DRAFT: for Public Comment, 2011

JUDICIAL COUNCIL OF CALIFORNIA

CALIFORNIA TRIAL COURT FACILITIES STANDARDS 2011

JUDICIAL COUNCIL
OF CALIFORNIA

CALIFORNIA TRIAL COURT FACILITIES STANDARDS
2011

Published by the Judicial Council of California
Administrative Office of the Courts
Office of Court Construction and Management
455 Golden Gate Avenue
San Francisco, CA 94102-3688

TABLE OF CONTENTS

DIVISION ONE: DESIGN CRITERIA

PAGE

PAGE

DIVISION TWO: TECHNICAL CRITERIA

PAGE

The Judicial Council of California, under Government Code, section 70391, has full responsibility, jurisdiction, control, and authority for trial court facilities, and shall adopt appropriate facilities standards. The Administrative Office of the Courts (AOC), Office of Court Construction and Management (OCCM) as staff to the Judicial Council, has the responsibility under rule 10.180 of the California Rules of Court to prepare and present to the Judicial Council recommendations for policies, procedures, and standards for ensuring that the courts have adequate and sufficient facilities.

With the transfer of responsibility for design, construction, and management of court facilities from counties to the state, the AOC has determined that it is prudent to develop standards reflecting the best practices and successful solutions for basic components of the trial court building. Upon adoption by the Judicial Council, the AOC, in accordance with rule 10.181 of the California Rules of Court, will apply these California Trial Court Facilities Standards (hereinafter Facilities Standards) for design and construction of court facilities.

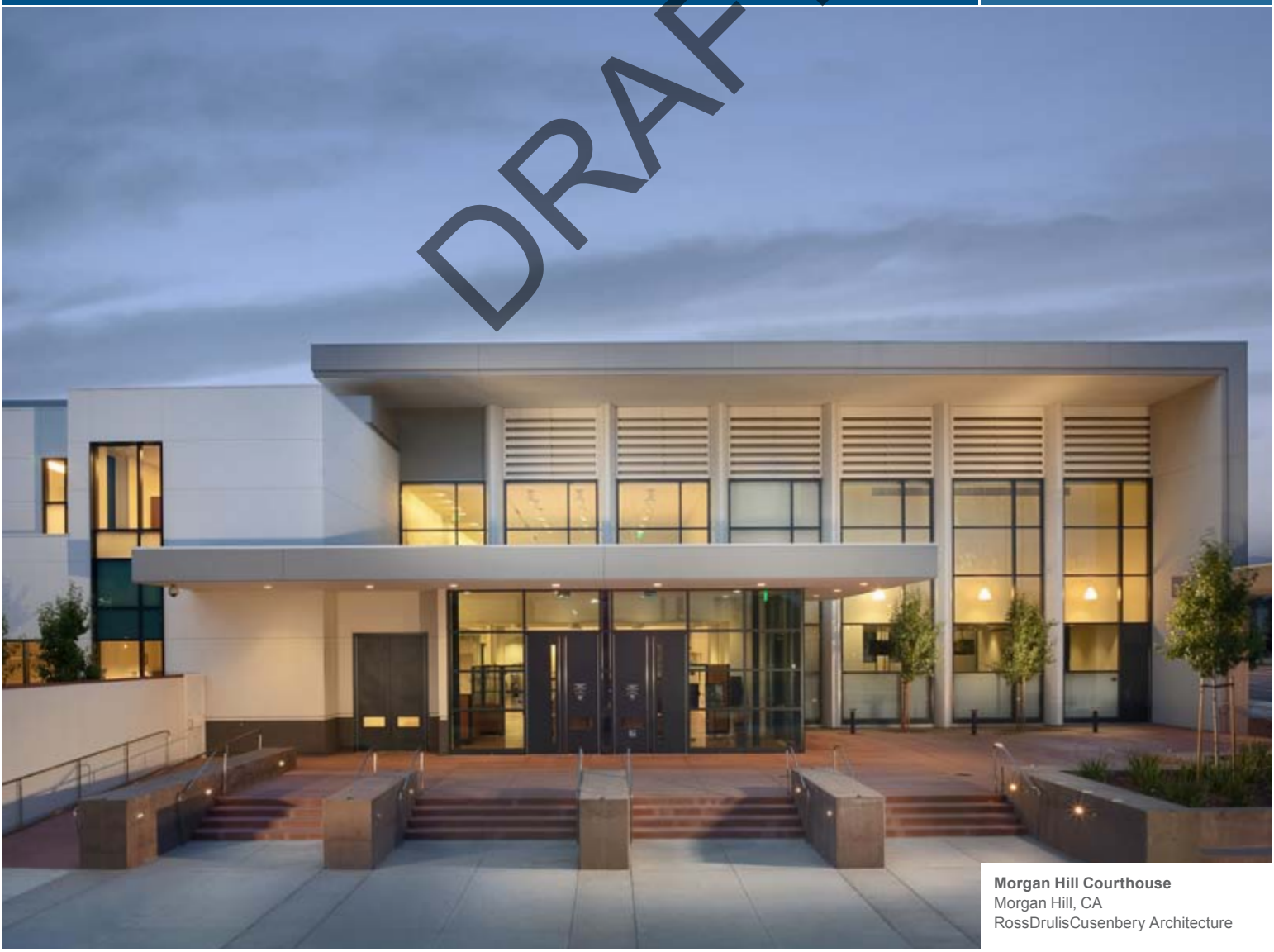
This edition supersedes the California Trial Court Facilities Standards adopted by the Judicial Council effective April 2006.

This 2011 edition is an expansion of the earlier Facilities Standards; it has been developed using input from a variety of sources, including the comments from knowledgeable judges, court administrators, court facility planners, and facility operations technicians; experienced architects and engineers; building code officials; and references such as federal and other state court facility standards. The "lessons learned" in the design and construction of recent court buildings in California, using the 2006 edition, were identified and incorporated in this 2011 edition. These Facilities Standards shall be utilized with professional care as defined in the Agreement for Services between the AOC and consultants retained for specific projects, and shall be used in conjunction with applicable code and project requirements as the basis of design for new court facilities in California. For each court building project, the AOC and the affected court will establish an advisory group in accordance with California Rules of Court, rule 10.184(d); the advisory group will assist the AOC with implementing the Facilities Standards for that specific building.

The Facilities Standards will promote buildings that provide long-term value to the judiciary, to the courthouse occupants, to the community in which they reside, and to the taxpayers of California. These Facilities Standards attempt to maximize value to the State of California by balancing the aesthetic, functional, and security requirements of courthouse design with the budget realities of initial construction cost and the long-term life cycle cost of owning and operating institutional buildings.

Judicial Council of California
Administrative Office of the Courts
Office of Court Construction and Management
Design and Construction Services

1 GENERAL PRINCIPLES



Morgan Hill Courthouse
Morgan Hill, CA
RossDrulisCusenbery Architecture

RIEN VAN RIJTHOVEN ARCHITECTURAL PHOTOGRAPHY

Related Reading

Principles of Design for California Court Buildings

Guiding Principles for Federal Architecture by Daniel Patrick Moynihan, Hon. AIA, former U.S. Senator (N.Y.), 1962

Excellence in Public Buildings Initiative by Stephan Castellanos, FAIA, former State Architect of California

Important References

2010 California Building Standards Code – Title 24, Part 11 California Green Building Standards Code (Cal Green)

LEED® v 3 "Certified"

LEED® v 3 "Silver"

ASHRAE 90.1

California Savings By Design Energy Efficiency Policy

The most recent version of applicable code requirements shall be used during design. For more information, see Chapter 21: Appendix.

The California Trial Court Facilities Standards define the minimum space and the functional, technical, and security requirements for the design of new court facilities in the State of California. The Facilities Standards reflect best practices and successful solutions as the basis for achieving design excellence within contemporary court facilities.

The Facilities Standards are criteria to be used by design professionals, the judiciary, court administrators, and facility planners. The Standards provide a resource of planning and technical criteria. Each courthouse project entails many variables that influence design decisions, including size, calendar type, location, climate, geography, and site context. The Standards provide a basic understanding of the programmatic, design, and operational concerns common to court facilities, and illustrate how standards may reasonably be applied to meet the needs of individual projects. The specific solutions may vary by project; therefore, the diagrams shown are representational and do not describe the only acceptable solutions. Variations have been suggested in some cases.

The Standards represent minimum planning and design expectations; design professionals must understand that these Standards do not exempt them from meeting the professional standard of care.

This document is intended primarily for new and solely court building projects. However, many of the design criteria and performance standards may be applicable to substantial court renovation projects or building system upgrades in existing court buildings, as well as to buildings shared with other related justice agencies.

1.A DESIGN PRINCIPLES

Design Excellence

The Standards require implementation of design excellence principles, collectively known as the *Principles of Design for California Court Buildings*. These principles are adapted from and based, in part, on the *Guiding Principles for Federal Architecture,* by Daniel Patrick Moynihan, Hon. AIA, former U.S. Senator (N.Y.), 1962, and on the *Excellence in Public Buildings Initiative*, by Stephan Castellanos, FAIA, former State Architect of California. These principles include:

- Court buildings shall represent the dignity of the law, the importance of the activities within the courthouse, and the stability of the judicial system.
- Court buildings shall represent an individual expression that is responsive to local context, geography, climate, culture, and history, and shall improve and enrich the sites and communities in which they are located.
- Court buildings shall represent the best in architectural planning, design, and contemporary thought, and shall have requisite and adequate spaces that are planned and designed to be adaptable to changes in judicial practice.

Flexibility and Growth

California court facilities shall be planned for flexibility and, to the extent feasible, to accommodate growth without increasing the authorized gross square footage.

- Court facility space needs change over time. Examples of programmed flexibility include standard courtroom sizes with capacity for juries or special case types, and standard structural modules with adequate dimension and capacity to be converted to courtroom space.
- Floor-to-floor heights, location of vertical and horizontal circulation elements, and column bay dimensions shall allow for conversion of office space into courtrooms. This approach will permit expansion of the judiciary within buildings containing infrastructure elements such as central holding, secure elevators, and electronic security systems. Building infrastructure

and raceway shall allow for a reasonable amount of future expansion consistent with the project program and funding.

Small, Medium, and Large Courthouses

Design responses to programmatic needs will vary, depending on the court facility size, type, and location.

For example, a small rural courthouse requires a different architectural scale, exterior cladding, room sizes, and building systems than those required for a large urban courthouse. Design solutions should be consistent and appropriate for the court type, size, location, context, project complexity, and community they serve.

Building Orientation and Wayfinding

Many court facility users, especially first-time visitors and persons with hearing or visual impairment, are unfamiliar with the public functions and spaces in the courthouse and require assistance in determining where they need to go. Clear circulation, wayfinding visual cues, signage, and graphics are important design elements that will minimize confusion and enhance the visitor's experience when using the courts.

Architects shall provide clear and identifiable pedestrian paths of travel to the main entrance of the courthouse and through internal corridor and site circulation systems, enabling the public to easily understand the facility's organization. They will provide a coordinated series of visual cues, placed in strategic locations, to allow visual orientation to key functional public areas, including courtrooms, the clerk's office, self-help centers, and the jury assembly room.

Views to the outdoors and of architectural elements, windows, doors, skylights, public art, landscaping, color, texture, and scale are among the design opportunities that can be applied when developing a wayfinding program. Other visual strategies that enhance orientation include stylized door types, door surrounds, and interior glazing in addition to standardized, multilingual signage. These elements encourage building users to rely on intuitive decisions, rather than signage only, when navigating the building. Other wayfinding strategies include:

- Design the public lobby as a focal point for the entire facility. Locate the entries of high-volume public use spaces so that they can be seen directly from the public entry lobby. If locations of high-volume spaces cannot be seen from the lobby, provide visual clues immediately upon entering the building. Provide vertical circulation (public stairs and/or elevators directly adjacent to, or clearly visible from, the public lobby).
- Provide clear, concise, and attractive graphics, signage, and visual elements so that visitors can locate their destinations without asking security personnel or courthouse staff for assistance.
- Plan and locate public toilet rooms, waiting areas, courtrooms, and public areas in the same areas on each floor to enhance orientation.

1.B SUSTAINABLE DESIGN

The objectives, design criteria, and performance goals outlined below provide the basis for the planning and design of sustainable trial court buildings in California.

Objectives

Architects and engineers shall focus on proven design approaches and building elements that improve court facilities for building occupants and result in cost-effective, sustainable buildings. All new courthouse projects shall be designed in conformance with the 2010 California Building Standards Code – Title 24, Part 11 California Green Building Standards Code (Cal Green) Mandatory Measures, but not Tier 1 or Tier 2 Measures. Additionally, all new courthouse projects shall be designed for sustainability and, at a minimum, to the standards of a LEED® v 3 "Certified" rating.

Universal Key Goals

- Comply with sustainable initiatives.
- Plan and design for flexibility.
- Use natural strategies.
- Improve energy efficiency.
- Perform building commissioning.
- Promote healthy environments.
- Recycle.

California court facilities shall be designed to provide long-term value by balancing initial construction costs with projected life cycle operational costs.

LCCA = Life Cycle Cost Analysis

Depending upon the project's program needs and construction cost budget, projects may be required to meet the standards for a LEED v 3 "Silver" rating. Projects designed to achieve a LEED "Silver" rating shall do so without an increase in the authorized project budget or long-term operating costs. At the outset of a project, the AOC will determine whether a project will participate in the formal LEED certification process of the United States Green Building Council (USGBC).

Design Criteria and Performance Goals

The following design criteria and performance goals are universally applicable to all court buildings. They shall provide a direct benefit to building occupants and reduce ownership costs.

- Comply with California Green Building Standards Code (Cal Green) Mandatory Measures as described above.
- Comply with LEED criteria as described above.
- Plan and design for flexibility and to anticipate future changes and enhance building longevity. Use modular planning and flexible building infrastructure for HVAC, power, security, and communications systems.
- Use natural strategies to protect and restore water resources. Limit disruption to existing vegetated areas. To purify runoff and promote groundwater recharge, use natural storm water treatment systems such as bio-retention, bio-swales, and permeable paving.
- Improve energy efficiency and ensure thermal comfort. Optimize the building envelope and develop passive solar strategies. Design energy-efficient HVAC systems. Use energy analysis to refine the design so that whole-building energy consumption is at least 15 percent less than permissible for an ASHRAE 90.1–compliant court building.
- Perform building commissioning to ensure that systems perform as designed. If the AOC determines that a project will not participate in the formal LEED certification process, building commissioning will still be required per the 2010 California Green Building Standards Code (Cal Green) criteria as described above.
- Promote occupant health and well-being in the indoor environment. Provide a connection to natural daylight, optimal lighting and acoustics, and good indoor air quality. Develop systems and detailing to ensure thermal comfort and prevent microbial contamination. Use natural ventilation, aided by HVAC systems, to promote effective ventilation; consider localized occupant-controlled systems.
- Plan for recycling of materials during construction, demolition, and occupancy. Develop specifications for construction recycling; require contractors to develop a construction waste management plan that identifies companies licensed to recycle materials. Provide collection bins for recyclable materials on each floor and a staging area for materials collection.

