Design Standards for U.S. Court Facilities

9

9.0 TABLE OF CONTENTS

Jose' V. Toledo United States Post Office and Courthouse
Old San Juan, Puerto Rico
Architect: Finegold Alexander + Associates, Inc.
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Photo: Kyle R. Brooks

9.1 Summary

The following complementary documents provide comprehensive programming and design criteria for United States Courts facilities.

- *U.S. Courts Design Guide: (USCDG)*
  Focuses on the functional program requirements; the departmental and interdepartmental adjacency relationships; finish materials; and the specific performance criteria for environmental systems including heating, cooling, and lighting. It also addresses acoustic, security, telecommunications and audio/visual design requirements.

- *Requirements and Specifications for Special Purpose and Support Space Manual including all volumes and addenda: (USMS-RSSPSSM)*
  Provides the finish criteria for USMS functional program requirements; spatial relationships; electronic/physical security plus hardware standards and special HVAC requirements within the U.S. Courts and Court-related spaces.

The USCDG includes a tabular comparison of funding responsibilities for all components of the courthouse and court functional space. (This information is organized into budget requirements for: GSA; Judiciary; and the Judiciary-Related Executive Branch Agencies.)

The USCDG and USMS-RSSPSSM speak directly to the functional requirements of the *user and tenant*. Chapter 9 presents the most cost effective and efficient building systems, and materials to achieve the appropriate environment from the perspective of the *building owner* (GSA); by reference to: applicable technical standards; security standards; life-safety and accessibility requirements.

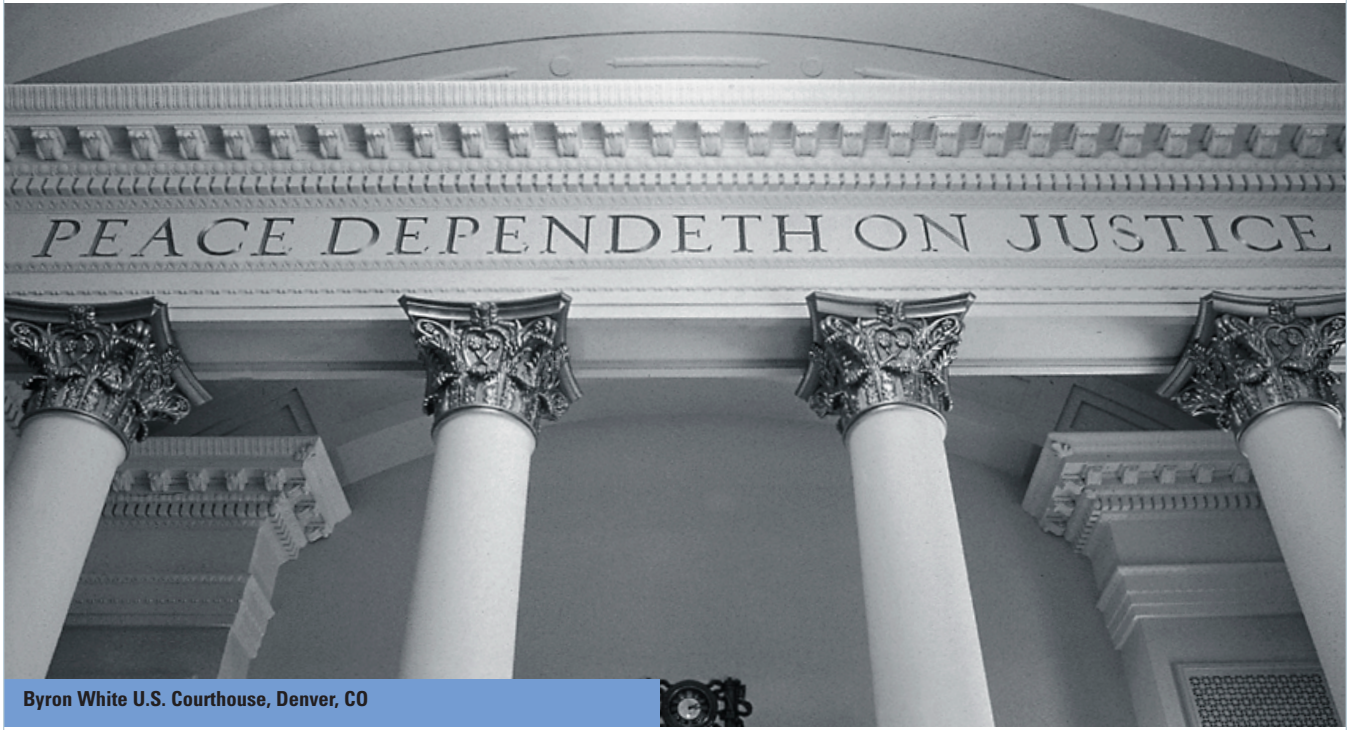
The USCDG makes reference to technical information related to performance criteria in order to help illustrate the rationale for the design requirements and to establish the standard for level of quality.

Chapter 9 refers to program and design issues in an effort to relate the design intent directly to the technical requirements for the building systems and finishes.

Chapter 9 does not cover issues related to selection of audio-visual, data, or telecommunications systems. (This criterion is developed in the *U.S. Courts Courtroom Technology Manual*.) Reference is made to these systems in Chapter 9 only with regard to the electrical service requirements in the areas where they are being installed.

Complementary documents to both the USCDG and Chapter 9 are the USMS-RSSPSSM standards. These documents establish, in detail, the environmental, security, functional, and technical requirements for the USMS spatial accommodations within U.S. courthouses. They include: information regarding secure environments for prisoners being held in preparation for a court appearance; USMS staff facilities; and general building security requirements. (The building perimeter and site specific security issues are the responsibility of the GSA.) GSA is responsible for power to the electronic security devices, but it should be understood by the design consultants that the USMS security contractor provides detailing and environmental requirements related to security within the functional area dedicated to the courts. Chapter 9 will indicate general requirements, but the USMS-RSSPSSM is the standard to follow.

9.2 General Requirements



Byron White U.S. Courthouse, Denver, CO

Planning for Future Requirements

The master plan for each courthouse facility is intended to accommodate 30 years of growth and the design of the initial phase of construction must provide the spatial requirements for the first 10 years of this plan from the start of design.

The conversion of general office or other support spaces to courtroom use will potentially put greater demands on the HVAC, electrical, and communications systems. These systems will require expansion capacity and space provided for additional equipment related to the future courts in the initial building design. Historic courthouses require special considerations. For guidance on renovation of historic courthouses, see Chapter 13 of the *U.S. Courts Design Guide*. Permanent ramps should be installed in historic buildings, unless such ramps will result in substantial loss of historic material. Under exceptional conditions, an application for a waiver may be made for a temporary ramp.

Planning for Accessibility

All U.S. Court facilities must be accessible to the physically disabled.

The detailed functional aspects of each courtroom component include an integrated reference to accessibility accommodation within the description of Courtroom Requirements in Chapter 4 of the USCDG.

The following information is intended only as a summary of the basic circulation; change in elevation; and spatial requirements to be addressed at each respective component with regard to accessibility for physically challenged individuals.

Design for accessibility should comply with the requirements of *Uniform Federal Accessibility Standards* (UFAS) and the *Americans with Disabilities Act of 1990* (ADA). The more stringent requirement between UFAS and ADA will be adopted as part of design criteria. Please refer to Chapter 1 and Appendix 1.A. for information on general compliance issues and measures in Federal building planning and design.

It is GSA and judiciary policy that all Federal courtrooms have the lectern, counsel tables, the witness stand, and jury box accessible in the original design; and the judge's bench, clerk's station, and other court personnel workstations adaptable, regardless of local or state code.

In all areas of a building used by the public, *Title II of the ADA* requires a totally accessible interior path from point of entry to all public services. The design elements affected by this requirement consist of:

- Vestibule configuration
- Door sizes and pressure of operation
- Corridor widths
- Elevator access and control
- Toilet room and stall dimensions
- Telephone and TTY (text telephone) provisions
- Drinking fountain location and dimensions
- Visual and audible alarm accommodations
- Signage design & location
- Quantity of accessible seating
- Ramps or lift access to all raised seating

Access to all raised areas in courtrooms require lifts or permanent ramps. If lifts are provided, lifts must be an integral part of the architecture of the courtroom. Bench areas will be designed to accommodate this equipment including structural slabs with a shallow pit for the lift platform.

U.S. Court facilities have several conditions that are unique to Federal building planning and design. These include provisions within the courtroom for fixed millwork to include elevated platforms for judges, witnesses, clerk staff, reporters, and jurors. In addition, design of spectator seating areas must consider physically challenged visitors including individuals with sight and hearing difficulties. (All areas of the Courtrooms must accommodate listening systems for the hearing impaired; and translators, notetakers, interpreters for the visually disabled.)

Table 9-1 outlines the accessible standards that apply specifically to courts and highlight instances where policy or preferences developed by GSA, in conjunction with the Judicial Conference of the United States, differ from UFAS or the ADA. If an ADA standard takes priority or must be considered in addition to UFAS, it is noted accordingly by the designation (ADA). Adaptability requires that dimensional consideration has been included in the original design to incorporate accessible elements at a later time. Wherever ramps or lifts are provided for access to a raised area, railings must be provided as required.

Infrastructure

Electrical outlets, wiring, conduit, or raceways to support sound and visual communication equipment for persons with disabilities shall be provided by GSA. Electrical service may be required for: transcription services, telephone handset amplifiers, telephones compatible with hearing aids, closed caption decoders, text telephones (TTYs) or other devices to assist those with hearing or visual impairments.

Acoustic Planning Requirements

The Project Design Team will include an acoustic consultant who shall develop the appropriate information at each stage of the design process to assure the Courts and GSA that sound/vibration issues have been properly addressed.

The following is a list of NIC and STC ratings for privacy levels required in a courthouse:

Privacy Level	NIC*	STC
Inaudible	65	55
Confidential	50	50
Normal	40	45
Minimal	27	40

*Per USCDG Standards

The STC ratings related to the Court's environment fall into three categories. These categories are listed below along with some typical examples of interior partition construction that will provide the appropriate acoustic isolation:

STC of 40-45: One layer of 12.7mm (1/2") gypsum wallboard on each side of steel studs to the underside of structure with acoustic sealant at top and bottom.

STC of 50: One layer of 15.9mm (5/8") gypsum wallboard on each side of steel studs, plus an additional layer on one side, to the underside of structure with acoustic sealant at top and bottom. (Install 69.8mm (2-3/4") glass fiber insulation in the wall cavity.)

STC of 55: One layer of 6.3mm (1/4") and 15.9 (5/8") gypsum wallboard on each side of steel studs to the underside of structure with acoustic sealant at top and bottom. (Install 69.8mm (2-3/4") glass fiber insulation in the wall cavity.)

Refer to discussions on the acoustic criteria for each courthouse facility space described in the USCDG. (The finished space performance will be tested against these specific requirements.)

Table 9-1
Accessibility Requirements

SPACE	ACCOMMODATION
COURTROOM	
Circulation Routes	Clearance and turning radius for wheelchairs throughout the courtroom.
Public Seating	Number of wheelchair spaces and location are set by UFAS and ADA.
Litigant Table	Height clearance at table(s) and circulation space.
Jury Box	One wheelchair space along the general circulation path at the box. (If located on a tier, provide a ramp or lift.)
Witness Stand	Wheelchair turning radius clearance. Permanent ramp or lift to provide access. (Adjacent space is required for an interpreter.)
Judge's Bench	Comply with space and maneuvering requirements of ADA. Adaptable for future inclusion of ramp or lift. (Electrical service, space, and floor depression to be included in the initial design for lift.)
Courtroom Clerk	Adaptable for future accommodation. (Raised level for clerk's position may be served by a movable ramp.)
Lectern	Include an adjustable platform with a height variation between 710mm and 760mm (28'' & 30'') above the floor. Knee space at least 685mm (27") high. The lectern must be at least 760mm (30'') wide and 480mm (19'') deep.
JURY & ANCILLARY FACILITIES	
Jury Assembly Room	Located on publicly accessible route. Refer to UFAS/ADA for number of wheelchair accommodating spaces. ADA determines requirements for listening devices. Kitchen-type service units and associated refreshment areas.
Jury Deliberation Rooms	One space at tables. Clearance provided at coat storage and dedicated toilet rooms. Portable assistive listening system may be used if there is more than one deliberation room. (Provided by Judiciary)
Witness Rooms **Attorney Rooms** **Conference Rooms**	Provide proper clearance for circulation and height at tables for wheelchairs.
USMS FACILITIES	
Court Holding Areas	Each classification of holding shall have one cell accommodating wheelchair clearances and an appropriate toilet plus lavatory.
Visitor Booths & Attorney/Prisoner Areas	One but not less than 5% of booths/areas must provide turning radius and counter height dimensions for a wheelchair on both sides.

White Plains Courthouse

9.3 Architectural and Interior Design

This section addresses technical requirements for architectural materials and systems which should be provided in buildings designed to serve the U.S. Courts. Specific requirements are presented for all special or unique Courts spaces and Court-related agencies, including those to accommodate the U.S. Marshals Service. See Chapter 13 of USCDG and Chapter 3 of this document for additional information.

General building design concepts for GSA-owned structures are based on an overall "systems" approach, utilizing all design elements of the building including: ceiling cavities; floor plenums created by use of access flooring; stacked vertical distribution cores; and centrally-located support areas; to increase functionality, improve flexibility for future modifications, and provide buildings which are efficient regarding construction, operation and maintenance costs.

Building Enclosure Systems

The baseline standard for quality of exterior materials for U.S. Court facilities is stone, brick, precast concrete, or other materials of substantial architectural character. Fundamental construction standards for the majority of the exterior building systems are discussed in Chapter 3.

Specific additional provisions for U.S. Court facilities include:

- Vehicular sallyport doors that meet USMS requirements.
- Appropriate (ballistic-resistant) glazing at various levels of a facility.
- Physical and electronic security design features at vulnerable areas that will decrease risk of attack to occupants or escape of prisoners.

- Level 4 classification of the DOJ Vulnerability Assessment and the Medium level protection of the Interagency Security Criteria.

Floor Systems

An important issue in the design of GSA-owned structures has been the evaluation and selection of an appropriate floor system, especially with the potential of using the plenum below for the horizontal distribution of conditioned air, power, data, telecommunication, and low-voltage system cabling; plus the related flexibility in position of connections above the floor. Accessible flooring systems can be defined as a suspended floor plane above the structural slab with relocatable modular components. Chapter 3 outlines appropriate dimensional characteristics of access floor systems for Federal facilities, describing the use of a 600 mm by 600 mm (2-foot by 2-foot) grid, having a clear raised depth, below floor supporting construction able to accommodate building system distribution below the floor. Access flooring shall be used in appropriate areas in courthouses, which include courtrooms, chambers, offices, conference rooms, etc.

It is extremely important to take in to account the height of the accessible floor system in the determination of floor-to-floor dimensions.

Standard floor finishes within each function of the Courts facility need to be selected primarily on the basis of acoustic enhancement and general durability.

The USCDG contains detailed information on specific requirements for the use of carpet and other floor finish materials under each category of functional space. The USMS-RSSPSSM contains the very stringent requirements for the USMS in all detention-related areas of their facilities.

Interior Wall Systems

Interior Partition Systems. Most interior wall partitions will be composed of gypsum board on metal studs with the exception of USMS detention spaces. (There may be instances in the general building construction where concrete masonry is used if building elements, including elevator or plumbing shafts, are stacked systematically floor upon floor.) Refer to the USCDG for further information related to recommended interior partition construction.

Ceiling Systems

Chapter 3 outlines the general parameters for selection of a ceiling system in typical office spaces and recommends the use of a standard 600 mm by 600 mm (2-foot by 2-foot) suspension system with a commercial quality, acoustic ceiling tile. The use of this system allows future flexibility in partition arrangement and corresponding relocation of mechanical diffusers, lights, sprinklers, and components of other systems such as speakers and fire alarm notification appliances.

There are several types of spaces with custom ceiling system requirements, which may include courtrooms public spaces, office and conference spaces of the courts or other agencies, and detainee areas. In historic buildings, satisfy acoustical requirements using removable finishes and features so that original ornamental surfaces may be maintained.

Courtrooms: Acoustic characteristics and aesthetics are the main considerations in the selection of a ceiling system. The ceiling design and materials must enhance the acoustic performance of the well area. (Ideal reverberation time in a courtroom is 0.5 to 0.6 seconds). This will involve the use of reflective and absorptive materials in the space.

Public Spaces: The ceiling system must accommodate future changes to the layout of the space and allow access for maintenance of the building systems above and within the ceiling plane including: mechanical systems; diffuser locations; smoke detectors; communication devices; lights; and life safety devices. Acoustic tile in a suspended ceiling grid is typically provided in these areas, along with supplemental use of gypsum wallboard in soffits, perimeter coves, recesses and reveals.

Office and Conference Spaces: Flexibility and durability are also the main considerations in the selection of a ceiling system which must accommodate change and accessibility above the ceiling plane. The ceiling material should absorb sound to provide speech privacy and control transfer of noise from machines, computers, light ballasts, and other sources within adjacent office areas.

Detainee Areas: Security and durability are the main considerations in the selection of a ceiling system. Refer to USMS-RSSPSSM for suggested ceiling materials in these spaces.

The USCDG outlines all of the appropriate interior finishes for U.S. Court related spaces.

Fixed and Movable Furniture

Components to be provided by GSA in U.S Court facilities include furniture and millwork required for the operations of the courts in courtrooms, grand jury, hearing room, jury assembly room, and public transaction counters. In general, built-in furniture needs to be designed with integral cable raceways plus conduits sized for future expansion and change. Built-in furnishings will also include access panels to permit easy cable and wiring changes. Provisions for power, data and telecommunication outlets and inputs; sound and other systems shall be confirmed during the Design Development Phase of the project on a position-by-position basis. Courthouse and office furniture systems must meet a variety of needs, and selection of these systems must consider function, cost, availability, and aesthetic criteria. The selection and design of fixed and movable furniture should be carefully coordinated to achieve a consistent image, proper function, and required clearances.

Movable furniture to be provided by GSA in the U.S. Court facilities will consist of miscellaneous items, to include lecterns, council tables for courtrooms, and grand jury spaces.

Typical provisions for moveable furnishings in U.S. Courts are indicated in tables provided for each category of space use in the USCDG. All items to be provided by the GSA within the baseline rent charges are assumed to be included within the anticipated construction budget.

Refer to the USMS-RSSPSSM for a detailed description of USMS fixed and movable furniture requirements in U.S. Court Facilities.

Fixed Components

Table 9-2 outlines the basic fixed furniture elements that are provided for all Courts related functions.

Signage and Graphics

Many Federal Courthouses are large, complex structures requiring clear and coordinated systems of signage and wayfinding which allows first time users to locate their place of involvement in the judicial process as quickly and directly as possible.

A standardized system of signage, with interchangeable components, is required throughout the courthouse. ADA Accessibility Guidelines are specific about parameters of design including location, size, color, and tactile qualities of signage and use of graphic symbols to assist non-readers.

Table 9-2
Typical Interior Fixed Furniture Elements

SPACE	TYPE OF FURNITURE ELEMENT
Courtroom	Judge's Bench (Refer to USCDG for specific configuration.) Deputy Clerk Desk (Adaptable for computer and printer.) Witness Box Fixed base chairs for jury and one not fixed Spectator Rail Jury Box Spectator Benches
Grand Jury Room	Bench Witness Stand Jury Rails Chairs
Judge's Chambers Suite	Kitchen-type serving unit with sink (Cabinets above and below) Book shelves
Judge's Robing Room	Lockers for robes
Judge's Toilet	Vanity, mirror, and medicine cabinet
Jury Assembly	Check-In counter Coat closet with rods Kitchenette-type serving unit (Cabinets above and below)
Jury Areas	Toilets with vanity and mirror Kitchenette-type serving unit Coat closet with rods
Library Spaces	Stand-up counter
All Public Areas	Stand-up counters
USMS Detention Cells	Benches Modesty screen
USMS Prisoner/Attorney Interview	Counter Stool (Prisoner side)
USMS Reception/Cashier	Service counter
USMS Staff Locker Rooms (Men's and Women's)	Lockers and benches Grooming shelf and mirrors Metal lockers Hooks or open closet rod and shelf for coats
USMS & CSOS Work/Mail Room	Base cabinets Work surface Shelving

Note: Refer to USMS-RSSPSSM for related furniture.

In addition to providing all general building identification and way-finding signage; GSA will supply all Courts related signs in public corridors of the building. Signage requirements within the Courts dedicated space, related to their function, will be provided by the Courts. Signs for life safety and public convenience (restrooms) within the functional areas of the Courts are supplied by GSA.

For installation of signage in historic buildings, the design team shall consult with the RHPO regarding the following requirements.

The following signage shall be furnished by GSA, and any remaining requirements will be determined and provided by the Courts:

Identification/Information Signage
- Building Identification/Seal/Cornerstone
- Division/Department, Tenant Agency Identification
- Courtroom/Room/Area Identification
- Special Function Identification – Library, Media Center, Cafeteria, etc.

Directional Signage
- Main Directory at Building Entrance – Graphic Plan
- Floor Directory on each floor – Graphic Plan
- Directory of Building Occupants with Suite Locations
- Directional Signage for Building Access by Handicapped
- Directional Signage for Parking/Restricted Entrances
- Directional Signage for Service Vehicles

Regulatory/Security Signage
- *Signage for Core Functions* – Restrooms, stairs, telephones, and other elements on ADA accessible path to building services.
- *Signage for Controlled Access Areas* – Judicial and staff areas and if admission to controlled areas is based upon recognizance, instructions for operating the call button/camera must be provided at the controlled door.
- *Signage for Dedicated Systems/Facilities* – Elevators, stairs, staff restrooms (Identification as dedicated and regulations for use stated)
- *Signage for Special Locking Arrangements*

Emergency Evacuation Route Signage
- Emergency evacuation route signage shall be posted in a tamper resistant frame or engraved on a placard that is mounted on the walls in each passenger elevator lobby, freight elevator lobby, and any mechanical spaces that may be occupied by contractors or other personnel not familiar with floor layouts and exit locations. The minimum size of the signage shall be 8 1/2 inches by 11 inches. This signage shall be depicted in either landscape or portrait form depending on the architectural layout and orientation of the elevator lobbies at each floor. {Also provide labeling as required in PBS ORDER 3490.1, Paragraph 7.d.(1), dated March 8, 2002.}
- The signage shall consist of a CADD generated floor plan for each floor with the evacuation routes identified (show routes to two different exits with directional arrows). Provide a "YOU ARE HERE" designation pointing directly to the signs final installed orientation. Also provide a main heading titled "EVACUATION PLAN". This signage may contain a zoomed in core area of the building (for a larger view of routes) if all evacuation routes and evacuation stairways are legibly shown. The signage shall contain a LEGEND for clarification purposes of any additional items shown on these evacuation plans. Also, include the following statement on plans "IN CASE OF FIRE DO NOT USE ELEVATORS - USE STAIRS".

9.4 Structural Systems

Byron White Courthouse, Denver, CO

General Requirements

The selection of the primary structural system for the new U.S. Court facility will be based on a variety of functional, technical, and load criteria. Whatever system is selected, the building should be planned with the longest logical clear spans (spacing between columns) and simplified structural framing to provide flexibility for modification/ adaptation to accommodate areas of special-use, including future courtrooms. (If space is dedicated to future Courts, the column layout must not disrupt internal sightlines of the courtrooms.)

