, such as xeriscaping, where geographically appropriate.

**Building Separation.** Building separation and requirements for rated exterior walls and openings for protection from exposure by adjacent buildings or hazards shall comply with the requirements of one of the International Building Code (IBC) and ASCE 7-98.

## 2.5 Grading

**Slopes.** The slopes of planted areas should permit easy maintenance. Turf areas shall have a slope of no more than 3:1 and no less than 1 percent. A 2 percent minimum slope is desirable. Areas with slopes steeper than 3:1 must be planted with ground cover or constructed with materials specifically designed to control erosion. Slopes steeper than 2:1 are not acceptable. Terracing may be an appropriate solution for sites with large grade differentials, as long as access for lawn mowers and other maintenance equipment is provided.

**Grading.** Existing trees or other plant materials to be preserved shall be reflected in the grading plan. Where trees are to be preserved, the existing grade within the circle of the tree drip line must not be disturbed by regrading or paving. Snow fencing shall be erected at the drip line of the tree to protect existing trees from construction materials or equipment.

The minimum slope for grassy swales and drainage ways is 1 percent to prevent standing water and muddy conditions.

Slopes for walkways will not exceed 5 percent, unless unavoidable. Slopes greater than 5 percent may make the construction of special ramps for the disabled necessary. The maximum cross-slope is 2 percent. Preferably, walkways should not have steps. Where steps are necessary, cheek walls enclosing the risers and treads should be used to make a smooth transition to planted areas on the sides of the steps if grass is planted.

Parking areas or large entrance plazas should have slopes of 1 percent minimum and 5 percent maximum. Drives within parking lots should not be crowned. In areas with

snowfall, provisions should be made for piling snow removed from roads and parking areas.

Drains should be provided at the entrance to ramps into parking structures to minimize the amount of rainwater run-off into the structure.

Paved areas adjacent to buildings will have a minimum 2 percent slope away from the structure to a curb line, inlet or drainage way to provide positive drainage of surface water.

For planted areas adjacent to buildings, the first 3000 mm (10 feet) should be sloped away from the structure to assure no standing water adjacent to basement walls and foundations (which could be detrimental).

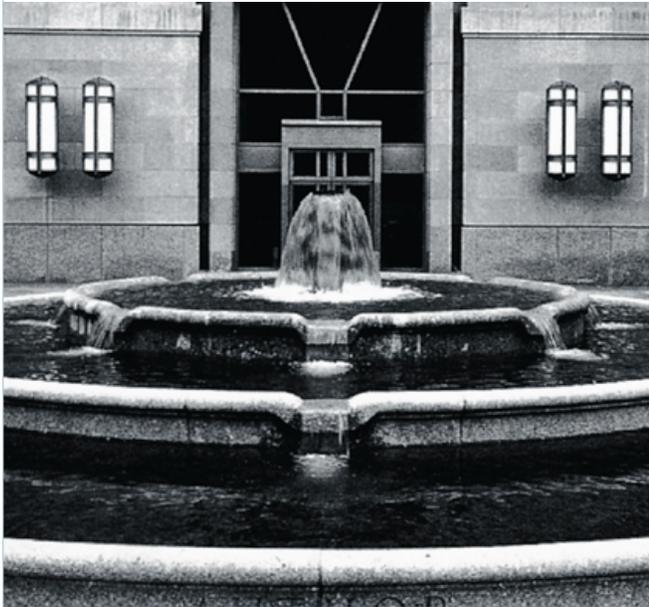
**Cut and Fill.** From a cost standpoint, it is desirable to minimize grading overall and to balance cut and fill, particularly in campus settings.

**Grading and Flood Plains.** No buildings shall be built within the 100 year flood plain. Exceptions will be approved by the PBS Assistant Commissioner for Portfolio Management and by the Chief Architect. If the building location is approved, mechanical and electrical equipment rooms must be located 1500 mm (5 feet) above the level of the 100 year flood plain.

No grading will be performed within the boundaries of any wetland.

**Storm Water Detention.** Local code requirements for storm water detention must be followed. Detention of storm water on GSA building rooftops is not permitted.

## 2.6 Site Utilities



Reagan Building Plaza fountain, Washington, D.C.

### Utilities/Services

The A/E will contact the local utility companies and/or other providers to determine the following: interest in providing service to the GSA; proposed rate structures and/or rebates; and system capacities, etc. This information will be compiled on the Site Analysis Data Sheets (see Appendix A: *Submission Requirements*). GSA will seek to negotiate contracts with the local utility companies and/or other providers to fix rates and establish connection charges.

