

# General Requirements

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United States Courthouse

Seattle, Washington

Architect: NBBJ

GSA Project Manager: Rick D. Thomas

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# 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.

The *Facilities Standards* is a building standard: it is not a guideline, 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 the public areas inside and surrounding our existing buildings. The program is comprised of five basic principles: streamlining security, consolidating functions, unifying signage, reducing clutter, and where necessary, implementing architectural modifications to transform the building's overall image. These principles should be applied to any building modernization, repair and alterations project, security upgrade, or landscape improvement that affects the public areas of a property. For more information visit, [www.gsa.gov/firstimpressions](http://www.gsa.gov/firstimpressions).

## The Integrated Workplace and WorkPlace 2020

The GSA supports an interior design program that provides tenants with superior workplace environments that meet their business goals and enhances employee health, satisfaction, and performance. The workplace is successful when it is a strategic tool that is integral to business and real estate goals. It should provide an effective workplace for federal employees reflecting the clients' culture, motivation, business strategy and nature of their work.

PBS has developed the WorkPlace 2020 Program to help particular organizations identify the unique nature of its work, its culture and its organizational goals, and to directly link design recommendations based on those understandings to the workplace. For more information, visit the WorkPlace 2020 website at: [www.gsa.gov/workplace2020](http://www.gsa.gov/workplace2020), or [www.gsa.gov/integratedworkplace](http://www.gsa.gov/integratedworkplace).

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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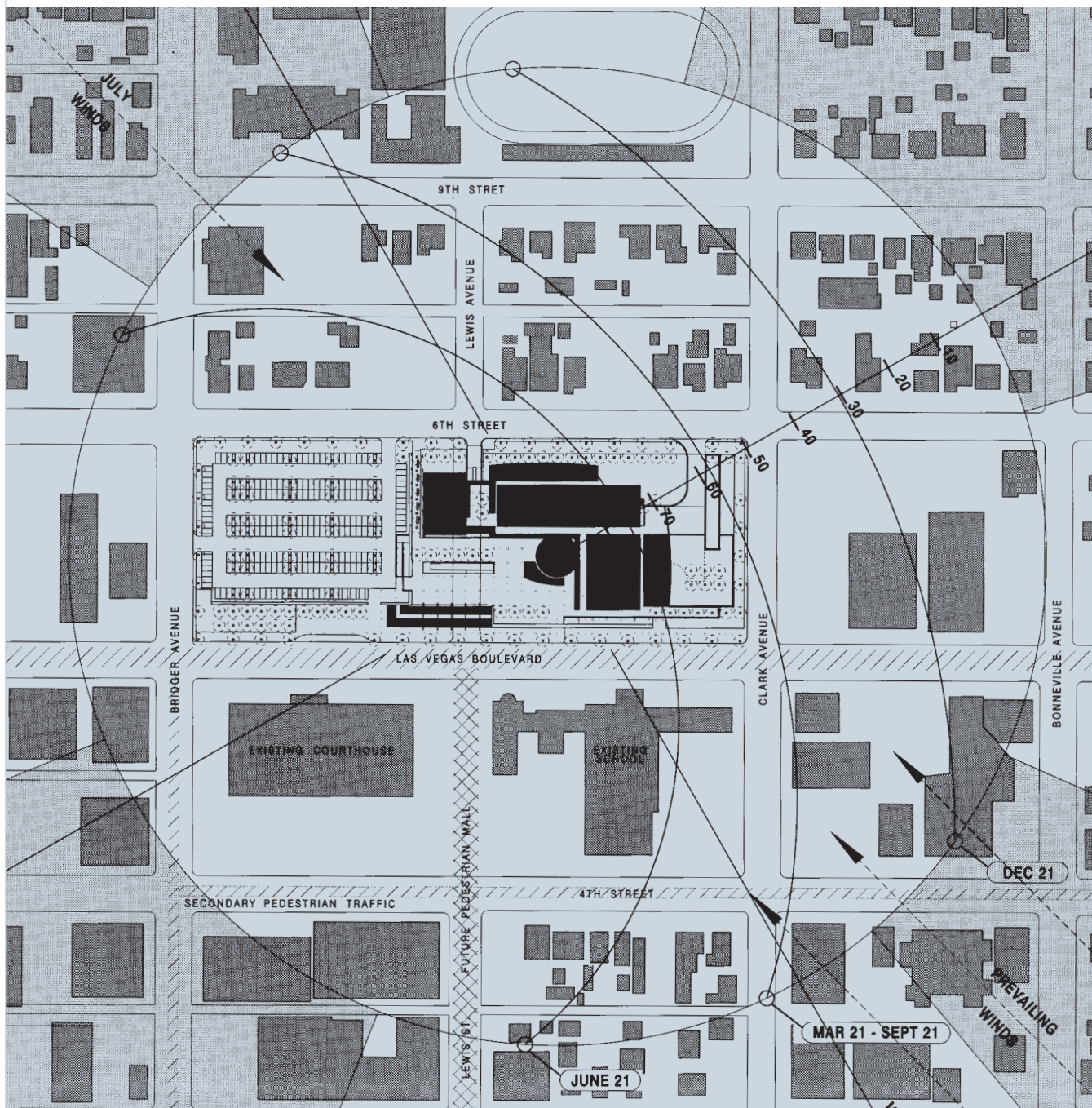
The development of an official style must be avoided. Design must flow from the architectural profession to the Government, and not vice versa. The Government should be willing to pay some additional cost to avoid excessive uniformity in design of Federal buildings. Competitions for the design of Federal 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.iccsafe.org/](http://www.iccsafe.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 considered 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 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; Courthouse Project Handbook, August 2004.</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>Design Excellence, Policies and Procedures.</i><br>GSA PBS <i>Design Excellence in Leasing.</i><br><i>The Whole Building Design Guide, <a href="http://www.wbdg.org">www.wbdg.org</a>.</i>           |
| <b>Fine Arts</b>           | GSA PBS <i>Fine Arts Program Desk Guide 2002.</i>   |