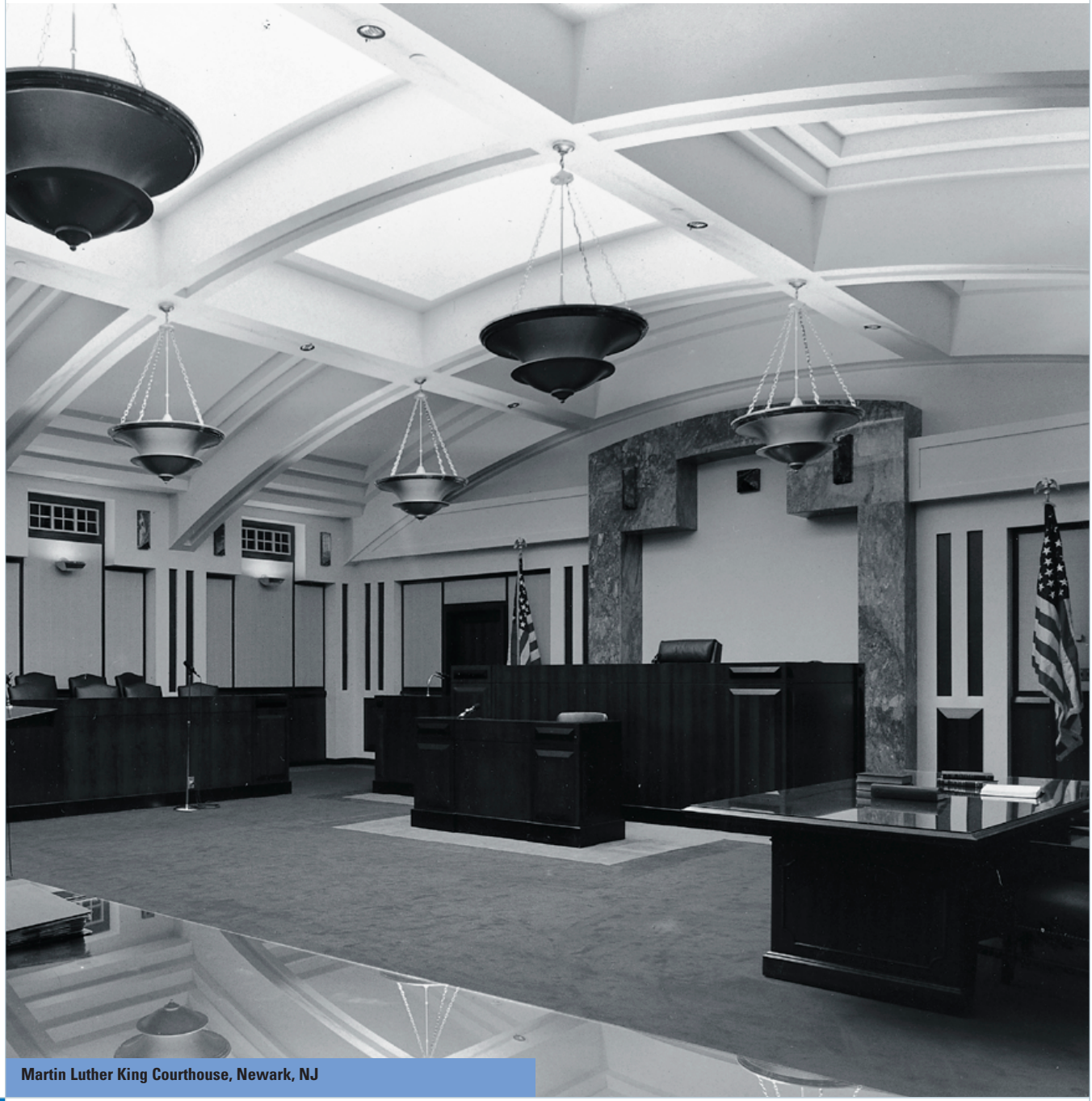
Design of the courtrooms and court-area structural configuration must respond to the needs for electrical and data/telecommunication systems and their related horizontal/vertical distribution network. An important consideration for a structural design is the number and size of floor slab penetrations required in court areas for initial and future renovation. Increasingly, the requirements of electrical and data/telecommunication systems require frequent access, and change to accommodate use of new technology.

Other design considerations include:

- **Floor-to-floor** heights providing adequate space for raised access floor systems.
- **Floor-to-floor** heights designed to support horizontal utility runs above the ceiling.
- **Floor-loading** capacities planned to accommodate initial and planned future loads, particularly in areas near building cores – which can serve as special "high" service zones.
- **Floor-loading** to accommodate the secure, solid filled, reinforced security walls wherever they may occur in the dedicated USMS space.
- **Roof loads** must consider general personnel and equipment loads, and should be planned to accommodate additional loads for antennas, satellite dishes, and window washing equipment.

Special structural capacity should also be provided in the following areas of U.S. Court facilities:

- **Judge's chambers** should be designed to provide 7.2 kPa (150 lb/sf) live load capacity.
- **Court library areas** (central and satellite) designed to provide 7.2 kPa (150 lb/sf) live load capacity.
- **Moveable shelving live loads** should be determined by reference to International Building Code requirements in the location where construction is taking place.
- **USMS space** per RSSPSSM.
- **Clerk of the Court file storage area** designed to accommodate high density file storage as identified by the court.



Martin Luther King Courthouse, Newark, NJ

9.5 Mechanical Systems

This section focuses on technical requirements for the mechanical engineering systems which should be provided in buildings designed to serve the U.S. Courts. Specific requirements are presented for all special or unique spaces used by the U.S. Courts and Court-related agencies, including spaces designed to accommodate the U.S. Marshal Service.

Federal Court facilities should be designed to take advantage of integrated systems and controls to provide better building performance through energy conservation, economy of operations, maintenance and flexibility for changes. Opportunities for system integration need to be evaluated throughout the design process.

U.S. Courts facilities require a variety of space types, each with it's own set of specific requirements. In addition, Court functions require flexibility in the time of operation and control of dedicated HVAC systems.

System Selection and Design

HVAC Specific Design Criteria Requirements

- Outdoor winter temperature equal to ASHRAE 1% design dry bulb and coincident wet bulb.
- Outdoor summer temperatures equal to ASHRAE 99% design dry bulb/97.5% wet bulb.
- Indoor air: Courtrooms – 22°C (74°F)/50% RH (at summer conditions and occupancy) - 22°C (74°F)/ 20-35% RH (at winter conditions and occupancy).
- If provided, the smoke purge system in the courtroom should be activated manually.
- All openings carrying piping through the slab or through partitions must be sealed with appropriate fire resistive/smoke resistive material. All air ducts leading to and from sensitive spaces must be acoustically treated with 2 inches (50 mm) of duct lining for a distance of at least 12 feet (3700 mm) from the diffuser or return air intake.
- HVAC systems shall be designed to provide optimum flexibility in scheduling the use of courtrooms and chamber areas.

General Criteria

The selection of the HVAC systems, equipment, and source of energy will be in accordance with the guidelines and procedures established in Chapter 5. Life Cycle Cost (LCC) analyses will be conducted to ensure selection of the most cost-effective alternative environmental considerations. The HVAC system should also be designed to provide 23.4°C (74°F) in judge's chambers, courtrooms and trial jury suites on average. The courtroom HVAC system will be designed so that courtroom thermostats can be reset from the building automation system to pre-cool the courtrooms to 21.1°C (70°F) prior to scheduled occupancy. Jury deliberation rooms, judges' chamber suites, and courtrooms are to be placed on the same system with separate zones having related thermostats and the design should account for variation in occupancy load. Humidification must be provided as specified in Chapter 5. Mechanical systems will provide 5.7 cubic meters (20 cubic feet) per minute as a minimum per person in all occupiable areas of U.S. Court facilities.

The HVAC systems shall be zoned in such a manner that the requirements of the special areas can be satisfied by efficient use of the systems and equipment. To allow flexible and efficient use of the HVAC systems for "after hours activity", and to satisfy specific requirements in a U.S. Court facility, the central plant equipment (chillers,

boilers, cooling towers, pumps, AHUs, etc.) will be designed using redundant equipment of various sizes to satisfy the requirements of differing number and sizes of zones. (The goal is to service no more than two courtrooms per each air handling unit.) Piping systems should consider arrangements to permit changing courtroom HVAC systems from primary to secondary chilled water for off hours. The design shall allow sub-metering of utilities and equipment to permit the facility manager to allocate cost of operation beyond standard-hours of operation.

Courtrooms/Chambers

Temperature and Systems Control. The HVAC system serving judge's chambers, courtrooms, and trial jury suites should provide an average temperature of 23.4° (74°F). The courtroom system zone will be designed to allow thermostats to be reset from the building automation system to pre-cool to 21.1°C (70°F) prior to scheduled occupancy.

Air Distribution. The diffusers serving the spectator areas must be sized to serve the allowable seating capacity plus 25%, to accommodate for extra seating. The diffusers need to be selected to meet minimum ventilation requirements at no loads, with no appreciable increase in system noise during load changes.

Provide six (6) air changes per hour for rooms with ceiling height up to 4.6 meters (15 feet); and eight (8) air changes per hour for rooms with a ceiling height greater than 4.6 meters (15 feet). Systems should be designed to meet these requirements when spaces are fully occupied, unless otherwise noted.

The maximum percentage of recirculated air should not exceed 85%.

If the courtroom is served by a fan system dedicated to more than one courtroom, then the return air from each courtroom and its associated areas must be ducted directly to the unit.

Return air from the chamber suites will be ducted directly toward the return air shaft for a minimum distance of fifteen (15) feet. (Treat ductwork to meet the acoustical design criteria.)

Jury Facilities

System Description and Control. Trial jury suites should be served from the same system as the associated courtrooms. (A separate thermostat for each trial jury room is desirable.)

Air Distribution. Air distribution systems in the jury facilities must provide separate temperature control and a high degree of acoustical isolation, particularly in the grand jury and trial jury rooms. Return air from the rooms must be ducted directly back to the exhaust air riser. Ductwork will be treated to meet the acoustical deliberation room design criteria.

Air Changes. In the Assembly Room, Deliberation Room, and toilet rooms, the system must provide 10 air changes per hour (ACH) with 80-85% return.

Refer to USMS-RSSPSSM for all detention requirements.

Harold D. Donohue Federal Building and U.S. Courthouse, Worcester, MA

Since U.S. Court facilities should be expected to have a long useful life, new construction and renovation projects need to be planned to provide adequate mechanical and electrical capability to the site and building(s) to support future additions. It is particularly important to design the systems for specialized areas of the building (lobby, food service, mechanical rooms, electrical rooms) to support the anticipated 30-year needs of the occupants. This can be accomplished by building additional space for future growth of the HVAC systems during initial construction and temporarily allocating it to building or tenant storage. HVAC designers shall locate equipment adjacent to the building perimeter wall that will abut future expansion for orderly tie into new system components.

The HVAC system design for the Courtroom, Judge's Chamber Suite, and the Jury Deliberation Room, which comprise a single "court set", shall be designed to allow the HVAC system to operate after hours.

The design shall include winter humidification for "special" designated areas in the building. Special controls for winter dehumidification will not be included since modern HVAC systems are designed to keep relative humidity within acceptable ranges.

Acoustic Performance

Acoustic performance should be a major consideration regarding the selection of HVAC equipment. Systems serving the courtrooms and auxiliary spaces should be designed with sound attenuation to provide consistent and acceptable sound levels. This is particularly critical in design of court facilities that require extensive use of sound and A/V equipment for recording and presentations.

Edward T. Gignoux U.S. Courthouse, Portland, ME

To control noise during all modes of operation and for all load conditions, the HVAC system should be provided with one or more of the following:

- Sound traps and acoustic lining in the duct work;
- Low-velocity, low static-pressure fan systems;
- Special low-noise diffusers; and
- Sound traps.

If air is returned by the ceiling plenum, special attention should be given to the location of any partitions extending to the floor structure above and to the acoustical treatment of the required penetration of these partitions for return air.

HVAC equipment including air-handling units (AHUs) and variable air volume (VAV) boxes will not be located in close proximity to courtrooms, jury rooms, and chambers. The minimum distance should be 7.6 meters (25 feet) between AHU and courtrooms. (Refer to Chapter 5, Theaters and Auditoriums, for criteria regarding maximum duct velocity.) General system design needs to provide appropriate treatment of mechanical supply/return ducts to minimize sound and voice transfer from courtroom, chambers, jury deliberation spaces, witness rooms to surrounding areas.

Noise criterion (NC), defines the limits that the octave band spectrum of noise source must not exceed, should range from 25-30 in U.S. Court facilities. For sound level maintenance, the courtroom needs to be served by constant volume air supply. The system must also support variable outside air requirements and variable cooling loads. Air ducts serving the trial jury and grand jury suites must be lined with 2 inches (50 mm) of acoustical absorption material for a length of at least 12 feet (3700 mm) from the diffuser or return air intake.

Mechanical System Diffusers, Vents

Mechanical system diffusers and grills in public and staff areas will need to be secure from tampering, particularly in areas which provide some degree of seclusion and privacy (restrooms, attorney-client visitation rooms, etc.). Maximum-security detention-type grilles, secured with tamper proof fasteners, shall be provided at all areas accessible to prisoners. (Refer to USMS-RSSPSSM for more information.)

Changes in Building Envelope to Meet Energy Guidelines

Due to the energy load requirements of court facilities, designers should use the alternative design processes of *ASHRAE 90.1R* to meet Federal energy guidelines for overall building energy usage. Increases in building envelope energy resistance should be used to compensate for higher than average load requirements resulting from court functions. Total building energy usage should be established according to calculations using mandatory design standards contained in Chapter 5. To demonstrate the same total energy usage, a new calculation will be done incorporating factors for energy reduction strategies to offset increased lighting, cooling and heating energy loads.

Information Technology System Loads

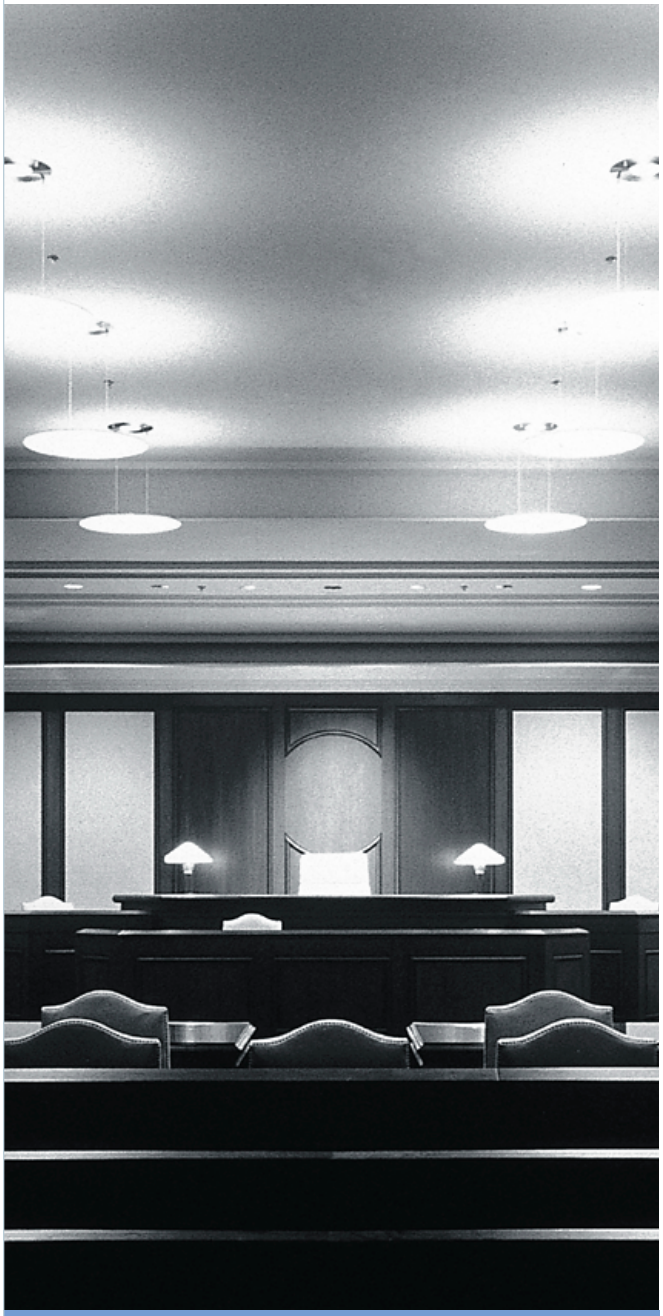
Information technology systems are not the largest source of heat within the office spaces but may be the largest sources in particular areas. Information technology systems will be the most uncertain source of heat flows during design phases, therefore the HVAC system should be planned with capacity and control to accommodate the need for constant temperature and humidity environments 24 hours a day, where systems hardware could be placed.

The design of the HVAC systems must take into consideration provisions for separate units for critical areas such as computer rooms, USMS control room, elevator machine rooms, etc., which generate additional heat loads. (The HVAC design for these areas should have redundancy and also be connected to the emergency power system.)

9.6 Fire Protection

Refer to Chapter 7: *Fire Protection Engineering* for sprinkler and fire alarm requirements.

All security systems, including those that control egress at the USMS detention area, will be connected to emergency power and meet the requirements of the International Building Code.



Robert C. Byrd Courthouse, Charleston, WV

9.7 Electrical Systems

GSA will provide emergency and secondary power distributed as a basic requirement.

Normal building distribution systems should be designed to comply with Chapter 6. They will include a special electrical distribution system, consisting of an isolation transformer with associated branch circuit distribution equipment, and should be designed to serve the data network system and associated equipment supporting non-linear loads.

Uninterruptible power will be provided to serve localized security, emergency smoke evacuation, and any other critical systems. This system should also be connected to the emergency power distribution system. (Other UPS for equipment is to be provided by tenants with their equipment.)

Spare Capacity. General design requirements for office and courtroom areas should be based on anticipated loads and requirements outlined in Chapter 6. The capacity of the feeders serving all areas of the building needs to accommodate growth to the extent shown in the 30 year long range plan for the facility.

Number of Outlets. The number of outlets provided in U.S. Court Facilities should be in accordance with: Table 9-3, Electrical Power Requirement/Outlets, electrical codes and good practice.

Grounding. The GSA will provide grounding as indicated in Chapter 6.

Clean Power. It is not economical, or convenient, to provide electrical supply from back-up generators and/or a central UPS to a small proportion of outlets in office areas. However, every desk in the courthouse is likely to support PC's or other data/telecommunication equipment, and "clean" (dedicated service with no harmonies or spikes) desk circuits should be protected by excluding "dirty" loads (such as large photocopiers and vacuum cleaners).

On-Floor Electrical Distribution

Most areas of the courthouse may incorporate underfloor horizontal distribution systems. Final horizontal distribution plans will be designed considering potential EMI/RFI sources. (Access floor areas will comply with Chapter 6.)

Emergency and UPS Power Systems

Service and Distribution. Emergency and normal electrical panels, conduit, and switchgear will be installed separately, at different locations, and as far apart as possible. Electrical distribution should also run at separate locations.

Conduit and lines need to be installed on the exterior of the building to allow use of a trailer-mounted generator to connect to the building's electrical system. This will be regarded as a tertiary source of power for systems in the building where operational continuity is critical. (An operational plan should be in place to provide this service quickly when needed.)

Emergency power will be derived from generators sized to carry the required loads. Generators should be synchronized to serve a common distribution board which, in turn, serves appropriate automatic transfer switches (ATS) and the fire pump. Separate ATS should be provided for the Life Safety/Security System, UPS system, and essential systems. (Essential systems will serve the ventilation and equipment loads required for personnel and building protection in the event of a commercial power failure or other catastrophic event.)

Discussions should be held early in the design process on a U.S. Court facility project to determine whether UPS is required for any function at the facility.

If a building-wide UPS system is provided, the system should serve the building distribution system at 208Y/120V. This system will have an output at 208Y/120V distributed through the building by a UPS power riser in each on-floor electric room. Taps from the riser will provide power to on-floor transformers and branch panels in each electric room to serve on-floor loads requiring UPS power. (Connected loads on the UPS power system may include PABX, computer and local equipment rooms.)

Coordination with Telecommunication System Design

Electrical power distribution for the various areas of U.S. Court facilities should be coordinated with the design of the telecommunication powering/grounding systems to improve the overall integrity of the telecommunications utility. As technology continues to increase in speed/performance, better distribution coordination becomes necessary. If this is not done, the grounding systems will not operate efficiently at the higher frequency ground currents, reducing the integrity of the telecom utility (creating errors in transmission, etc.).

Table 9-3
Electrical Power Requirement/Outlets

Note: This table is comprehensive, but may not be complete as needs and systems change over time and from court to court. These requirements are in addition to those described in Chapter 6.

LOCATION	EQUIPMENT/OUTLET(S)	NOTES
COURTROOMS		
Judge's Bench	Quadriplex receptacle for general purpose use; Duplex receptacle for computer, monitor; additional duplex receptacle for video arraignment.	
Courtroom	Duplex outlet with dedicated circuit for portable magnetometer. Branch circuits will be provided for additional loads dictated by the Courts.	
Court Clerk Workstation	One quadriplex receptacle (general use) and one duplex receptacle for PC and monitor per clerk position.	Printers as a group.
Court Reporter's Workstation	One quadriplex receptacle (general use), one duplex receptacle for reporter's computer/CRT.	Provide additional duplex receptacle(s) at alternate CR position(s) in the courtroom.
Witness Box	One duplex receptacle.	
Jury Box	One quadriplex receptacle for general purpose use.	Mounted on inside of jury box enclosure.
Attorney Tables	One quadriplex receptacle (general use) per attorney table position.	Recessed floor box.
Spectator Seating	One duplex outlet at front rail ("bar") for computer/monitor for CRT or other use.	Mounted on spectator side of rail enclosure.
Equipment Room/Area	Multiple outlets (as required) for sound, ALS, data, telecommunication and video recording and presentation equipment.	
Other	Duplex outlets at 20' intervals along the walls of courtroom. Duplex outlets at two locations (min.) in front of bench millwork. Additional outlets at appropriate locations for ceiling-mounted screen, fixed and/or movable positions for slide projector, video monitor, video recorder, interactive white-board and image copier, and x-ray viewer equipment. Locate floor boxes for multiple possible locations of a lectern and/or alternative locations for attorney tables. Provide additional outlets for initial/future location of video cameras. Provide outlet for wall-mounted clock. Provide outlet(s) for ALS unit(s). Provide outlets as required for video conferencing/arraignment equipment, video monitors/VCR equipment, security, and so on.	The courtroom well will have a suspended access floor system for flexible location of outlets.

LOCATION	EQUIPMENT/OUTLET(S)	NOTES
COURT SUPPORT		
Witness Waiting Rooms	Distributed convenience outlets, including provisions for cleaning/ housekeeping.	
Attorney/Client Conference	Distributed convenience outlets, including provisions for cleaning/ housekeeping and for audiovisual equipment (monitor/VCR).	
Public Waiting Areas	Distributed convenience outlets, including provisions for cleaning/ housekeeping. Provide outlets for clock. Duplex outlet with dedicated circuit for magnetometer outside sound lock.	
Media Area(s)	Distributed convenience outlets, including provisions for cleaning equipment and motor loads. Provide separately metered power outlets for news agencies telecast equipment.	
Law Clerk Office	One quadriplex receptacle (general use). Duplex outlet(s), two minimum, for PC, monitor, printer, FAX.	Computer and office equipment (PC, monitor, printer) not in FF&E budget.
Court Reporter Office	One quadriplex receptacle (general use). Duplex outlet(s), two minimum, for PC, monitor, printer, FAX.	Computer and office equipment (PC, monitor, printer) not in FF&E budget.
Judicial Conference Room(s)	Distributed convenience outlets. Provide outlets as required for video conferencing/arraignment equipment, video monitors/ VCR equipment, security, sound-system, ALS and other equipment, based on anticipated locations of equipment.	Computer and office equipment (PC, monitor, printer) not in FF&E budget.
JUDICIAL CHAMBERS		
Judge's Chambers	Quadriplex receptacle for general purpose use. Two duplex receptacles for miscellaneous uses (TV monitor, slide projector use, etc.). Two duplex receptacles for PC, monitor, printer and other computer equipment. Additional duplex receptacle for video arraignment and FAX equipment where required (initial/future use).	Duplex outlets for PC and monitor positions to be located in multiple positions (based on likely furniture placement). Computer and office equipment (PC, monitor, printer) not in FF&E budget.
Secretary/ Judicial Assistant	One quadriplex receptacle (general use). Duplex outlet(s), two minimum, for PC, monitor, printer, FAX.	
Work Area	Quadriplex receptacle for general purpose use. Duplex outlets for coffee machine, microwave unit, refrigerator, based on equipment/ furniture layouts. Additional outlet(s) for copier.	Equipment not included in base building budget. Refrigerator included in FF&E budget. Other equipment (PC, monitor, printer, FAX, copier, etc.) not in FF&E budget.

Table 9-3
Electrical Power Requirement/Outlets (continued)

LOCATION	EQUIPMENT/OUTLET(S)	NOTES
JUDICIAL CHAMBERS (continued)		
Reference/Conference General	Provide outlets for video conferencing, TV monitor, projectors. Distributed convenience outlets in reception/waiting and general office areas. Provide outlets for floor-cleaning equipment and motor loads. Provide outlets as required for video conferencing/ arraignment equipment, security, sound-system, ALS or other equipment, based on anticipated locations of equipment.	Computer and office equipment (PC, monitor, printer, FAX, copier, etc.) not in FF&E budget.
TRIAL JURY SUITE(S)		
Jury Deliberation Room	Distributed convenience outlets, including provisions for cleaning/ housekeeping. Outlets (GFI) on separate circuit for kitchen type service unit equipment (microwave, coffee maker). Outlets for film/ slide projection equipment, TV monitor and VCR, audio tape recorder/player. Outlet for wall-mounted clock.	Computer and office equipment (PC, monitor, printer) not in FF&E budget.
Other areas	Distributed convenience outlets, including provisions for cleaning/ housekeeping.	GFI in toilet areas, per codes.
GRAND JURY		
Witness Box	Duplex receptacle.	
Jury Seating	Convenience outlets, including provisions for cleaning equipment and motor loads.	
Court Reporter's Workstation	One quadriplex receptacle (general use), one duplex receptacle for reporter's computer/CRT.	Provide additional duplex receptacle(s) at alternate court reporter position(s) if applicable.
Attorney Tables	One quadriplex receptacle (general use). Recessed floor box, if appropriate. Foreperson One quadriplex receptacle (general use).	Recessed floor box, if appropriate.
Other areas	Distributed convenience outlets, including provisions for cleaning/ housekeeping.	GFI in toilet areas, per codes.
General	Distributed convenience outlets, including provisions for cleaning/ housekeeping. Outlets (GFI) on separate circuit for kitchen type service unit equipment (microwave, coffee maker). Outlets for film/ slide projection equipment, TV monitor and VCR, audio tape recorder/player. Outlet for wall-mounted clock. Power for sound, video system, if any.	Computer and office equipment (PC, monitor, printer) not in FF&E budget.