**Location of Aboveground Utility Elements.** It is the A/E's responsibility to ensure that all utility elements, such as electrical transformers, emergency generators, backflow preventers and meters, are located with access convenient to the utility companies and where they can be integrated with the building and landscape design without creating a negative visual image.

### Water

**Local Water Authority.** Regulations of local water authorities must be followed. The service connection between building and public water line will be coordinated with the local water authority. Use monitoring points (including data logging functions) on primary water meters controlled by the Building Automation System (BAS). Where municipal graywater is available, service connections should be coordinated with the local water authority.

**Dual Service.** For large buildings or campuses, a loop system fed from more than one source must be considered. Some occupancies require dual service for the fire protection systems under the provisions of the national code used.

**Locating Water Lines.** Water lines shall be located behind curb lines, in unpaved areas if possible, or under sidewalks if not. They shall not be located under foundations and streets, drives, or other areas where access is severely limited.

**Fire Protection Water Supplies.** A dependable public or private water supply capable of supplying the required fire flow for fire protection shall be provided for all new construction and renovation projects in accordance with the requirements of NFPA 24. See Chapter 7, *Fire Protection*, for additional information.

**Special Requirements.** The requirements below supersede the requirements of NFPA 24:

- A secondary water supply for high rise buildings shall be provided in seismic zones 2, 3, and 4 by an on-site reservoir supplying fire pumps installed in accordance with NFPA 20. The supply to the fire pump shall include an auxiliary bypass (normally closed) from the municipal water supply. The secondary water supply shall have enough capacity to supply building fire suppression systems for a 30-minute duration in accordance with appropriate NFPA requirements.
- For buildings located in rural areas where established water supply systems for fire fighting are not available; the water supply shall be obtained from a tank, reservoir or other source that can supply a minimum of 10,000 gallons.

**Fire Hydrants.** Fire hydrants shall be provided for all new construction and renovation projects in accordance with NFPA 24. The local fire department shall be consulted with regard to their specific requirements regarding the locations of fire hydrants and thread types for hydrant outlets.

## **Sanitary Sewer**

**Local Sewer Authority.** The regulations of the local sewer authority should be followed.

**Discharge in Remote Rural Areas.** In areas where no public sewers exist, septic tanks and leach fields should be used for sewage discharge. Cesspools are not permitted. Septic systems will have additional land area (in accordance with local and State code requirements) for future expansion of the discharge system.

**Locating Sewer Pipes.** All sewer lines will be located below unpaved areas if at all possible.

**Manholes.** Pipe runs between manholes should be straight lines.

Manholes must not be located in the main pedestrian route in walkways. The placement of manholes in other pedestrian areas such as plazas and entry courts should be avoided, particularly in the primary traffic routes across plazas and entry courts.

**Cleanouts.** Cleanouts will be provided on all service lines, approximately 1500 mm (5 feet) away from the building, and at all line bends where manholes are not used.

## **Storm Drainage**

It is GSA policy to separate storm drains from sanitary sewers within the property limits, even in cities where separate public systems are not yet available. A storm drainage system may consist of an open system of ditches, channels and culverts or of a piped system with inlets and manholes.

In most cases building roof drainage will be collected by the plumbing system and discharged into the storm drains; exceptions are small buildings in rural areas where gutters and downspouts may discharge directly onto the adjacent ground surface.

Most storm drainage systems will be designed for a 25-year minimum storm frequency, unless local criteria are more stringent.

**Gravity Drainage.** Storm drainage systems should always use gravity flow. Piped systems are preferred. In large campus settings, open ditches or paved channels should be avoided as much as possible.

**Location of Storm Drainage Pipes.** Storm drainage pipes will be located in unpaved areas wherever possible. It is desirable to offset inlets from main trunk lines to prevent clogging.

**Rainwater Harvesting.** Rainwater harvesting may be considered as an alternative source for such purposes as irrigation, etc. Rainwater harvesting systems must comply with all local codes and standards.

## 2.7 Site Circulation Design

Site circulation design for GSA projects will vary greatly depending on the context, which can range from tight urban sites to suburban campuses or isolated rural settings. Yet the basic criteria remain the same in all situations: the site design should segregate, at a minimum, pedestrian access, vehicular access (including parking) and service vehicle access.

Security is an important consideration in site design. Refer to Chapter 8: *Security Design* for detailed criteria related to this matter.