## 1.5 Commissioning

### Project Development

GSA PBS *Project Management Guide*.  
GSA PBS *The Project Planning Guide*.  
GSA PBS *Cost Estimating Guide*.  
GSA PBS *The Building Commissioning Guide*.

### Historic Buildings

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

### Landscape

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

### Security

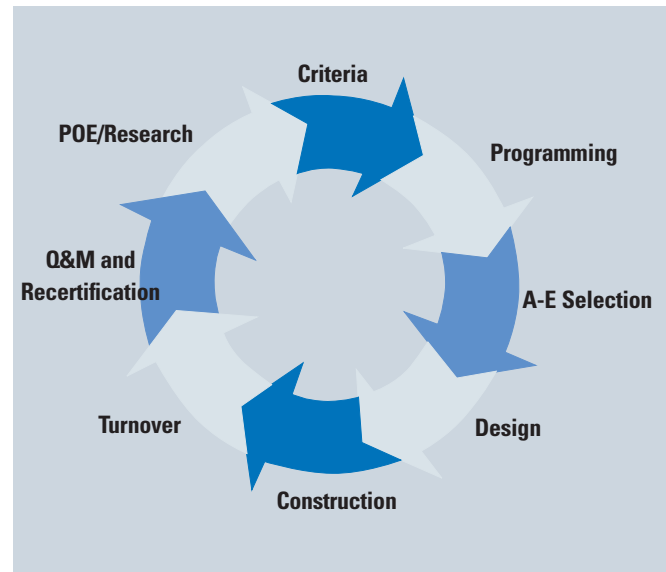
Interagency Security Committee's *Security Design Criteria*.  
GSA PBS *Design Notebook for Federal Lobby Security*.

### Site Selection

GSA PBS *Site Selection Guide*.  
GSA PBS *Floodplain Management Deskguide*.

**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 compliant with the *GSA Building Commissioning Guide*. See [www.gsa.gov/commissioning](http://www.gsa.gov/commissioning) for more information.

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 followed by extended operating practices and 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, and adequate testing procedures and certifications to assure achievement of these goals, shall be reflected within construction specifications. Construction specification references shall also define any required

permanent testing, monitoring 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 Commissioning Authority to identify appropriate commissioning program goals and develop supporting inspection and testing practices. Commissioning practices and certifications are addressed within individual chapters of this document.



United States and Canada Shared Border Station, Sweet Grass, Montana/Coutts, Alberta

## 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.gsa.gov/sustainable](http://www.gsa.gov/sustainable).

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. When no target is provided, energy performance shall exceed 20% below ASHRAE 90.1. The A/E shall design to these targets. For additional information see section 1.7, *Energy Conservation Standards*.





Ronald Reagan Building, Washington, D.C.

## Building Materials

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

- Products containing asbestos.
- Products containing added 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 lead.

**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. For more information on GSA's compliance with NEPA and to download the GSA PBS NEPA Desk Guide and other environmental technical guides visit, [www.gsa.gov/nepa](http://www.gsa.gov/nepa).

## 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 1095.6: *Consideration of Floodplains in Decision Making*.
- GSA ADM 1095.5: *Consideration of Wetlands in Decisionmaking*.
- GSA PBS *Floodplain Management Desk Guide*.
- 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.