LOCATION	EQUIPMENT/OUTLET(S)	NOTES
GRAND JURY (continued)		
Other areas	Distributed convenience outlets, including provisions for cleaning/ housekeeping.	GFI in toilet areas, per codes.
JURY ASSEMBLY		
Jury Assembly Room	Distributed convenience outlets. Provide outlets as required for video conferencing equipment, video monitors/VCR equipment, security, sound-system, ALS and other equipment, based on anticipated locations. Provide outlets for use at carrels and tables for jurors for personal use.	Computer and office equipment (PC, monitor, printer) not in FF&E budget.
Jury Clerk Workstation(s)	One quadriplex receptacle (general use). Duplex outlet(s), two minimum, for PC, monitor, printer, FAX.	Computer and office equipment (PC, monitor, printer) not in FF&E budget.
Other Area(s)	Distributed convenience outlets, including provisions for cleaning equipment/motor loads.	
LAW LIBRARY		
Circulation Desk	Outlets for PC, other equipment. Distributed convenience outlets.	
Public Waiting Areas	Distributed convenience outlets, including provisions for cleaning/housekeeping.	
Entry Control	Security equipment. Distributed convenience outlets, including provisions for cleaning/housekeeping.	Recessed floor box, if/as required.
Staff Offices	One quadriplex receptacle (general use). Duplex outlet(s), two minimum (for PC, monitor, printer, FAX) per workstation.	Computer and office equipment (PC, monitor, printer) not in FF&E budget.
Staff Work Areas	Distributed convenience outlets; quadriplex receptacle(s) for general purpose use. Additional outlet(s) for copier.	Computer and office equipment (PC, monitor, printer) not in FF&E budget.
CALR Areas	Duplex outlet(s), two minimum (for PC, monitor, printer, FAX) per workstation.	Recessed floor box, if/as required.
Carrel/Casual Seating Areas	Distributed convenience outlets. Provide outlets for use at carrels and tables.	
Conference/ Group Study/ Work Rooms	Multiple outlets (as required) for sound, ALS, data, telecommunication and video recording and presentation equipment. Duplex outlet for Microfiche machine.	

Table 9-3
Electrical Power Requirement/Outlets (continued)

LOCATION	EQUIPMENT/OUTLET(S)	NOTES
CLERK OF COURT AREAS		
Counter Work positions	One quadriplex receptacle (general use); duplex outlet(s), two minimum, for PC, monitor, printer, FAX; per workstation. Provide additional outlet(s) for cash registers, additional printers, shared-access PCs, printers.	Computer and office equipment (PC, monitor, printer) not in FF&E budget.
Public Waiting/ Document Viewing Areas	Provide duplex outlet(s) for public access PCs, monitor, printer, and FAX equipment. Provide outlet(s) on separate circuits for public access copier(s).	Computer and office equipment (PC, monitor, printer) not in FF&E budget.
Other staff Workstations	One quadriplex receptacle (general use). Duplex outlet(s), two minimum, for PC, monitor, printer, FAX.	Computer and office equipment (PC, monitor, printer) not in FF&E budget.
Shared staff work Areas	Distributed convenience outlets; quadriplex receptacle(s) for general purpose use. Additional outlet(s) for copier(s), FAX equipment, etc.	Computer and office equipment (PC, monitor, printer) not in FF&E budget.
Staff Break Areas	Distributed convenience outlets, including provisions for cleaning/ housekeeping. Outlets (GFI) on separate circuit for kitchen type service unit equipment (microwave, coffee maker).	Equipment not included in base building or FF&E budget.
Other Area(s)	Distributed convenience outlets, including provisions for cleaning equipment and motor loads.	
COURT-RELATED AGENCIES/ SPACES		
	Similar to Court Clerk/Court Administrative areas above.	

NOTE:
(1) For all electrical power and outlet requirements in USMS dedicated spaces, refer to USMS-RSSPSSM.
(2) The power outlet requirements for each project should be verified.

A secure, air-conditioned data/telecommunications closet should be located near the judges' chambers, courtroom, and court offices to contain network equipment. (The use of cable trays rather than conduits needs to be considered.)

Lighting Systems

Illumination levels, lighting types, and lighting controls in specific court functional areas are provided in the USCDG. In all other spaces, illumination levels and lighting controls will be provided as specified in Chapter 6. Task lighting must be variable to 100 FTC (1100 lx).

Color accuracy is of the highest priority in the courtroom. GSA will provide fixtures with accurate color rendition, and avoid the use of metal halide fixtures. The use of indirect pendant-mounted fluorescent fixtures provides good soft diffuse general lighting in a courtroom; complemented with recessed concentrated light sources at: the judge's bench; the witness box; and attorneys' tables. Lighting levels must consider the impact of courtroom finishes.

An override switch will be located at the judge's bench and at the courtroom deputy clerk station to allow instantaneous over-ride of all dimming controls in an emergency.

The following lighting controls can be specified, depending upon the size of the courtroom, lighting arrangements, and lamp types:

- A more complex lighting installation consisting of local, wall, box-type, electronic, silicon-controlled rectifier (SCR) dimmers; or
- Remote electronic dimmers with pre-set lighting arrangements, for large courtrooms with high ceilings.

Control of lighting is the responsibility of the courtroom deputy clerk or another designated court officer and should be operated with a key. Light switches will not be accessible from the spectator seating area or witness box. Provision of integrated electronic controls should be considered with pre-set lighting schemes having integrated controls for: shading devices at windows and skylights; plus controls for presentation screens (if provided by the Courts). The controls should allow varying levels of light to suit the needs and desires of the courtroom participants.

Electronic ballasts for fluorescent lamps should not be used in areas that contain sensitive security devices, or special equipment that is sensitive to electronic interference, such as ALD infrared emitters.

Guidelines for site illumination are specified in Chapter 6. Lighting in parking areas must allow for identification of vehicle color, and the design should avoid the use of low-pressure sodium fixtures.

Emergency lighting for courtrooms and security areas, to include USMS detention facilities, will have built-in batteries plus emergency generator service.

Areas that require battery back up in the event of power failure to maintain camera and direct visual surveillance include:

- Vehicular Sallyport;
- Prisoner Sallyport and Movement Corridors;
- Detention Cell Block areas;
- Communications Center;
- Prisoner Processing areas;
- Squad Room;
- Public Reception Rooms;
- Prisoner-Attorney Interview room;
- Court Holding Cell Areas;
- Judge's Chambers;
- Interconnecting door from Public Corridors to Controlled Corridors;
- Command and Control Center; and
- Courtrooms

Audio/Visual Systems in U.S. Court Facilities

All audio/visual design and technical requirements are indicated in the Administrative Office of the United States Courts (AOUSC) Publication: *Courtroom Technology Manual*.

9.8 Security Design

Agency Responsibilities

Courthouse security is the joint responsibility of the judiciary, GSA Federal Protective Service (FPS), and USMS. (The USMS has the primary role in security decisions.) Decisions regarding security planning and design are made by individual agencies and the local Court Security Committee (CSC), or for multi-tenant buildings, the Building Security Committee (BSC).

The CSC is responsible for identifying the court's specific security requirements and developing a security plan for judicial facilities and operations throughout the district.

All security systems and equipment must be consistent with requirements in: *ISC Security Design Criteria* (Class Medium level protection buildings); the Department of Justice's (DOJ) *Vulnerability Assessment of Federal Facilities* (Level IV buildings); and the *United States Courts Design Guide* (USCDG); and *Requirements and Specifications for Special Purpose and Support Space Manual Volumes 1-3,* USMS publication number 64. The CSC must be informed about and have the opportunity to review all security-related design decisions.

The USMS Central Courthouse Management Group's (CCMG) Facilities Management Team is responsible for design considerations involving secure prisoner movement, holding cell and interview facility requirements, and USMS-occupied office and support space. The Judicial Security Systems Team (JSST) within the CCMG is responsible for the planning, design, and installation of security systems in spaces occupied by the judiciary. The USMS coordinates the work of the security system and security construction contractors.

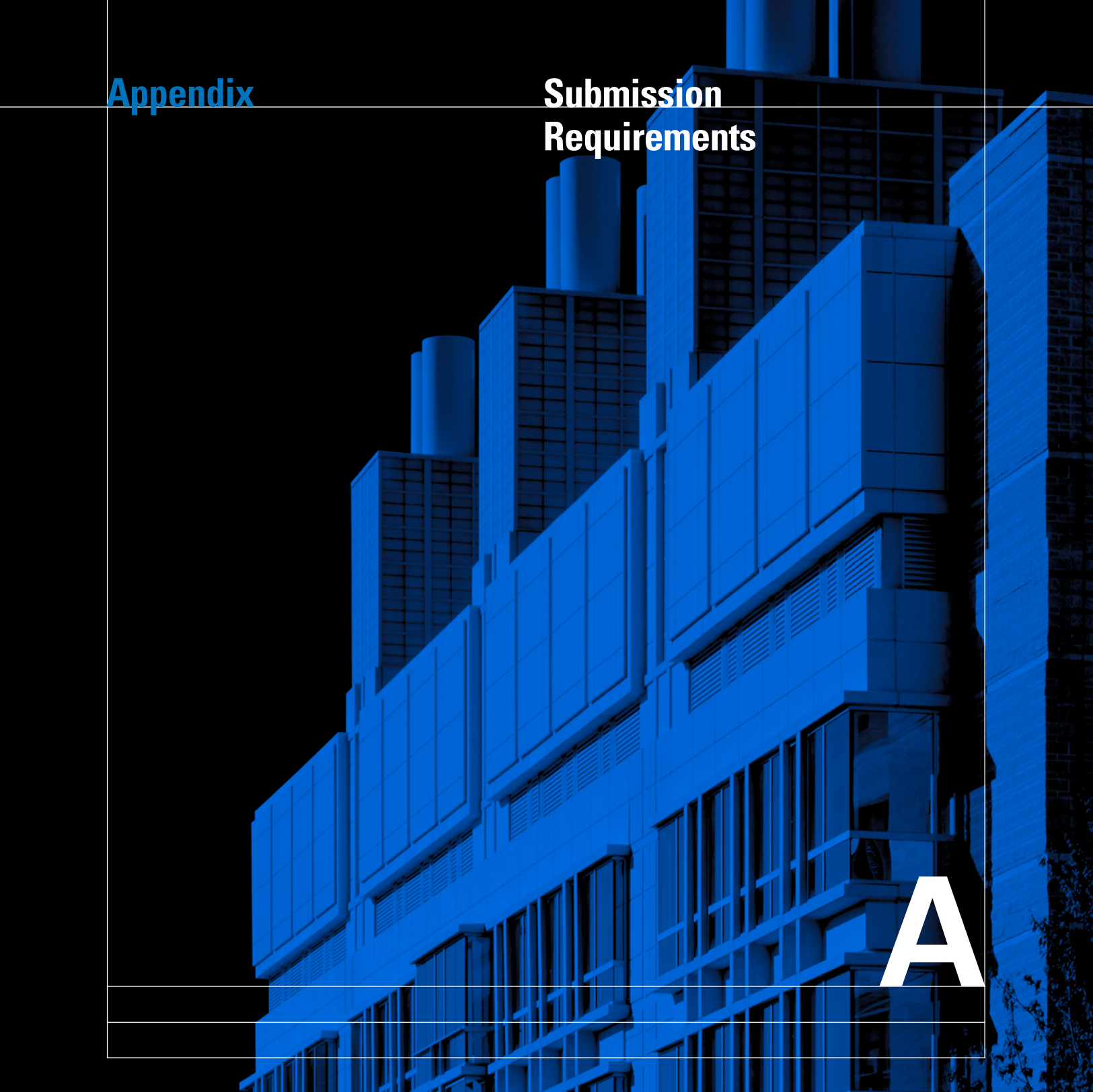
In addition, the CCMG often acts as security engineer for court buildings, designing and integrating security systems for building perimeters in conjunction with the GSA.

Refer to the USCDG for a more detailed explanation of security design responsibilities.

Once the functional planning criteria including security related issues, as outlined in the USCDG and USMS-RSSPSSM, is implemented into the conceptual design for the new or renovated courts facility, it is intended to help in the development of the technical drawings, specifications, and other information to incorporate the security components into the project.

Appendix

Submission Requirements

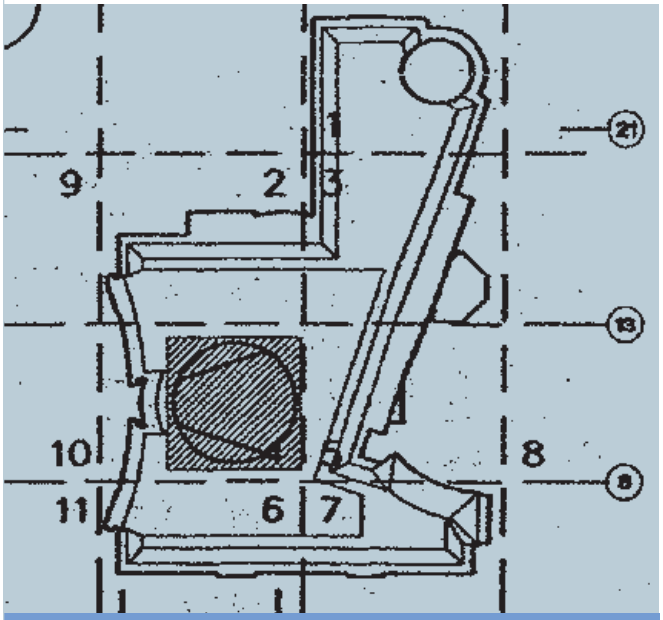


A

A.0 TABLE OF CONTENTS

Environmental Protection Agency
Research and Administration Facility
Research Triangle Park, North Carolina
Architect: Hellmuth, Obata + Kassabaum, P.C.
GSA Project Manager: Michael L. Pope
Photo: Alan Karachmer

A.1 General Requirements



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These design submission requirements have been developed to ensure a rational, well-documented design process and to facilitate reviews by GSA staff and tenant agencies as the design develops. The submission requirements listed here apply to all projects, whether design services are performed by architects and engineers under contract to GSA or by in-house staff.

These requirements are the minimum standards and the specific A/E Scope of Work will take precedence on each project.

All submissions in each phase of work are required to be given to the GSA in drawing or written form and on computer disk as determined by the GSA Project Manager.

Drawings

Drawing Size. All drawings of a single project must be a uniform standard size, as designated by the American National Standards Institute (ANSI). The following are related sheet sizes:

(A)	8.5" x 11"	220 mm x 280 mm
(B)	11" x 17"	280 mm x 430 mm
(C)	17" x 22"	430 mm x 560 mm
(D)	22" x 34"	560 mm x 860 mm
(E)	34" x 44"	860 mm x 1120 mm

Drawing Lettering. Lettering on drawings must be legible when drawings are reduced to half size and when they are microfilmed. This applies to concept and design development drawings as well as construction documents.

Drawing Scale. All drawings will be produced with metric drawing scales which are always expressed in non-dimensional ratios. Scales should also be illustrated graphically on the drawings. Scale of drawings should be appropriate for high resolution and legibility to include half-size reduced copies.

There are nine preferred base scales: 1:1 (full size), 1:5, 1:10, 1:20, 1:50, 1:100, 1:200, 1:500, 1:1000. Three others have limited usage: 1:2 (half size), 1:25, 1:250. Floor plans should be drawn at 1:100 (close to 1/8-inch scale).

CAD Standards. The National CAD/CIFM Standards should be obtained via the internet at www.gsa.gov/pbs/cifm/cifm_resources/standards.htm or by contacting the PBS CAD Center at (202) 501-9094, Fax: (202) 208-7147. These guidelines should be followed for all CAD drawing formatting. Regional CAD standards are available through the Regional CAD Coordinator and are considered supplements to the national standards. (Refer to the base scale examples in the previous paragraph.)

Dimensioning. The millimeter is the only unit of measurement to appear on construction documents for building plans and details for all disciplines except civil engineering, which shall be stated in meters. However, building elevation references are stated in meters. Use of millimeters is consistent with how dimensions are specified in major codes, such as BOCA. No dimension requires the "mm" label. On the drawings the unit symbol is eliminated and only an explanatory note such as: "All dimensions are shown in millimeters" or "All dimensions are shown in meters," is provided. Whole numbers always indicate millimeters; decimal numbers taken to three places always indicate meters. Centimeters will not be used for dimensioning.

If dual dimensioning is utilized on drawings, SI units shall be primary, with English units secondary and in parenthesis.

Seals. Each sheet of the construction documents must bear the seal and signature of the responsible design professional. (Specification and calculations cover page only.)

Cover Sheet. Provide code certification statement for compliance with specified codes and standards by each discipline with the professional seal and signature. The intent is to formally recognize the responsibility for compliance.

Security Requirements. All building plans, drawings and specifications prepared for construction or renovation, either in electronic or paper formats, must have imprinted on each page of the construction drawings or plans and on the label of electronic media, "**PROPERTY OF UNITED STATES GOVERNMENT - FOR OFFICIAL USE ONLY**" in a minimum of 14 point bold type.

The following paragraph will be noted on the cover page of the construction drawings set and on the cove page of the specifications:

> "**PROPERTY OF THE UNITED STATES GOVERNMENT. COPYING, DISSEMINATION, OR DISTRIBUTION OF THESE DRAWINGS, PLANS OR SPECIFICATIONS TO UNAUTHORIZED PERSONS IS PROHIBITED.**" in a minimum of 14 point bold type.

The construction drawings, plans, and specifications are to be disseminated only to those requiring the information necessary for design, construction bidding, construction coordination, or other GSA procurement competition processes.

Specifications

Format. Specifications should be produced according to the CSI division format. Each page should be numbered. Specifications should be bound and include a Table of Contents. The specifications shall include instructions to bidders and Division 1, edited to GSA requirements.

Project Specifications. The *General Guide for Editing Specifications* published by GSA can be obtained and used as a resource.

Editing of Specifications. It is the designer's responsibility to edit all specifications to reflect the project design intent, GSA policy requirements and Federal law. Specifications must be carefully coordinated with drawings to ensure that everything shown on the drawings is specified. Specification language that is not applicable to the project shall be deleted.

Dimensioning in Specifications. Domestically produced hard metric products shall be specified when they meet GSA guidelines regarding cost and availability; see Chapter 1, *General Requirements, Metric Standards* in this document. In the event a product is not available domestically in hard metric sizes, a non-metric sized product may be specified, and its data will be soft converted to a metric equivalent.

Only in special cases can dual dimensions be used on GSA projects, subject to the approval of the GSA Contracting Officer.

Turnover Documents. Documentation on all building systems should be provided for the guidance of the building engineering staff. This should show the actual elements that have been installed, how they performed during testing, and how they operate as a system in the completed facility.

The building staff should be provided with the following:

- Record drawings and specifications.
- Operating manuals with a schematic diagram, sequence of operation and system operating criteria for each system installed.
- Maintenance manuals with complete information for all major components in the facility.

Design Narratives and Calculations

Format. Typed, bound narratives should be produced for each design discipline.

Content. Narratives serve to explain the design intent and to document decisions made during the design process. Like drawings and specifications, narratives are an important permanent record of the building design. Drawings and specifications are a record of WHAT systems, materials and components the building contains; narratives should record WHY they were chosen. The narrative of each submittal may be based on the previous submittal, but it must be revised and expanded at each stage to reflect the current state of the design.

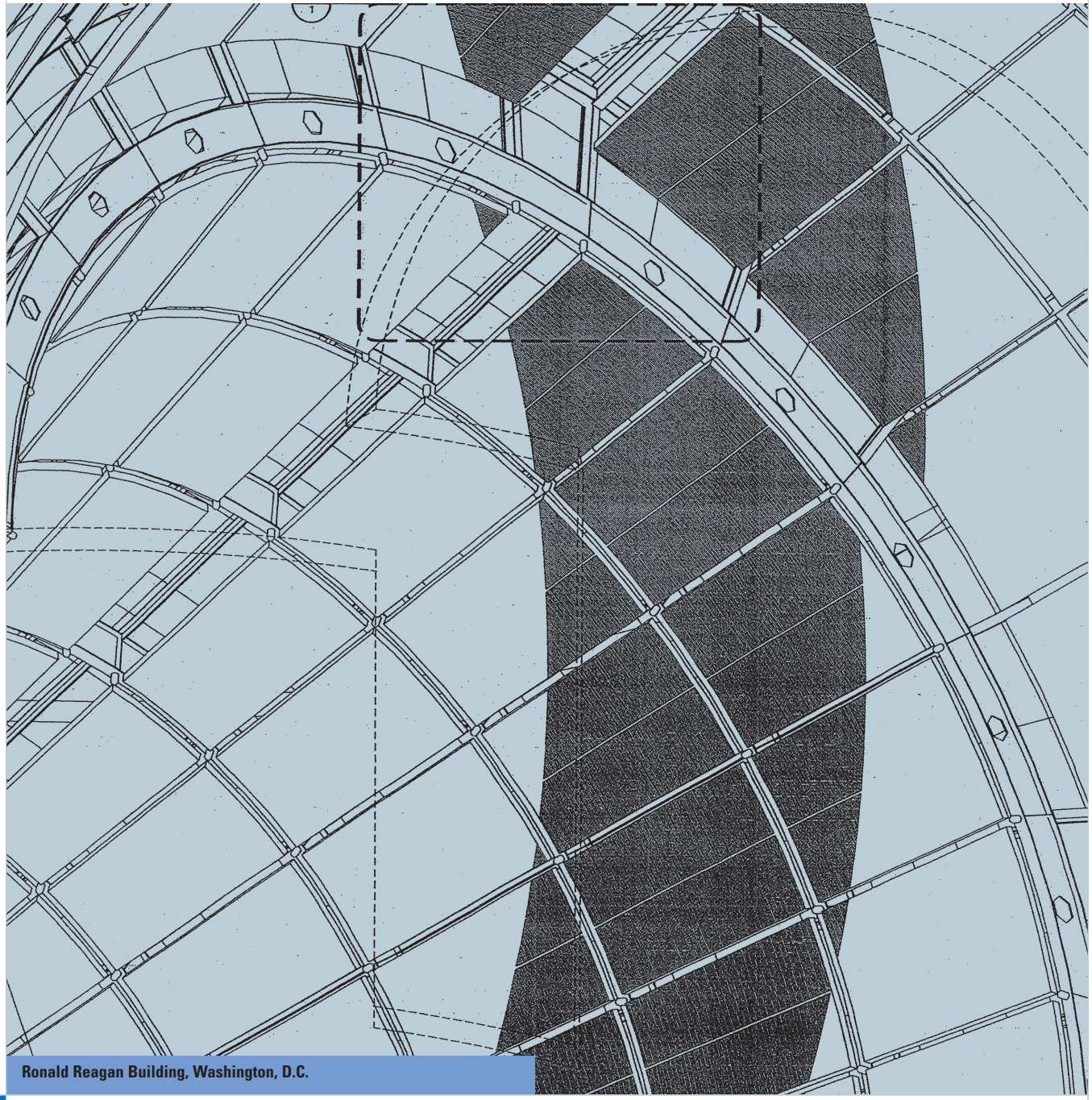
Calculations. Manual and/or computer based calculations should accompany narratives where required to support technical analysis. Each set of calculations should start with a summary sheet, which shows all assumptions, references applicable codes and standards, and lists the conclusions. Calculations should include engineering sketches as an aid to understanding by reviewers. The calculations for each submittal should be cumulative, so that the final submittal contains all calculations for the project. Calculations submitted at early stages of the project must be revised later to reflect the final design. Calculations must refer to code, paragraph of code used, standards, text books used for specific portion of calculation. Refer to drawing number where the results of the calculations have been used. Example: number and sizes of re-bars used in reinforced concrete members.

Performance Criteria. As part of the development of concepts through construction documents there shall be a check of building performance criteria as noted in A.2.

Cost Estimates

Cost estimates must be provided at various stages of the design process and must comply with the GSA document *Project Estimating Requirements*.

In addition to the designer's estimate, GSA will have independent estimates performed at approximately 30, 60, and 90 percent design completion to compare with the A/E estimate.



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A.2 Performance Expectations Matrices

At the beginning of each project, the GSA Project Manager, tenants and design A/E need to define the functional objectives of a project. A functional objectives matrix, similar to the one shown in Figure A-1, while not required, may be an effective tool to define these objectives. (Such a matrix may also exist within the project's design programming documents.) By providing a numeric impact weight (e.g. 1-3, where 3 is high) at each intercept, a graphic check list becomes apparent as to which systems/features are most important in delivering a project's performance expectations. The high impact matrix intercepts call for design solutions that will optimize functional interests, consistent with the need to integrate solutions that will support all functional objectives.

High impact intercepts require formal design team technical discussions to help optimize design solutions. These technical discussions shall take the form of either a pre-concept design charrette and/or through a series of design team technical meetings during the concept phase. The technical discussion agenda can be organized by discipline (systems) and/or by functional objective heading, but should address:

- Functional performance goals
- Integrated solution options
- Heading-off what can go wrong
- Inspections/certification requirements
- Coordinating construction and turnover-phase issues/deliverables

For both the design concept and design development submissions, the design A/E shall identify the attainment of building functional objectives as represented by the matrix. This shall take the form of a narrative report that by system indicates how the proposed design supports expected building performance.