### Urban Site with Structured Parking

**Service Traffic.** Service dock access may be from an alley, from a below-grade ramp or from a site circulation drive. If large trucks are to service the facility, sufficient maneuvering space must be provided, and the service drive shall be screened as much as possible. It should always be separate from the access to the parking garage. Where possible, a one-way design for service traffic is preferable to avoid the need for large truck turning areas. The service area of the facility shall not interfere with public access roadways. See Chapter 3: *Architectural and Interior Design* for criteria on ramps and service areas.

**Public Transportation.** GSA encourages the use of public transportation among employees and visitors. The potential need for a bus stop should be considered early in the design of a GSA building in an urban setting and should be discussed with planners of the mass transit system. The project team should consider how to treat the orientation of the building and the site design and landscaping to encourage use of public transit and to address pedestrian traffic 'desire lines' between the building entrance and transit stops.



Oakland Federal Building, Oakland, CA

**Pedestrian Circulation.** The project team should consider neighboring uses, existing pedestrian patterns, local transit, and the building's orientation to anticipate pedestrian 'desire lines' to and from the building from off site. Designers should avoid dead ends, inconvenient routes, and the like and consider how people moving across the site might help to activate sitting areas, outdoor art, programmed events, etc.

**Drop-Off.** If the security analysis determines it is feasible, a vehicular drop-off area should be located on the street nearest the main entrance and, site conditions permitting, also near the entrance to the child care center, if the project includes one. See *GSA Child Care Center Design Guide (PBS-P140)*.

#### **Fire Apparatus Access**

Fire department vehicle access shall be provided and maintained to all new construction and alterations in accordance with the requirements of National Model Fire Code that is used, NFPA 241, and NFPA 1141.

**Fire Apparatus Access Roads.** The local fire department shall be consulted with regard to their specific requirements regarding the surface material of the access roadway(s), minimum width of fire lane(s), minimum turning radius for the largest fire department apparatus, weight of largest fire department apparatus, and minimum vertical clearance of largest fire department apparatus.

#### **Vehicular Drives, Parking Lots and Service Areas**

**Entrance Drives.** Follow local codes for entrance driveways within the right-of-way limits of city, county or State maintained roads.

**Aerial Apparatus.** Buildings or portions of buildings exceeding 30 feet in height from the lowest point of fire department vehicle access shall be provided with access



Bruce R. Thompson U.S. Courthouse and Federal Building, Reno, NV

roads capable of accommodating fire department aerial apparatus. Overhead utility and power lines shall not be within the aerial access roadway. In addition, at least one access road having a minimum unobstructed width of 26 feet shall be located within a minimum of 15 feet and a maximum of 30 feet from the building. Also, at least one side of all buildings shall be accessible to fire apparatus.

**Surface Parking Lots.** Parking stalls must be 2700 mm (9 feet) wide and 5400 mm (18 feet, 6 inches) long, with two-way aisles of 7300 mm (24 feet). Where possible, 90-degree parking should be used. Accessible parking spaces must be provided; these shall comply with the UFAS/ADA in quantity, location and size.

Internal islands for landscape planting should occupy no less than 10 percent of the total parking lot area. Curbs should be provided around the parking lot perimeter and around landscape islands.

The maximum combined gradient for parking lots should not exceed 5 percent.

## 2.8 Pavements and Curbs

**Materials.** Usually the best wearing paving materials are those that are used extensively in the local area. Pavements and curbs should be designed for ease of long-term maintenance, not just for first cost.

**Curbs.** Curbs should be designed per local standard practice. Surface-applied precast concrete curbs or asphalt-type curbs are not allowed as a permanent solution for channeling traffic and/or drainage on site.

**Public Streets and Sidewalks.** The GSA project may be in an area for which there are no established urban design guidelines, but where such considerations would be valuable. Designs should consider proposing new curb lines, sidewalk widening, or street configurations to enhance pedestrian access, perimeter security, and urban design quality. Although such public works may not ultimately become part of the project scope, the design can be a catalyst for encouraging local action to enhance project quality.

**Drives.** Drives should meet local code requirements for street design, construction requirements, materials and surface finishes.

**Fire Lanes.** Grass pavers or open concrete grids are encouraged for fire lanes that do not carry normal vehicular traffic.

**Service Areas.** Areas for truck maneuvering should have concrete pavements.

**Pavement Markings.** Follow local street code.

**Signage for Roads and Parking Lots.** The minimum number of signs necessary to convey the information should be used; these must comply with UFAS/ADA.