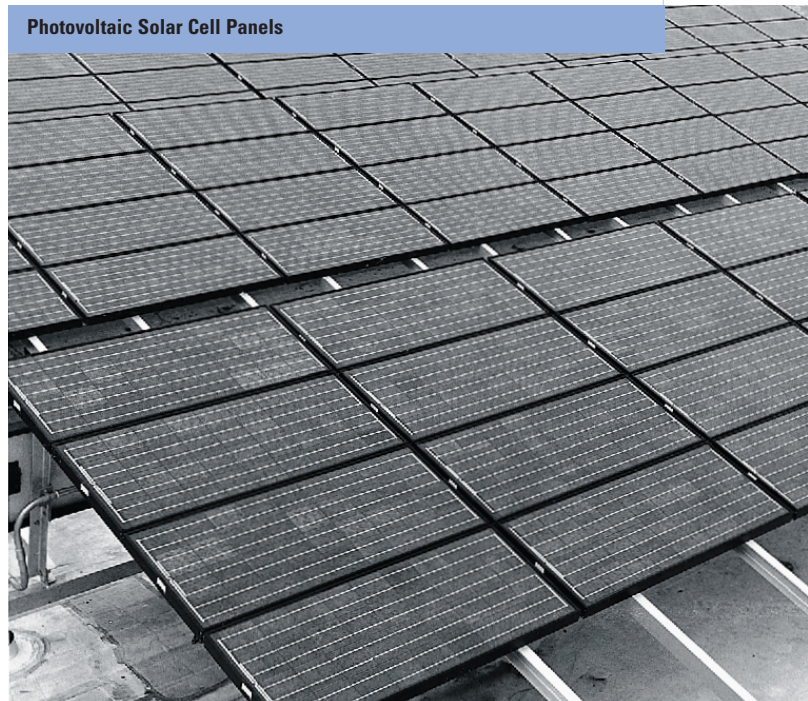
## Energy Goal Applications

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. 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.

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. 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*. 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.eere.energy.gov/femp](http://www.eere.energy.gov/femp).

### Procedures and Approach

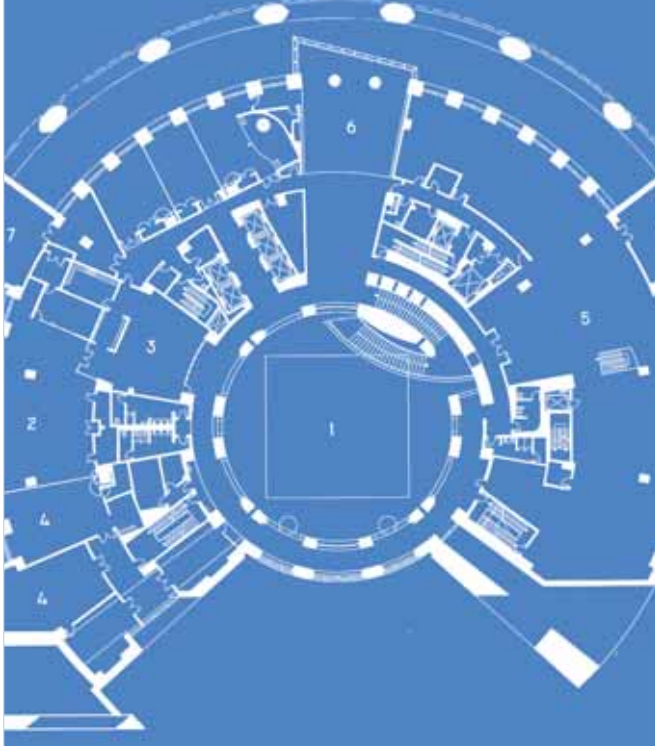
The most effective approach to LCC is to appropriately integrate it into the design process.

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.