The Functional Objectives Matrix can be further refined by establishing a matrix for each expectation, e.g. that provided for Sustainability, in figure A-2. While not required, these matrices may help ensure a comprehensive response to functional objectives by breaking down each major function into its component principles/objectives. Sample matrices for Productivity, Security, and other functional objectives are available upon request through the Office of the Chief Architect.

Figure A-1 Program Goals Matrix

SYSTEMS		FUNCTIONAL OBJECTIVES: Productivity	Sustainability	Security	Seismic	Fire Protection and Life Safety	Accessibility	Historic Preservation	Maintainable
Foundations		1	1	1	3	1	1	1	1
On/Below Grade		1	1	2	3	1	2	1	1
Superstructure		1	1	3	3	2	2	2	1
Enclosure	Walls	2	3	3	3	2	1	3	2
	Windows/Doors	3	3	3	2	1	3	3	3
Roofing	Coverings	1	3	2	1	3	1	3	3
	Openings	2	3	2	1	1	1	3	3
Interior Construction	Partitions/Doors	2	2	3	2	3	3	3	2
	Access Floors	3	1	1	2	2	1	1	1
Interior Finishes	Walls	3	2	1	1	2	1	1	2
	Floors	3	3	1	1	2	1	1	3
	Ceiling	3	3	1	2	2	1	1	3
Conveying		2	1	1	2	2	3	1	3
Plumbing		1	3	1	2	2	3	1	3
HVAC	Central Plant	3	3	1	2	1	1	1	3
	Distribution	3	3	1	2	3	1	1	3
Fire Protection		1	1	2	3	3	1	1	1
Electrical	Service/Distribution	2	1	2	3	2	1	1	1
	Lighting	3	3	3	2	2	1	1	3
Equipment		1	1	3	1	2	1	1	2
Furnishings		3	3	1	1	2	3	1	2
Special Construction		1	2	1	2	2	1	1	2
Demolition	Building Elements	3	3	1	1	1	1	3	1
	Hazard Mat.	3	3	1	1	1	1	1	1
Building Sitework	Site Preparation	1	3	1	1	1	2	1	1
	Landscaping	2	3	2	1	1	1	1	3
	Utilities	1	1	1	3	2	1	1	2
Trans. Sitework		2	3	1	2	1	3	1	2

Figure A-2 Sustainability Matrix

SYSTEMS		PRINCIPLES / OBJECTIVES: Energy	Water	Materials	In. Env. Qual.	Site & Trans.	O & M
Foundations		1	1	2	1	1	1
On/Below Grade		1	1	2	1	1	2
Superstructure		1	1	2	1	1	2
Enclosure	Walls	3	1	2	2	1	3
	Windows/Doors	3	1	1	2	1	3
Roofing	Coverings	3	1	2	3	1	3
	Openings	3	1	1	2	1	3
Interior Construction	Partitions/Doors	1	1	3	3	1	3
	Access Floors	1	1	2	1	1	3
Interior Finishes	Walls	2	1	3	2	1	3
Floors		2	1	3	2	1	3
	Ceiling	2	1	3	2	1	3
Conveying		2	1	1	1	1	3
Plumbing		3	3	1	1	1	2
HVAC	Central Plant	3	3	2	1	1	3
	Distribution	3	2	1	3	1	3
Fire Protection		1	1	1	1	1	1
Electrical	Service/Distribution	1	1	1	1	1	1
	Lighting	3	1	1	2	2	2
Equipment		2	2	1	1	1	1
Furnishings		1	1	2	2	1	2
Special Construction		1	1	1	1	2	1
Demolition	Building Elements	1	1	2	2	2	1
	Hazard Mat.	1	1	3	3	2	1
Building Sitework	Site Preparation	2	1	1	1	3	2
	Landscaping	3	3	2	1	2	2
	Utilities	1	1	1	1	1	1
Trans. Sitework		2	1	1	1	3	1

A.3 New Construction and Modernizations

The design process and related submission requirements for new construction and modernizations are somewhat different than those for alteration projects. A modernization is defined as the comprehensive replacement or restoration of virtually all major systems, tenant-related interior work (such as ceilings, partitions, doors, floor finishes, etc.) and building elements and features. The following flow diagram and related definitions describe this process.

Peer review, arranged through the Office of the Chief Architect, is required for all new construction projects as well as any modernization project with significant alterations to either the building aesthetic or systems. All new construction projects, as well as modernization projects which significantly alter an existing structure shall be presented to the Commissioner and Chief Architect for approval in Washington D.C.

Design Process Definitions

General. These definitions are for new construction. Some requirements will be eliminated for a modernization project, such as zoning area, form, massing, etc.

Program Review

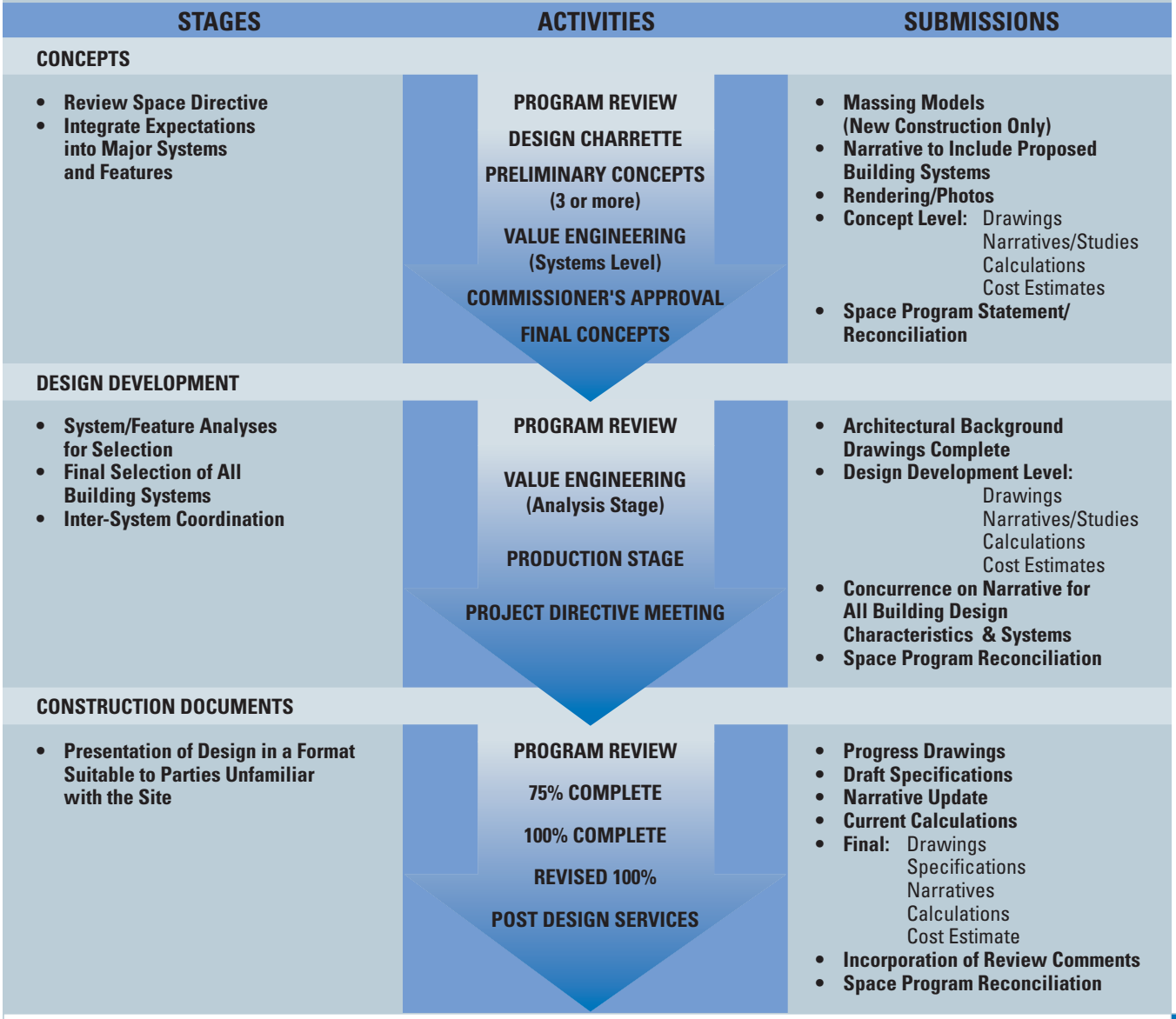
Prior to initiating each phase of design, the design team should meet to review design program expectations and to exchange ideas, lessons-learned, and concerns. Such technical "partnering" sessions allow a clearer definition of expectations while remaining within the project's scope and budget.

Concepts

A submission that will demonstrate compliance with the Building Program (space tabulation of building program) including all adjacency and functional requirements. This submission will also show that the proposed project is within the zoning area, and that the building and massing are compatible with the surroundings. The aesthetics should support the design philosophy of GSA shown in the general approach to architecture in the preceding chapters of this document. Building systems and building envelope appropriate for the conceptual designs should be defined in order that they can be evaluated early for effectiveness and efficiency related to operation, maintenance and energy consumption.

Since there are many options to accomplish these ends with any particular program and site, GSA will participate in the normal design process of comparing options by working with the A/E through preliminary concepts. During preliminary concepts, three concepts must be presented; these preliminary concepts are intended to be working level and not presentation documents. They should be developed only to the level that allows selection of a concept that will still be within program operation

Figure A-3 Design Process and Related Submission Requirements for New Construction and Modernization



and budget goals. This selected concept will be further refined and presented as the final concept.

For major projects, presentation is made to the Commissioner of the Public Buildings Service for final approval.

Design Development

A set of submissions and meetings that will finalize the selection of all systems with respect to type, size and other material characteristics. Systems are not only structural, mechanical, fire protection and electrical, but include all other building components such as the building envelope (wall, window and roof), interior construction (flooring, ceiling and partitions), service spaces, elevators, etc.

The design submission will consist of a combination of drawings, narrative and calculations. Although final design development plans, sections and elevations must be to scale, drawings made in the analysis stage to illustrate various options may be freehand.

This submission is not a preliminary construction document stage. The approval at the project directive meeting may require that building layout or size changes be incorporated into the construction documents. No design discipline should start work on construction documents until the project directive has been approved.

Life Cycle Cost Analysis. As specified herein and within programming requirements, life cycle cost assessments shall be made, leading to system/feature selections.

Production Stage. Development of the most favored of each system with supporting calculations and narrative. Plans, sections, elevations and details showing systems should be included.

Value Engineering (Analysis Stage). VE is a process that is somewhat continuous throughout the project but its greatest emphasis should be in the early stages of the project (concepts and design development). Initially it should focus on building systems and materials in a general sense during concepts. As the project is developed the focus will shift to detailed aspects of the earlier decisions during design development.

- Diagrams, narratives, and sketches with calculations to demonstrate the life-cycle cost effectiveness of the system should be prepared and received during this phase.
- This approach requires a diligent effort and commitment by all project team members early in the project to systems and materials that make sense economically and allow quality and durability.

Project Directive. The report summarizes analysis and design to date at completion of the design development phase. A meeting among GSA and A/E staff, particularly those who will be working on the construction documents, is held to review the project directive for concurrence.

Construction Documents

A set of detailed and coordinated submissions that become the basis of a construction contract. The notes on these should result in a single interpretation of a specific set of data or facts and, therefore, become the basis of a competitive price proposal. Construction documents should avoid using terms that the design specialist may know, but which have nothing to do with the purchase and installation of a product. Individual GSA regions may request a single or multiple submissions (i.e. 75 percent, 100 percent) as appropriate. Reviews may be both formal and informal ("onboard"). Language between specifications and notes on the drawings must be consistent and complementary.

Design Awards

Every two years GSA recognizes outstanding projects through its biennial Design Awards program. Designers are required to submit each new construction project for consideration.

Site Analysis and Preliminary Concepts

Requirements. The preliminary concepts submittal consists of three or more distinctly different architectural design schemes presented in sketch format (single line, drawn freehand to scale), along with massing models, site slides and photographs, and sufficient narrative to allow comparison and selection of a design direction for preparation of a final design concept.

- **Site Survey.** If a survey is part of the scope of work for the project, see Appendix A.5 for requirements.
- **Sketches.** It may be recognized that the information requested in subparagraphs 1 and 2 may be in progress and not yet complete.

1. Site location plan [at least 2 kilometers (1.25 miles) around site], showing:
   - Site relative to location of city center, major landmarks, major parking facilities, major roads and airport.
   - Location of subway stations and other mass transit links.

2. Existing site plan (at least one block around site), describing:
   - Site boundaries, approximate topography, existing buildings, setbacks and easements.
   - Climatic conditions including path of sun.
   - Location of on-site and off-site utilities.
   - Natural landscape.
   - Pedestrian and vehicular circulation. (Include direction of traffic on adjoining streets.)

3. Site plans for each design scheme, showing:
   - Building location and massing.
   - Building expansion potential.
   - Parking and service areas.

4. Floor plans, showing as a minimum:
   - Entrances, lobbies, corridors, stairways, elevators, work areas, special spaces, mechanical rooms for major equipment and air handlers, and service spaces (with the principal spaces labeled). Dimensions for critical clearances, such as vehicle access, should be indicated.

5. Building sections (as necessary), showing:
   - Floor-to-floor heights and other critical dimensions.
   - Labeling of most important spaces.
   - Labeling of floor and roof elevations.

Slides.

1. Minimum of six 35 mm slides showing the site and elevations of existing buildings (or landscape, as applicable) surrounding the site.

Models.

1. Massing models of each architectural design scheme on a common base. (No fenestration should be provided at this stage of design development.)

Narrative (in "Executive Summary" format).

1. Site statement, describing:
   - Existing site features.
   - Climatic conditions.
   - Topography and drainage patterns.
   - Any existing erosion conditions.
   - Wetlands and locations of flood plains.
   - Surrounding buildings (style, scale).
   - Circulation patterns around site.
   - Site access.
   - Noise/visual considerations.
   - Local zoning restrictions.
   - Federal Aviation Agency requirements.
   - Hazardous waste.
   - Pollution.
   - Potential archeological artifacts.
   - Historic preservation considerations, if applicable.

2. Site photographs, showing contiguous areas and effected preservation zones.

3. Existing major site utilities.

4. Description of each architectural design scheme, explaining:
   - Organizational concept.
   - Expansion potential.
   - Building efficiency.
   - Energy considerations.
   - Advantages and disadvantages.
   - Historic preservation considerations, if applicable.
   - Sustainable design considerations.
   - Baseline mechanical system and strategy to comply with the assigned energy goal.
   - Fire protection design considerations.

5. Code statement.
   - Provide a brief statement from each design team discipline member regarding the Code requirements that relate to the site and occupancy use. For example, items such as, but not limited to: classification of construction and occupancy group(s), fire resistance requirements and general egress requirements, etc. would be prepared by the design team fire protection engineer.

6. Construction cost of alternative schemes.
   – Verify that each design scheme presented can be constructed within the project budget.

7. Space Program Statement/Reconciliation

8. Preliminary Energy Analysis for compliance with the assigned Energy Goals for each architectural concept.

9. Art in Architecture Statement.
   – Provide statement defining the integration of Art in Architecture. At a minimum identify the location for the proposed art concept.

10. A description of any deviation from the PBS P100.

Final Concept

Site Planning and Landscape Design

The following information must be complete for the final concept submittal of all buildings. (If materials produced for the preliminary concepts submittal do not require modification, such materials are acceptable for this submission.)

Drawings.

1. Site plan (at least one block around site), describing:
   – Site boundaries, approximate topography, existing buildings, setbacks and easements.
   – Building orientation with respect to path of sun.
   – Building massing and relationship to massing of surrounding buildings.
   – Future building expansion potential.
   – Location of on-site and off-site utilities.
   – Grading and drainage.
   – General landscape design, showing location of major features.
   – Pedestrian and vehicular circulation. (Include direction of traffic on adjoining streets.)
   – Parking and service areas.
   – Fire protection, water supplies, fire hydrants, and fire apparatus access roads.

Narrative.

1. Description of site and landscape design final concept.
   – Circulation.
   – Parking.
   – Paving.
   – Landscape design.
   – Irrigation, if any.
   – Utility distribution and collection systems.
   – Method for storm water detention or retention.
   – Landscape maintenance concept.
   – Fire protection, water supplies, fire hydrants, and fire apparatus access roads.
   – Accessibility path for the physically disabled.

Architectural

Drawings.

1. Floor plans, showing as a minimum:
   - Work areas, lobbies, corridors, entrances, stairways, elevators, special spaces and service spaces (with the principal spaces labeled). Dimensions for critical clearances, such as vehicle access, should be indicated.
   - Office areas must show proposed layouts down to the office level of detail verifying the integration between the approved program and the building concept is achievable.
   - Indicate how major mechanical and electrical equipment can be removed/replaced.

2. Elevations of major building façades, showing:
   - Fenestration.
   - Exterior materials.
   - Cast shadows.

3. Building sections (as necessary), showing:
   - Adequate space for structural, mechanical and electrical, telecommunications and fire protection systems.
   - Mechanical penthouses.
   - Floor-to-floor and other critical dimensions.
   - Labeling of most important spaces.
   - Labeling of floor and roof elevations.

4. Color rendering. [Minimum size must be 600 mm by 900 mm (24 inches by 36 inches).]

Photographs.

1. Four 200 mm by 250 mm (8-inch by 10-inch) color photographs, mounted, identified and framed, and two color slides, of the rendering or model image (showing at least 2 vantage points). In addition, provide for all building elevations (at least 1 vantage point per each elevation).
   - Two of the photographs and the two slides are to be sent to the GSA project manager.
   - Provide two additional 600 mm by 900 mm (24-inch by 36-inch) photographs of the rendering for the GSA project manager. (For courthouse projects only.)

Model.

1. Provide a model of the final concept with sufficient detail to convey the architectural intent of the design.

Narrative.

1. Architectural program requirements.
   - Show in tabular form how the final concept meets the program requirements for each critical function.
   - A revised description of any deviation from PBS-P100

2. Description of final concept, explaining:
   - Expansion potential.
   - Building floor efficiency.
   - Conveying systems design (elevators, escalators).
   - Design strategy to attain the assigned energy goal.
   - Treatment of historic zones, if applicable.
   - Operations and maintenance goals (exterior and interior window washing, relamping, etc.).
   - Sustainable design concepts (LEED strategy).

3. Vertical transportation analysis (elevators and escalators).

4. Code analysis.
   The Code criteria shall be reviewed by each design team discipline member to the degree of detail necessary to assure that tasks accomplished in this phase meet all the Code requirements.
   – A Code/Criteria analysis shall be prepared by each design team discipline member that documents an investigation of the applicable codes and agency criteria that will govern the design of a specific project. This analysis should alert the Government to any conflicts in the project's design criteria so that they can be resolved early. The analysis should also provide a common perspective for the design and review of the project. This analysis is probably most critical in building modernization and repair/alteration projects.

5. Construction cost.
   – Verify that the final concept can be constructed within the project budget.

6. Identify architectural systems alternatives which will be analyzed during design development for life cycle cost analysis.

Historic Preservation

8.5" x 11" report, signed by qualified preservation architect, including

Narrative.

1. General: Project purpose, scope, groups and individuals involved

2. Existing conditions, describing:
   – Overall building size, configuration, character
   – Project location
   – Existing original materials and design, relevant alterations

3. Preservation design issues and prospective solutions, including:
   – Location of new work/installation: visibility, impact on historic finishes
   – Compare options for preserving/restoring historic materials and design
   – Identify further study required to avoid adverse effects as applicable

Photographs.

   – General and detail views showing existing conditions at affected preservation zones, keyed to plan showing location and orientation of each view
   – Captions identifying location, subject, condition shown

Drawings.

Reduced to 8.5" x 11, 11" x 17" foldout or placed in cover pocket:
   – Site and floor plans, as applicable
   – Sketches or schematic CAD drawings (elevations, plans) showing preservation design concepts

Structural

Drawings.

1. Plans, showing:
   - Framing plans of the proposed structural system showing column locations; bay sizes; and location of expansion and seismic joints.

Narrative.

1. Identification of any unusual local code requirements.

2. Code compliance statement.
   - Name of model building code followed.
   - Building classification.
   - Identification of Region of Seismicity, wind speed, etc.
   - Identification of special requirements, such as highrise.

3. For new buildings:
   - Statement certifying that the structural engineer has reviewed the building configuration for seismic adequacy, and the criteria outlined in Chapter 4, *Structural Engineering,* have been met. This statement must be signed by the structural engineer and the architect.

Mechanical

For the system approved and selected from the three concepts, provide the following:

Drawings.

1. Floor Plan(s):
   - Identification of equipment spaces for major equipment.
   - Location of major equipment, including size, weight, and clearance requirements.

2. Flow Diagram(s):
   - Air flow diagrams representing final concept of systems for each major space.
   - Air flow diagrams representing final concept of building system.
   - Water flow diagrams of the main mechanical system in the mechanical room(s) and throughout the building.

Narrative.

A written narrative describing the selected mechanical system and equipment, including:

- Design conditions.
- Ventilation rates, dehumidification and pressurization criteria.
- Equipment capacities, weights, sizes and power requirements.
- Description of heating, cooling, ventilating, and dehumidification systems for each major functional space.
- Fuel and utility requirements.
- A code compliance statement.

Calculations and Energy Analysis.

- Building load calculations.
- Psychometric calculations for full load and partial load utilization in summer, winter, spring, and fall. (Partial loads at 50% and 25%, and unoccupied hours.)
- Energy and life cycle cost analysis using DOE-2, or approved equal.
- Fuel consumption estimates.

Specifications.

- Table of Contents identifying specifications to be used on the project.

Cost Estimates.

- Cost of total HVAC system.
- Cost of major equipment.
- Cost of air distribution and piping system materials.

Fire Protection

Fire protection and life safety submission requirements shall be identified as a separate Fire Protection section as outlined in this document.

Drawings.

1. Plans showing:
   - Equipment spaces for fire protection systems (e.g., fire pump, fire alarm, etc.).
   - Fire protection water supplies, fire hydrant locations, fire apparatus access roads, and fire lanes.

Narrative.

1. Description of the building's proposed fire protection systems including the egress system.

2. Code compliance analysis
   - The design team fire protection engineer shall prepare an analysis of the applicable codes and agency criteria that will govern the design of the specific project. For example, items such as, but not limited to: classification of construction and occupancy group(s), rating of structural components, fire resistance requirements, interior finish, occupant load calculations, exit calculations, identification of areas to receive automatic sprinkler systems and/or automatic detection systems, smoke control systems, etc. would be prepared by the design team fire protection engineer as necessary to provide a complete fire protection and life safety analysis for the Final Concept.

Electrical

Drawings.

1. Plans showing equipment spaces for all electrical equipment to include: panels; switchboards; transformers; UPS; and generators.

Narrative.

1. Description of at least two potential electrical systems and a baseline system.
   – General characteristics of a baseline system are described in Chapter 1, *General Requirements* of this document.

2. Proposed special features of electrical system.

3. Code compliance statement.

Certification Requirements

1. The architect/engineer (lead designer) must certify that the project has been conceptualized to comply with *ASHRAE 90.1* and will meet GSA's energy goal requirement.

2. Green building (sustainable) design concepts—LEEDS strategy.

3. Life cycle cost analysis.
   – VE decisions and commitments that were made during this phase by the Project Team.

4. In bullet form, identify how proposed design features will support performance expectations of the project. Expectations are identified in the project's design program and within the Functional Objectives Matrix in Appendix A.2.

Final Concept Cost Estimate

A cost estimate must be provided. It should comply with the requirements for the concept stage estimate stated in GSA document *Project Estimating Requirements*.

Cost estimates must separate costs for interior tenant buildout from core/shell cost items as described in the *GSA New Pricing Guide*. The interior buildout cost must be divided by each building tenant.

Design Development

Site Planning and Landscape Design

Calculations.

1. Site storm drainage combined with building storm drainage, and sanitary sewer calculations.

2. Storm water detention calculations, if applicable.

3. Parking calculations, if applicable.

4. Dewatering calculations
   - Calculations modeling dewatering rates during dry and wet season excavation. Calculations must take into account effect of dewatering on adjacent structures and improvements.
   - Calculations must assume a specific shoring system as part of a comprehensive excavation system.

Narrative.

1. Site circulation concept, explaining:
   - Reasons for site circulation design and number of site entrances.
   - Reasons and/or calculations for number of parking spaces provided.
   - Reasoning for design of service area(s), including description of number and sizes of trucks that can be accommodated.
   - Proposed scheme for waste removal.
   - Proposed scheme for fire apparatus access and fire lanes.

2. Site utilities distribution concept.
   - Brief description of fire protection water supplies.
   - Brief description of fire hydrant locations.

3. Drainage design concept.

4. Landscape design concept, explaining:
   - Reasoning for landscape design, paving, site furnishings, and any water features.
   - Reasoning for choice of plant materials.
   - Proposed landscape maintenance plan and water conservation plan.
   - Brief operating description of irrigation system.

5. Site construction description.
   - Brief description of materials proposed for pavements and utilities.

Code analysis.

1. The Code criteria shall be reviewed by each design team discipline member to the degree of detail necessary to assure that tasks accomplished in this phase meet all the Code requirements.
   - Identify local zoning and all building code requirements and provide a complete analysis as they pertain to the project.

Drawings.