The following design criteria and performance goals shall be applied as best practices:

- Conserve water and consider water reuse systems. Use low-flow plumbing fixtures, water-efficient appliances, and energy-efficient HVAC equipment. Consider collection of rainwater, reuse of gray water for nonpotable uses, and construction of wetland bio-swales for natural wastewater treatment.
- Use environmentally preferable building materials. Evaluate the life cycle environmental impacts, resource efficiency, and performance of building materials. Seek out nontoxic materials from local, renewable, and sustainably acquired resources that minimize waste and pollution from manufacturing, installation,

and maintenance. Use wood products from independently certified, sustainably managed sources. Do not use tropical hardwoods.

- Use appropriate plant materials. Reduce maintenance and irrigation requirements by giving preference to native plant species. Explore opportunities to provide habitat for wildlife and to restore degraded site areas.
- Select and develop sites to promote livable communities. Seek opportunities to redevelop existing sites. Develop links to public transit and create strategies for pedestrian-friendly, mixed-use communities. Consider regional land-use patterns and impacts to the watershed and wildlife habitat. Provide dedicated open space, greenways, and flyways.
- Reduce environmental impact related to energy use. Investigate opportunities to reduce reliance on fossil fuels and to use cleaner power sources. Consider cogeneration, fuel cells, photovoltaic cells, solar hot water, and other renewable energy sources. Explore the potential to use green power. Consider overall energy cost and energy source when evaluating system options.

Participation in Energy Savings Programs

Participation in the California Savings By Design Energy Efficiency Policy, or other programs that are or may become available, is encouraged to promote energy efficiency and environmental awareness, and as a guide for sound energy use and cost decisions. Programs such as California's Savings By Design program address energy efficiency in new construction and renovation projects, and are funded by utility customers through the Public Purpose Programs surcharge applied to gas and electric services. Free services offered under programs such as these include design assistance, energy efficiency analysis, life cycle cost, and financial incentives for the facility owner and design team.

- As long as the Savings By Design program is funded, all new California court projects may participate in the program and implement energy efficiency measures in accordance with the project's financial criteria.
- Upon designation for energy savings programs, a court project shall be analyzed by the "whole building approach" and by Life Cycle Cost Analysis (LCCA) to determine the energy efficiency measures to be included in the court building.

1.C PHYSICAL DURABILITY AND FUNCTIONAL USEFULNESS

California court facilities shall be designed to provide long-term value by balancing initial construction costs with projected life cycle operational costs. To maximize value and limit total ownership costs, the Standards require architects, engineers, and designers to develop building components and assemblies that function effectively for the durations (target functional lifetime) listed in Table 1.1.

Life Cycle Cost Analysis

Selection of major building components, materials, and systems must consider long-term costs for operations and maintenance. Life Cycle Cost Analysis (LCCA) shall be used to evaluate the return on investment of design alternatives over the useful life of components or systems in a court facility. The AOC will consider life cycle cost analysis, along with other project specific factors, in determining acceptability of design alternatives.

- LCCA shall be applied over a 25-year life cycle for design alternatives. The energy efficiency measures shall be evaluated over an eight-year life cycle. The target functional lifetime for components and systems are listed in Table 1.1
- Life Cycle Cost Analysis shall be prepared, using the building LCCA program available from the Federal Energy Management Program (FEMP) or similar tools accepted by the AOC;

FEMP = Federal Energy Management Program

Universal Design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.

Ronald L. Mace
FAIA (1941–1998),
Founder of the Center for Universal Design

- Energy consumption costs shall be calculated from annual energy usage reports generated by compliance software and utility rate schedules. The discount, inflation, and escalation rates shall be determined, by the AOC.
- Selection of structural systems, building components, and materials should consider long-term capital cost impacts of estimated losses resulting from expected earthquakes and other rare and damaging events.
- In certain projects, to be determined by the AOC, the LCCA should be based on known and established methods and techniques including simulations to estimate probable losses—due to seismic events—at various confidence levels for individual event scenarios or over a considered timeframe.
- Table 1.1 lists the building components, materials or systems, which may subject to LCCA depending on the size or scale of a particular court facility.

1.D ACCESSIBILITY

Accessibility is an integral component of civic building planning and design. As an essential element of the justice system, courthouses must be easily accessible to the public. Because of the unique spaces and functions, court buildings often present unique access challenges for persons with disabilities or with limited English language proficiency.

Universal Design

Since most people experience changing physical abilities over a lifetime and benefit from barrier-free design, the design team shall use the principles of Universal Design to ensure equal access to court facilities, to simplify life for everyone, and to make the built environment usable by as many people as possible, regardless of age, ability, or condition. The principles of Universal Design are:

- Equitable use: The design is useful and marketable to people with diverse abilities.
- Flexibility in use: The design accommodates a wide range of individual preferences and abilities.
- Simple and intuitive: Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
- Perceptible information: The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
- Tolerance for error: The design minimizes hazards and the adverse consequences of accidental or unintended actions.
- Low physical effort: The design can be used efficiently and comfortably and with a minimum of fatigue.
- Size and space for approach and use: Appropriate size and space are provided for approach, reach, manipulation, and use, regardless of the user's body size, posture, or mobility.

The Center for Universal Design (1997)
The Principles of Universal Design, Version 2.0
Raleigh, N.C.: North Carolina State University

Universal Design principles shall be incorporated into all court buildings.

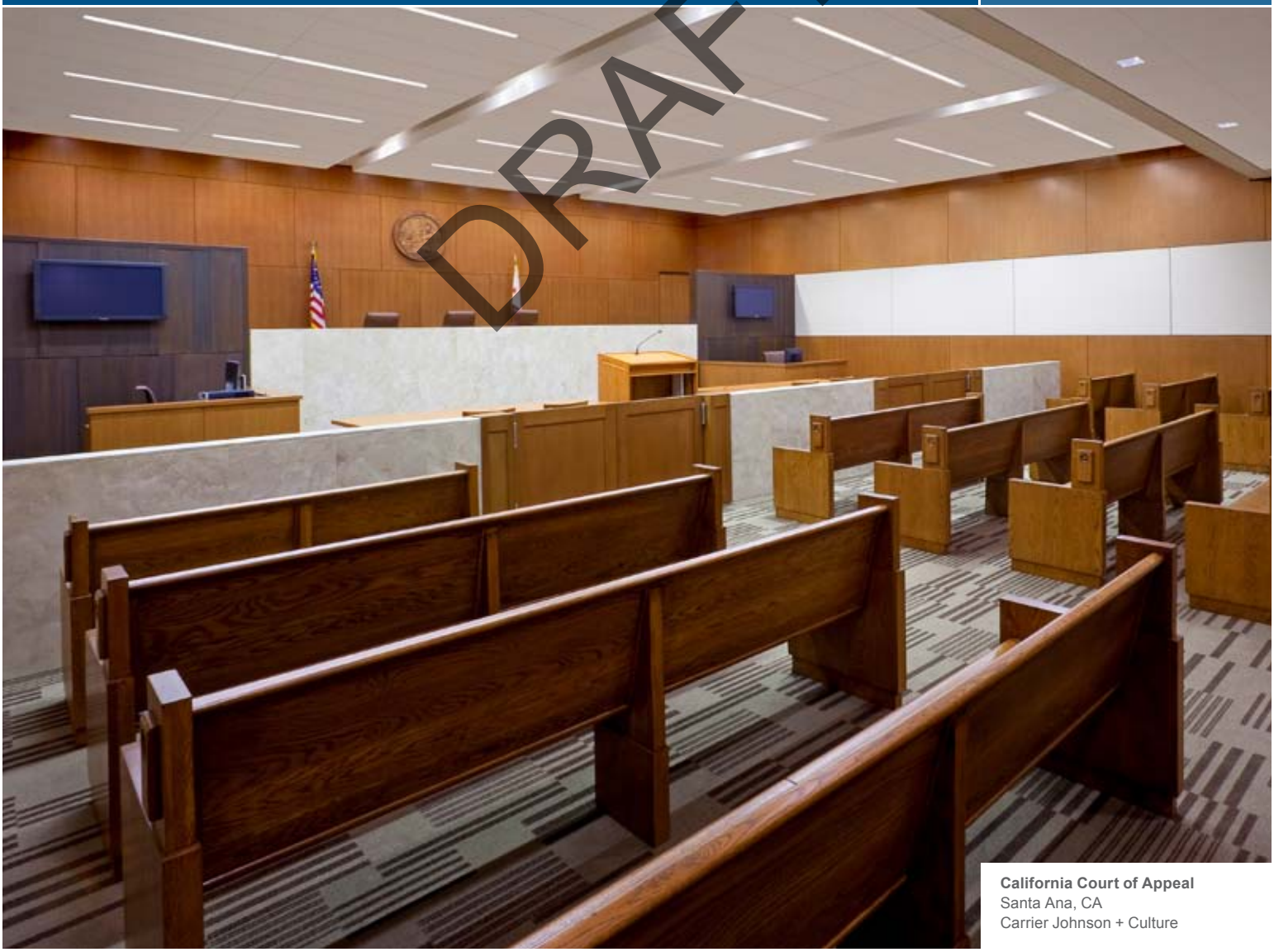
Courthouses shall be designed in accordance with California Building Code Chapter 11B, which sets the minimum standards of equal facilitation for public buildings.

Table 1.1 Functional Life of Building Components or Assemblies

COMPONENT	TARGET FUNCTIONAL LIFETIME (YEARS)
Architectural Elements: Shell and Core	
Foundations, Horizontal, Vertical Framing, and Floor Structures	50–75
Exterior Cladding (Except Sealants)	50
Curtain Wall and Glazing	30
Roofing/Sloped Roofs, Metal or Tile	50
Low Slope (Flat) Roof Membranes	20
Elevator	30
Public Restrooms, Stairs	50
Interior Construction	
Permanent / Core Partitions	50
Improvements Requiring Periodic Remodeling—e.g., "Tenant Improvements"	20
Casework in Courtrooms	35
Stone, Terrazzo, Ceramic Tile Flooring	25
Other Casework	20
Vinyl Composition Tile (VCT), Linoleum, Acoustical Tile	5–10
Carpet and Wall Coverings	5–7

COMPONENT	TARGET FUNCTIONAL LIFETIME (YEARS)
Heating, Ventilating, and Air-Conditioning Systems (HVAC)	
Primary Water-Cooled Equipment	25
Primary Air-Cooled Equipment	12
Fans, Air-Handling Units	25
Distribution Systems (Ductwork)	50
Control Systems	15
Trim/Diffusers	20
Pump Seals	5
Emergency Standby Generators	25
Electric Motors	10
Electrical Systems	
Primary Equipment (Switch Gear, Transformers)	25
Distribution System	50
Fixtures	25
Low Voltage/Security/Access Control	15
Engine-Generator Set	25
Plumbing Systems	
Primary Equipment, Pumps, Boilers	15
Distribution Piping	50
Fixtures	50
Valves, Faucets, Trim	10
Fire Protection Sprinkler Systems	50

2 COURTHOUSE ORGANIZATION



California Court of Appeal
Santa Ana, CA
Carrier Johnson + Culture

COSTEA PHOTOGRAPHY

The general organizational principles for courthouse functions are described in this chapter. Site and program constraints of each project will determine the optimum organization or configuration of a specific court facility.

Three Distinct Circulation Systems

- Public
- Detention
- Private

2.A PROGRAM STACKING/ZONING

Courthouse organization is segregated both horizontally and vertically. In courthouses with in-custody defendants, courtrooms are commonly provided in multiples of two, sharing one court floor holding area and a security elevator to the central in-custody defendant holding area.

Large Facilities: High-volume public spaces and services should be conveniently accessible to the public entrance(s), minimizing elevator load and public penetration into the courthouse. They are typically located on the lower floors of court facilities directly adjacent to the public lobby, while courtroom functions are on upper floors. Lower floor functions typically include the offices of the court clerk, jury services and jury assembly room, child waiting rooms, records, public cafeteria, self-help centers, and other frequently visited public areas, in addition to high-volume courtrooms (for arraignments, felony depositions, and high-profile cases). If these functions are located on the second floor of the building, a connecting set of stairs shall be provided from the main public lobby to access these areas, in addition to public elevators. If high-volume spaces, such as jury assembly rooms, are located above the first floor, the impact on the building's exiting strategy will need to be considered since high-occupancy uses typically require multiple exits; additional egress stairs may be required. Functions requiring less public contact or quieter surroundings, including courtrooms, court administration, and judges' chambers, shall be located on the upper floors, and functions requiring the least amount of public accessibility, such as executive and administrative offices, may be located on the highest floors of the building. Functions requiring higher levels of security and control, including law enforcement waiting, in-custody receiving and holding, and security command centers, may be located on or below the ground level floors in order to minimize the transport of in-custody defendants within the courthouse and the risk associated with this transport. Operational adjacencies shall be considered in the program stacking so that elevator travel times are as efficient as possible (i.e., arraignment courts typically include a steady flow of in-custody defendants, so it is beneficial to locate these courtrooms on a lower floor closer to the central holding area).

Small Facilities: High-volume public spaces and services are located directly adjacent to the public lobby, while courtroom and high-security functions are located in more remote, quieter locations.