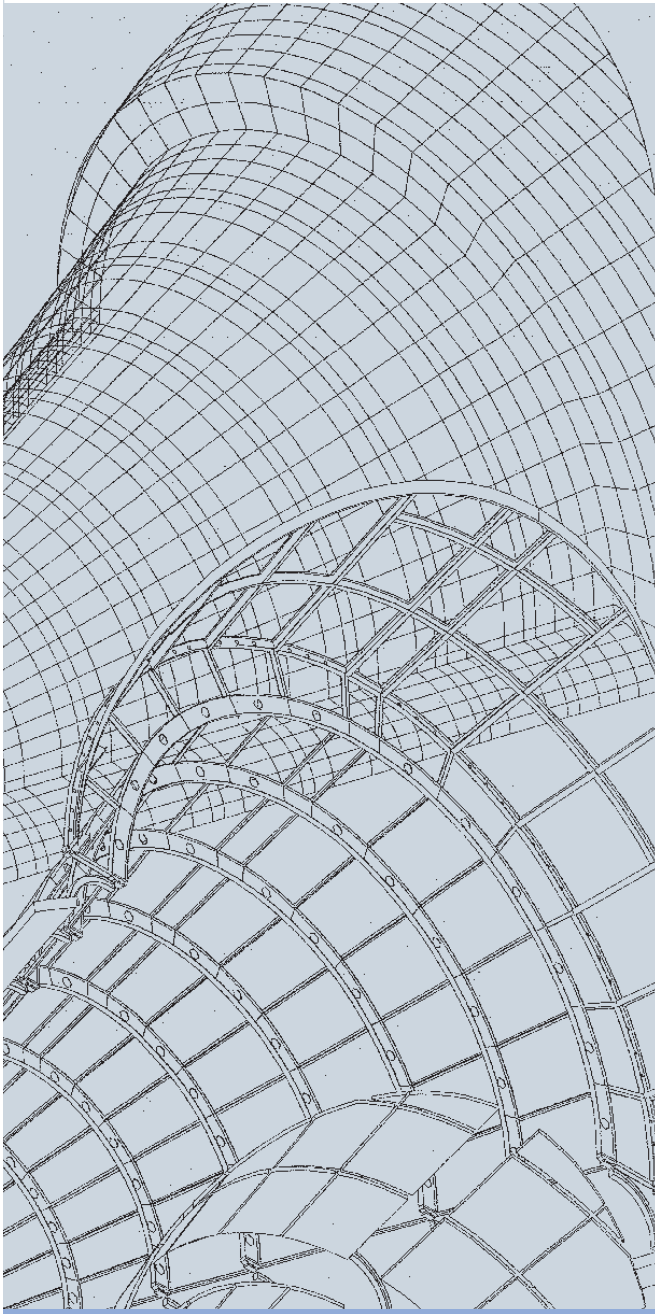


## Table 1-1 LCC Formulas

| Type of Cost                    | Cost Examples   | Present Value Relationships  | Comments  |
|---------------------------------|---|--|---|
| <b>Sunk</b>                     | Design Fees<br>Funds irrevocably committed  | Not Applicable   | Costs are not included in the Analysis  |
| <b>First</b>                    | Investment Costs<br>Construction Costs<br>Purchase Price  | $PV = TV$  | For those investment costs that begin at the start of the analysis period   |
| <b>Salvage Value</b>            | Scrap value of equipment at the end of its service life   | $PV = \frac{FV}{(1+d)^n}$<br>where $FV=TV(1+e)^n$  | Present value equals the future value at the end of the service life, discounted by n service years   |
| <b>Future Investment</b>        | One time investments occurring after the start of the analysis period<br>Non-Annual maintenance or repair<br>Major alterations to initial investment work | $PV = TV \frac{(1+e)^n}{(1+d)^n}$<br><br>Where FV is the time pro-rated amount that separates investment value to the end of service life salvage value. | Discount the future value (Today's Value escalated at rate e to year n) back to the present.  |
| <b>Residual Value</b>           | Equipment with a service life extending beyond the analysis period  | $PV = \frac{FV}{(1+d)^n}$  | Residual value equals the future value at the end of the analysis period, discounted to the present.  |
| <b>Annually Recurring Fixed</b> | Fixed payment service contracts with inflation adjustments<br>Preventative maintenance  | $PV = TV(UPW)$<br>where<br>$UPW = \frac{(1+d)^n - 1}{d(1+d)^n}$  | 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> | Service or maintenance which involve increasing amounts of work<br>Frequent replacements that escalate at a rate different than inflation   | $PV = TV(UPW^*)$<br>where $UPW^* = \frac{\left[ \frac{(1+e)}{(1+d)} \right]^n - 1}{1 - \frac{(1+d)}{(1+e)}}$ or $UPW^* = \left( \frac{1+e}{d-e} \right) \cdot \left[ 1 - \left( \frac{1+e}{1+d} \right)^n \right]$ | 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>                        | Fuel related costs, such as fuel oil, natural gas or electricity  | $PV = TV(UPW^*)$   | Energy related UPW* factors are found in the NIST BLCC program.  |
| <b>Escalation Rates</b>              | Relating Budgetary Escalation to Real Growth Escalation   | $E = e + I + eI$<br>or $e = \frac{E - I}{1 + I}$   | 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.



## 1.10 Accessibility Design Standards

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.

**The Architectural Barriers Act Accessibility Standard (ABAAS)** is mandatory for all GSA projects. The A/E is responsible for checking to see whether there are local

accessibility requirements. If they exist, the most stringent requirements will prevail between local and ABAAS.

The criteria of these standards should be considered a minimum in providing access for the physically disabled. Dimensions that are not stated as “maximum” or “minimum” are absolute. All dimensions are subject to conventional industry construction tolerances except where the requirement is stated as a range with specific minimum and maximum end points.

### Federal Courthouses

Please refer to Chapter 9 (*Design Standards for U.S. Court Facilities*), Section 9.2 (*General Requirements*), *Planning for Accessibility*, and Table 9-1, *Accessibility Requirements*.



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