1. Site layout plan, showing:
   - All buildings, roads, walks, parking and other paved areas (including type of pavement).
   - Accessible route from parking areas and from public street to main facility entrance.
   - Fire apparatus and fire lanes.

2. Grading and drainage plan, showing:
   – Site grading and storm drainage inlets, including storm water detention features.

3. Site utilities plan, showing:
   – Sizes and locations of domestic and fire protection water supply lines, sanitary sewer lines, steam/condensate lines, and chilled water supply and return lines, if applicable.

4. Landscape design plan, showing:
   – General areas of planting, paving, site furniture, water features, etc.

5. Irrigation plan, if applicable.

Architectural

Calculations.

1. Acoustical calculations.

2. Dew point location.

3. Toilet fixture count.

Narrative.

1. Building concept, explaining:
   – Reasons for building massing, entrance locations and service locations.
   – Building circulation and arrangement of major spaces.
   – Interior design.
   – Adherence to the Building Preservation Plan, if applicable.
   – Energy conservation design elements.
   – Water conservation considerations.
   – Explain how all these design considerations are combined to provide a well integrated cohesive design concept.

2. Analysis of refuse removal, recycled materials storage and removal, and maintenance requirements.

3. Building construction description, explaining:
   – Structural bay size.
   – Exterior materials, waterproofing, air barriers/vapor retarders, and insulation elements.
   – Roofing system(s).
   – Exterior glazing system.
   – Interior finishes, with detailed explanation for public spaces.
   – Potential locations for artwork commissioned under the "Art in Architecture " program, if applicable.
   – Use of recycled materials.
   – Sustainable design concepts and LEED strategy

4. Review of project for code compliance.
   – Code criteria should be reviewed by each discipline to the degree of detail necessary to assure that tasks accomplished in this phase meet the code requirements.

5. For major alterations, provide a determination whether an accessible floor is needed.

6. Building maintenance, explaining:
   – How unique and tall architectural spaces such as atriums or grand staircases will be cleaned, have their light fixtures maintained, have interior and exterior glass surfaces cleaned and typical maintenance performed.
   – How courtrooms, dining facilities and other assembly spaces with fixed seating, multi-level spaces or with sloped floors will have their ceilings, lights and other ceiling elements maintained and repaired.
   – Proposed scheme for window washing equipment.
   – Consideration and prevention of bird nesting on exterior surfaces.
   – How major mechanical and electrical equipment can be serviced and/or replaced in future years.

7. Review of building for compliance with project specific criteria as noted in Chapter 8, *Security Design*.

8. Description of process for servicing and replacement of equipment given the necessary dimension clearances.

9. Program Status and Reconciliation Report.
   – Report verifying the current design's compliance with the approved space program. Any deviations must be clearly reported.

10. Curtainwall Report.
   – In projects with complex curtainwall systems, describe size and locations of major movement joints to accommodate structural drift due to seismic and/or wind loading. Describe proposed curtainwall attachment methods to accommodate these lateral movements.
   – Describe water migration, and fire safety systems.
   – Describe typical interfaces between exterior wall system and interior finishes.
   – Describe interfaces between major enclosure assemblies such as glass curtain wall to precast or stone panels.
   – Identification of at least three suppliers that can provide proposed exterior wall system.
   – Address any requirement for blast resistance in the context of "Windgard" simulations and/or blast testing results, as provided by the Office of the Chief Architect.

11. Building Keying and Signage Report.
   – Report must fully define the keying hierarchy for the entire building incorporating various levels of access, security, and fire egress. A/E should coordinate with GSA Fire Safety Engineer for keying.
   – Signage system and room numbering system must be integrated with keying system.

12. Provide two Finish Boards for both Public and Tenant interior areas composed of actual material samples and color coded plans and sections of major spaces showing their use.

Drawings.

1. Building floor plans, showing:
   - Spaces individually delineated and labeled.
   - Enlarged layouts of special spaces.
   - Dimensions.
   - Planning module.

2. Building roof plan, showing:
   - Drainage design, including minimum roof slope.
   - Dimensions.
   - Membrane and insulation configuration of the roofing system.

3. Elevations, showing:
   - Entrances, window arrangements, doors.
   - Exterior materials with major vertical and horizontal joints.
   - Roof levels.
   - Raised flooring and suspended ceiling space.
   - Dimensions.

4. One longitudinal and one transverse section, showing:
   - Floor-to-floor dimensions.
   - Stairs and elevators.
   - Typical ceiling heights.
   - General roof construction.

5. Exterior wall sections, showing:
   - Materials of exterior wall construction, including flashing, connections, method of anchoring, insulation, vapor retarders, and glazing treatments.
   - Vertical arrangement of interior space, including accommodation of mechanical and electrical services in the floor and ceiling zones.

6. Proposed room finish schedule, showing:
   - Floors, bases, walls and ceilings.
   - (Finish schedule may be bound into narrative.)

7. Perspective sketches, renderings and/or presentation model, if included in the project scope.

8. Proposed site furniture, showing:
   - Site furniture cut sheets or photos
   - Proposed locations.

9. Diagrams illustrating the ability to access, service and replace mechanical/electrical equipment showing the pathway with necessary clearance.

10. Location of accessible pathways and services for the physically disabled.

11. Placement of Art-in-Architecture elements.

Photographs.

1. Two sets each of 35 mm slides and 200 mm by 250 mm (8 inch by 10 inch) photographs for: rendering or model image (if changed from concept submission); and elevation views for all exposures (if changed from concept submission).

Historic Preservation

8.5" x 11" report, signed by qualified preservation architect, including

Narrative.

1. General: Project purpose, scope, groups and individuals involved, substantive changes to approach described in concept submission

2. Existing conditions, describing:
   - Overall building size, configuration, character
   - Project location
   - Existing original materials and design, alterations.
   - New findings from testing or analysis in concept phase

3. Preservation solutions explored, how resolved and why, including:
   - Location of new work: visual impact, protection of ornamental finishes
   - Design of new work/installation: visual and physical compatibility with existing original materials and design; materials/finishes chosen
   - Methods of supporting new work/installation
   - Preservation and protection of historic materials during construction through tenant move in

4. Effects, describing:
   - How project will affect the building's architecturally significant qualities
   - Measures proposed to mitigate any adverse effects on historic materials or design

Photographs.

- General and detail views showing existing conditions at affected preservation zones, keyed to plan showing location and orientation of each photo view
- Captions identifying location, subject, condition shown

Drawings.

Reduced to 8.5" x 11, 11" x 17" foldout or placed in cover pocket:

- Site and floor plans, as applicable
- Elevations, plans, and section details showing preservation design solutions for each issue identified, as approved by Regional Preservation Officer

Cover.

Building name, Address, Project title, Project Control Number, Author (Preservation Architect), Preservation Architect's Signature, Date of Submission.

Structural

Calculations. For any computer-generated results, submit a program user's manual, a model of the input data and all pertinent program material required to understand the output. A narrative of the input and results for computer-generated calculations for the recommended structural concept should be contained in the calculations as well.

1. Gravity load and lateral load calculations, with tabulated results showing framing schedules.

2. Foundation calculations.

3. Calculations showing that the system is not vulnerable to progressive collapse.

4. Vibration calculations.

5. Blast calculations.

Narrative.

1. Code criteria should be reviewed by each discipline to the degree of detail necessary to assure that tasks accomplished in this phase meet the code requirements.

2. Comparative cost analysis of at least three potential framing systems.
   – The analysis should compare first costs based on the design of a typical cross section of the building, one interior column bay in width, including a comparison of lateral load-resisting elements. Nonstructural building systems that have a bearing on the overall cost of the systems must be included. For example, in a comparison between steel and concrete systems, the cost of fireproofing the steel structure must be considered, if fireproofing is required by code.
   – The analysis should include a brief narrative listing factors that may have a bearing on the final selection, such as the availability of local labor skilled in the erection systems, speed of construction and other concerns.

3. Description of recommended structural concept, including:
   – Choice of framing system, including lateral load-resisting elements, and proposed foundation design.
   – Verification of adequacy of all assumed dead and live loads.

4. Identify all code requirements and provide a complete analysis as it pertains to this project including but not limited to:
   – Required fire-resistance rating of structural elements.
   – Summary of special requirements resulting from applicable local codes.

5. Proposed methods of corrosion protection, if applicable.

6. Geotechnical Engineering Report, including boring logs (if part of scope of work).
   – See Appendix A.5 for specific requirements.

7. Geologic Hazard Report.
   – See Appendix A.5 for specific requirements.

8. Blast consultant's report and analysis (if part of scope of work).

Drawings.

1. Framing plans and key details.

Mechanical

Drawings.

HVAC

1. Floor plan(s):
   - Single line piping and ductwork schematic layout.
   - Show terminal air devices.
   - Perimeter terminal units.
   - Quarter-inch scale drawings of mechanical equipment room(s) showing all mechanical equipment serving the project, including equipment access and service requirements.
   - Roof plan showing all roof mounted equipment.
   - Show adequate access from mechanical equipment room(s) to freight elevators.
   - Show adequate access to roof-mounted equipment.

2. Single line schematic flow and riser diagram(s):
   - Airflow quantities and balancing devices for all heating/cooling equipment.
   - Water flow quantities and balancing devices for all heating/cooling equipment.
   - Flow/energy measuring devices for water and air systems for all cooling, heating and terminal equipment.

3. Automatic Temperature Control Diagram(s):
   - Control flow diagrams showing all sensors, valves, and controllers (analog and digital).
   - Sequence of operations of all the systems and its operation (occupied and unoccupied).
   - BACnet or LON Work Building Automation System and their descriptions.

4. Schedules
   - Provide schedules of major equipment that includes chillers, boilers, pumps, air handling units, and terminal units.
   - Air Terminal Devices
   - Air Balance Relationships between Spaces

Plumbing

1.Floor plan(s)
   - Proposed building zoning and major piping runs.
   - Locations of proposed plumbing fixtures and equipment.

2. Systems schematics and flow diagrams.

Narrative.

HVAC

1. A written narrative describing the final mechanical system and equipment selection including:
   - Design conditions.
   - Ventilation rates, dehumidification and pressurization criteria.
   - Equipment capacities, weights, sizes and power requirements.
   - A complete description of the air side and water side systems and the associated components including operating characteristics, ranges, and capacities, spaces served and special features.
   - Description of occupied and unoccupied and related sequence of operations.
   - Fuel and utility requirements.
   - An *ASHRAE 90.1* compliance statement.
   - A PBS-P100 compliance statement.
   - A revised description of any deviation from the baseline system and PBS-P100

Plumbing

1. Proposed plumbing system.
   - Include lists of typical fixtures.

2. Evaluation of alternate sources for preheating of domestic water (solar or heat recovery).

Calculations and Energy Analysis.

HVAC

- Building load calculations.
- Heat and air balance calculations.
- Psychometric calculations for full load and partial load utilization in summer, winter, spring, and fall. (Partial loads at 50% and 25%, and unoccupied hours.)
- Detailed energy analysis using DOE-2, or approved equal. Output shall indicate energy consumption of the system and total building energy summary.
- Fuel consumption estimates.
- Comparative analyses to recommended system defined in concept submissions.
- Additional life cycle cost analyses as required to optimize equipment selections, heat recovery/storage, and control/zoning options.
- Selection cut sheets of equipment and control systems.
- Calculations for duct losses.
- Calculations for piping losses.

Plumbing

1. Proposed plumbing system.
   - Include lists of typical fixtures.

2. Evaluation of alternate sources for preheating of domestic water (solar or heat recovery).

Specifications.

- Redlined (strike through) version of each specification section to be used on the project

Cost Estimates.

- Cost of total HVAC system.
- Cost of major equipment.
- Cost of air distribution and piping system materials.

Fire Protection

Fire protection and life safety submission requirements shall be identified as a separate Fire Protection section as outlined in this document.

Calculations.

1. Occupant load and egress calculations.

2. Fire protection water supply calculations.
   - Includes water supply flow testing data.

3. Fire pump calculations where applicable.

4. Smoke control calculations where applicable (e.g., atrium, etc.).

5. Stairway pressurization calculations where applicable.

6. Calculations contained in *The SFPE Handbook of Fire Protection Engineering* for calculating sound attenuation through doors and walls for placement and location of fire alarm system audible notification appliances.

Narrative.

1. Building egress system.
   - Includes egress calculations and stairway exit capacities, remoteness, exit discharge, etc.

2. All building fire alarm and suppression systems.

3. Smoke control system(s), where applicable.

4. Special fire protection systems (e.g., kitchen extinguishing system), where applicable.

5. Fire resistance rating of building structural elements.
   – Coordinate with structural engineer.

6. Fire alarm system.

7. Interface of fire alarm system with Building Automation system and Security Systems.

8. Review of building for compliance with life safety requirements and building security requirements.

9. Interior finish requirements as they pertain to the life safety requirements.

Drawings.

1. Floor Plans showing:
   – Equipment spaces for fire protection systems (e.g., fire pump, fire alarm, etc.)
   – Fire protection water supply lines, fire hydrant locations, fire apparatus access roads, and fire lanes.
   – Standpipes and sprinkler risers.
   – Riser diagrams for sprinkler system.
   – Riser diagram for fire alarm system.
   – Remoteness of exit stairways.
   – Location of firewalls and smoke partitions.
   – Identification of occupancy type of every space and room in building.
   – Calculated occupant loads for every space and room in the building.
   – Location of special fire protection requirements (e.g., kitchens, computer rooms, storage, etc.)

Electrical

Calculations.

1. Lighting calculations for a typical 186 m2 (2,000 sf) open office plan with system furniture.

2. Lighting calculations for a typical one person private office.

3. Power calculations from building entry to branch circuit panel.

4. Load calculations.

5. Life cycle cost analysis of luminaire/lamp system and associated controls.

Narrative.

1. Description of alternative power distribution schemes.
   – Compare the advantages and disadvantages of each approach. Include the source of power, potential for on-site generation, most economical voltage and primary versus secondary metering.

2. Proposed power distribution scheme.
   – Provide a detailed description and justification for the selected scheme. Address special power and reliability requirements, including emergency power and UPS systems.

3. Proposed lighting systems.
   – Discuss typical lighting system features, including fixture type, layout, and type of controls.
   – Discuss special spaces such as lobbies, auditoria, dining rooms and conference rooms.
   – Discuss exterior lighting scheme.

4. Interface with Building Automation System.
   – Methods proposed for energy conservation and integration with Building Automation System.

5. Engineering analysis for demand limit controls.

6. Description of each proposed signal system.

7. Description of proposed security systems' features and intended mode of operation.
   – Proposed zone schedule.
   – Proposed card access controls, CCTV assessment and intrusion protection system, if applicable.

8. Proposed Telecommunications Infrastructure.
   – Systems proposed for infrastructure and cabling to accommodate the communications systems. These must be designed and provided in compliance with EIA/TIA Building Telecommunications Wiring Standards.

9. Code criteria should be reviewed by each discipline to the degree of detail necessary to assure that tasks accomplished in this phase meet the code requirements.

Drawings.

1. Site plan.
   – Proposed site distribution for power and communications, proposed service entrance and location of transformers, generators, and vaults, etc.

2. Floor plans.
   – Proposed major electrical distribution scheme and locations of electrical closets.

3. Floor plans.
   – Proposed major routing of communications system, communications equipment rooms and closets.

4. Floor plans.
   – Plan layouts of electrical rooms, showing locations of major equipment, including size variations by different manufacturers.

5. Single line diagram of the building power distribution system.

6. Plan of typical office lighting layout.

7. Single line diagram of other signal system including: telephones; security; public address; and others.

8. Security system site plan.
   – Proposed locations for CCTV, duress alarm sensors, and access controls for parking lots. If the system is not extensive, these locations may be shown on the electrical site plan.

9. Security system floor plans.
   – Proposed locations for access controls, intrusion detection devices, CCTV and local panels.

Design Development Cost Estimate

A cost estimate must be provided. It should comply with the requirements for the design development estimate stated in GSA document *Project Estimating Requirements*.

Cost estimate must separate costs for interior tenant buildout from core/shell cost items as described in the *GSA New Pricing Guide*. The interior buildout costs must be divided by each building tenant.

Address what value engineering items were incorporated from the Concept Value Engineering Workshops. (Document all VE Workshop sessions during design development and show what is to be incorporated into the final design.)

Specifications.
Assemble all project related construction guide specifications and mark out all content that does not apply to the project.

Certification Requirements

1. The architect/engineer (lead designer) must provide certification that the project has been designed and is in compliance with ASHRAE 90.1 and will meet GSA energy goal requirements.

2. Assemble material for LEED rating submission, indicating features and points that assure desired LEED rating.

3. VE decisions and commitments that were made during the Design Development phase by the Project Team.

4. In bullet form, identify how selected design features will support the project's performance expectations. All building systems involved with the project shall be discussed, each addressing all performance expectations as covered in the design program and Appendix A.2.

Construction Documents

The construction documents must be complete, coordinated between disciplines, biddable, readable and buildable, with no room for unreasonable additional interpretation. The drawings listed below represent requirements for GSA's review, and do not constitute any limitation on the documentation required to properly contract for the construction of the project, or limit the professional design liability for errors and omissions.

One of the guidelines to insure inter-discipline and intra-discipline coordination is included under each category of work and is referred to as the Review Checklist. The A/E consultant should make sure that all of these items, and others that pertain to good project coordination, are reviewed and addressed before submission of the documents to GSA.

Update of Code Analysis. The Code criteria shall be reviewed by each design team discipline member to the degree of detail necessary to assure that tasks accomplished meet all the Code requirements.

Site Planning and Landscape Design

Drawings. General: The plans listed below, except the demolition plans, may be combined on small projects.

1. Demolition plans, if required.

2. Site layout plan.
   - Location of all buildings, roads, walks, accessible routes from parking and public street to building entrance, parking and other paved areas, and planted areas.
   - Limits of construction.
   - Locations and sizes of fire protection water supply lines, fire hydrants, fire apparatus access roads, and fire lanes.
   - Location of floodplains and wetlands.

3. Grading and drainage plan, showing:
   - Existing and new contours [use 500 mm (2 foot) interval minimum in area around buildings].
   - Spot elevations at all entrances and elsewhere as necessary.
   - Elevations for walls, ramps, terraces, plazas and parking lots.
   - All surface drainage structures.
   - Water retainage and conservation.

4. Site utilities plan, showing:
   - All utilities, including inlets, manholes, clean-outs and invert elevations.

5. Planting plan, showing:
   - Building outline, circulation, parking and major utility runs.
   - Size and location of existing vegetation to be preserved (include protection measures during construction).
   - Location of all new plant material (identify function, such as windbreak or visual screen where appropriate).
   - Erosion control.

6. Planting schedule, showing:
   - Quantity of plants, botanical names, planted size and final size.

7. Irrigation plan, if applicable.
   - Include schematic of irrigation control system.

8. Planting and construction details, profiles, sections, and notes as necessary to fully describe design intent.

9. Construction phasing, if part of project.

10. Survey of surrounding buildings, structures and improvements in both wet and dry season to document pre-construction elevations.

11. Potential archeological artifacts.

Calculations.

1. Final drainage calculations, including stormwater detention.

2. Final parking calculations, if applicable.

3. Pipe sizing calculations for water and sewer pipes.

4. Pavement design calculations.

Site Design Review Checklist.
This checklist is intended to provide an inter-disciplinary coordination review.

□ Piping and other utility locations and inverts at building penetrations coordinated with mechanical drawings.

□ Electrical service coordinated with electrical drawings.

□ Interference of utilities with underground electrical runs checked.

□ Interference between planting and utilities checked.

□ Elevations of entrances coordinated with architectural drawings.

□ Required reinforcement shown for all free standing and retaining walls.

□ Connections to foundation drainage coordinated.

□ Sub-surface drainage shown.

□ Location of underground storage tanks shown.

□ Construction of underground storage tanks detailed.

Architectural

Drawings.

1. Project title sheet, drawing index.

2. Demolition plans.
   – Show for modernizations, if required.

3. Floor plans.
   – Show planning grids and raised access floor grid, if applicable.

4. Reflected ceiling plans.
   – Show ceiling grid and location of all elements to be placed in the ceiling.

5. Building sections.
   – Vertical zoning for electrical and mechanical utilities must be indicated on sections.

6. Roof plans.
   – Roof plans must show slopes, low points, drains and scuppers, equipment, equipment supports, roof accessories and specialty items, if applicable.

7. Exterior elevations.

8. Wall sections.

9. Interior elevations.

10. Details.

Schedules.

Diagrams illustrating proper clearance for servicing and replacement of equipment.

Specifications.

1. Room finish, color and door schedules can be incorporated into either the specifications or drawings.

2. Call for thermographic scans of building envelope to identify sources of heat transfer.

3. Call for assembly of mock-ups for spaces such as courtrooms and sample office space fitouts.

Architectural Review Checklist.

This checklist enumerates some of interfaces between architectural and engineering disciplines that require close coordination.

- □ Interference with structural framing members coordinated.
- □ Locations and details of below-grade and other waterproofing shown, and coordinated with structural drawings.
- □ Anchorage of exterior wall elements shown.
- □ Expansion and/or seismic joints shown and detailed.
- □ Adequate clearances to install, service, repair and replace mechanical and electrical equipment. (Verify all space requirements are incorporated into the floor plans.)
- □ Rooftop mechanical equipment shown.
- □ Adequate clearances under rooftop mechanical and electrical equipment to facilitate maintenance, repair and replacement of the roofing system.

- ☐ Location of roof drains and floor drains coordinated with mechanical drawings.
- ☐ Air diffusers and registers coordinated with mechanical drawings.
- ☐ Louver sizes and locations coordinated with mechanical drawings.
- ☐ Light fixture types and locations coordinated with mechanical and electrical drawings.
- ☐ Wall and roof sections coordinated with heat loss calculations.
- ☐ Adequate envelope design details to ensure thermal/air/moisture control.
- ☐ For pressurized plenum raised flooring, assure effective barrier to prevent air passage to exterior walls.
- ☐ Acoustical wall treatments shown in mechanical rooms (if applicable).
- ☐ Location of access panels in plaster ceilings and soffits coordinated with mechanical drawings.
- ☐ Plumbing fixture mounting heights coordinated with mechanical drawings.
- ☐ Coordination of architectural elements with exposed structural members.
- ☐ Location of air supply and ducted exhaust systems.
- ☐ Security light fixtures required and locations coordinated with electrical drawings.

Historic Preservation

Specifications.
Competency of bidder and restoration specialist qualification requirements, Sections 00120 and 009[00], cross referenced in material specifications

Technical specifications for repair and restoration of historic materials, including:

- Specialized materials and procedures for repair and restoration of historic materials
- Procedures for protecting historic materials in areas being altered
- Sample review requirements of repair and restoration procedures
- Sample submittal requirements for replacement materials and new installations in preservation zones

Structural

Drawings.

1. Demolition plans (when applicable).

2. Full set of structural construction drawings.
   - Drawings must be fully dimensioned, noted and detailed for accurate bidding and construction.
   - Load criteria for all floor live loads, roof live load, roof snow load, wind load, earthquake design data, and special loads must be shown on drawings. Live load reduction of the uniformly distributed floor live loads, if used in the design, shall be indicated.
   - Basic wind speed (3-second gust), miles per hour (km/hr), Wind importance factor, I, and building category, Wind exposure, the applicable internal pressure coefficient must be indicated.
   - Seismic design criteria, such as Seismic use group, Spectral response coefficients S_{DS} and S_{D1}, Site class, Basic seismic-force-resisting system, Design base shear, and analytical procedure must be indicated. Additional information may be required by the local building official.
   - Soil bearing pressure and lateral earth pressure must be indicated.
   - Properties of basic materials must be indicated.
   - Blast-resistant requirements if applicable.
   - Indicate the codes and standards used to develop the project.

3. Schedules.
   - Schedules for foundations, columns, walls, beams, slabs, and decks, as applicable.

4. Structural details. (All typical details must be shown on the drawings.)
   - Include details for steel connections.
   - Include details for anchorage of building system equipment and nonstructural building elements (may be shown on mechanical, electrical or architectural drawings, as applicable).

Calculations. For any computer generated results, submit a model of the input data and all pertinent program material required to understand the output. A narrative of the input and results should be contained in the calculations as well.

1. Final structural calculations, including:
   - Gravity loads.
   - Lateral loads.
   - Foundations.
   - Thermal loads where significant.
   - Vibration propagation.
   - Progressive collapse.
   - Supports for nonstructural elements, including mechanical and electrical equipment.
   - Steel connections
   - Blast analysis.

Structural Review Checklist.

- □ Floor elevations shown on drawings.
- □ Camber requirements shown on drawings.
- □ Beam and girder connections detailed.
- □ Clearances for bolts and fasteners shown (steel and wood construction).
- □ Fire resistance of structural members indicated.
- □ Beam reactions shown for moment connections.
- □ Equipment, piping and ductwork supports detailed (may be shown on structural, mechanical or electrical drawings, as applicable).
- □ Hoists shown in major mechanical rooms (if required).
- □ Interference with piping and ductwork coordinated.
- □ Interference with electrical ducts and conduit coordinated.
- □ Anchorage of architectural, mechanical or electrical systems and components.
- □ Roof drains coordinated with architectural and mechanical drawings.
- □ Subdrainage and foundations coordinated with mechanical drawings/piping.
- □ Waterproofing of foundation walls, retaining walls and other structural elements coordinated with architectural drawings.