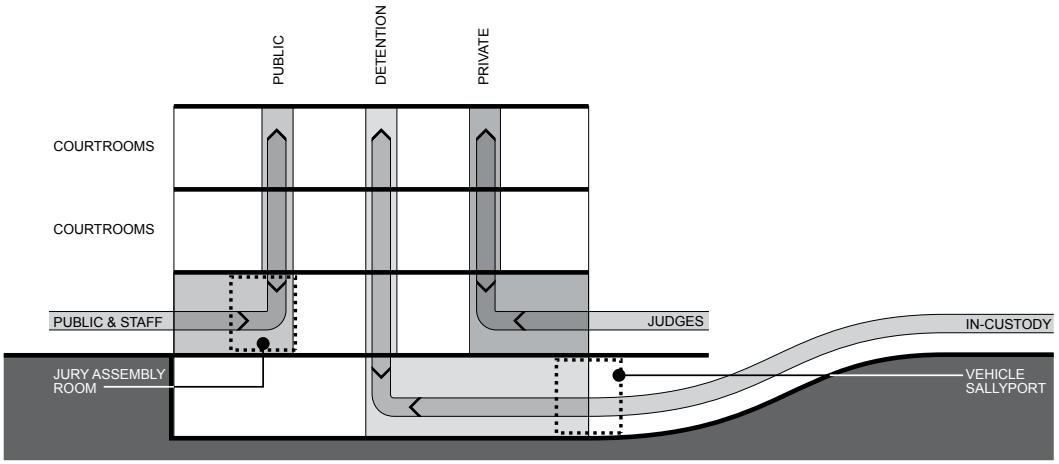


Figure 2.1 Section Showing Three-Part Circulation System

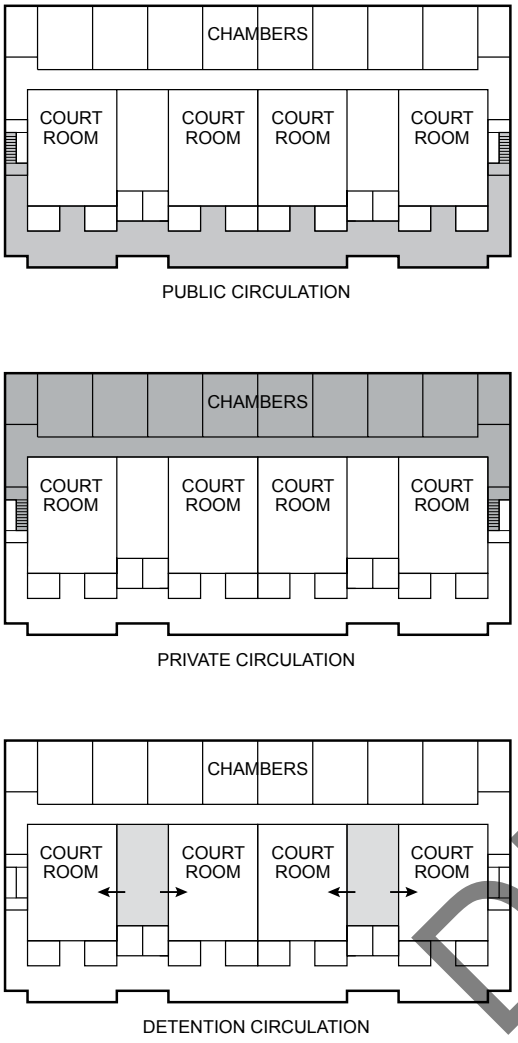


Figure 2.2 Three Circulation Zones

Criminal and family law courthouses require three separate and distinct zones of public, private, and detention circulation. Figure 2.1 indicates the vertical relationships of the three-part circulation system in a multilevel courthouse. The exact locations of these circulation systems may vary, depending on the location of departments and uses within the building. Civil court facilities may only require two dedicated circulation zones, public and private, because in-custody cases are not frequently processed in these facilities. Controlling unauthorized movement from a public zone to a private zone is a security requirement. Each circulation zone shall be separated from the others by access control systems, or sallyports monitored from a central security control room, and entry authorization protocols as part of security operations, as described in Chapter 4 (Courthouse Security). The three zones of horizontal and vertical circulation shall only intersect in controlled areas, including courtrooms, sallyports, and central detention. A brief description of the three circulation systems is illustrated in Figure 2.2.

Public Circulation System

Provide a corridor circulation system linking the public lobby to all public parts of a court building. The overall building organization must be easily understood and be defined by this circulation system. Introduce natural light into public and restricted corridors where possible, and simplify building orientation and wayfinding to and from all public spaces and courtrooms.

The public circulation system provides access from the public point of entry to the controlled access points of the private and detention areas of the courthouse. All areas that have a public service counter, or require access by the general public, shall be accessible from the public circulation system. These areas include the courtrooms, public counter areas, jury assembly room, mediation and Alternate Dispute Resolution (ADR) centers, administrative offices, public waiting areas, food service or vending areas, children's waiting area, public restrooms, public elevators, and other public reception areas. All participants and visitors to the building shall pass through security screening at the main building entry. In buildings where justice partners also occupy space in the courthouse building, their employees are to be screened. The public circulation system also includes the public waiting areas immediately adjacent to courtrooms and attorney conference rooms. Appropriately size the public circulation

NSF = Net Square Feet

CGSF = Component Gross Square Feet

BGSF = Building Gross Square Feet

NSF x Grossing Factor = CGSF

corridors to allow for adequate waiting areas by providing "wide spots in the road" for benches or other breakout areas for conversation and waiting. The public circulation system may be located on the perimeter of the court floors, thereby providing windows to this space that allow natural light in and promote a sense of the transparency of the judicial process within to the public on the outside. This approach implies a single-loaded public corridor with courtrooms on one side of the corridor only, but some courthouses may benefit from a double-loaded corridor approach with courtrooms on both sides of the public corridor, thereby resulting in a more efficient component gross square footage ratio of circulation to program area.

Private Circulation System

The private circulation corridors provide access to court staff, judges/judicial officers, escorted jurors, and security personnel. These corridors and vertical circulation systems connect courtrooms, chambers, support space, jury deliberation rooms, and authorized staff parking areas. The private circulation system cannot be bisected by the public circulation system. Building service functions, including storage, staging and loading areas, security staff offices, and other support areas, are located within the private circulation zone. In most courthouses, the emergency egress stair for private circulation should be separate from the egress stair for public circulation, but occasionally the public and private egress may be combined as long as security measures are provided prohibiting reentry to the floors. If dedicated stairs are provided for the private circulation system, connecting stairs may be utilized between staff areas on other floors. Depending on the location, the building's required emergency egress stair system can be used as an intercommunicating stair between floors. Analyze the security, fire exiting, and smoke stair air evacuation system requirements before implementing this option.

Detention Circulation System

Separate the detention circulation system for in-custody defendants from the public and private circulation zones. The detention circulation system provides access between the secured in-custody entrance (sallyport), central holding and intake areas, secure attorney interview rooms, courtroom holding areas, and courtrooms. The design of these areas shall prohibit unauthorized access by the public and escape by persons in custody. California Code of Regulations, title 15, section 1105(c) requires that court holding facilities have a secure path of travel for in-custody defendants that is separate from paths used by the public. Detention circulation corridors, elevators, and stairwells should minimize turns, alcoves, and other potential hiding places; detention circulation areas are monitored with video cameras supervised by the court security staff. Detention circulation does not necessarily require its own independent means of emergency egress, assuming in-custody defendants are escorted and/or supervised during emergency exiting.

2.B SPACE STANDARDS

Space Standards

The standards for the size of typical functional areas in court facilities are listed in Table 2.2. A selection of sample layouts are provided in figures 2.4–2.8.

Ceiling Heights

Table 2.1 lists the ceiling height requirements for functional areas of California court facilities. All ceiling heights are measured to the face of ceiling finish. In courtrooms and public lobbies, heights will vary and may be lower or higher than the nominal height.

Corridor Widths

The following minimum and maximum corridor widths apply:

- Public corridors: 8'–12', depending on code requirements for occupancy loading and amount of public waiting that is provided in the corridor.
- Private corridors: 6', depending on code requirements for occupancy loading.
- Detention corridors: Minimum 6' in most areas where in-custody defendants are transported, and 8' in central holding areas where two detainees may be escorted in opposite directions, in order to minimize the risk of contact or conflict.

2.C AREA AND VOLUME DEFINITIONS

This section defines terms used in the planning and measurement of court building size and volume, and the ratios resulting from the implementation of these standards.

Table 2.1 Typical Ceiling Heights

SPACE	HEIGHT
Courtroom	12–15'
Chambers	8'–10'
Public Lobby	Varies
Open Plan	9'–10'
Private Offices	9'
Clerk's Public Spaces	9'–10'
Jury Assembly Room	10'–12'
Jury Deliberation Room	8'–10'
Public Corridors	9'–12'
Restricted Corridors	8'–9'
Ancillary Spaces	8'–10'
Secure Corridors	per BOC stds.
Holding Cells	per BOC stds.

BOC = Board of Corrections

Net Square Feet (NSF)

The amount of space required for or assignable to a specific employee classification or function, exclusive of interior walls or internal circulation, is the net area, expressed in net square feet (NSF). The Facilities Standards include space standards that are described in NSF. For example, a courtroom of 1,650 NSF describes the courtroom floor area measured to the face of finishes, excluding the thickness of demising walls. However, space required for ramping outside the courtroom (i.e., ramps up to the judge's door in the private corridor) should also be included in the courtroom NSF; otherwise, the space required for the widened corridor to accommodate the ramp would have to be accounted for in the CGSF (see section on CGSF below). Functional areas to be included in the assignable NSF include but are not limited to court floor public waiting areas, weapons screening stations and the public queuing aisles serving them, server and telecommunications equipment rooms, courtroom technology closets, public entry lobby vestibules, courtroom vestibules, court floor holding, public waiting areas for all public service counters, self-help public access computer stations, elevator equipment rooms, mechanical and electrical equipment rooms, fire control rooms, security control rooms, enclosed parking spaces, vehicle sallyports, and enclosed receiving/recycling areas.

Component Gross Square Feet (CGSF)

The amount of area required by a department or component to function within a court facility is the component area, expressed in component gross square feet (CGSF). In predesign, the CGSF is calculated by multiplying a department or component's total NSF by a factor, to approximate the area needed for circulation, partitions, and structural members and columns within the space. Circulation factors vary, depending on the type and size of the spaces in a component.

Building Gross Square Feet (BGSF)

The gross area of California court buildings shall be measured in accordance with Building Owners & Managers Association (BOMA) *Gross Areas of a Building: Methods of Measurement* © 2009. Gross building area (GBA), which is the total constructed area of the building, and gross measured area (GMA), which is the total area enclosed by the dominant portion of the exterior wall, shall both be computed in accordance with the BOMA standards.

Courthouses require a relatively high grossing factor because of the multiple levels of circulation, assembly spaces, and public waiting areas. For predesign purposes, building gross square feet (BGSF) is typically 1.3 to 1.4 times the CGSF.

Figure 2.3 illustrates the relationships between NSF, CGSF, and BGSF.

Ratio of Total Building Area to Total Number of Courtrooms

The application of the space standards and the planning factors should result in a range of 9,000 to 14,000 BGSF per courtroom. Courts that include the relatively large ratio of office departments to court sets, unique programs, or other specialized functions may have a larger than average BGSF per courtroom. Conversely, court facilities that are used part-time, have no in-custody holding capacity, or have no jury facilities may be less than the average BGSF per courtroom. As the number of courtrooms increases, the overall efficiency (by this measure) of the building should increase and result in a total BGSF that is lower than the average BGSF per courtroom.

For a one-courtroom courthouse project, annual case filings shall be considered and may influence a reduction in the total size of the proposed new courthouse. The sizes of some functional areas should be reduced, and the development of multifunctional spaces should be maximized. For example, for a court handling a low annual caseload and number of jury trials, jury assembly could be held in a multipurpose room functioning as a conference room/jury deliberation room.

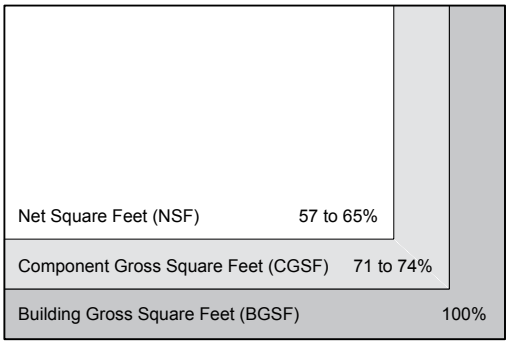


Figure 2.3 Courthouse Efficiency Factors

Relative Building Volume Ratios

The relative building volume ratio for California court facilities shall be in the range of 14 to 16 when total building gross area is divided by total interior building volume and expressed as a resultant. Court facilities typically require a higher volume ratio than office buildings to accommodate the higher ceilings of courtrooms and large assembly areas, as well as the volume needed to provide a public entry with visual orientation to a majority of public services from the lobby.

Predesign Planning Factors for Mechanical and Electrical Equipment Spaces

For planning purposes, mechanical spaces may be estimated to require 5 to 6 percent of the total estimated building gross. Electrical spaces will require an additional 2 to 3 percent of the total estimated building gross. Mechanical and electrical equipment spaces are considered functional areas that are included in the assignable NSF.

Table 2.2 Space Standards

DESCRIPTION	SIZE (NSF)
Court Set	
Multipurpose Courtroom	1,600–1,800
Large Courtroom	2,100–2,400
Arraignment Courtroom	2,100–2,400
Chambers (incl. private toilet)	400
Reception/Waiting	50–80
Staff/Reception/Wait—1 person	100–140
Staff/Reception/Wait—2 person	140–200
Copy/Workroom/Supply Area	80–100
Court Reporter's Workstation	48–64
Research Attorney Work Area	80–150
Staff Toilet Room	60
Jury Deliberation Room	350
Jury Toilet Room	60
Attorney Interview Room	100
Entry Vestibule	64
Law Enforcement Waiting Room	100
Courtroom Exhibit/Evidence Storage	50
Jury Assembly Facilities	
Entry Queuing Area	10–25% of jury call*
Reception/Registration	0–300
Jury Assembly Room	12–20/juror
Forms Counter	3–10% of jury call*
Coffee and Snack Area	115
Staff Workstation	48

DESCRIPTION	SIZE (NSF)
Court Administration	
Public Counter Queuing	14/person
Records Viewing	24/person
Training Room	
Large	1200
Medium	800
Small	400
IS Workroom and Storage	150–300
Active Records Storage	*
Inactive Records Storage	*
Mail Center	150–300
Staff Break Area	*
Lactation Room	50
Private Office	
Director	240–300
Large	175–225
Medium	120–150
Standard	100
Mediator	120–150
Workstation	
Large	80
Medium	64–80
Standard	48
Counter Workstation	40–48
Conference Room	
Large (18–20 people)	360–450
Medium (10–12 people)	240–300
Small (4–6 people)	120–150

Note: For small courthouses, the areas should be scaled down, and some may not be required.

** Per programmatic, technology, equipment, or code requirements*

Table 2.2 continues on next page

* Space standards illustrations are diagrammatic; project-specific furniture and equipment requirements should take precedent.