## 2.9 Sustainable Landscape Design

For projects located in a district designated for special landscaping by the local Government, local design guidelines should be followed. Where local government has not designated special districts or guidelines, GSA's project and site design may be a catalyst for encouraging such efforts.

### Maintenance Considerations

Before initiating the landscape design, the landscape architect should discuss with the facility manager how the landscaping will be maintained. If this information is not available, assume that only limited maintenance capabilities will be available.

Sustainable design benefits GSA with healthier, longer-lived plantings which rely less on pesticides, herbicides and fertilizers, minimize water use, require less maintenance and increase erosion control.



Russell B. Long Federal Building and United States Courthouse

The long-term upkeep and maintenance of landscape elements such as lighting, plaza or courtyard areas, fountains and similar elements must be considered during design. Equipment required for maintenance should be readily available standard equipment such as forklifts or electrical lifts, and its use approved by the facility manager.

### General Design Principles

Sustainable landscape design considers the characteristics of the site and soil, and the intended effect and use of the developed area, in addition to the selection of plants. Where appropriate, regionally-native plants will be used. Zoning or grouping by plant materials may be considered if an irrigation system is to be used. Refer to the seven principles of Xeriscape™ on the Internet at [www.xeriscape.org](http://www.xeriscape.org) for further information.

Given limited maintenance budgets, GSA conceptually divides the areas in a typical site into two categories. Category I areas have high visibility—such as the building entrance—and consist of highly developed designs. These areas should be sensitive to the architectural features of the building, and can require higher maintenance. Category II areas have lower visibility—such as parking lots, maintenance areas and outlying areas—and are of simpler design and maintenance.

Design teams shall carefully consider how these landscape plans affect the use and feel of adjacent public spaces and properties. Where appropriate, they should coordinate design with local properties and plans—considering input but also encouraging compatible approaches by other developments.

The designer should discuss the appropriate amounts of Category I and II areas with the facility manager, as the proportions will depend on the level of total maintenance capability. As the landscape design is developed, Category

I and II areas should be identified on the drawings to clarify the design concept. A preliminary description of the necessary maintenance program should also accompany the Final Concept Submittal. See Appendix A: *Submission Requirements*.

Soils will vary from site to site and even within sites selected by GSA. A soil test based on random samplings will provide the landscape architect with information needed for proper selection of plant materials and, if needed, soil amendments. The design will include those soil amendments to enhance the health and growing capabilities of the landscape.

### Landscape Elements

**Outdoor Plazas and Courtyards.** Consideration should be given to development of plazas and courtyards for employee and visitor uses, and for both planned and passive activities. It may also be possible to incorporate program requirements into these spaces, for example, for use as outdoor dining or meeting spaces.

**Fountains, Reflecting Pools and Ponds.** Water may be used as a visual and possibly as an acoustic element. However, water features should not become a maintenance burden. Water consumption should be kept low, especially in very dry climates with high evaporation rates. Non-potable water sources may be considered for these uses. In colder climates provisions must be made for easy shut-off and drainage during the winter season. Fountains and reflecting pools with pumping systems are restricted to Category I areas of the site. Water features should not be placed over occupied space since leakage problems frequently occur.

**Sculpture.** Sculpture may be provided as part of the Art-in-Architecture Program. It is not addressed by the site designer except as a coordination effort since the sculptor is selected under a separate contract. Although under a



Old Post Office historical preservation

separate contract, it is crucial in such cases for the artist and the A/E to coordinate not only the art installation, but how people will move to and from each other's designed areas and how one might support the other. It is also important to ensure that routine maintenance of the artwork can be performed at reasonable cost and that it does not create safety hazards.

**Rocks and Boulders.** Lightweight and synthetic rocks or boulders will not be used as landscape elements.



Ronald Reagan Courthouse, Santa Ana, CA

## 2.10 Plant Materials

Plant selection, including turf, shall be based on the plant's adaptability to the region. Regionally mature plants are recommended in desert or areas of the country where water is scarce. The use of hearty native turf species or other ground cover is encouraged.

**Existing Vegetation.** GSA has a commitment to using sustainable design principles in the landscape. Therefore, all existing vegetation should be evaluated for appropriateness to remain. Where appropriate, existing trees and shrubs should be protected and a planting plan be built around them.

### Species Selection

Plant selection should be based on the plant's adaptability to the landscape area, desired effect, color, texture and ultimate plant size. Maximum water conservation can be achieved by selecting appropriate plants that require minimal amounts of supplemental water.