Mechanical

Drawings.

HVAC

1. The construction documents must be complete, coordinated between disciplines, biddable, readable and buildable, with no room for unreasonable additional interpretation.

2. The drawings listed below represent requirements for GSA's review, and do not constitute any limitation on the documentation required to properly contract for the construction of the project, or limit the professional design liability for errors and omissions.

3. One of the guidelines to insure inter-discipline and intra-discipline coordination is included under each category of work and is referred to as the Review Checklist.

4. The A/E consultant should make sure that all of these items, and others that pertain to good project coordination, are reviewed and addressed before submission of the documents to GSA.

5. Systems must be fully drawn and sized to permit accurate bidding and construction.

6. Demolition plans:
   - Show for modernizations, if required.
   - Show all existing conditions relative to the project.
   - Show all work to be removed and differentiate this work from all existing conditions to remain.

7. New work HVAC piping and equipment plans:
   - All valves must be shown. Indicate locations where temperature, pressure, flow, contaminant/ combustion gases, or vibration gauges are required, and if remote sensing is required.
   - Mechanical room piping layout shall be double line.

8. New work HVAC duct and equipment plans:
   - Single line piping and double line ductwork layout.
   - Show terminal air devices.
   - Perimeter terminal units.
   - Quarter-inch scale drawings of mechanical equipment room(s) showing all mechanical equipment serving the project including equipment access and service requirements. (The layout shall indicate the spaces allocated for maintenance and removal.)
   - Air balancing of systems.
   - Roof plan showing all roof-mounted equipment.
   - Show adequate access from mechanical equipment room(s) to freight elevators.
   - Show adequate access to roof-mounted equipment.
   - Mechanical details.
   - All dampers—both fire dampers and volume control dampers—must be shown. Ductwork ahead of the distribution terminal must be indicated in true size (double line).

9. New work single line schematic flow and riser diagram(s):
   - Airflow quantities and balancing devices for all heating/cooling equipment.
   - Water flow quantities and balancing devices for all heating/cooling equipment.
   - Flow/energy measuring devices for water and air systems for all cooling, heating and terminal equipment.

10. New work automatic temperature control diagram(s):
    - Control flow diagrams showing all sensors, valves, and controllers (analog and digital inputs for controllers, front end equipment and system architecture).
    - Sequence of operations of all the systems and its operation (occupied and unoccupied).
    - BACnet or LON Work Building Automation System and their descriptions.
    - Energy flow/metering devices for major equipment such as chillers, boilers, pumps, and other terminal equipment.
    - Diagram to show control signal interface, complete with sequence of operation; BACnet/LON Works.
    - Software requirements.
    - Show location of energy metering devices and their connection to central processor.

11. New work schedules:
    - Provide schedules of major equipment that includes chillers, boilers, pumps, air handling units, and terminal units.
    - Air Terminal Devices
    - Air Balance Relationships between Spaces

Plumbing

1. Demolition plans
   - Show for modernization, if required.

2. Piping riser diagrams.
   - Plumbing

3. Floor plans.
   - Plumbing layout and fixtures; large-scale plans should be used where required for clarity.

4. Riser diagrams for waste and vent lines.

5. Riser diagrams for domestic cold and hot water lines.

6. Plumbing fixture schedule.

Narrative.
A written narrative describing the final mechanical system and equipment selection including:

- Updated narrative submitted during design development.
- Updated ductwork and piping loss calculations.
- Updated equipment selections with capacities, weights, sizes and power requirements
- Updated psychometrics.
- Updated design conditions.
- Updated Ventilation rates, updated dehumidification and pressurization conditions.
- Updated description of the airside and waterside systems and the associated components, including operating characteristics, ranges, and capacities, spaces served and special features.
- Updated description of occupied, partial occupancy, and unoccupied related sequence of operations.
- Updated fuel and utility requirements.
- An *ASHRAE 90.1* compliance statement.
- A code compliance statement.
- An updated description of any deviation from PBS-P100.

Calculations and Energy Analysis.

HVAC

- System load and supply air calculations (for VAV systems).
- System pressure static analysis at peak and minimum block loads (for VAV systems).
- Acoustical calculations (for VAV systems, use peak air flow).
- Calculations for duct losses.
- Calculations for piping losses.
- Flow and head calculations for pumping systems.
- Selection of equipment, cut sheets of selected equipment.
- Psychometric calculations for full load and partial load utilization in summer, winter, spring, and fall. (Partial loads at 50% and 25%, and unoccupied hours.)
- Detailed energy analysis using DOE-2, or approved equal. Output shall indicate energy consumption of the system and total building energy summary.
- Fuel consumption estimates.
- Comparative analyses to recommended system defined in concept submissions.
- Additional analyses as required to optimize equipment selections, heat recovery/storage, and control/zoning options.
- Sizing of fuel storage and distribution and vibration isolation.

Plumbing

1. Plumbing calculations.
   - Include entire building, including roof drainage calculations and hot water heating calculations.
   - Water supply calculations, including pressure.
   - Roof drainage calculations.
   - Sanitary waste sizing calculations.

Specifications.

- Completely edited version of each specification section to be used on the project.

Checklists

Mechanical Review Checklist.

- ☐ Interference with structural framing members coordinated. Equipment pad locations coordinated with structural drawings.
- ☐ Adequate clearances to service and replace mechanical equipment. Hoist (or other means of equipment replacement) coordinated with structural drawings.
- ☐ Motors and special power needs coordinated with electrical drawings. Location of roof drains and floor drains coordinated with architectural and structural drawings.
- ☐ Air diffusers and registers coordinated with architectural drawings and electrical lighting plans.
- ☐ Location of supply and exhaust systems coordinated with security barriers, detection devices and other related concerns.
- ☐ Louver sizes and locations coordinated with architectural drawings.
- ☐ Inverts of piping coordinated with civil drawings. Supports and bracing for major piping, ductwork and equipment coordinated with structural drawings.
  - – Penetrations through rated wall/floor/roof assemblies detailed and specified.
  - – BAS system specified, including software and point schedules. (Use an open communication protocol system like BACnet.)
  - – Startup and testing requirements specified.
  - – Provide PBS-P100 checklist compliance.

Special Checklist for VAV Systems.

- ☐ Minimum amount of outside air to be admitted during occupied hours shown on drawings; also mini-mum ventilation supplied at lowest setting of VAV box.
- ☐ Fan schedule for both supply and return fans, showing minimum and maximum airflow rates and total pressure at minimum flow, maximum sound power level and blade frequency increment at peak air flow.
- ☐ VAV terminal units to be specified indicating maximum and minimum air flow rates minimum static pressure required, maximum static pressure permitted and noise ratings at maximum air flow.
- ☐ Supply air outlets specified by face and neck sizes, ADPI performance for maximum and minimum airflow.
- ☐ Controller pressure setting and sensor location shown, including reference pressure location.
- ☐ For multiple sensors all locations must be shown. Also show pressure setting for high limit of supply fan.
- ☐ Maximum and minimum airflow rates shown for airflow measuring stations.
- ☐ Airflow measuring stations located. All required control instruments shown and located.

Fire Protection

Fire protection and life safety submission requirements shall be identified as a separate Fire Protection section as outlined in this document.

Drawings.

1. Demolition plans.
   – Show for modernizations, if required.

2. Full set of fire protection construction drawings.
   – Drawings must be carefully dimensioned, noted and detailed for accurate bidding and construction.

3. Fire Protection details. (All typical details must be shown on the drawings.)

   Building Construction
   – Building's construction type (e.g., 443, 222, etc.).
   – Firewalls and smoke partitions.
   – Panel and curtain walls.
   – Fire stopping configurations. Include details of all openings between the exterior walls (including panel, curtain, and spandrel walls) and floor slabs, openings in floors, and shaft enclosures.

   Life Safety
   – Each stair.
   – Horizontal exits.
   – Each required fire door.
   – Stairway pressurization fans.
   – Security door hardware, including operation procedures.

   Water Supply
   – Fire pump configuration.
   – Anchorage of underground fire protection water supply lines.
   – Standpipe riser.

   Water Based Fire Extinguishing Systems
   – Installation of waterflow switches and tamper switches.
   – Sprinkler floor control valves, sectional valves, and inspector text assembly.

   Non-Water Based Fire Extinguisher Systems
   – Special fire extinguishing systems (e.g., wet chemical, etc.).

   Fire Alarm System
   – Fire alarm riser.
   – Typical firefighter telephone station.
   – Typical firefighter telephone jack.
   – Electrical closets for fire alarm system panels.
   – Fire alarm telephone panel (includes voice paging microphone and firefighter telephone system).
   – Visual indicating device control and power detail, typical for floors (state location).
   – Amplifier rack (state location).
   – Typical location of duct smoke detectors.
   – Outdoor fire alarm speaker.
   – Wall mounted cone fire alarm speaker.
   – Typical terminal cabinet.
   – Lay in ceiling mounted fire alarm speaker.
   – Lay in ceiling mounted fire alarm combination speaker/strobe.
   – Wall mounted strobe device.
   – Typical manual fire alarm box installation.
   – Fire alarm system input/output matrix.
   – Graphic annunciator panel.
   – Installation of the graphic annunciator.
   – Fire command center showing the locations of each panel to be installed.

Specifications.

1. Final Specifications.
   – Specifications shall be based on GSA M/E Supplements to Masterspec.

Calculations. For any fire modeling generated results, submit a copy of the input data and all pertinent program material and assumptions required to understand the output and the analysis. A narrative of the input and results shall be part of the calculations.

1. Final occupant load and egress calculations.

2. Final fire protection water supply calculations.
   – Includes water supply flow testing data.

3. Final fire pump calculations where applicable.

4. Final smoke control calculations where applicable (e.g., atrium, etc.).

5. Final stairway pressurization calculations.

6. Fire modeling.

7. Final calculations contained in *The SFPE Handbook of Fire Protection Engineering* for calculating sound attenuation through doors and walls for placement and location of fire alarm system audible notification appliances.

Fire Protection Review Checklist.

Building Construction

□ Verify details for fire walls and smoke partitions.

□ Verify Underwriters Laboratories or U.S. Gypsum Association design numbers with fire walls, smoke partitions, and partitions.

□ Verify firestopping for penetrations in fire rated walls and floors meet Code requirements.

□ Verify structural components are fire rated (if applicable).

□ Verify fireproofing meets Code requirements (if applicable).

□ Verify proper building separation for exposure protection.

□ Verify interior finish meets Code requirements.

Life Safety

□ Verify the number of exits based on occupant load.

□ Verify exits discharge outside.

□ Verify travel distance to exits.

□ Verify remoteness of exits.

□ Verify common path of travel limits meet Code requirements.

□ Verify door swings meet Code requirements.

□ Verify stair details.

□ Verify horizontal exit details.

□ Verify exit signs meet Code requirements.

□ Verify emergency lighting meet Code requirements.

□ Verify each occupancy classification meets specific exiting requirements.

□ Verify the type, size, and location of each portable fire extinguisher.

Water Supply

- ☐ Verify water supply is adequate to meet design density.
- ☐ Verify detail of anchorage of underground fire protection water supply line.
- ☐ Verify location of valve box and cover plate on buried gate valve.
- ☐ Verify fire pump calculations justify the size of the fire pump and jockey pump.
- ☐ Verify riser diagram for fire pump meets Code requirements.
- ☐ Verify detail of fire pump configuration.
- ☐ Verify sensing lines for both the fire pump and jockey pump are indicated on the details.
- ☐ Verify all piping for fire pump is identified on the drawings.
- ☐ Verify the location of the test header.
- ☐ Verify the location of both controllers.
- ☐ Verify the power feeds to the fire pump and jockey pump are identified on the drawings.

Water Based Fire Extinguishing Systems

- ☐ Verify specifications contain information stating the static and residual pressures are available at a measured flow rate.
- ☐ Verify the sprinkler riser is sized properly on the riser diagrams.
- ☐ Verify that sprinkler piping is not shown on the construction contract drawings. Only the interior fire main piping shall be shown, in addition to the location of obstructions, structural components, construction of walls, floors, and ceilings.
- ☐ Verify the location and size of underground or standpipe water supplies.
- ☐ Verify the location and arrangement of all waterflow and tamper switches.
- ☐ Verify the location of the riser and all points where it penetrates a floor.
- ☐ Verify the location of the fire department connection.
- ☐ Verify the location of all control valves and alarm valves.
- ☐ Verify all areas of the building have sprinkler protection.
- ☐ Verify accuracy of symbol list.
- ☐ Verify all floor control valves and sectional valves have drains.
- ☐ Verify inspector's test valve arrangements.
- ☐ Verify wall and ceiling construction is indicated, as well as ceiling height.

Non-Water Based Fire Extinguisher Systems

- ☐ Verify kitchen equipment is protected by a wet chemical system, monitored by fire alarm system.
- ☐ Verify power and gas shut down for kitchen equipment meet Code requirements.

Fire Alarm System

- ☐ Verify location of all audible notification appliances on the drawings and riser diagram meet Code requirements and that the design calculations for substantiating the placement and location of the audible notification appliances match the drawings.
- ☐ Verify audible notification appliances are identified in stairways and elevator cabs.
- ☐ Verify location of all visible notification appliances on the drawings and riser diagram meet Code requirements.
- ☐ Verify accuracy of fire alarm riser diagram.
- ☐ Verify that at least two vertical fire alarm risers are installed remote as possible from each other. Verify that a minimum two-hour fire rated assembly, shaft, or enclosure, not common to both risers protects one riser. Verify that a minimum one-hour fire rated assembly, shaft, or enclosure protects the second riser. Verify that a minimum one-hour fire rated assembly, shaft, or enclosure protects the horizontal interconnection between the two risers.
- ☐ Verify that a minimum of two (2) distinct fire alarm audible appliance circuits and a minimum of two (2) distinct visible appliance circuits are provided on each floor.
- ☐ Verify that adjacent fire alarm audible and visual appliances are on separate circuits.
- ☐ Verify location and construction requirements of fire command center.
- ☐ Verify location of graphic annunciator panel.
- ☐ Verify fire alarm system wiring is solid copper.
- ☐ Verify location of all manual fire alarm stations meet Code requirements.
- ☐ Verify smoke detectors are installed in each elevator lobby and elevator machine room to initiate elevator recall.
- ☐ Verify locations of all area smoke detectors on the drawings and riser diagram meet Code requirements.
- ☐ Verify locations of all fire fighter telephone stations and telephone jacks on the drawings and riser diagram meet Code requirements.
- ☐ Verify locations of all duct smoke detectors on the drawings and riser diagram meet Code requirements.
- ☐ Verify accuracy of fire alarm system input/output matrix.
- ☐ Verify accuracy of symbol list.
- ☐ Verify accuracy of final smoke control calculations where applicable (e.g., atrium, etc.).
- ☐ Verify accuracy of final stairway pressurization calculations where applicable.
- ☐ Verify accuracy of interface of fire alarm system and Building Automation System.
- ☐ Verify accuracy of interface of fire alarm system and the building security systems.

Miscellaneous

□ Verify that the locations of the fire dampers meet Code requirements.

□ Verify that the location of smoke dampers meet Code requirements.

□ Verify that the elevator systems meet Code requirements.

□ Verify that sprinklered elevator machine rooms are provided with a means to automatically disconnect power.

Electrical

Drawings. General: Systems must be fully drawn and sized to permit accurate bidding and construction.

1. Demolition plans.
   – Show for modernizations, if required.

2. Floor plans.
   – Show lighting, power distribution and communications raceway distribution and locations of fire alarm and annunciator panels.

3. Single-line diagram of primary and secondary power distribution.
   – Include normal power, emergency power and UPS.

4. Single-line diagram of fire alarm system.

5. Single-line diagram of telecommunications system.

6. Circuit layout of lighting control system.

7. Details of underfloor distribution system.

8. Site plan.
   – Indicate service locations, manholes, ductbanks and site lighting.

9. Layout of electrical equipment spaces.
   – Show all electrical equipment. Include elevations of substation transformers and disconnect switches.

10. Schedules for switchgear, switchboards, motor control centers, panelboards and unit substations.

11. Grounding diagram.

12. Complete phasing plan (if required) for additions and alterations.

13. Security systems site plan.
   – Final locations of all security devices and conduit runs.

14. Security system floor plans.
   – Layout of all security systems.

15. Storage areas for electrical equipment/spare parts.

Specifications.

1. Final specification.
   – Zone schedules may be bound into the specifications or shown on drawings.

Calculations.

1. Illumination level calculations.
2. Short circuit calculations.
3. Voltage drop calculations.
4. Overcurrent coordination study.
5. Generator calculations.
   – Include starter loads.

Electrical Review Checklist.

- □ Interference between major conduit and structural framing members coordinated.
- □ Adequate clearances to install and service electrical equipment.
- □ Light fixture locations and types coordinated with architectural drawings and interior design.
- □ Screens for exterior generators and transformers coordinated with architectural drawings.
- □ Penetrations through rated wall/floor/roof assemblies detailed and specified.
- □ Normal or emergency power supplied for all mechanical and fire safety equipment.
- □ Supports and bracing for major conduits and equipment coordinated with structural drawings.

Certification Requirements for Energy Conservation

The architect/engineer (lead designer) must provide certification that the project has been designed and is in compliance with ASHRAE 90.1 (latest approved version), and will meet GSA energy goal requirements.

Certification will also indicate that the architectural/engineering design elements have been integrated with the overall project design, and that the building can meet the programmed LEED rating.

The architect/engineer certification must be signed and sealed by a principal of the architectural/engineering firm in charge of the project.

Construction Documents Cost Estimate

A cost estimate must be provided. It should comply with the requirements for final working drawing stage estimate stated in the GSA document, *Project Estimating Requirements*.

Cost estimate must separate costs for interior tenant buildout from core/shell cost items as described in the *GSA New Pricing Guide*. The interior buildout costs must be divided by each building tenant.

Data and Operations Manual

An operations manual shall be prepared and training provided for the building Operations and Maintenance personnel describing the design objectives and how to operate the building. The manual shall include: as-built drawings, equipment data, model numbers for the equipment, parts lists, equipment options, operating manuals for each piece of equipment, testing and balancing reports and certifications, maintenance schedules, videos, and warranty schedules. The manual must be reviewed and certified complete by the GSA project manager before submission to the Facilities Manager.

GSA Design Awards Submission

All prospectus level projects shall be submitted of the GSA Design Awards Program for consideration.

The submission must clearly communicate, in visual and narrative form, the scope and outstanding features of the project and be organized to facilitate easy review by the jury.

Materials must be in transparent sleeves inside a standard 10 by 11-1/2 inch three-ring binder that is no more than 1-1/2 inches thick. The project name and category must appear on the front and the spine of the binder. No deviations from these requirements are permitted.

A.4 Alteration Projects

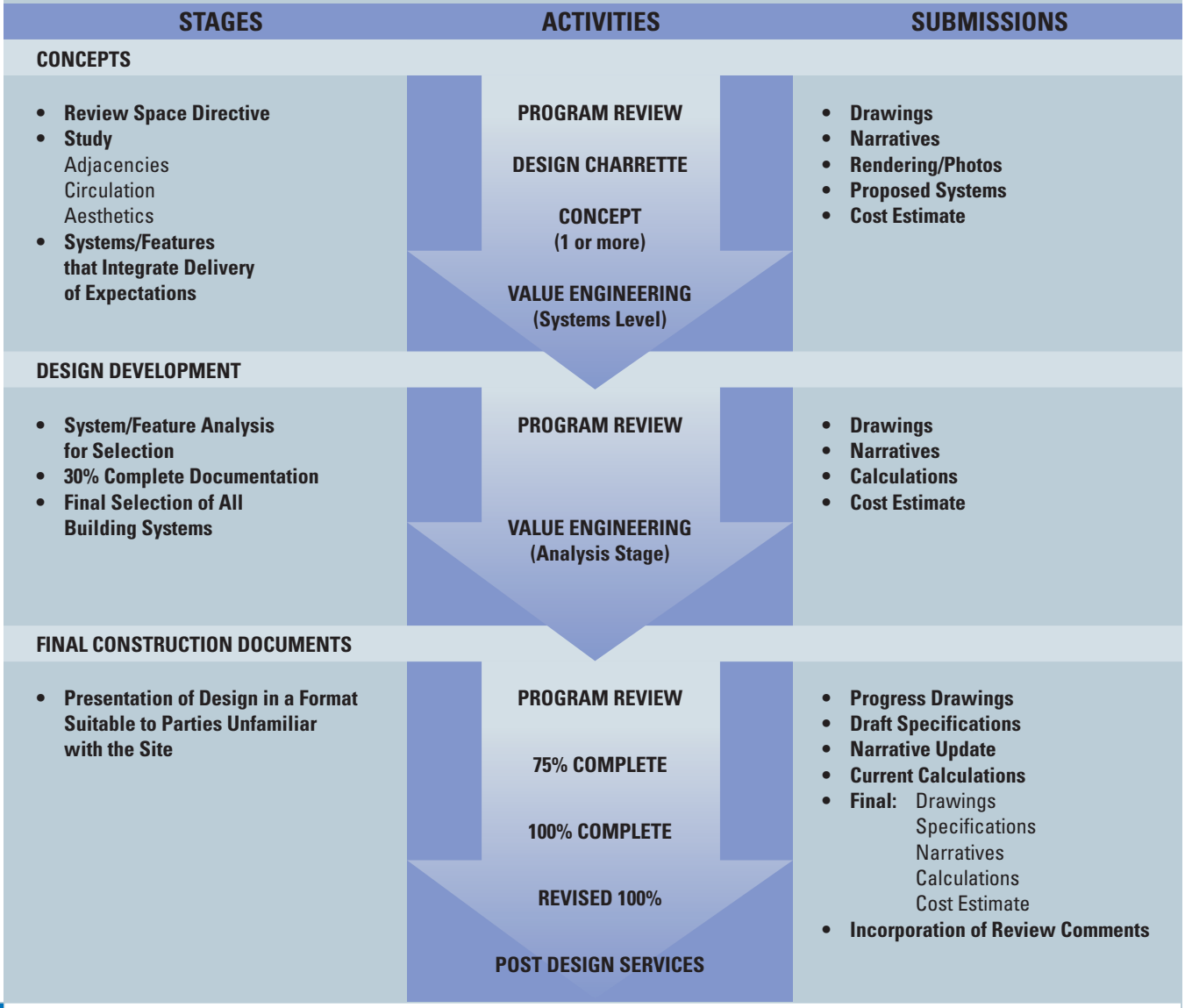
The design process and related submission requirements for alterations are somewhat different than those for new construction and modernizations. An alteration is defined as a limited construction project for an existing building that comprises the modification or replacement of one or a number of existing building systems or components. Alterations are less than total building modernizations. The following flow diagram and related definitions describe this process.

Design Process Definitions

Program Review. Prior to initiating each phase of design, the design team should meet to review design program expectations and to exchange ideas, lessons-learned, and concerns. Such technical "partnering" sessions allow a clearer definition of expectations while remaining within the project's scope and budget.

Concept. A submission that will demonstrate that the space program has been accomplished, including any adjacency and functional requirements. This submission will also show that the proposed project is compatible with the project authorization and that the aesthetics support the design philosophy of GSA shown in Chapter 3, Architecture and Interior Design of this document. A preliminary analysis of proposed building systems should be accomplished to determine the most cost-effective alternatives.

Figure A-4 Design Process and Related Submission Requirements for Renovation



Design Development. A set of submissions and meetings that will finalize the selection of type, size and other material characteristics of all systems. Systems are not only structural, mechanical, fire protection and electrical, but all other building components such as envelope (wall, window and roof), interior (flooring, ceiling and partitions), toilet and service rooms, elevators, etc. The submission will consist of a combination of drawings, narrative and calculations.

Construction Documents. A set of detailed and coordinated submissions that become the basis of a construction contract. They should be produced in a general fashion that any construction contractor nationwide can understand. Designs shall be illustrated to distinguish between existing construction and new work, and be clear enough to result in a single interpretation of a specific set of data or facts. Language used in the specifications should be consistent and complementary to notes on the drawings. The documents should avoid using terms that the design specialist may know, but which have nothing to do with the purchase and installation of a product.

Specifications. Specifications to be organized according to CSI format, fully edited, typed and bound.

Code Analysis. Code criteria should be reviewed by each discipline to the degree of detail necessary to assure that tasks accomplished in each phase meet the code requirements.

Concept

Site Planning and Landscape Design

A sitework narrative only needs to be submitted if sitework is a substantial part of the scope of work for the alteration.

Narrative.

1. Site statement, describing:
   - Existing site features.
   - Topography and drainage patterns.
   - Any existing erosion conditions.
   - Wetlands and location of flood plains.
   - Circulation patterns around site.
   - Site access.
   - Noise/visual considerations.
   - Local zoning restrictions.
   - Potential archeological artifacts.
   - Historic preservation considerations, if applicable.
   - Fire protection considerations, if applicable.

2. Site analysis of utilities, if utilities are to be changed.

3. Description of site and landscape design concept.
   - Proposed changes to circulation design.
   - Proposed changes to parking.
   - Proposed method for stormwater detention or retention.
   - Proposed changes to paving.

Architectural

An architectural concept only needs to be submitted if architectural work is a substantial part of the scope of work for the alteration.

Drawings.