Table 2.2 Space Standards *continued*

DESCRIPTION	SIZE (NSF)
Family Law Facility/Self-Help Center	
Waiting	14/person
Reception/Sign-in	40–60
Orientation Room	150–200
Workshop	375–400
Mediation Room	120–150
Child Waiting	120 + 20/child
Security Station	50–80
Equipment Storage	100
Alternative Dispute Resolution	
Reception/Waiting	14/person
Mediation/Arbitration Rooms	200–400
Caucus Room	100
Related Justice Agency Spaces	
Multipurpose Rooms	*
Attorney Convenience Center	150–300
Volunteer Workstation	48
Volunteer Coordinator	100–120
In-Custody Defendant Receiving, Holding & Transport	
Vehicle Sallyport	Size per bus dimensions*
Security Vehicle Parking	350
Pedestrian Sallyport	50–100
Detention Control Room	100–250
Central Holding Cells	10/inmate
Attorney Interview Booth	60–80
Courtroom Holding Cell	40 min. (1 per courtroom)
Bail/Fine Payment Counter	48
Storage Rooms	40–100

DESCRIPTION	SIZE (NSF)
Public Areas	
Public Queuing Area	14/person
Security Screening Station	150
Information Kiosk or Counter	64
Courtroom Public Waiting	220 ea.
Public Toilet Rooms	*
Public Transaction Counter	40–60/station
Building Support Services	
Janitor Closet	40
Loading Dock	*
Trash & Recycling Area	*
Media Area	*
Mailroom	160
Staff Toilet with Shower	80
Maintenance Shop	150
Furniture/Equipment Storage	*
Telecommunications Equip. Room	150 min.
Telecommunications Room	90 per 120,000 SF served
Electrical Room	*
Electrical Closet	*
Security Operations Center	150–400
Security Equipment Closet	100 min.

Note: For small courthouses, the areas should be scaled down, and some may not be required.

** Per programmatic, technology, equipment, or code requirements*

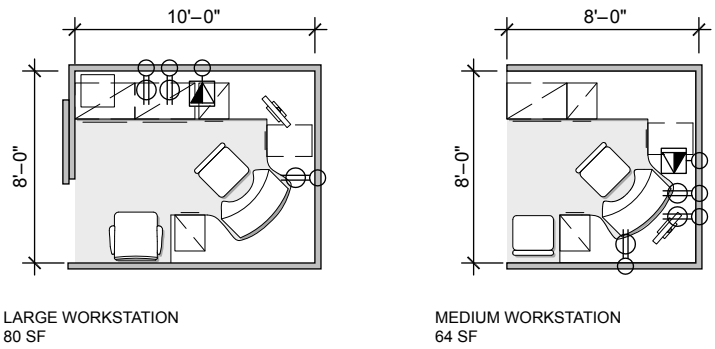


Figure 2.4 Open Plan Workstations*

* Space standards illustrations are diagrammatic; project-specific furniture and equipment requirements should take precedent.

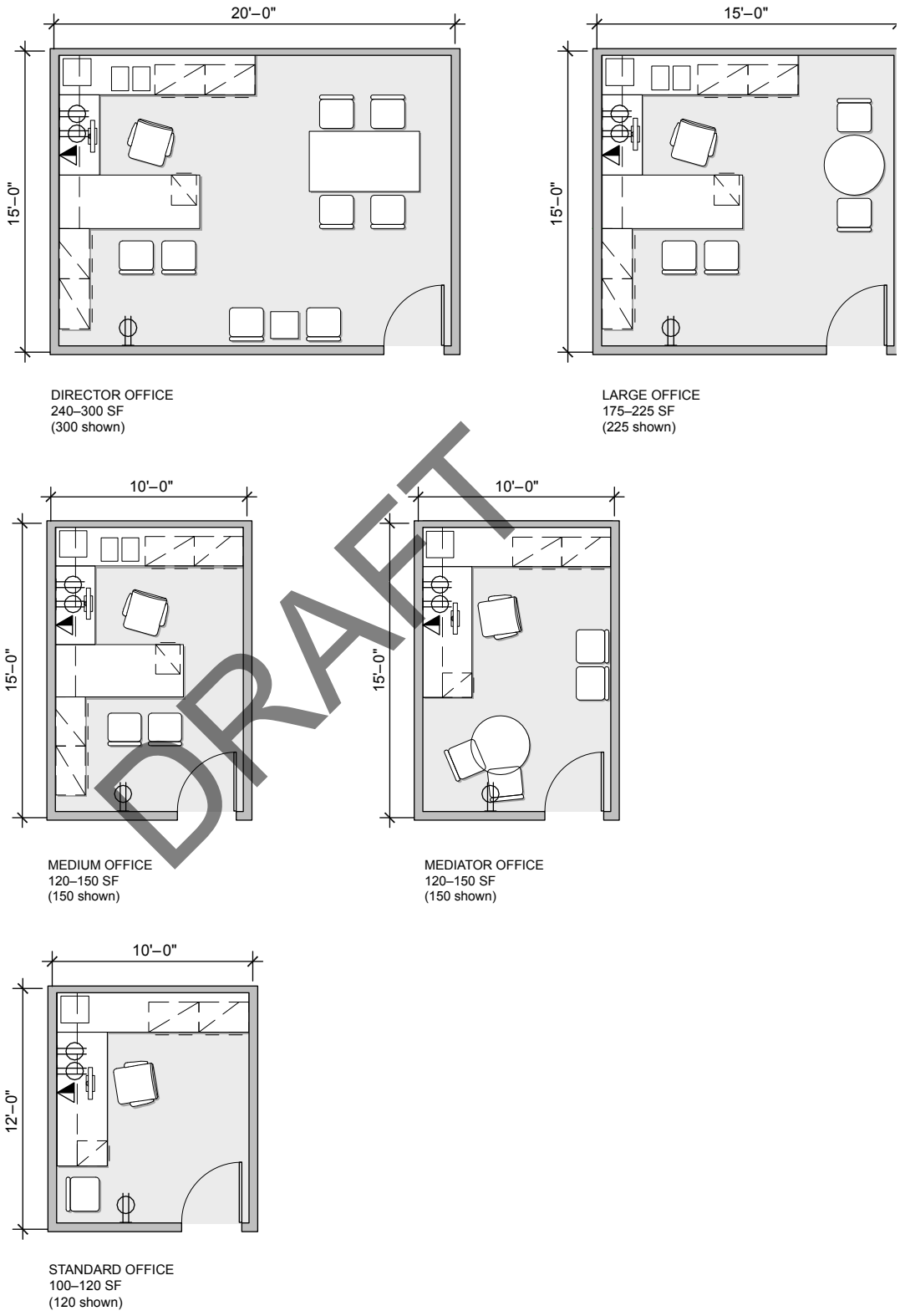


Figure 2.5 Offices—Large Range*

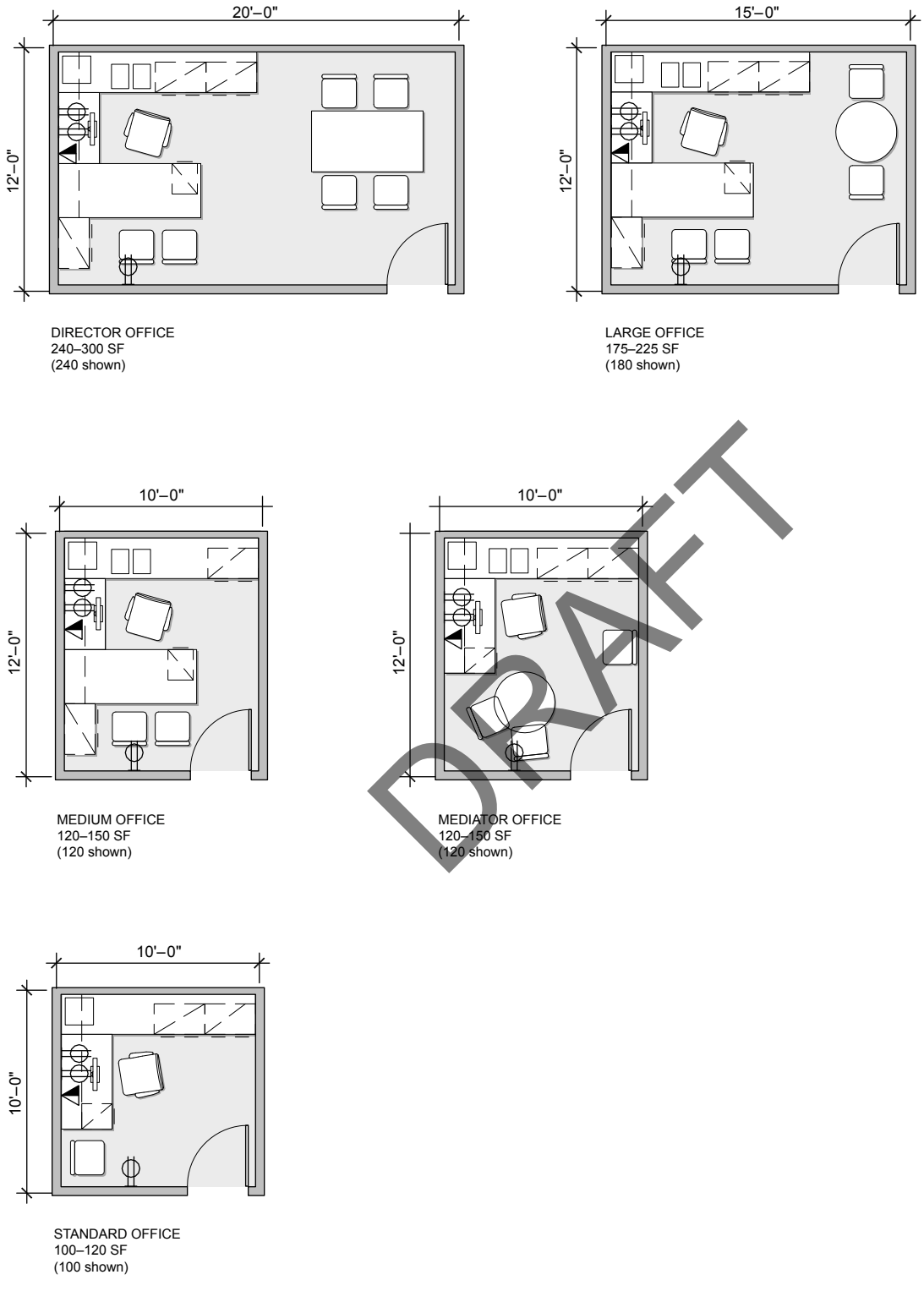


Figure 2.6 Offices—Small Range*

* Space standards illustrations are diagrammatic; project-specific furniture and equipment requirements should take precedent.

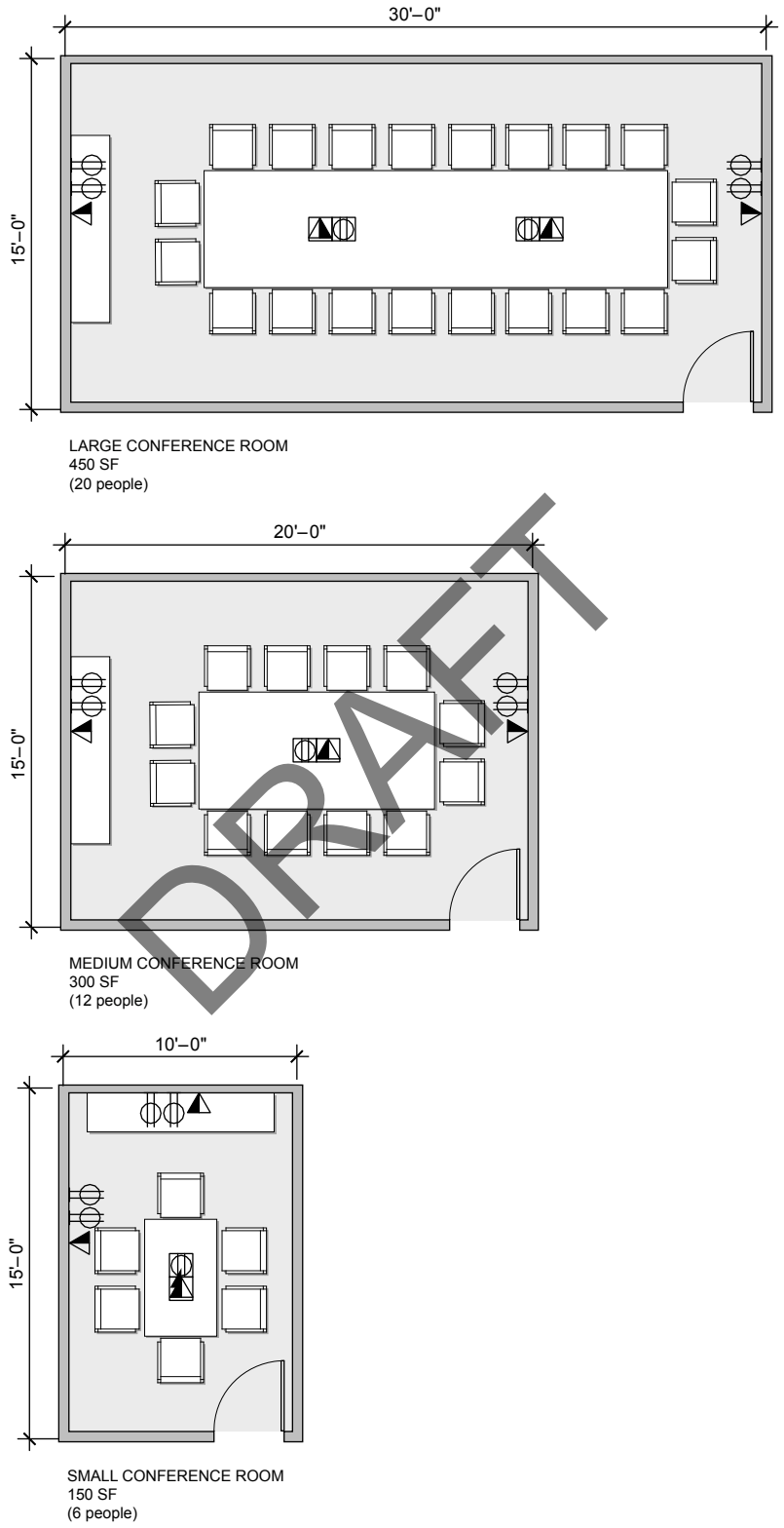
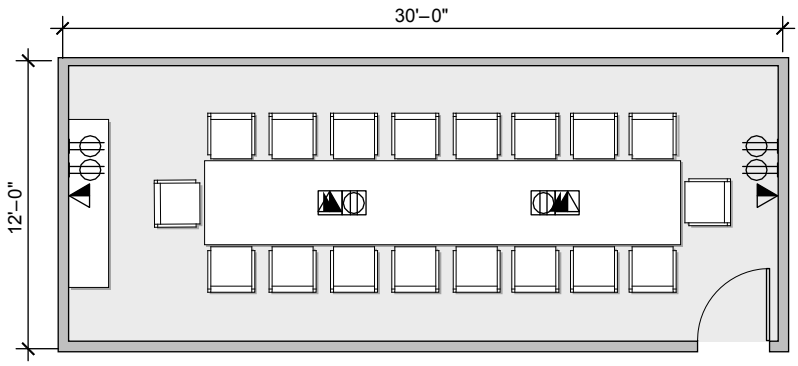
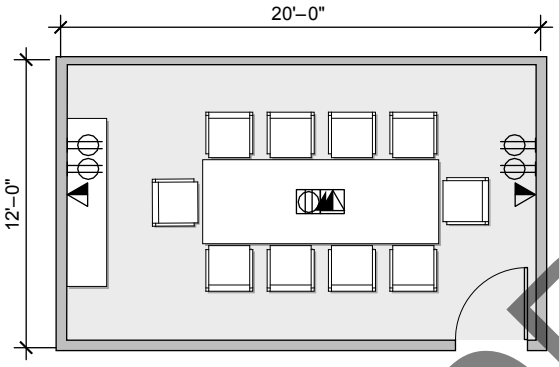