**Hardiness and Availability.** Plants must be hardy in the climate where they are to be planted.

**Demanding Plants.** Plants requiring meticulous soil preparation, fertilization and spraying shall be avoided.

**Growth Habits.** Plants need to be chosen with their mature size and growth habit in mind to avoid over-planting and conflict with other plants, structures or underground utility lines.

## Placement

Landscape design should be closely coordinated with the architectural characteristics of the building and the community where the building is located.

Trees should not be planted where potential intruders could use them to climb a wall or reach an upper story window. Care should be taken that the selected plant material in parking lot islands or adjacent to walkways will not grow over time to become hiding places for assailants, or create a traffic hazard by restricting sight lines. Turf should not be used for small islands in parking lots because it is too difficult to maintain. Trees, shrubs in low hedge rows and low-maintenance ground covers are more suitable in these locations.

**Shade.** Trees should be placed to provide shady sitting areas, reduce heat and glare on hard surfaces, and enhance pedestrian comfort.

## Planting Practices

**Tagging.** For most projects, tagging of plant materials at the nursery should be employed only selectively for specimen plants. Instead, specifications should be tight enough to provide criteria for a rigorous inspection at the project site and rejection of plants if necessary.

**Staking.** Local conventions for staking, wrapping and guying trees should be followed. Local extension horticulturists can provide good advice.

**Warranties.** Warranties for the replacement of plant materials must be specified to extend for 1 year after the date of building acceptance by GSA or 1 year after installation of landscaping, whichever is later.

**Mulch.** Mulch selection should be made upon the basis of local practice. Bark products, pine needles or other organic materials are preferred over inert mulches, such as gravel which reflects heat and can burn plants, in all geographic areas except those where drought tolerant planting (cacti, etc) is proposed. Where hydroseeding is proposed, hydraulic mulch with recycled paper binders should be specified.

## 2.11 Irrigation for Landscaping

### System Design

**General Criteria.** An irrigation system (if required) will provide water to plants only when needed. Drip irrigation should be considered where appropriate. Care will be taken so that water can be conserved through the use of a properly designed irrigation system.

Non-potable water should be used as a source for the irrigation system when it is available.

Reliable performance must be a prime goal in the design of irrigation systems. Materials will be durable and relatively maintenance free. Irrigation systems will be most successful in the long run if local design practices are followed and locally available materials are used.

Allow for expansion of the irrigation system, both in area and in flow rate, so the system can be adjusted as plants mature.

**Metering.** Irrigation water should be metered separately from domestic water to avoid expensive user sewage fees.

**Zoning.** Irrigation systems shall be zoned so different areas can be watered at different times. Avoid mixing different head or nozzle types (such as a spray head and a bubbler) on the same station. Different types of vegetation, such as turf and shrub areas, should also not be placed on the same station.

**Application Rates.** The system shall be designed to minimize surface run-off. In heavy clay soils, a low application rate may be required. Overspray onto paved surfaces should be avoided.

**Controls.** Irrigation controls should be easily understood by maintenance personnel. The designer should coordinate with the Building Manager as to the appropriate controls. Provide automatic controls to allow for scheduling of watering times for late night and early morning to reduce water losses due to evaporation.

Rain sensors or soil moisture sensors are essential to prevent unnecessary watering. Freeze sensors should be provided for systems in cold climates.

**Maintenance Considerations.** All major components shall be installed in protected, accessible locations. Controllers and remote sensing stations should be placed in vandal-proof enclosures. Above-ground components, such as backflow preventers, shall be placed in unobtrusive locations and protected from freezing.

Quick coupling valves should be of two-piece body design and installed throughout the system to allow for hosing down areas and to permit easy access to a source of water. Locate drain valves to permit periodic draining of the system.

## 2.12 Landscape Lighting



U.S. Courthouse, Brownsville, TX

Landscape lighting should be used to enhance safety and security on the site, to provide adequate lighting for nighttime activities and to highlight special site features. See Chapter 6: *Electrical Engineering, Lighting, Exterior Lighting*.

The primary purpose of any particular application of landscape lighting will help determine the requirements for light coverage and intensity. Generally, unobtrusive lighting schemes are preferred. Where the intent of the lighting is primarily aesthetic, the A/E is encouraged to consider low-voltage systems.

**Color.** It is desirable to maintain a single, or at least similar, light color throughout the project site.

**Fixtures.** Site lighting fixtures should complement other site elements. Fixtures should be placed so people do not look directly at the light source. To avoid plant damage and fire hazard, high intensity or heat generating fixtures shall not be located immediately adjacent to plant material. Fixtures shall be resistant to vandalism and easily replaceable from local sources.