1. Demolition plans.

2. Floor plans, showing as a minimum:
   - Existing and new spaces, circulation, entrances, stairways, elevators, special spaces and service spaces including mechanical, fire protection, electrical and communication spaces. Dimensions for critical clearances, such as vehicle access and fire apparatus access should be indicated.

Narrative.

1. Architectural program requirements.
   - Describe how the design meets the project authorization.

2. Design concept, explaining:
   - General layout.
   - Treatment of historic zones, if applicable.

3. Calculations.
   - Where building renovation involves window or insulated wall systems, perform an LCC assessment to optimize selection.

Historic Preservation

8.5" x 11" report, signed by qualified preservation architect, including

Narrative.

1. General: Project purpose, scope, groups and individuals involved

2. Existing conditions, describing:
   - Overall building size, configuration, character
   - Project location
   - Existing original materials and design, relevant alterations

3. Preservation design issues and prospective solutions, including:
   - Location of new work/installation: visibility, impact on historic finishes
   - Compare options for preserving/restoring historic materials and design
   - Identify further study required to avoid adverse effects as applicable

Photographs.

- General and detail views showing existing conditions at affected preservation zones, keyed to plan showing location and orientation of each view
- Captions identifying location, subject, condition shown

Drawings.

Reduced to 8.5" x 11, 11" x 17" foldout or placed in cover pocket:

- Site and floor plans, as applicable
- Sketches or schematic CAD drawings (elevations, plans) showing preservation design concepts

Structural

A structural narrative only needs to be submitted if a structural upgrade is part of the scope of work.

Narrative.

1. Description of current structural systems, state of repair, variances from present codes and available spare load capacity. Data may be obtained from review of original construction drawings and codes or from an analysis of the actual structure.
   – This report may have been completed as part of the Prospectus Development Study.

2. Identification of governing codes.

3. Description of recommended changes to the structural system, addressing:
   – Structural materials, required selective demolition or alteration of existing structural elements, roof and floor framing system, means of resisting lateral loads and connections between existing and new structural systems.

4. If a seismic safety study exists for the building, describe any variations taken in design, compared to the study's recommendations.

Mechanical

A mechanical narrative only needs to be submitted if the alteration scope of work involves changes to the major mechanical systems. Replacement in kind of all or part of an existing mechanical system does not need to be shown at this stage of design.

Narrative.

1. Description of requested changes to existing systems.
   – Describe HVAC and plumbing systems, including available capacity versus criteria in Chapter 5 of this document and operational characteristics.
   – Identify how new systems will be tied into existing systems. (Any replacement should be well-integrated with other building systems that remain or are replaced.)
   – Outline energy conservation opportunities that were researched. Highlight those that were incorporated. This report may have been completed as part of the Prospectus Development Study.

Fire Protection

Fire protection and life safety submission requirements shall be identified as a separate Fire Protection section as outlined in this document.

Drawings.

1. Demolition plans.
   - Identify existing fire protection systems (e.g., sprinklers, fire alarm notification appliances, etc.).

2. Floor plans, showing a minimum:
   - New fire protection systems (e.g., sprinklers, fire alarm notification appliances, etc.).

Narrative.

A fire protection narrative only needs to be submitted if the fire protection work is a substantial part of the scope of work for the alteration or involves changes to a fire protection system.

1. Fire Protection program requirements.

2. Description of the buildings proposed fire protection systems including modifications to the existing egress systems.

3. Code statement identifying changes in building occupancy classification, occupancy group(s), fire resistance requirements, egress requirements, etc.

Electrical

An electrical narrative only needs to be submitted if the alteration scope of work involves changes to the type or location of major electrical systems.

Narrative.

1. Description of requested changes to existing systems.
   - Describe lighting, power and signal systems, including available capacity versus criteria in Chapter 6. and operational characteristics.
   - Describe code deficiencies. Identify how new systems will be tied into existing systems.
   - This report may have been completed as part of the Prospectus Development Study.

2. Describe both existing and new distribution systems within the building.
   - Special power and reliability requirements should be addressed, including emergency power and UPS systems.

Concept Cost Estimate

A cost estimate must be provided. It should comply with the requirements stated for the Concept Stage Estimate in GSA document *Project Estimating Requirements*.

A life cycle cost analysis of three options that have been modeled should be included with this submittal.

Design Development

Site Planning and Landscape Design

Calculations.

1. Storm drainage and sanitary sewer calculations.

2. Storm water detention facility calculations, if applicable.

3. Parking calculations, if applicable.

Narrative.

1. Site circulation concept, explaining:
   - Reasons for site circulation design and number of site entrances.
   - Reasons and/or calculation for number of parking spaces provided.
   - Reasoning for design of service area(s), including description of number and sizes of trucks that can be accommodated.
   - Proposed scheme for waste removal.
   - Proposed scheme for fire apparatus access (including aerial apparatus), roads and fire lanes.

2. Site utilities distribution concept.

3. Drainage design concept.

4. Landscape design concept, explaining:
   - Reasoning for landscape design, paving, site furnishings, and any water features.
   - Reasoning for choice of plant materials.
   - Proposed landscape maintenance plan.
   - Brief operating description of irrigation system.
   - Summarize water conservation opportunities that have been studied.
   - Brief description of fire protection water supplies.
   - Brief description of fire hydrant locations.

5. Site construction description.
   - Brief description of materials proposed for pavements and utilities.

6. Code Analysis.
   - Analysis of applicable local zoning and building code requirements.

Drawings.

1. Demolition plans (when applicable).

2. Preliminary site layout plan, showing:
   - Roads, walks, parking and other paved areas (including type of pavement). Show access route for the physically disabled from parking and from public street to main entrance.
   - Fire apparatus access (including aerial apparatus) and fire lanes.

3. Preliminary grading and drainage plan, showing:
   - Preliminary site grading, storm drainage inlets, including detention facilities.

4. Preliminary site utilities plan, showing:
   - Sizes, inverts, and locations of domestic and fire protection water supply lines, sanitary sewer lines, gas lines, steam/condensate lines and chilled water supply and return lines, if applicable.

5. Preliminary landscape design plan, showing:
   - Preliminary hardscape design, including site furniture, water features, etc.
   - Preliminary planting scheme.
   - Preliminary irrigation design.

Architectural

Narrative.

1. Building concept, explaining:
   - Entrance locations and service locations.
   - Building circulation and arrangement of major spaces.
   - Interior design.
   - Adherence to the Historic Building Preservation Plan, if applicable.

2. Building construction description, explaining, if applicable:
   - Exterior materials, waterproofing, air barriers/vapor retarders and insulation elements.
   - Roofing system(s).
   - Exterior glazing system.
   - Interior finishes, with detailed explanation for public spaces.
   - Potential locations for artwork commissioned under the "Art in Architecture" program, if applicable.

Drawings.

1. Demolition plans.

2. Building floor plans, showing:
   - Spaces individually delineated and labeled.
   - Enlarged layouts of special spaces.
   - Dimensions.
   - Accessible routes for the physically disabled as well as other compliance requirements regarding signage, toilets, etc.

3. Building roof plan, if applicable, showing:
   - Drainage design, including minimum roof slope.
   - Dimensions.
   - Membrane and insulation configuration of the roofing system.

4. Elevations of major building façades (if changes to the exterior are proposed), showing:
   - Existing and new fenestration.
   - Existing and new exterior materials.
   - Cast shadows.

5. Two building sections (of renovated areas only), showing:
   - Accommodation of structural systems.
   - Mechanical penthouses, if any.
   - Floor to floor and other critical dimensions.

   Labeling of most important spaces.

6. Exterior wall sections, showing:
   - Materials of exterior wall construction, including flashing, connections and method of anchoring.
   - Vertical arrangement of interior space, including accommodation of mechanical, fire protection and electrical services in the floor and ceiling zones.

7. Proposed room finish schedule, showing:
   - Floors, base, walls and ceilings.
   - Finish schedule may be bound into narrative.

Historic Preservation

8.5 " x 11" report, signed by qualified preservation architect, including

Narrative.

1. General: Project purpose, scope, groups and individuals involved, substantive changes to approach described in concept submission

2. Existing conditions, describing:
   - Overall building size, configuration, character
   - Project location
   - Existing original materials and design, alterations
   - New findings from testing or analysis in concept phase

3. Preservation solutions explored, how resolved and why, including:
   - Location of new work: visual impact, protection of ornamental finishes
   - Design of new work/installation: visual and physical compatibility with existing original materials and design; materials/finishes proposed (as specified)
   - Methods of supporting new work/installation
   - Preservation and protection of historic materials during construction through tenant move in

4. Effects, describing:
   - How project will affect the building's architecturally significant qualities
   - Measures proposed to mitigate any adverse effects on historic materials or design

Photographs.
   - General and detail views showing existing conditions at affected preservation zones, keyed to plan showing location and orientation of each photo view
   - Captions identifying location, subject, condition shown

Drawings.
Reduced to 8.5" x 11, 11" x 17" foldout or placed in cover pocket:
   - Site and floor plans, as applicable
   - Elevations, plans, and section details showing preservation design solutions for each issue identified, as approved by Regional Preservation Officer

Cover.
Building name, Address, Project title, Project Control Number, Author (Preservation Architect), Preservation Architect's Signature, Date of Submission.

Structural

Calculations. For any computer generated results, submit a model of the input data and all pertinent program material required to understand the output. A narrative of the input and results should be contained in the calculations as well.

1. Gravity load calculations.

2. Lateral load calculation.

3. Foundation calculations.

4. Calculations showing that system is not vulnerable to progressive collapse.

5. Vibration calculations.

6. Results of any other studies necessary for the project design.

Narrative.

1. Description of structural concept, including:
   - Choice of framing system, including lateral load resisting elements.
   - Proposed foundation design.
   - Verification of adequacy of all assumed dead and live loads.

2. Code analysis.
   - Building classification, required fire resistance of structural elements, identification of seismic zone, wind speed, etc.
   - Identification of special requirements, such as highrise.
   - Summary of special requirements resulting from applicable local codes.

3. Proposed methods of corrosion protection, if applicable.

4. Geotechnical Engineering Report, including boring logs (if part of scope of work).
   – See Appendix A.5 for specific requirements.

5. Geologic Hazard Report.

Drawings.

1. Demolition plans (where applicable).

2. Preliminary framing plans and key details.
   – Include column locations, bay sizes and location of expansion and seismic joints.

3. Preliminary schedules, including:
   – Column, beam, slab, metal deck, and wood framing schedules, as applicable.
   – Preliminary seismic details.

Mechanical

Calculations.

HVAC.

1. Block loads for heating and refrigeration.

2. Heat and air balance calculations.

3. HVAC calculations for air handling units.

4. Heat loss calculations for walls and roofs.

5. Energy analysis.
   – Projections for the annual energy consumption of the building, taking into account architectural wall and roof design and lighting.

Plumbing.

1. Water supply calculations.
   – Include pressure for domestic hot and cold water.

2. Roof drainage calculations, should new roof drainage be part of the project.

Narrative.

1. Life Cycle Cost Analysis of at least three potential HVAC systems.
   – The analysis should compare first cost and operating costs. One of the systems must be the base line system described in the Chapter 1 of this document.

2. Description of the HVAC systems studied.
   – The general features, configuration, and functional advantages and disadvantages of each system should be compared qualitatively.

3. Description of recommended HVAC system.
   – Include cost and other considerations.

4. Recommendations for HVAC systems for special spaces.
   – Automated data processing rooms, auditoria, conference rooms, kitchens and other special spaces identified in the building program.

5. Proposed plumbing system.
   – Include lists of typical fixtures.

6. Evaluation of alternate sources for preheating of domestic water (solar or heat recovery).

7. Code criteria should be reviewed by each discipline to the degree of detail necessary to assure that tasks accomplished in this phase meet the code requirements.

Drawings.

1. Demolition plans.

2. Site plan.
   – Proposed inverts of sewers, stormwater pipes and gas lines at the building service entrance, showing match to existing utilities.

3. Floor plans.
   – Proposed HVAC scheme, showing building zoning and major duct and piping runs.

4. Floor plans.
   – Sketch layouts of mechanical rooms, showing locations of major equipment. including size variations by different manufacturers.

5. Floor plans.
   – Locations of proposed plumbing fixtures and equipment.

6. Systems schematics and flow diagrams.

7. Typical schematics for plumbing systems.

Fire Protection

Fire protection and life safety submission requirements shall be identified as a separate Fire Protection section as outlined in this document.

Calculations.

1. Occupant load and egress calculations.

2. Fire protection water supply calculations.
   – Includes water supply flow testing data.

3. Fire pump calculations where applicable.

4. Smoke control calculations where applicable (e.g., atrium, etc.).

5. Stairway pressurization calculations where applicable.

6. Calculations contained in *The SFPE Handbook of Fire Protection Engineering* for calculating sound attenuation through doors and walls for placement and location of fire alarm system audible notification appliances.

Narrative.

1. Building egress system.
   – Includes egress calculations and stairway exit capacities, remoteness, exit discharge, etc.

2. All building fire alarm and suppression systems.

3. Smoke control system(s), where applicable.

4. Special fire protection systems (e.g., kitchen extinguishing system), where applicable.

5. Fire resistance rating of building structural elements.
   – Coordinate with structural engineer.

6. Fire alarm system.

7. Interface of fire alarm system with Building Automation system and Security Systems.

8. Review of building for compliance with life safety requirements and building security requirements.

9. Interior finish requirements as they pertain to the life safety requirements.

Drawings.

1. Floor Plans showing:
   – Equipment spaces for fire protection systems (e.g., fire pump, fire alarm, etc.).
   – Fire protection water supply lines, fire hydrant locations, fire apparatus access roads, and fire lanes.
   – Standpipes and sprinkler risers.
   – Riser diagrams for sprinkler system.
   – Riser diagram for fire alarm system.
   – Remoteness of exit stairways.
   – Location of firewalls and smoke partitions.
   – Identification of occupancy type of every space and room in building.
   – Calculated occupant loads for every space and room in the building.
   – Location of special fire protection requirements (e.g., kitchens, computer rooms, storage, etc.).

Electrical

Calculations.

1. Lighting calculations for a typical 186 m^2 (2,000 sf) open plan office with system furniture.

2. Lighting calculations for a typical one person private office.

3. Power calculations from building entry to branch circuit panel.

4. Load calculations.

5. Life cycle cost analysis of luminaire/lamp system.

6. Life cycle cost study on the options to integrate related building systems.

Narrative.

1. Proposed power distribution scheme.
   – Provide a detailed description and justification for the selected scheme.

2. Interface with Building Automation System.
   – Methods proposed for energy conservation and integration with Building Automation System.

3. Engineering analysis for demand limit controls.

4. Description of each proposed signal system.

5. Description of proposed security systems features and intended mode of operation.
   – Proposed zone schedule.
   – Proposed card access controls, CCTV assessment and intrusion protection system, if applicable.

Drawings.

1. Demolition plans.

2. Site plan.
   – Proposed site distribution for power and communications, proposed service entrance and location of transformers, generators, and vaults, etc.

3. Floor plans.
   – Proposed major electrical distribution scheme and locations of electrical closets.

4. Floor plans.
   – Major routing of communications system, communications equipment rooms and closets.

5. Underfloor distribution system.
   – Show typical detail for power and communications services.

6. One-line diagram.

7. Typical lighting layout.
   – Include lighting for special areas.

8. Exterior lighting scheme.

9. Layout of electrical rooms.
   – Show locations of major equipment.

10. One-line diagrams of other signal systems.

11. Security system site plan.
    – Location for CCTV, duress alarm sensors and access control locations for parking lots shown. If the system is not extensive, these locations may be shown on the electrical site plan.

12. Security system floor plans.
    – Access controls, intrusion detection devices and CCTV locations shown. Preliminary local panel locations shown.

Design Development Cost Estimate

A cost estimate must be provided. It should comply with the requirements stated in GSA document *Project Estimating Requirements*.

Construction Documents

The construction documents must be complete, coordinated between disciplines, biddable, readable and buildable, with no room for unreasonable additional interpretation.

The A/E firm shall provide a signed and dated professional seal on all final contract documents. The cover sheet should also include a statement by the design A/E, certifying the design meets the listed design criteria. Exceptions and waivers to the design criteria should also be listed on the cover sheet of the contract documents, including the name and date of the individual providing authorization.

Site Planning and Landscape Design

Cover Sheet. Provide code clarification statement for compliance with specified codes and standards by each discipline with professional seals and signatures. In addition, include a drawing index.

Drawings. General: The plans listed below, except the demolition plans, may be combined on small projects.

1. Demolition plans.

2. Site layout plan.
   - Location of all buildings, roads, walks, accessible routes, parking and other paved areas and planted areas.
   - Limits of construction.
   - Locations of fire protection water supply lines, fire hydrants, fire apparatus access roads, and fire lanes.

3. Grading and drainage plan, showing:
   - Existing and new contours [use 500 mm (2 foot) interval minimum in area around buildings].
   - Spot elevations at all entrances and elsewhere as necessary.
   - Elevations for walls, ramps, terraces and plazas.
   - All surface drainage structures.

4. Site utilities plan, showing:
   - All underground utilities, including inlets, manholes, clean-outs and invert elevations.

5. Planting plan, showing:
   - Building outline, circulation, parking and major utility runs.
   - Size and location of existing vegetation to be preserved (include protection measures during construction).
   - Location of all new plant material (identify function, such as windbreak or visual screen where appropriate).

6. Planting schedule, showing:
   - Quantity of plants, botanical names, planted size and final size.

7. Irrigation plan, if applicable.
   - Include schematic of irrigation control system.

8. Construction details, profiles and sections and notes as necessary to fully describe design intent.

9. Construction phasing, if part of project.

Calculations.

1. Final drainage calculations, including stormwater detention.

2. Final parking calculations, if applicable.

3. Pipe sizing calculations for water and sewer pipes.

4. Pavement design calculations.

Site Design Review Checklist.

□ Piping and other utility locations and inverts at building penetrations coordinated with mechanical and electrical drawings.

□ Interference of utilities with underground electrical runs checked.

□ Interference between planting and utilities checked.

□ Elevations of entrances coordinated with architectural drawings.

□ Required reinforcement shown for all free standing and retaining walls.

□ Connections to foundation drainage coordinated.

□ Sub-surface drainage shown.

□ Location of underground storage tanks shown.

□ Construction of underground storage tanks detailed.

Architectural

Drawings.

1. Demolition plans.

2. Floor plans.
   – Show planning grids and raised access floor grid, if applicable.

3. Reflected ceiling plans.
   – Show ceiling grid and location of all elements to be placed in the ceiling.

4. Building sections.
   – Vertical zoning for electrical and mechanical utilities must be indicated on sections.

5. Roof Plans.
   – Roof plans must show slopes, low points, drains and scuppers, if applicable.

6. Exterior elevations.

7. Wall sections.

8. Interior elevations.

9. Details.

10. Schedules

Specifications.

1. Instructions to bidders.

2. Division 1, edited to suit specific GSA requirements.

3. Room finish, color and door schedules can be incorporated into either the specifications or drawings.

Architectural Review Checklist.
This checklist enumerates some of interfaces between architectural and engineering disciplines which require close coordination.

- □ Interference with structural framing members coordinated.
- □ Location of below-grade waterproofing shown.
- □ Anchorage of exterior wall elements shown.
- □ Expansion and/or seismic joints shown and detailed.
- □ Adequate clearances to install, service and replace mechanical and electrical equipment.
- □ Rooftop mechanical equipment shown.
- □ Location of roof drains and floor drains coordinated with mechanical drawings.
- □ Air diffusers and registers coordinated with mechanical drawings.
- □ Louver sizes and locations coordinated with mechanical drawings.
- □ Light fixture types and locations coordinated with mechanical and electrical drawings.
- □ Wall and roof sections coordinated with heat loss calculations.
- □ Adequate envelope design details to ensure thermal/air/moisture control.
- □ Acoustical wall treatments shown in mechanical rooms (if applicable).

Historic Preservation

Specifications.
Competency of bidder and restoration specialist qualification requirements, Sections 00120 and 009[00], cross referenced in material specifications

Technical specifications for repair and restoration of historic materials, including:

- Specialized materials and procedures for repair and restoration of historic materials
- Procedures for protecting historic materials in areas being altered
- Sample review requirements of repair and restoration procedures
- Sample submittal requirements for replacement materials and new installations in preservation zones

Structural

Drawings.

1. Demolition plans (where applicable).

2. Full set of structural construction drawings.
   - Drawings must be fully dimensioned, noted and detailed for accurate bidding and construction.
   - Load criteria for all floor live load, roof live load, roof snow load, wind load, earthquake design data, and special loads must be shown on drawings. Live load reduction of the uniformly distributed floor live loads, if used in the design, shall be indicated.
   - Basic wind speed (3-second gust), miles per hour (km/hr), Wind importance factor, I, and building category, Wind exposure, the applicable internal pressure coefficient must be indicated.
   - Seismic design criteria, such as Seismic use group, Spectral response coefficients S_{DS} and S_{D1}, Site class, Basic seismic-force-resisting system, Design base shear, and analytical procedure must be indicated. Additional information may be required by the local building official.
   - Soil bearing pressure and lateral earth pressure must be indicated.

3. Schedules.
   - Schedules for foundations, columns, walls, beams, slabs, and decks, as applicable.

4. Structural details.
   - Include details for steel connections.
   - Include details for anchorage of nonstructural building elements.

Calculations. For any computer generated results, submit a model of the input data and all pertinent program material required to understand the output. A narrative of the input and results should be contained in the calculations as well.

1. Final structural calculations, including:
   - Gravity loads.
   - Lateral loads.
   - Foundations.
   - Thermal loads where significant.
   - Vibration propagation.
   - Progressive collapse.
   - Supports for nonstructural elements, including mechanical and electrical equipment.
   - Steel connections.

Structural Review Checklist.

- ☐ Floor elevations shown on drawings.
- ☐ Camber requirements shown on drawings.
- ☐ Beam and girder connections detailed.
- ☐ Clearances for bolts and fasteners shown (steel and wood construction).
- ☐ Fire resistance of structural members indicated.
- ☐ Beam reactions shown for moment connections.
- ☐ Equipment, piping and ductwork supports detailed (may be shown on mechanical or electrical drawings, as applicable).
- ☐ Hoists shown in major mechanical rooms (if required).
- ☐ Interference with piping and ductwork coordinated.
- ☐ Interference with electrical ducts and conduit coordinated.
- ☐ Concrete inserts shown for anchorage of architectural, mechanical or electrical systems and components.
- ☐ Roof drains coordinated with architectural and mechanical drawings.
- ☐ Subdrainage and foundations coordinated with mechanical drawings/piping.
- ☐ Details for drift, anchoring of exterior walls and anchoring of nonstructural full-height partitions shown in drawings.

Mechanical

Drawings. Systems must be fully drawn and sized to permit accurate bidding and construction.

HVAC.

1. Demolition plans.

2. HVAC piping layouts.
   – All valves must be shown. Indicate locations where temperature, pressure and flow gauges are required.

3. HVAC duct layouts.
   – All dampers, both fire dampers and volume control dampers, must be shown. Ductwork ahead of the distribution terminal must be indicated in true size (double line).

4. Automatic control diagram.
   – Diagram to show control signal interface, complete with sequence of operation.

5. Layout of equipment rooms showing all mechanical equipment.
6. Mechanical details.

7. Complete equipment schedules.

8. HVAC duct riser diagram.

Plumbing.

1. Demolition plans.

2. Floor plans.
   – Plumbing layout and fixtures; large scale plans should be used where required for clarity.

3. Riser diagrams for waste and vent lines.

4. Riser diagrams for domestic cold and hot water lines.

Calculations.

1. HVAC calculations for the entire building, arranged by individual air handling and pumping system.
   – Block loads for heating and refrigeration.
   – Room load and supply air calculations.
   – System load and supply air calculations (for VAV systems).
   – System pressure static analysis at peak and minimum block loads (for VAV systems).
   – Heat loss calculations for walls and roofs.
   – Acoustical calculations (for VAV systems use peak air flow).
   – Flow and head calculations for pumping systems.

2. Plumbing calculations.
   – Include entire building, including roof drainage calculations and hot water heating calculations.
   – Water supply calculations, including pressure.
   – Sanitary waste sizing calculations.

3. Sizing of fuel storage and distribution and vibration isolation.

Mechanical Review Checklist.

□ Interference with structural framing members coordinated.

□ Equipment pad locations coordinated with structural drawings.

□ Adequate clearances to install and service mechanical equipment.

□ Hoist (or other means of equipment replacement) coordinated with structural drawings.

- ☐ Motors and special power needs coordinated with electrical drawings.
- ☐ Location of roof drains and floor drains coordinated with architectural drawings.
- ☐ Air diffusers and registers coordinated with architectural drawings.
- ☐ Louver sizes and locations coordinated with architectural drawings.
- ☐ Inverts of piping coordinated with civil drawings.
- ☐ Supports and bracing for major piping and equipment coordinated with structural drawings.
- ☐ Penetrations through rated wall/floor/roof assemblies detailed and specified.
- ☐ BAS system specified, including software and point schedules.
- ☐ Start up and testing requirements specified.

Special Checklist for VAV Systems.