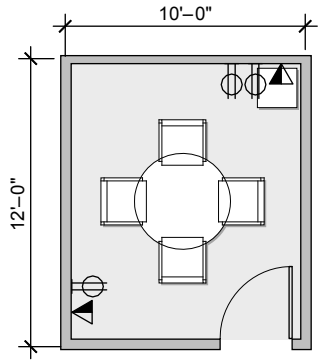
Figure 2.7 Conference Rooms—Large Range*



LARGE CONFERENCE ROOM
360 SF
(18 people)



MEDIUM CONFERENCE ROOM
240 SF
(10 people)



SMALL CONFERENCE ROOM
120 SF
(4 people)

Figure 2.8 Conference Rooms—Small Range*

3 SITE DESIGN

Richard E. Arnason Justice Center
Pittsburg, CA
HOK Architects

DAVID WAKELY PHOTOGRAPHY

Court Facility Site Design Shall

- Provide a safe yet accessible environment.
- Use site design to engage and reinforce the architectural design principles.
- Provide secured and public parking, and appropriate loading areas, as determined by the program.

3.A OBJECTIVES

The selection of a site impacts the building design, the building's users, and the surrounding area. In order to provide the courts with the most well-located and thoughtfully sited facilities, the design team must consider:

- Initial and life cycle costs including site development and site purchase. This should include features that have ongoing maintenance costs (i.e., fountains and water features).
- Convenience and access to public transportation, major roads, and parking. This may predetermine the location in areas with existing infrastructure and transit systems.
- Utility infrastructure.
- Proximity to existing and planned future justice agencies and detention facilities.
- Visibility and dignity of the location for an important civic building.
- Community and regional context. Local community groups' point of view must be considered in the design process. The siting of the court facility should take into consideration and ideally improve the existing context by complying with local restrictions and planning mandates, such as compatibility with neighboring land use and view corridors.
- Effect on the environment. Selection of sites requiring reclamation and cleanup, or sites with historic buildings, may reduce environmental impact and serve as successful examples of reuse.

The selection of an appropriate and successful site will serve the best interests of the courts, building users, and the community.

3.B SITE AND BUILDING SECURITY

Balancing security and openness is an essential site design principle. Court facilities must be and appear to be open to those who use them. A building can provide a safe working environment without becoming a fortress, isolated from the community. For specific security measures, see Chapter 4 (Courthouse Security).

3.C INTEGRATION OF BUILDING AND SITE

The following planning criteria shall apply to site design.

Orientation

Consider airflow and microclimate when siting buildings. In hot climates, maintain airflow around buildings to reduce interior temperatures. Avoid creating enclosed areas, which can block airflow. Maximize solar orientation for outdoor seating and to cool the buildings. In hot climates, position the building on the site in such a way so as to minimize the solar exposure of façades enclosing permanently occupied space.

- Create spaces for programmed outdoor uses, scaled to the intended activity. Locate outdoor sitting areas and service areas away from building air intake units, to minimize the intake of smoke and exhaust fumes.
- Orient main entrances of new buildings toward pedestrian areas, to facilitate safe and barrier-free access. Orient buildings to take advantage of views; conversely, in new buildings, do not block major view corridors.
- Provide two flagpoles prominently located near the public entrance and of a height scaled in accordance with the building position such that the flags unfurled on these poles will not interfere with the surveillance camera coverage or landscape trees. Provide one pole each for the State of California flag and the United States flag.

Massing

Building shape, size, and scale contribute to a facility's architectural and visual character. To convey human scale, and not overwhelm court users, massing and scale of all new construction shall be considered during planning and design. The following shall apply:

- Building height and coverage may respect local zoning regulations, although such regulations do not strictly apply to state buildings.
- Detail architectural elements of large buildings to maintain a sense of scale and sensitivity to the neighborhood context. Consider the visual and environmental effects that new and existing structures will have on the neighborhood, and on existing buildings located in the sphere of influence caused by shading or reflectance, changes in airflow, and views to and from existing buildings.

Pedestrian Access

Access to and from the courthouse must be safe, convenient, and consistent with Universal Design principles. If access involves crossing of streets, provide traffic control measures. On extremely busy streets, engage local government in discussion of potential for signalized pedestrian crossing to the courthouse from the parking area.

Building Entrances

Provide a single building entrance for visitors, staff, and the public, to facilitate cost-effective security operations. See Figure 3.1. Provide a separate entrance for judges and bench officers. See Chapter 4 (Courthouse Security) for specific security requirements.

Site Utilities

Design the location and visibility of utilities to minimize impact on the landscape.

- Service areas and above-grade utilities, including backflow preventors, standpipes, gas docks, and emergency generators: Locations shall accommodate long-term maintenance requirements and minimize conflicts with landscape design. Integrate enclosures with or into adjacent buildings; locate away from primary entries. If this is not possible, cluster components and screen from entries and primary pedestrian paths using appropriate lighting, materials, and planting material. Consider maintenance access and serviceability requirements for site-located equipment (i.e., consider access for fuel delivery tucks when locating emergency generators on the site).
- Underground utilities, including electrical substations, manholes, controlled environment vaults, and steam service: If possible, consolidate under roads, walks, and plazas to minimize impact on the landscape. Locate surface hatches, utility covers, ventilation, and access elements within paved areas. If planted areas are the only option, integrate into shrub and ground cover plantings to conceal appearance. Conceal vault covers in modular paving areas.

COSTEA PHOTOGRAPHY

Figure 3.1 Public Entry, California Court of Appeal, Fourth District, Santa Ana

Scale and function of landscape materials shall be appropriate to the region, site climate, neighborhood context, security, and functional requirements of a California courthouse.

Landscape Design

Provide a related group of landscape materials, to promote continuity throughout the site. The following landscape design standards apply:

- Configure landscape elements per CPTED strategies. See Chapter 4 (Courthouse Security).
- Provide visual focus for the public entry and the path to it with appropriate planting scale and plant placement.
- Define outdoor spaces consistently and with appropriate scale and function throughout the premises.
- Design landscaping features so as not to compromise video and staff surveillance of the building or create hiding places.
- Use landscaping and building configuration to shade and provide sound, sun, and wind buffering for outdoor spaces and pedestrian areas. Provide shading on southern and western building elevations.
- Provide surface parking lot shading, with a minimum of 1 canopy shade tree per every 10 parking spaces.
- Respect sustainable performance goals described in section 1.B (Sustainable Design) to reduce maintenance and irrigation requirements by giving preference to regionally appropriate plant species and by using natural strategies to protect and restore water resources.
- Design landscape elements to prevent unsightly damage by vandalism, birds, trash, transients, or skateboarders where necessary.
- Consider the maintenance requirements of tree and planting selections (i.e., pruning and seasonal cleanup requirements of selected vegetation species). Consider appropriateness of location for certain plant species relative to the site's climate and solar exposure. Consider the location of specific species within the site boundaries (i.e., tree species selected for parking lots should provide shade, but not drop excessive debris on parked cars).

3.D PARKING

The transportation contexts in which trial court facilities will be designed and built vary greatly throughout the state and over time. Certain communities limit the amount of parking to shift people into public transit; some communities are not served by public transit. Parking in surface lots or structures requires large amounts of land, funds for capital construction, operation, and maintenance. The public may equate convenient access to the justice system with easy access to inexpensive parking. Therefore, parking demands and solutions must be carefully considered for each new or expanded court building.

Access to and availability of adjacent public parking for staff, visitors, and jurors must be studied before determining how to provide parking for each new or expanded court building. Public transit service to the site must be studied, as parking demand may be correspondingly reduced. Shared parking agreements with adjacent property owners are encouraged, to use existing parking with demand times that might be different from those of the trial court. In areas where the

Figure 3.2 Secure parking, Vista Courthouse, San Diego

public typically expects to pay for parking, it is consistent to expect visitors, jurors, and staff to pay prevailing rates for parking in adjacent public or privately operated parking lots and structures.

If public parking is provided, calculate parking requirements as follows:

- The number of courtrooms and types of matters to be heard.
- Expected public transit use. Staff parking demands can be reduced through traffic management plans, such as carpooling and public transportation programs.
- The average number of attorneys, visitors, and jurors expected daily; the expected length of stay for each type of parking user.
- Availability of parking within a three- to five-minute walk from the facility.
- The number of employees at the facility; existing employment agreements regarding provision of parking.
- The average number of official vehicles expected daily at the site.

Demand for parking spaces at court facilities is not well documented by empirical studies. Limited data gathered by the OCCM indicates a parking demand for all courthouse users except judicial officers ranging from 2 spaces to 4 spaces per 1,000 gross building square feet. There is no single standard for parking. The characteristics of individual court projects such as geographic location; number of courtrooms and court calendars; number of employees; proximity to downtown and to transit systems; shared parking with other departments; and land uses—as well as users' perspective of existing parking supply or transit—all affect parking demand.

Transportation Demand Management (TDM) measures can be effective in reducing parking demand if applied to the three components of parking demand: jurors, visitors, employees. TDM measures may be different for each group. An integrated parking management strategy using more than one TDM measure can reduce parking demand by 20 to 40 percent and improve convenience for those who use the parking.

Provide secured parking adjacent to or within the courthouse for each judge, the court executive officer, and a small number of staff that may require secured parking. See Figure 3.2. If secured parking is provided beneath the courthouse, separate private elevator access from the secure parking area to private court spaces shall be provided. Other requirements for vehicular access to security areas are provided in Chapter 4 (Courthouse Security).

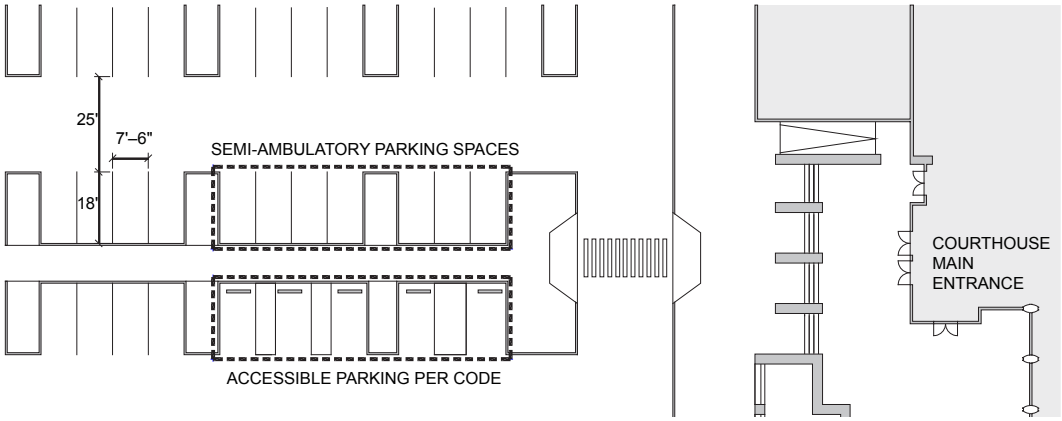


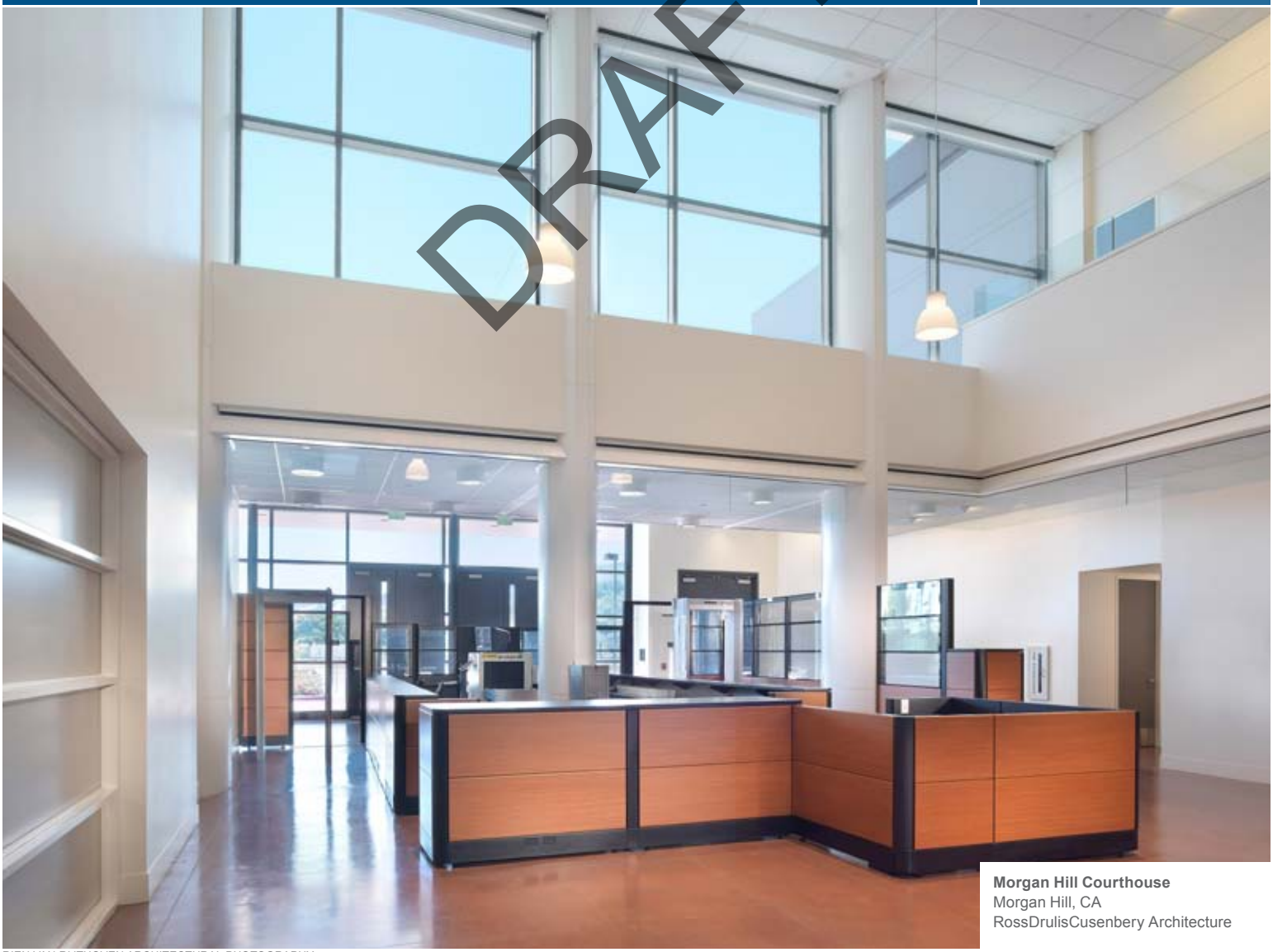
Figure 3.3 Parking Layout Showing Location of Accessible and Semiambulatory Spaces

Parking spaces, except for accessible spaces, shall be 7'-6" by 18'. Provide 25' wide drive aisles for double-loaded 90-degree layouts. Parking space depth can overhang a planting area by 1'-6". See Figure 3.3.