**Controls.** Landscape lighting and building illumination should be controlled by clock-activated or photocell-activated controllers.

## 2.13 Site Furniture

Useful outdoor spaces require furniture just as much as do rooms in a building. Seating, tables, bollards, bicycle racks, cigarette urns, trash receptacles, flagpoles, lighting standards and tree grates should be considered as part of the initial site design.

Site furniture shall be compatible in design, size and color with the surrounding architecture and landscape design. They should be selected and submitted in the Design Development package (see Appendix A: *Submission Requirements*).



Jacob Javits Plaza, New York, NY

**Seating.** GSA is committed to providing public amenities such as outdoor seating. The design should consider appropriate locations (bus stops, plazas) where seating could be used. Movable furniture can be an important component in effective public plazas and courtyards. In many intensively-used public spaces, it is an effective supplement to built-in seating. Where appropriate, perimeter walls and stair elements should be designed to provide comfortable height and depth for seating. Seating should be designed and placed on the site to provide choices for employees and visitors, including sun and shade, fixed and movable, etc.

**Trash Containers.** Locate trash containers at the entrances of buildings, on the path people will take to leave a seating area, and other locations to encourage their use.

**Bicycle Racks.** The use of bicycle racks shall be considered at all GSA facilities (LEED criteria suggest racks for 5% of building occupants). Bicycle racks shall be placed in a location that is convenient to riders, such as a parking garage, parking lot or near a building entry. This location should be highly visible by building occupants, security personnel or by general traffic or in a secure (locked) area for use only by employees. Racks shall have provisions for locking bicycles to them. Bicycle racks shall be compatible with the architecture and landscape design.

**Materials.** Materials for outdoor furniture must be very durable and resistant to vandalism. Movable furniture can be an important component in effective public plazas and courtyards. In many intensively-used public spaces, it is an effective supplement to built-in seating. Metals that require repainting shall not be permitted.

## 2.14 Site Signage

A well-designed site should use as few signs as possible. Signs should make the site clear to the first-time user by identifying multiple site entrances, parking and the main building entrance.

Generally, graphics and style of site signage should be in keeping with the signage used inside the building. Signs integrated with architectural elements can also be very effective. There shall be a consistency in the font style and color plus any directional symbology used in site and building signage. Signage placement can be an important detail element of the building design whether prominently displayed and tooled into the exterior building wall materials or as a freestanding component near the entrance to the facility. See Chapter 3: *Architectural and Interior Design, Guidelines for Building Elements, Artwork and Graphics*, and *Exterior Closure, Cornerstone and Commemorative Plaques* for applicable standards.

### Construction Signs

All GSA new construction and prospectus level repair and alteration projects must display an official construction sign on the site, in a prominent location. Construction signs must conform to the following specifications.

**All Construction Signs.** The size of the sign shall be 3600 mm by 1800 mm (12 feet by 6 feet). It shall be constructed of a durable, weather resistant material, properly and securely framed and mounted. Standard GSA color (blue) with white lettering should be used. Signs shall be mounted at least 1200 mm (4 feet) above the ground, display the official GSA logo which should be no less than 400 mm (16 inches) square, and provide the following information:



- Building for the People of the United States of America
- (Name of) Federal Building
- Constructed by (building contractor)
- U. S. General Services Administration. – Public Buildings Service
- (President's name), President of the United States.
- (Administrator's name), Administrator, GSA
- (Name), Commissioner, PBS
- (Regional Administrator's name), Region X Administrator
- The lettering, graphic style, and format should be compatible with the architectural character of the building.

**New Construction Signs.** Signs at new construction sites shall include the name of the architect and general contractor and may contain an artist's rendering or photograph of the model of the building under construction.

**Repair and Alteration Projects.** Signs at prospectus level repair and alteration project sites shall include the name of the architect and/or engineers for the major systems work (i.e. structural, mechanical, electrical), if appropriate. In addition, the sign should include the name of the general contractor.



Charles Evans Whittaker United States Courthouse, Kansas City, MO

## 2.15 Flagpoles

A ground-mounted flagpole, located preferably at the left of the entrance (facing the building), must be provided for new Federal buildings. If ground-mounted poles are not feasible, a roof-mounted pole is permissible; or, if roof mounting is not suitable, an outrigger pole may be used. Only one flagpole is needed for a complex of buildings on a common site. The flag shall be illuminated.