- ☐ Minimum amount of outside air to be admitted during occupied hours shown on drawings; also minimum ventilation supplied at lowest setting of VAV box.
- ☐ Fan schedule for both supply and return fans, showing minimum and maximum airflow rates and total pressure at minimum flow, maximum sound power level and blade frequency increment at peak air flow.
- ☐ VAV terminal units to be specified indicating maximum and minimum air flow rates minimum static pressure required, maximum static pressure permitted and noise ratings at maximum air flow.
- ☐ Supply air outlets specified by face and neck sizes, ADPI performance for maximum and minimum airflow.
- ☐ Controller pressure setting and sensor location shown, including reference pressure location. For multiple sensors all locations must be shown. Also show pressure setting for high limit of supply fan.
- ☐ Maximum and minimum air flow rates shown for air flow measuring stations. Air flow measuring stations located.
- ☐ All required control instruments shown and located.
- ☐ Location of supply and exhaust systems coordinated with security barriers, detection devices, and other related concerns.

Fire Protection

Fire protection and life safety submission requirements shall be identified as a separate Fire Protection section as outlined in this document.

Drawings.

1. Demolition plans.

2. Full set of fire protection construction drawings.
   - Drawings must be carefully dimensioned, noted and detailed for accurate bidding and construction.

3. Fire Protection details. (All typical details must be shown on the drawings.)

   Building Construction
   - Building's construction type (e.g., 443, 222, etc.).
   - Firewalls and smoke partitions.
   - Panel and curtain walls.
   - Fire stopping configurations. Include details of all openings between the exterior walls (including panel, curtain, and spandrel walls) and floor slabs, openings in floors, and shaft enclosures.

   Life Safety
   - Each stair.
   - Horizontal exits.
   - Each required fire door.
   - Stairway pressurization fans.
   - Security door hardware, including operation procedures.

   Water Supply
   - Fire pump configuration.
   - Anchorage of underground fire protection water supply line.
   - Standpipe riser.

   Water Based Fire Extinguishing Systems
   - Installation of waterflow switches and tamper switches.
   - Sprinkler floor control valves, sectional valves, and inspector text assembly.

   Non-Water Based Fire Extinguisher Systems
   - Special fire extinguishing systems (e.g., wet chemical, etc.).

   Fire Alarm System
   - Fire alarm riser.
   - Typical firefighter telephone station.
   - Typical firefighter telephone jack.
   - Electrical closets for fire alarm system panels.
   - Fire alarm telephone panel (includes voice paging microphone and firefighter telephone system).
   - Visual indicating device control and power detail, typical for floors (state location).
   - Amplifier rack (state location).
   - Typical location of duct smoke detectors.
   - Outdoor fire alarm speaker.
   - Wall mounted cone fire alarm speaker.
   - Typical terminal cabinet.
   - Lay in ceiling mounted fire alarm speaker.
   - Lay in ceiling mounted fire alarm combination speaker/strobe.
   - Wall mounted strobe device.
   - Typical manual fire alarm box installation.
   - Fire alarm system input/output matrix.
   - Graphic annunciator panel.
   - Installation of the graphic annunciator.
   - Fire command center showing the locations of each panel to be installed.

Calculations. For any fire modeling generated results, submit a copy of the input data and all pertinent program material and assumptions required to understand the output and the analysis. A narrative of the input and results shall be part of the calculations.

1. Final occupant load and egress calculations.

2. Final fire protection water supply calculations.
   – Includes water supply flow testing data.

3. Final fire pump calculations where applicable.

4. Final smoke control calculations where applicable (e.g., atrium, etc.).

5. Final stairway pressurization calculations.

6. Fire modeling.

7. Final calculations contained in *The SFPE Handbook of Fire Protection Engineering* for calculating sound attenuation through doors and walls for placement and location of fire alarm system audible notification appliances.

Fire Protection Review Checklist.

Building Construction

□ Verify details for fire walls and smoke partitions.

□ Verify Underwriters Laboratories or U.S. Gypsum Association design numbers with fire walls, smoke partitions, and partitions.

□ Verify firestopping for penetrations in fire rated walls and floors meet Code requirements.

□ Verify structural components are fire rated if applicable.

□ Verify fireproofing meets Code requirements if applicable.

□ Verify proper building separation for exposure protection.

□ Verify interior finish meets Code requirements.

Life Safety

□ Verify the number of exits based on occupant load.

□ Verify exits discharge outside.

□ Verify travel distance to exits.

□ Verify remoteness of exits.

□ Verify common path of travel limits meet Code requirements.

□ Verify door swings meet Code requirements.

□ Verify stair details.

□ Verify horizontal exit details.

□ Verify exit signs meet Code requirements.

□ Verify emergency lighting meet Code requirements.

□ Verify each occupancy classification meets specific exiting requirements.

□ Verify the type, size, and location of each portable fire extinguisher.

Water Supply

- ☐ Verify water supply is adequate to meet design density.
- ☐ Verify detail of anchorage of underground fire protection water supply line.
- ☐ Verify location of valve box and cover plate on buried gate valve.
- ☐ Verify fire pump calculations justify the size of the fire pump and jockey pump.
- ☐ Verify riser diagram for fire pump meets Code requirements.
- ☐ Verify detail of fire pump configuration.
- ☐ Verify sensing lines for both the fire pump and jockey pump are indicated on the details.
- ☐ Verify all piping for fire pump is identified on the drawings.
- ☐ Verify the location of the test header.
- ☐ Verify the location of both controllers.
- ☐ Verify the power feeds to the fire pump and jockey pump are identified on the drawings.

Water Based Fire Extinguishing Systems

- ☐ Verify specifications contain information stating the static and residual pressures are available at a measured flow rate.
- ☐ Verify the sprinkler riser is sized properly on the riser diagrams.
- ☐ Verify that sprinkler piping is not shown on the construction contract drawings. Only the interior fire main piping shall be shown, in addition to the location of obstructions, structural components, construction of walls, floors, and ceilings.
- ☐ Verify the location and size of underground or standpipe water supplies.
- ☐ Verify the location and arrangement of all waterflow and tamper switches.
- ☐ Verify the location of the riser and all points where it penetrates a floor.
- ☐ Verify the location of the fire department connection.
- ☐ Verify the location of all control valves and alarm valves.
- ☐ Verify all areas of the building have sprinkler protection.
- ☐ Verify accuracy of symbol list.
- ☐ Verify all floor control valves and sectional valves have drains.

- □ Verify inspector's test valve arrangements.

- □ Verify wall and ceiling construction is indicated, as well as ceiling height.

Non-Water Based Fire Extinguisher Systems

- □ Verify kitchen equipment is protected by a wet chemical system, monitored by fire alarm system.

- □ Verify power and gas shut down for kitchen equipment meet Code requirements.

Fire Alarm System

- □ Verify location of all audible notification appliances on the drawings and riser diagram meet Code requirements and that the design calculations for substantiating the placement and location of the audible notification appliances match the drawings.

- □ Verify audible notification appliances are identified in stairways and elevator cabs.

- □ Verify location of all visible notification appliances on the drawings and riser diagram meet Code requirements.

- □ Verify accuracy of fire alarm riser diagram.

- □ Verify that at least two vertical fire alarm risers are installed remote as possible from each other. Verify that a minimum two-hour fire rated assembly, shaft, or enclosure, not common to both risers protects one riser. Verify that a minimum one-hour fire rated assembly, shaft, or enclosure protects the second riser. Verify that a minimum one-hour fire rated assembly, shaft, or enclosure protects the horizontal interconnection between the two risers.

- □ Verify that a minimum of two (2) distinct fire alarm audible appliance circuits and a minimum of two (2) distinct visible appliance circuits are provided on each floor.

- □ Verify that adjacent fire alarm audible and visual appliances are on separate circuits.

- □ Verify location and construction requirements of fire command center.

- □ Verify location of graphic annunciator panel.

- □ Verify fire alarm system wiring is solid copper.

- □ Verify location of all manual fire alarm stations meet Code requirements.

- □ Verify smoke detectors are installed in each elevator lobby and elevator machine room to initiate elevator recall.

- □ Verify locations of all area smoke detectors on the drawings and riser diagram meet Code requirements.

- □ Verify locations of all fire fighter telephone stations and telephone jacks on the drawings and riser diagram meet Code requirements.

- □ Verify locations of all duct smoke detectors on the drawings and riser diagram meet Code requirements.

- □ Verify accuracy of fire alarm system input/output matrix.

- □ Verify accuracy of symbol list.

□ Verify accuracy of final smoke control calculations where applicable (e.g., atrium, etc.).

□ Verify accuracy of final stairway pressurization calculations where applicable.

□ Verify accuracy of interface of fire alarm system and Building Automation System.

□ Verify accuracy of interface of fire alarm system and the building security systems.

Miscellaneous

□ Verify that the locations of the fire dampers meet Code requirements.

□ Verify that the location of smoke dampers meet Code requirements.

□ Verify that the elevator systems meet Code requirements.

□ Verify that sprinklered elevator machine rooms are provided with a means to automatically disconnect power.

Electrical

Drawings.

1. Demolition plans.

2. Floor plans.
   – Show lighting, power distribution and communications raceway distribution.

3. Single-line diagram of primary and secondary power distribution.
   – Include normal power, emergency power and UPS.

4. Single-line diagram of fire alarm system.

5. Single-line diagram of telecommunications system.

6. Circuit layout of lighting control system.

7. Details of underfloor distribution system.

8. Site plan.
   – Indicate service locations, manholes, ductbanks and site lighting.

9. Layout of electrical equipment spaces.
   – Show all electrical equipment. Include elevations of substation transformers and disconnect switches.

10. Schedules for switchgear, switchboards, motor control centers, panelboards and unit substations.

11. Grounding diagram.

12. Complete phasing plan (if required) for additions and alterations.

13. Security systems site plan.
    – Final locations of all security devices and conduit runs.

14. Security system floor plans.
    – Layout of all security systems.

15. Storage areas for electrical equipment/spare parts.

Calculations.

1. Illumination level calculations.
2. Short circuit calculations.
3. Voltage drop calculations.
4. Overcurrent coordination study.
5. Generator calculations.
   – Include starter loads.
6. UPS calculation (if UPS provided).

Electrical Review Checklist.

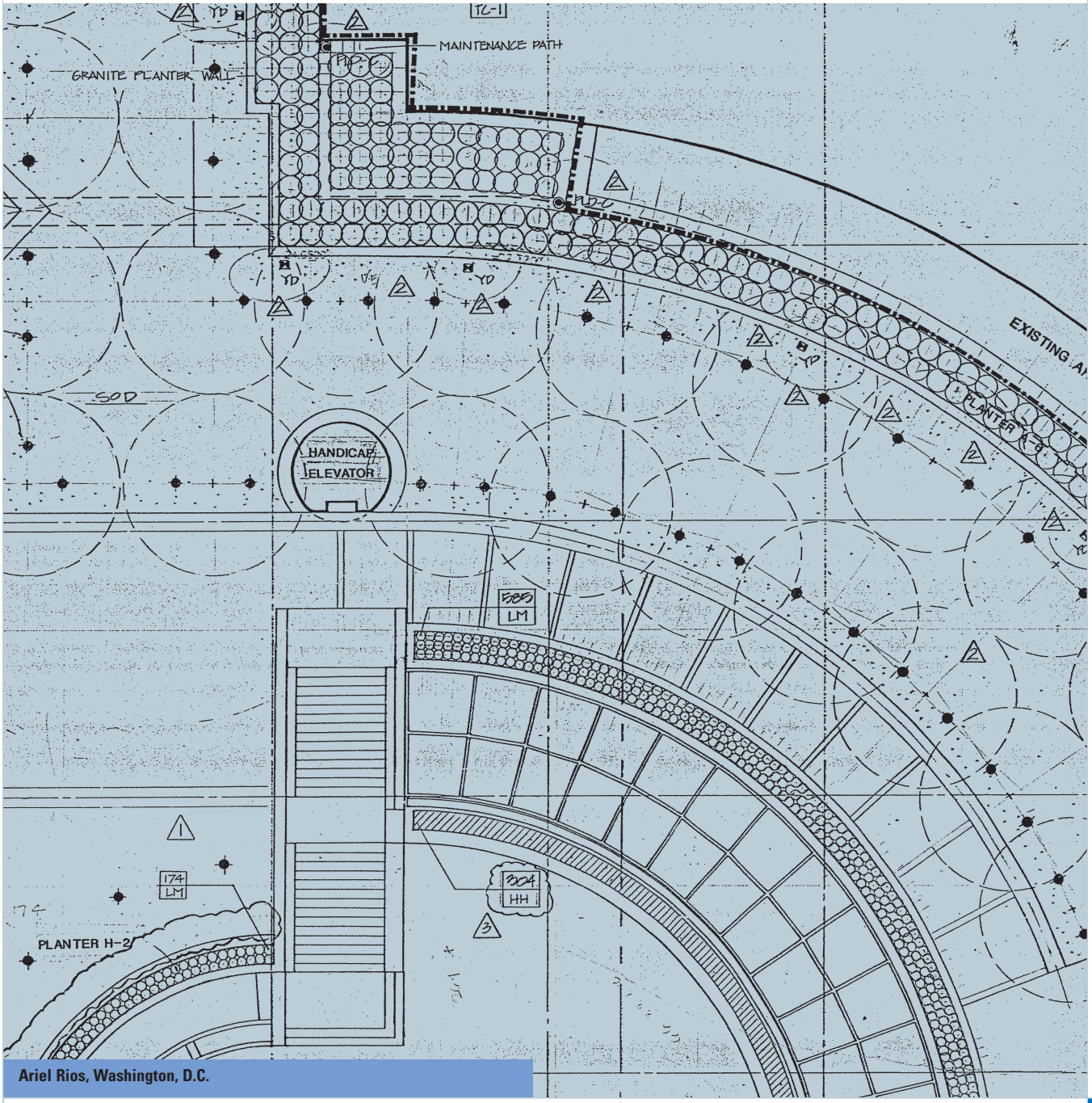
- □ Interference between major conduit and structural framing members coordinated.
- □ Adequate clearances to install and service electrical equipment.
- □ Light fixture locations and types coordinated with architectural drawings and interior design.
- □ Screens for exterior generators and transformers coordinated with architectural drawings.
- □ Penetrations through rated wall/floor/roof assemblies detailed and specified.
- □ Normal and emergency power requirements supplied for all mechanical and fire safety equipment.

Code criteria should be reviewed by each discipline to the degree of detail necessary to assure that tasks accomplished in this phase meet the code requirements.

Construction Documents Specifications

1. Instructions to bidders.
2. Division 1, edited to suit specific GSA requirements.
3. Technical specifications sections, organized according to CSI format.
   – Specifications must be fully edited, typed and bound. Room finish, color and door schedules can be incorporated into either the specifications or drawings.

Construction Documents Cost Estimate. A cost estimate must be provided. It should comply with the requirements for final working drawing stage estimate stated in GSA document *Project Estimating Requirements.*



Ariel Rios, Washington, D.C.

A.5 Surveys and Geotechnical Reports

Site Survey

Site surveys are generally prepared for GSA projects involving sitework. The survey may be contracted separately by GSA or may be included in the scope of the A/E for the project. The guidelines given here apply in either case. In cases where GSA contracts for the survey directly, the A/E may be requested to review the scope of work for the survey and recommend modifications to the technical requirements to suit the specific project site.

The criteria listed here are not absolute; they should be modified by the civil engineer to suit the particular conditions of the project. All surveys should be prepared and sealed by a surveyor licensed in the state where the project is located.

General Requirements. Surveys should generally contain the following information:

- Locations of all permanent features within limits of work, such as buildings, structures, fences, walls, concrete slabs and foundations, above-ground tanks, cooling towers, transformers, sidewalks, steps, power and light poles, traffic control devices, manholes, fire hydrants, valves, culverts, headwalls, catch basins or inlets, property corner markers, benchmarks, etc.
- Location of all adjacent and abounding roads or streets and street curbs within limits of work, including driveways and entrances. Type of surfacing and limits should be shown. For public streets, right-of-way widths and centerlines should also be shown.
- Location of all trees, shrubs, and other plants within limits of work. For trees, caliper size should be shown; dead trees should be indicated.
- Location of all overhead telephone and power lines within the limits of work and their related easements.
- Based on existing records, location of underground utilities, such as gas, water, steam, chilled water, electric power, sanitary, storm, combined sewers, telephone, etc. should be shown. Sizes of pipes (I.D.), invert elevations, inlet or manhole rim elevations should be indicated. Where appropriate, information should be verified in the field.
- Based on existing records, location of underground storage tanks or other subsurface structures.
- Topography field criteria should include such items as 300 millimeter or 600 millimeter (1 to 2 foot) contour intervals plotted on a grid system appropriate to the scale of the survey; elevations at top and bottom of ditches and at any abrupt changes in grade; periodic top-of-curb and gutter elevations, as well as street centerline elevations; elevations at all permanent features within the limits of work; ground floor elevations for all existing buildings.
- Bearings and distances for all property lines within the limits of work.
- Official datum upon which elevations are based and the benchmark on or adjacent to the site to be used as a starting point.
- Official datum upon which horizontal control points are based.
- If there are not already two benchmarks on the site, establish two permanent benchmarks.
- Elevations of key datum points of all building structures and improvements directly adjacent and across the street from the project site during both wet and dry season.
- Delineate location of any wetlands or floodplains, underground streams or water sources.

Geotechnical Investigation and Engineering Report

On most GSA projects geotechnical investigations will take place at three separate stages: during site selection, during building design, and during construction. The requirements for geotechnical work during site selection and during construction are described in other GSA documents. The requirements for geotechnical work for the building design are defined here. They apply whether GSA contracts for geotechnical work separately or includes the geotechnical investigation in the scope of the A/E services.

Purpose. The purpose of the geotechnical investigation during building design is to determine the character and physical properties of soil deposits and evaluate their potential as foundations for the structure or as material for earthwork construction. The type of structure to be built and anticipated geologic and field conditions have a significant bearing on the type of investigation to be conducted.

The investigation must therefore be planned with a knowledge of the intended project size and anticipated column loads, land utilization and a broad knowledge of the geological history of the area.

The guidelines given here are not to be considered as rigid. Planning of the exploration, sampling and testing programs and close supervision must be vested in a competent geotechnical engineer and/or engineering geologist with experience in this type of work and licensed to practice engineering in the jurisdiction where the project is located.

Analysis of Existing Conditions. The report should address the following:

- Description of terrain.
- Brief geological history.
- Brief seismic history.
- Surface drainage conditions.
- Groundwater conditions and associated design or construction problems.
- Description of exploration and sampling methods and outline of testing methods.
- Narrative of soil identification and classification, by stratum.
- Narrative of difficulties and/or obstructions encountered during previous explorations of existing construction on or adjacent to the site.
- Description of laboratory test borings and results.
- Plot plan, drawn to scale, showing test borings or pits.
- Radon tests in areas of building location.
- Soils resistivity test, identifying resistivity of soil for corrosion protection of underground metals and electrical grounding design.
- Boring logs, which identify:
  Sample number and sampling method.
  Other pertinent data deemed necessary by the geotechnical engineer for design recommendations, such as:
  - Unconfined compressive strength.
  - Standard penetration test values.
  - Subgrade modulus.
  - Location of water table.
  - Water tests for condition of groundwater.
  - Location and classification of rock.
  - Location of obstructions.
  - Atterberg tests.
  - Compaction tests.
  - Consolidation tests.
  - Triaxial compression test.
  - Chemical test (pH) of the soil.
  - Contamination.

Engineering Recommendations. Engineering recommendations based on borings and laboratory testing should be provided for the following:

Recommendations for foundation design, with discussion of alternate solutions, if applicable, including:

- Allowable soil bearing values.
- Feasible deep foundation types and allowable capacities, where applicable, including allowable tension (pull-out) and lateral subgrade modulus.
- Feasibility of slab on grade versus structurally supported floor construction, including recommended bearing capacities and recommended subgrade modulus (k).
- Discussion of evidence of expansive soils and recommended solutions.
- Lateral earth design pressures on retaining walls or basement walls, including dynamic pressures.
- Design frost depth, if applicable.
- Removal or treatment of contaminated soil.
- Discussion of potential for consolidation and/or differential settlements of substrata, with design recommendations for total settlement and maximum angular distortion.
- Use and treatment of in-situ materials for use as engineered fill.
- Recommendations for future sampling and testing.
- Recommendations for pavement designs, including base and sub-base thickness and subdrains.
- Recommendations for foundation and subdrainage, including appropriate details.
- Discussion of soil resistivity values.
- Discussion of radon values and recommendation for mitigating measures, if required.

Geologic Hazard Report

A geologic hazard report shall be prepared for all new building construction in Regions of Low, Moderate and High seismicity, except for structures located in regions of Low seismicity designed to the Life Safety Performance Level. Geologic hazard reports are not required for minor or relatively unimportant facilities for which earthquake damage would not pose a significant risk to either life or property.

Required Investigation. When required by the project scope, a geologic hazard investigation which addresses the hazards indicated below should be performed. Whenever possible, a preliminary investigation should be performed in the planning stage of siting a facility, to provide reasonable assurance that geologic hazards do not preclude construction at a site. During a later stage of geotechnical investigations for a facility at a selected site, supplemental investigations may be conducted as needed to define the geologic hazards in more detail and/or develop mitigating measures. The scope and complexity of a geologic hazard investigation depends on the economics of the project and the level of acceptable risk. In general, major new building complexes, high-rise buildings, and other high value or critical facilities shall have thorough geologic hazard investigations. Small, isolated buildings need not have elaborate investigations.

Surface Fault Rupture. For purposes of new building construction, a fault is considered to be an active fault and a potential location of surface rupture if the fault exhibits any of the following characteristics:

- Has had documented historical macroseismic events or is associated with a well-defined pattern of microseismicity.
- Is associated with well-defined geomorphic features suggestive of recent faulting.
- Has experienced surface rupture (including fault creep) during approximately the past 10,000 years (Holocene time).

Fault investigations shall be directed at locating any existing faults traversing the site and determining the recency of their activity. If an active fault is found to exist at a site and the construction cannot reasonably be located elsewhere, investigations shall be conducted to evaluate the appropriate set-back distance from the fault and/or design values for displacements associated with surface fault rupture.

Soil Liquefaction. Recently deposited (geologically) and relatively unconsolidated soils and artificial fills without significant cohesion and located below the water table, are susceptible to liquefaction. Sands and silty sands are particularly susceptible. Potential consequences of liquefaction include foundation bearing capacity failure, differential settlement, lateral spreading and flow sliding, flotation of lightweight embedded structures, and increased lateral pressures on retaining walls. The investigation shall consider these consequences in determining the size of the area and the depth below the surface to be studied. An investigation for liquefaction may take many forms. One acceptable method is to use blow count data from the standard penetration test conducted in soil borings. This method is described in publications by H. B. Seed and I. M. Idriss, (1982), *Ground Motions and Soil Liquefaction During Earthquakes*: Earthquake Engineering Research Institute, Oakland, CA, Monograph Series, 134 p. and H.B. Seed et al, (1985) "The Influence of SPT Procedures in Soil Liquefaction Resistance Evaluations": *Journal of Geotechnical Engineering*, ASCE 111(12): pp. 1425-1445.

Landsliding. New construction shall not be sited where it may be within a zone of seismically induced slope failure or located below a slope whose failure may send soil and debris into the structure. Factors which affect slope stability include slope angle, soil type, bedding, ground water conditions, and evidence of past instability. The geologic hazard investigation shall address the potential for seismically induced slope deformations large enough to adversely affect the structure.

Differential Settlement. Loosely compacted soils either above or below the water table can consolidate during earthquake shaking, producing surface settlement. The potential for total and differential settlements beneath a structure shall be assessed. If liquefaction is not expected to occur, then in most cases, differential settlement would not pose a significant problem to construction.

Flooding. Earthquake-inducing flooding can be caused by tsunamis, seiches, and dam and levee failures. The possibility of flooding shall be addressed for new construction located near bodies of water.

Duration of Strong Ground Shaking. Estimates of the duration of strong ground shaking at a site are defined by earthquake magnitude and shall be used to assess geologic hazards such as liquefaction and slope failure. Strong motion duration is strongly dependent on earthquake magnitude.

Estimates of the duration of strong ground shaking shall be based on the assumption of the occurrence of a maximum considered earthquake generally accepted by the engineering and geologic community as appropriate to the region and to the subsurface conditions at the site.

Mitigative Measures. A site found to have one or more geologic hazards may be used, provided the hazards are removed, abated, or otherwise mitigated in the design, or if the risk is judged to be acceptable. Examples of mitigative measures include: removal and recompaction of poorly compacted soils; use of special foundations; stabilizing slopes; and draining, compaction, or chemical treatment of liquefiable soils. The geological hazard report shall identify feasible mitigative measures.

Required Documentation. Investigations of geologic hazards shall be documented. As noted in the paragraph entitled "Required Investigation" above, a preliminary geologic hazard investigation shall be conducted and a report issued during the siting phase for a facility. However, unless the geologic hazard investigations have been documented in a stand-alone report, they shall be addressed in a section of the geotechnical engineering report prepared during the design phase of a project. The geologic hazard report, whether it is a separate report or a section of the geotechnical engineering report, shall as a minimum contain the following:

- List of hazards investigated, which must include the five described earlier in this section.
- Description of the methods used to evaluate the site for each hazard.
- Results of any investigations, borings, etc.
- Summary of findings.
- Recommendations for hazard mitigation, if required.

In some cases, estimates of site ground motions may be needed for assessment of geologic hazards such as liquefaction and slope failure.

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