Provide handicapped-accessible parking spaces in the quantities required by code relative to the overall size of the parking lot. Accessible spaces should be located adjacent (or as close as possible) to the building entry.

Provide a loading zone for delivery vehicles that do not need to use the loading dock, or where a loading dock is not provided.

4 COURTHOUSE SECURITY



Morgan Hill Courthouse
Morgan Hill, CA
RossDrulisCusenbery Architecture

RIEN VAN RIJTHOVEN ARCHITECTURAL PHOTOGRAPHY

Courthouses must be a safe harbor to which members of the public come to resolve disputes that often are volatile. Once courthouses themselves are perceived as dangerous, the integrity and efficacy of the entire judicial process are in jeopardy.

Ronald M. George
Former Chief Justice
of California

* Security risks for new courthouses are from The National Center for State Courts

See Chapter 8: In-Custody Defendant Receiving, Holding, and Transport for security relating to in-custody defendants. See Chapter 17: Unified Communications and Chapter 15: Electrical Criteria for electronic systems infrastructure.

Courthouse security planning must ensure a safe and secure environment for the staff and public, and must protect the functions and assets of California court facilities. Balancing security and openness in civic buildings presents myriad challenges. Security planning and design must anticipate terrorist events, chemical and biological attack, natural disasters, emergencies, power outages, crime, and workplace violence. Building systems shall be designed and maintained to protect public health and life safety, and provide direct egress routes for rapid and safe evacuation of building occupants to the outside. These guidelines represent best practices to maximize public security and personal safety. The security planning process is most effective when integrated into the courthouse design at an early stage.

4.A OBJECTIVES

Courthouse security planning and design shall be based on a site-specific risk assessment and will:

- Ensure a safe and secure environment for all building occupants.
- Maintain continuous operations until building inhabitants can evacuate to a safer area.
- Provide security and confidentiality of critical information.
- Enable security and court personnel to maintain control during normal and disrupted operations.
- Be responsive to the risk assessment.

4.B DESIGN, TECHNOLOGY, AND OPERATIONS

A comprehensive court facility security plan integrates design, technology, and operations, including policies, procedures, and personnel.

The most effective security plan is achieved when these three elements are coordinated during early project phases.

- Design: Design comprises architectural elements and engineering systems, including space planning, adjacencies, user group zoning, and passive physical protection; doors, locks, and site perimeter barriers; exterior lighting and egress and circulation system; and all building systems relating to building evacuation.
- Technology: Technology includes electronic security systems and equipment, such as weapons screening, automated access controls, alarm monitoring, duress alarms, remote door and gate controls, and video surveillance.
- Operations: Operations refers to policies and procedures for the court facility, and those for security program management, security staffing, and employee training.

This chapter addresses design and technology planning criteria. When developing a facility security plan, the project team must understand the essential role of operations and staffing levels, because they are directly related to the ability to provide a safe environment, and they affect annual operating costs and budgets.

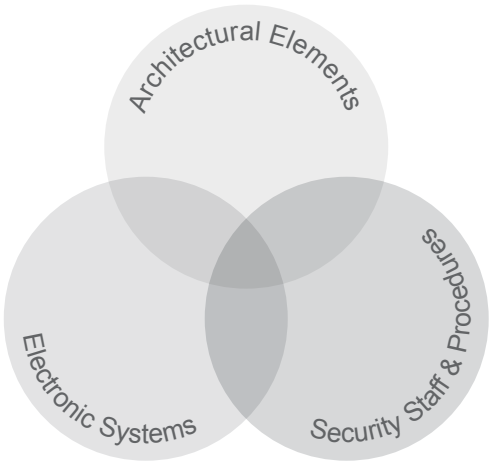


Figure 4.1 Security Plan Elements

Security planning must consider and reflect security staffing levels at each facility. The project team shall develop a comprehensive plan with courthouse security personnel to understand operating policies, procedures, and projected security staffing levels (refer to Chapter 8 for the sheriff's "Operational Program Statement" related to in-custody movement and detention). Technology and electronic systems shall be coordinated with architectural and engineering systems and with building operations. The Operational Program Statement, together with the risk assessment measures, and the security and detention space program are key elements of a comprehensive security plan, which shall be prepared for each new court building project—ideally in the Program Verification/Predesign phase.

4.C FACTORS AFFECTING SECURITY LEVELS

New court facilities vary in size, complexity, types of cases handled, threats, and geographic location. Court facilities may, in some instances, be colocated with other public or private uses. Security design may be influenced by:

- Size of court operation: Loss of the use or destruction of a facility would have a significant impact on the courts and the community.
- Types of cases: Juvenile and family courts have a high risk of confrontation, assault, and violent behavior. Criminal courts require security measures to ensure safe handling of individuals in detention.
- Threats: Past history of incidents or threats may be interpreted as a site-specific increased risk factor. Intelligence from local police, the California Highway Patrol, and the Federal Bureau of Investigation shall also be considered.
- Location: Adjacent facilities, such as federal and public buildings, symbolic targets, and landmarks, may pose a threat to a court facility. High-crime neighborhoods, as identified by crime risk survey data, may result in increased security risks. Measures may be required to mitigate substandard site characteristics such as lack of building setback distances, limited parking arrangements, and sightlines from adjacent buildings or landscapes into chambers windows.

Courthouse Risks

The project team will provide appropriate security design elements and countermeasures to mitigate potential risk and damage pursuant to the findings and recommendations of the risk assessment conducted by the AOC's Office of Emergency Response and Security (OERS). Refer to Section 4.D below for risk assessment procedures. Security risks for new courthouses include:*

- Violent or assaultive behavior directed against staff, judicial officers, the public, or detainees.
- Damage to physical facilities and theft of property, including money.
- Disruption of court activities.
- Compromise of court process, including evidence, court records, jury sequester, and due process.

Capability to Increase Security

The facility must be designed to accommodate changes in security requirements. For example, if a high-profile or celebrity case is assigned to a court located in a small county, security needs may temporarily increase to levels higher than normally encountered. National, regional, and local conditions and threat levels may also impact security requirements. Examples of increased security during heightened threat and alert levels include escalating screening capacity in the lobby and increasing building setback distances to protect against vehicular threats.

CPTED = Crime Prevention Through Environmental Design

Basic CPTED Strategies

- Natural surveillance
- Natural and constructed access control
- Territoriality

4.D RISK ASSESSMENT PROCEDURES

The AOC's Office of Emergency Response and Security (OERS) shall conduct a risk assessment for each project. The risk assessment shall identify potential threats and vulnerabilities, consider the likelihood and potential consequences of an event occurring, and recommend mitigation measures. The assessment shall be used as the reference document for project-specific solutions prepared by the architects and engineers, such as environmental deterrents, blast-resistant requirement, and electronic monitoring and control measures. Table 4.1 indicates the mandatory requirements, as well as those that are determined by the project-specific risk assessment. Table 4.2, as well as the principles and security measures described in this chapter, shall set the scope of security design elements for the site and the court building.

4.E PHYSICAL SECURITY PLANNING CRITERIA

The security planning best practices for trial court buildings are described in this section. Provide the minimum physical security elements indicated or as modified and required by the project-specific risk assessment.

Crime Prevention Through Environmental Design (CPTED)

The design team must comply with the findings and recommendations of the risk assessment and accommodate their impact on the operational design criteria. Permanent, effective, and visually appealing security planning solutions are the basis of CPTED. CPTED principles reinforce the ability of design and the built environment to minimize crime and the fear of crime, and improve the quality of life. Apply CPTED principles in site and building master plans and in the early phases of architectural and landscape design.

There are three basic CPTED strategies:

- Natural surveillance: The placement of physical features, activities, and people in such a way as to maximize visibility, thus preventing the opportunity of crime (e.g., proper placement of windows overlooking sidewalks and parking lots, using transparent vestibules at building entrances to divert persons to reception areas, etc.). This strategy can be supplemented with the use of security and police patrols and the application of closed-circuit television.
- Natural and constructed access control: Natural access control focuses on limiting and providing guided access through use of properly located entrances, exits, fencing, landscaping, sidewalks and roadways, signage, and lighting. This guidance helps deter access to a crime target and creates a perception of risk to a perpetrator.
- Territoriality: The use of physical attributes that express ownership such as fencing, pavement treatments, signage, and landscaping promotes a perception that these areas are controlled. In an area that is physically designed to protect designated space, people are more likely to challenge intruders or report suspicious activity, and the design itself causes intruders to stand out.

Concentric Circles of Protection

The concept of concentric circles of protection is based on varying levels of protection originating at the site perimeter, building envelope, lobby areas, and interior specialty controlled areas, with the levels becoming increasingly more stringent as one proceeds through each level to reach the most critical areas. This concept establishes "intervention zones" between security levels, which provide an opportunity for control, detection, evaluation, and response to undesired activity or intruders or other unauthorized individuals.

Where possible, the facility design should establish distinct separation of areas with differing levels of security.

Site Selection and Design

Vehicular and adjacency threats may be a major concern at court facilities, and must be considered during site selection and site design.

The site must have a minimum 25' setback between unscreened vehicle threats and buildings, unless otherwise determined by the risk assessment. Setback is the distance maintained between a structure or asset and the potential location of the explosive threat. Increasing setback distance greatly improves protection for the building and occupants, as blast pressure and impulse quickly decay as a function of distance. See Figures 4.2 and 4.3.

Improvised explosive devices (IED) weigh approximately 100 pounds per cubic foot. It is reasonable to assume that 10 to 50 pounds may be transported in a hand-carried package, 50 pounds may be surreptitiously concealed within a vehicle, and 100 to 500 pounds (or more) may be transported within a vehicle. While these magnitudes may be significantly less than the weights of explosive that may be transported by the largest vehicles accessible to the site, they correspond to the reasonable levels of blast load intensity (based on site standoff distances) that normal building materials and any feasible upgrades to the building construction can reasonably be expected to withstand.

Site setback is measured from the face of the building structure and/or enclosure to the location of the nearest parked vehicle for the

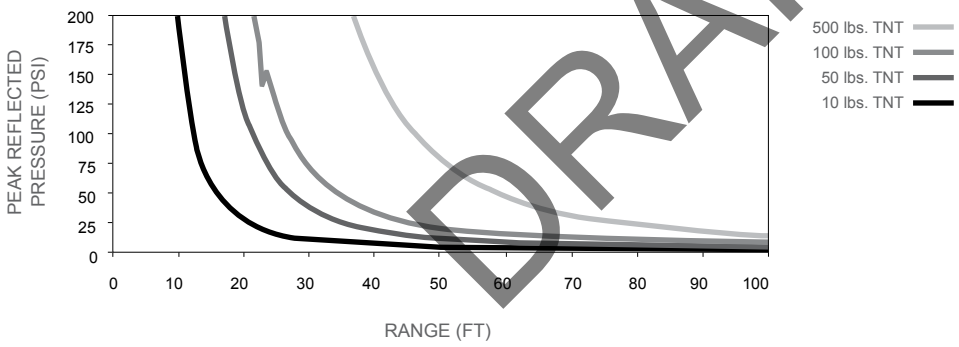


Figure 4.2 Peak Pressure Decay with Distance

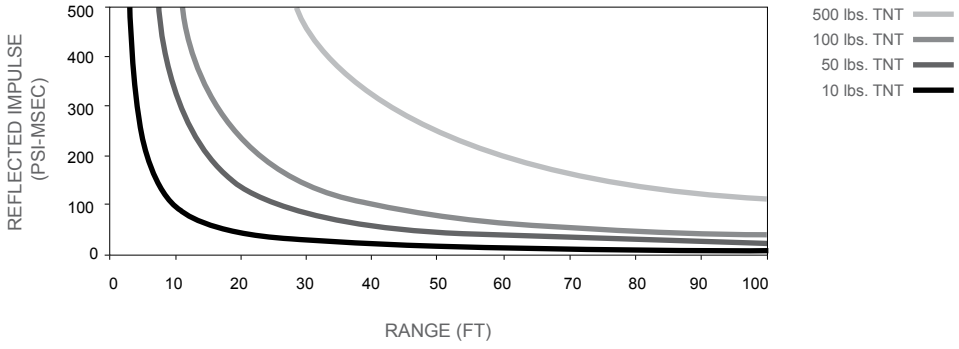


Figure 4.3 Impulse Decay with Distance

High-risk areas are those into which unscreened packages or vehicles may be brought.

passive vehicle threat and to the location of the antiram perimeter for the moving vehicle threat (see the Site Security section of this chapter). Increased setback may also decrease the cost of blast hardening as required. Every foot of setback distance is critical.

Site the building so street configurations do not create a straight, head-on approach to the facility and adjacent facilities, and so that functions do not pose significant risks or threats. Certain site configurations will require vehicle barriers (described in the Site Security section of this chapter).

Parking Security

- Public parking shall not be allowed within or beneath the courthouse.
- Public parking must have a minimum 25' setback from the courthouse, unless otherwise determined by the risk assessment.
- Secured parking in surface lots shall be fenced, visually screened, and separated from public circulation pathways and parking.
- Place all on-site (nonsecure) parking as far from the building as possible. Reduce or eliminate adjacencies between occupied or critical areas and spaces accessible to screened or unscreened vehicles.
- The number of vehicular access points into secure parking areas and sallyports must be minimized and controlled.
- Exterior secure and service parking areas adjacent to the courthouse as well as interior secure parking areas require operable barriers at entries.
- Colocate loading dock and parking garage entries.
- If a screened vehicle threat is specified by the risk assessment, harden interior walls around interior secure parking areas where a 25' distance to critical or occupied space is not provided; heavy damage to these interior enclosure walls is acceptable as long as adjacent occupied or critical space is protected. Harden interior columns in or adjacent to interior secure parking and the floor above and below interior secure parking to resist the specified explosive where the spaces above or below are occupied or contain critical equipment. Interior secure parking areas should be considered to include sallyports.
- If a screened vehicle threat is not specified by the risk assessment, provide a minimum 6" architectural cover around all columns in or adjacent to the interior secure parking.

Site Security

- Employ CPTED principles.
- Place any trash receptacles or public mailboxes outside the site setback distance.
- Illuminate site perimeters, walkways, and drives.
- Restrict heights of landscaping to maintain natural surveillance. As a goal, avoid landscaping that will allow for concealment of 12" tall packages within the site setback distance.
- Protect utilities (gas, power, telephone) at entrance to the site through burial or concrete encasement.
- Employ physical barriers to maintain setback distances, enhance perceived protection, and create a perception of the courthouse as a hard target. The risk assessment will specify either a passive or moving vehicle threat as well as the location of each if not uniform. For a moving vehicle threat, the level of antiram resistance will be determined by the risk assessment. Threat definition and barrier selection shall be based on ASTM F2656. A passive vehicle threat may be deterred through the use of curbs, no parking signs/striping, etc. A moving vehicle threat must be stopped at the minimum required

setback distance by the use of an antiram barrier. The design team must select a barrier system around the entire protected perimeter that will stop the identified vehicular threat. Consider traffic pattern and flow relative to the site configuration. The moving vehicle threat should minimally be considered opposite pedestrian building entrances and at vehicle entrances to loading docks, sallyports, and underground parking.

- Barrier systems may consist of landscaping elements, street furniture, grade changes, planters, walls, bollards, or other antiram designs that provide the required antiram resistance and are integrated into the site/building architecture but shall not be an impediment to visual surveillance by law enforcement.

Building Layout

The building shall be planned to minimize vulnerabilities through appropriate space planning and adjacencies:

- Locate lobbies and delivery areas outside the main building footprint or in an exterior bay, and away from densely occupied spaces and critical facilities.
- Provide one shared staff and public entrance point to reduce weapons screening operational requirements. Provide a secure path from the judges' secure parking area to judges' chambers.
- Provide natural or constructed surveillance for building access points.
- Protect buildings from vehicular threats. Public parking is not allowed within or directly adjacent to the building.
- Separate high-risk areas, including unscreened lobby, loading docks, mailrooms, vehicle sallyports, and secure parking garage, from occupied spaces, critical utilities, and building systems needed to ensure rapid and safe building evacuation, including electrical, mechanical, and fire protection equipment. Do not place critical utilities at exterior walls or within 25' of high-risk areas. Do not place occupied areas within 25' of high-risk areas.
- Locate emergency generators at least 50' from the primary electrical source.
- Colocate loading dock and mailroom toward the building exterior.
- Locate all emergency egress away from high-risk areas. Provide redundant emergency egress exits but do not cluster routes.
- Stack critical areas and supporting utilities.
- Provide ductile materials in emergency egress pathways to minimize debris.

Courtrooms

- Provide bullet-resistant panels within podium/bench for judge, CSO, clerk, and witness stand (see section 4.K).
- Minimize windows with direct line of sight from public areas, circulation zones, and parking garages, to prevent observation of activities, threat exposure, or communication with courtroom occupants.
- Where exterior courtroom windows are provided, ballistic glazing is required as determined by the risk assessment (see section 4.K).

Chambers

- Minimize windows with direct line of sight from public areas, circulation zones, and parking garages, to prevent observation of activities, threat exposure, or communication with courthouse occupants.
- Where exterior chambers windows are provided, ballistic glazing is required as determined by the risk assessment (see section 4.K).

Lobby Considerations

- At courts with high peak screening volumes, an employee bypass lane should be considered.
- Limit adjacencies between the unsecured portions of lobby and court offices or jury assembly spaces.
- Consider potential for mail and package deliveries to be brought in through the lobby in smaller courthouses.

Minimum Prescriptive and Performance-Based Design Requirements

- Blast-resistant design
- Ductile systems
- Hardening critical building elements
- Forced entry protection
- Bullet resistance

Jury Deliberation Rooms

- Minimize windows with direct line of sight from public areas, circulation zones, and parking garages, to prevent observation of activities, threat exposure, or communication with courthouse occupants.

Public Transaction Counters

- Outdoor or unsecure public transaction counters shall be provided with bullet-resistant wall panels, transaction glazing, and pass-through drawers (see section 4.K).

Lobby and Waiting Areas

- Place unsecured lobby areas outside the main building footprint or in an exterior bay so that a blast will not damage the building frame or critical court functional areas.
- Eliminate trash, mail receptacles, or other areas of concealment in the unscreened lobby areas.
- Staffing level for screening is the primary consideration in lobby screening design. The screening configuration needs to optimize throughput with the level of staffing to be provided.
- Design lobby, queuing area, screening lanes, and exit lanes to accommodate direct visual surveillance by staff and security officers. Optimally, an exit lane should be located adjacent to a regularly staffed (incoming) screening lane.
- Design lobby for increased levels of security; this may include additional screening areas or restriction of openings into secure areas.
- Provide physical barriers and indirect circulation between unsecure and secure space to minimize cross contamination of screened and unscreened persons and the introduction of harmful agents or weapons.
- If explosive screening is provided and a hand-carried satchel threat is specified by the risk assessment, harden interior walls around the lobby screening area as well as the adjacent lobby or other space into which blast pressures may propagate; heavy damage to these interior enclosure walls is acceptable as long as adjacent occupied or critical space is protected. The lobby is considered transient and is not required to be protected from the prescreening area. Harden the interior columns in or adjacent to the prescreening area and the floor above and below the unsecured lobby areas to resist the specified satchel explosive threat located at the lobby floor level where the spaces above or below are occupied or contain critical equipment.
- If a hand-carried satchel threat is not specified by the risk assessment, provide a minimum 6" architectural cover around all columns in or adjacent to the loading dock and mailroom.

Evidence and Exhibit Storage Rooms

- Locate evidence and exhibit storage rooms in private circulation areas.
- Both evidence and exhibit storage rooms shall have full-height partitions and hard ceilings, and be secured using keyed locks.

Loading Dock and Mailroom

- Control access to loading dock area by means of operable barriers at entries.
- Place loading docks and mailroom outside the main structure or in the exterior bay and provide a means for venting gas pressures that may result from an internal detonation. If this is not possible, screen incoming packages and mail via the lobby or at a remote facility. Locate critical and occupied space at least 25' away from the loading dock and mailroom.
- If explosive screening is provided and a package threat is specified by the risk assessment, harden interior walls around the loading dock, shipping/receiving areas,

and mailroom where a 25' distance to critical or occupied space is not provided; heavy damage to these interior enclosure walls is acceptable as long as adjacent occupied or critical space is protected. Harden interior columns in or adjacent to the loading dock, shipping/receiving areas, and mailroom and the floor above and below the loading dock, shipping/receiving areas, and mailroom to resist a satchel explosive at the floor level or on the dock where the spaces above or below are occupied or contain critical equipment.

- If a package threat is not specified by the risk assessment, provide a minimum 6" architectural cover around all columns in or adjacent to the loading dock, shipping/receiving area, and mailroom.

Security Operations Center

Locate security operations center in a location to visually monitor the entrance screening area and to monitor and operate electronic security systems. Refer to Figure 4.4. This space is not required in small court facilities. Fire control centers, required with high-rise life safety systems, shall remain separate from the security operations center.

Building Envelope

The exterior building envelope shall be designed to minimize vulnerabilities and protect occupants from flying debris entering the building in the event of an external blast. The risk assessment will specify whether a performance-based design approach is required. If a performance-based approach to building hardening is required, the exterior façade systems comprising the building envelope shall resist a 4-psi and 28 psi-msec air-blast loading.

Minimum Prescriptive Requirements

- Glass: The innermost pane of all exterior glass shall be laminated.
- Windows: Limit or eliminate operable windows.
- Doors: Lock and monitor all unscreened perimeter doors.
- Limit building envelope fenestration at critical areas such as courtrooms, chambers, and jury deliberation rooms, especially at the first level.
- Minimize blast effects by using convex shapes and limited reentrant corners.
- Provide bullet-resistant exterior glazing in judicial chambers and courtrooms, with extent as required based on the risk assessment and available line of sight from surrounding street and nearby buildings. See section 4.K.
- Provide forced entry protection at the first floor. Forced entry rating shall satisfy ASTM F588 for windows, ASTM F476 for swinging doors, and ASTM F 842 for sliding doors, as specified by risk assessment including required resistance grade.
- Walls: Use ductile systems that will resist the defined loads or are designed to support the windows, and will minimize flying debris entering occupied spaces.

Performance Requirements

- Glass: Design exterior glass to achieve a "Low Hazard" rating as defined by ASTM F1642 in response to the specified blast loading. Ideally, the glass pane shall be as weak as possible, so as not to transmit additional load to the frames, mullions, and anchorage. Structural silicone sealant shall be used along the exterior perimeter of the pane to adhere the glass to the frame.
- Window mullions, frames, and anchorage: Frames and anchorage shall be designed to resist the maximum capacity of the glass. Calculations or explosive testing results of identical systems shall demonstrate that the façade components are capable of resisting the specified tributary blast loads without failure, dismemberment, or premature ejection of the glass panels. The allowable rotation of mullion ends

Protective Structural Design

- Prescriptive threat independent approach
- Redundant and ductile structural systems
- Resist disproportionate and progressive collapse
- Ductive detailing and failure modes

in response to the specified blast loading shall be a maximum of 3 degrees (L/40 maximum deflection), and the allowable rotation of the mullion ends in response to the maximum capacity of the glass shall be a maximum of 6 degrees (L/20 maximum deflection). Components shall be designed using allowable stresses equal to the yield strength of their respective materials. This approach creates a balanced design in which the weakest element, the glass, fails first and creates a controlled (instead of catastrophic) failure of the system. Aluminum or steel mullions are preferred. Typically, curtain wall systems, including unitized systems, can be modified with deeper or thicker sections than generally used. A clear load path, incorporating balanced design, must be provided from the glass to the primary structure.

- Doors: The operable portion of doors that is exposed to an explosive threat shall consist of heavy gauge (14 gauge or greater) metal and debris-mitigating materials (e.g., laminated glass adhered with structural silicone). The stationary frame shall be designed to develop the tributary blast load reaction forces. Calculations or explosive testing results of identical systems shall demonstrate that the frame components are capable of resisting the specified tributary blast loads without failure.
- Nonglazed façade systems: Design components using ductile materials to withstand the specified blast load and transfer reaction forces back to the building structure without failure. Refer to U.S. Army Corps of Engineers Protective Design Center document PDC-TR 06-08, Revision 1, for appropriate response limits.

4.F STRUCTURAL SYSTEMS

Protective structural design enables building occupants to evacuate the building safely and rapidly during an emergency, especially if part of the building is damaged, destroyed, or subject to a blast. The goal is to avoid progressive collapse, by designing a structure that will not collapse if one or more structural members are damaged, fail, or are destroyed. This threat independent approach is intended to assure redundant structural design. If the risk assessment specifies an exterior vehicle explosive threat or a hand-carried package threat (and associated magnitudes), the structural members must also be designed to provide the specified performance in response to the calculated blast loading. Since the consequences of structural damage may be significantly greater than the hazards associated with glass debris, the actual blast loading that results from the specified explosive threat must be used. Primary structural members that may be exposed to blast loading shall be designed to resist the tributary loads by developing ductile deformations or redundant load paths. Secondary structural members may sustain localized breach in response to near contact detonations; however, the extent of damage shall be limited to the structural bay in proximity to the event and shall not precipitate a disproportionate collapse.

The following general guidelines shall be followed to improve the structural performance in the event of an explosion.

- Avoid overhangs with occupied space above.
- Provide redundancy and alternative load paths to mitigate blast loads.
- Minimize horizontal and vertical structural irregularities.
- Prevent single-point-of-failure of the building structure by avoiding large transfer girders or locating them away from areas that may be exposed to blast loading.
- Select a ductile structural system. Preferred structural systems include moment frame steel structures, steel frames with shear walls, braced steel frames, and reinforced concrete beam and slab systems with ductile detailing.

- Structures greater than two stories tall shall be designed to resist progressive collapse using the alternate path method, which requires the structure to withstand the threat independent removal of any first floor exterior column, one at a time, or one bay width of exterior load-bearing walls, one at a time, without precipitating a disproportionate extent of damage. Consideration shall be given to ductile moment resisting frame lateral systems at the exterior of the building. Alternate path analysis methods for demonstrating a structure's resistance to progressive collapse shall conform to Design of Buildings to Resist Progressive Collapse, UFC 4-023-03. Columns spaced closer than 30 percent of the largest bay dimension are to be removed in the same alternate path analysis.
- Structural members that may be exposed to blast loading must develop deformations due to direct blast loading and the effects of rebound. Performance shall conform to medium level of protection as described in Protective Design Center PDC-TR 06-08, Single Degree of Freedom Structural Response Limits for Antiterrorism Design.
- All flexural elements and their connections shall be designed and detailed such that no brittle failure mode limits the capacity of the section. Unless the element is designed to remain elastic in response to blast loading, ductile failure modes shall be the governing failure mode for flexural elements and their connections and splices. If the elements are designed to resist the blast loads elastically, the design of nonductile modes shall include a 1.5 factor of safety on the calculated forces.
- Ductile detailing is required for primary structural member connections.
- Floor systems separating high-risk areas and occupied court areas must be hardened to withstand the effects of the specified explosive, as per the risk assessment, located within an adjacent structural bay. Floor slabs above high-risk areas must be designed for upward forces by using continuous, symmetrical reinforcement at the top and bottom.
- Structural columns in high-risk areas must be designed to resist the specified explosive, as per the risk assessment, located 3' away.
- Wall elements that may be exposed to blast loading shall be one-way systems that span from floor-to-floor and shall not be attached to columns.
- Concrete masonry unit (CMU) walls that may be exposed to blast loading shall be fully grouted and reinforced, with connections designed to allow full development of capacity at the supports.

4.G MECHANICAL, ELECTRICAL, AND FIRE PROTECTION SYSTEMS

Mechanical, electrical, and fire protection systems are critical security elements that must remain functional until all building occupants are able to evacuate safely and completely during an emergency.

Critical systems include fire protection, air-handling systems to evacuate smoke and positively pressurize egress stairs and vestibules, emergency communications systems, emergency lighting (especially at means of egress), and emergency power to ensure that these systems are functional in the event of a power outage.

- Locate critical utilities as far as possible from high-risk areas. Do not install utilities within 25' of public parking areas, unscreened lobby, loading docks, and mailrooms. Stack critical areas and their supporting utilities.
- Locate power supply transformers and emergency generators away from high-risk areas. Locate below-grade where possible for best protection. If exterior transformers are required, locate in secured screened areas. Locate emergency generators at least

Electronic security systems shall be coordinated with building systems and reflect the evolving needs of the facility.

50' from the primary electrical source; if emergency generators are located adjacent to high-risk areas, harden the intermediate floor and wall systems.

- Avoid routing critical utilities next to parking areas. If this cannot be avoided, encase in concrete.
- To mitigate a chemical or biological attack within the building, locate air intakes at least 48' above-grade or as high as practical. If air intakes are placed on the roof, secure all roof access points.
- Protect critical utilities, including service entrances.
- Locate main and backup systems as far apart from each other as possible, a minimum of 50'.
- Isolate the mailroom HVAC zone to prevent circulation into main building.
- Provide a system to purge mailroom in case of biochemical contamination.
- Evaluate required redundancy of critical systems. Refer to the individual sections for evaluation requirements. Where redundancy is provided for security purposes, place backup systems and distribution as far from primary systems as possible.

4.H ELECTRONIC SECURITY PLANNING CRITERIA

The electronic security planning best practices are described in this section. Table 4.2 lists the electronic security elements that are mandatory for all court buildings and those that may be required or modified by the project-specific risk assessment.

Site Security

- Secure driveway entrances using vehicle entry and exit gates and gate barrier arms.
- Provide video surveillance of all secure driveway areas and general coverage of public circulation areas. Coordinate with the landscape design to ensure that camera sightlines are unobstructed. Refer to Chapter 3 (Site Design).
- At secure driveway entry vehicle gates, provide pedestals that accommodate the vehicle heights anticipated. Pedestal heads must support a card reader and hands-free telephone. Where in-custody transport vehicles share use of the secure driveway, pedestal heads must also support a detention intercom substation.
- In addition to pedestal-mounted card readers, provide a long-range reader at the secure vehicle gate entry lane to allow operation of the entry gate by judges and other designated personnel from within the safety of their vehicles using a windshield mount access card signal booster.
- Provide alarm monitoring and video surveillance of pedestrian gates.

At secure parking entries and exits, provide video surveillance, hands-free telephones, and card access control of vehicle doors, gates, and gate barrier arms.

Building Envelope

- Provide video surveillance of building exterior.
- Provide video surveillance, door position monitoring, and local alarm sounders at all operable building entry points.
- Control after-hours access through designated perimeter doors with card readers. Provide the minimum number of card readers at perimeter doors that will facilitate operations.
- Provide intrusion alarms to monitor perimeter doors and sensitive areas after-hours as required by the risk assessment.

Lobby, Circulation, and Waiting Areas

- Provide video surveillance, duress alarms, magnetometer, and package weapons scanners at screening lanes.

- Barrier turnstiles shall be provided at exit lanes in line with the screening lanes to restrict access to the secure area from the exit lane.
- Provide video surveillance of lobby, circulation, and waiting areas.
- Provide alarm monitoring, local alarms, and video surveillance at doors separating unsecure from secure, public from private, public from detention, and private from detention spaces. Provide card readers at designated security separation doors only where needed to facilitate operations.
- Doors used strictly for emergency egress purposes that separate areas with differing security levels shall have video surveillance, be monitored for alarms, and have local alarm sounders.

Private Circulation and Waiting Areas

- Provide alarm monitoring, local alarms, and video surveillance at doors separating public from private and private from detention spaces. Provide card readers at designated security separation doors only where needed to facilitate operations.
- Emergency egress doors separating areas with differing security levels shall have video surveillance, alarm monitoring, and local alarm sounders.

Courtrooms

- Provide silent duress alarm buttons for judge, court security officer (CSO), and clerk positions.
- Provide video surveillance of the courtroom, including well area, public seating, and, where applicable, the door to court holding.
- Control the public entry door into the courtroom using a card reader with integral keypad. Presentation of a card at the reader will provide momentary unlock of the doors to provide access to authorized persons when court is not in session. Each use of a card at the reader will activate the courtroom entry door to unlock the door while courtroom is in session or lock the door to secure the courtroom when not in session.
- Card access control from the courtroom to the private corridor at the witness stand/jury egress door is permissible; however, card access control of the judge's door behind the bench is not allowed.

Chambers

- Provide silent duress alarm buttons at judge's desk.
- Provide card access at judge's chambers doors to restrict entry to authorized personnel.

Jury Deliberation Rooms

- Provide wall-mounted silent duress alarm buttons in jury deliberation rooms. Locate duress buttons in a readily accessible area, situated to minimize inadvertent activation.

Public Transaction Counters

- Each public transaction counter position shall have a duress alarm button.
- Provide overall video surveillance of the public queuing and walk-up areas. Cameras behind the transaction counters are not permitted.
- Provide an active full-duplex audio communication system at outdoor and unsecure public transaction counters. The communication system must have an on/off switch allowing staff to enable or disable communications.

Family Court Services Mediator Offices

- Provide silent duress alarm buttons in mediator offices and video surveillance outside offices in the adjacent corridors.

Child Waiting

- Provide silent duress alarm buttons and video surveillance inside child waiting areas. Camera coverage should include

Refer to Table 4.2 for security requirements by area and space type and AOC's Systems Design Brief in the Appendix for specific information regarding security systems requirements.

interior and exterior corridors by the child waiting area door as well as the main child waiting area.

- A door intercom, remote door release, and local alarm annunciation system should be considered at child waiting areas with doors and interior circulation that are out of view of the staffed position. Local alarm annunciation must notify staff that a child has entered an out-of-view area or that someone has entered child waiting without permission. The staff person shall have the ability to arm and disarm local alarm annunciation as needed.

Current Case File Storage Areas

- Provide silent duress alarm buttons at staffed positions in public records viewing areas.
- Where public records rooms are not staffed, provide remote door release from secured staffed positions that are within view of the door.
- Provide video surveillance of all public viewing areas to provide a record of files in custody of the public.

Evidence and Exhibit Storage Rooms

- Limit access to authorized personnel via card access control at the door. Provide two-factor authentication (card plus PIN) access control for entry into the evidence storage room using a card reader with integral keypad to prevent lost or stolen access cards from being used by unauthorized persons to enter evidence storage.
- Provide video surveillance and recording of all who enter and exit the evidence storage room.

Loading Dock, Receiving, and Mailroom

- Utilize card readers at key operational doors to facilitate loading dock and mailroom operations.
- Provide video surveillance of loading dock and receiving areas and monitor doors for intrusion.
- Provide video surveillance and silent duress alarm button in the mailroom. Provide telephone outside receiving door to facilitate communication with delivery drivers when loading dock and mailroom are closed.
- Where required by the risk assessment, provide package weapons scanner in the mailroom. Where a package weapons scanner is not required, all incoming packages delivered shall go through lobby security screening or other package screening process consistent with the court security operations plan.

Security Operations Center

- The SOC may duplicate functions from the detention control room, or may be combined with the holding control room. Chapter 8 (In-Custody Defendant Receiving, Holding, and Transport) describes systems that may require backup operation in the SOC.
- Detention cameras monitored outside the detention area must not be viewable by the public at any time.
- Utilize modular workstation furniture in the SOC that is ergonomic and does not obstruct visibility of the lobby and screening area.
- Fire control centers, required with high-rise life safety systems, shall remain separate from the security operations center. Locate a fire alarm annunciator in the SOC to provide security personnel with immediate fire alarm event information that impacts security of the facility. Refer to Chapter 20 (Fire Protection Criteria) for specific fire alarm system criteria.

Security Equipment Location

- Locate electronic security "headend" equipment, including computers, storage, interface equipment, and the like, in the building MDF room.
- Monitoring and control computers, monitors, annunciators, and related equipment shall be located in the security operations center or other designated area if an SOC is not required.
- Security headend equipment in MDF/IDF rooms shall be housed in enclosed and lockable equipment racks and/or wall cabinets. Coordinate ample rack and wall space plus 25 percent future security equipment capacity. Coordinate rack and wall space requirements with the design of the MDF and IDF rooms. Refer to Chapter 17 (Unified Communications) for specific telecommunications criteria.
- Electronic security system headend equipment must be network based and be provided with network connectivity and an uninterruptible power source.
- Point-to-point wiring is permitted in MDF and IDF rooms and from MDF/IDF rooms to field devices located on the same floor.
- Communication between floors must be over the court network using a VLAN. Point-to-point wiring between floors is not permitted.

4.J ELECTRONIC SECURITY SYSTEMS

Security systems shall be integrated and communicate with each other via the court's local area network. Security electronics systems shall include the following.

Card Access Control

The card access control system is the primary means of monitoring security events, controlling card access points, and logging and reporting activity.

- Provide monitoring and control of the secure driveway vehicle gates and doors, vehicle gate barrier arms, building perimeter protection, and controlled separation between public, private, detention, and other critical areas.
- Design card access control measures to restrict access from a lower security area to a higher security area and where the measures will substantially benefit operations and minimize issuance of keys.

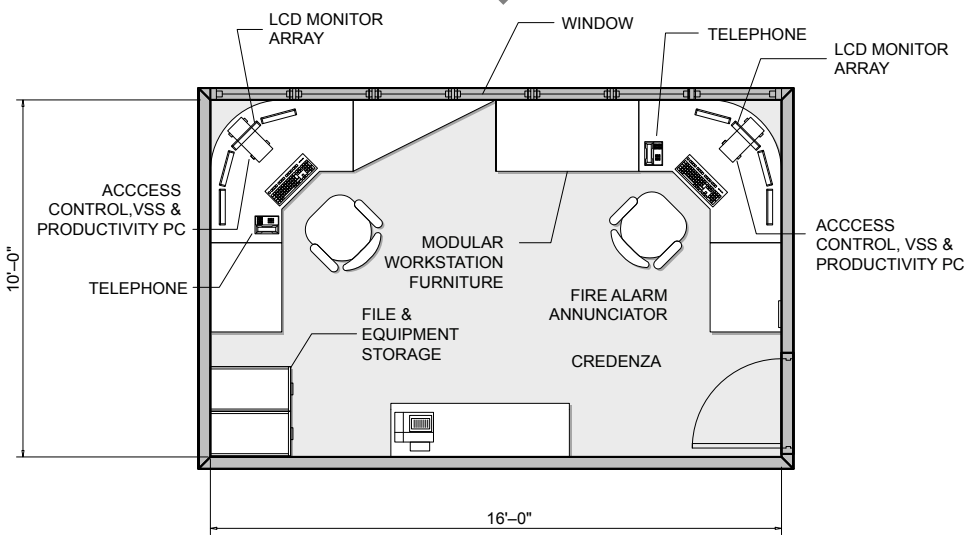


Figure 4.4 Plan of Security Control Station

Security Electrical Systems

- Card access control
- Video surveillance
- Duress alarm
- Intrusion detection
- Turnstiles
- Weapons screening
- Secure driveway and parking controls
- Cable routing

Provide free egress in the reverse direction using a request-to-exit (REX) switch in the door hardware and a REX push button or motion sensor. Except where otherwise required by the type of door hardware, REX devices shall not unlock doors; REX devices shall only bypass the door position sensors to allow egress without generating an alarm.

- When armed, doors, hatches, and other operable access points shall be monitored for forced entry.
- Monitor all card access controlled doors for forced door and propped door alarms.
- Monitoring and administration of the system shall be via client computers located in the SOC.
- Integrate the card access control system with the video surveillance system, duress alarm system, lobby exit lane turnstiles, and intrusion detection system to provide alarm monitoring and automated camera call-up of all events in view of a camera.

Video Surveillance

- Provide an IP-based video surveillance system utilizing networked cameras, video servers, storage, and workstations. In smaller facilities where a fully networked system is impractical, analog cameras and digital video recorders may be used providing that video and control signals are transmitted via UTP interfaces over network cable. Coaxial cable is not acceptable. Refer to Chapter 17 (Unified Communications) for network cable criteria.
- Provide high-resolution color cameras throughout the facility and high-definition color cameras in each courtroom with digital video recording and storage for all cameras with seven days of data retention. Exterior cameras must have day/night capability to provide a usable image in low-light conditions.
- Cameras may be powered via POE or by Class 2 camera power supplies providing they have a separate circuit breaker or fuse-protected output for each camera.
- Monitoring and control of the video surveillance system shall be at computer workstations located in the SOC and detention control room (DCR). Smaller facilities may combine the operations of the SOC and DCR.
- Integrate the video surveillance system with the card access control system, duress alarm system, detention control system, and vehicle gate control equipment to automatically call up cameras relevant to facility alarms, triggers, and system events requiring immediate assessment and response by security or law enforcement personnel. Refer to Chapter 8 for detention control system requirements.

Duress Alarm

- Provide a wireless duress alarm system consisting of a controller, repeaters for larger facilities, and wireless duress buttons.
- The duress alarm system shall communicate alarms using a designated law enforcement radio frequency and verbally announce the location of the alarm. Coordinate the exact frequency to be used with the court's designated law enforcement agency.
- Integrate the duress alarm system with the card access control and video surveillance systems via the court network to permit alarm notification and automatic camera call-up in the SOC or other designated security monitoring locations.

Intrusion Detection

- Where required by the risk assessment, provide intrusion detection at perimeter doors. Provide double-pole door position switches at doors being monitored by

the access control and intrusion detection systems to isolate their inputs and minimize modifications to doors and frames.

- Locate arming stations at designated entry points. Keep the number of arm/disarm entry points to a minimum. Where the entry point is a public area, situate arming stations to minimize public access while remaining in plain sight of staff.
- Provide a card reader at each arming station and interface the card access system with the intrusion detection system to allow arming and disarming by access card.

Turnstiles

- Monitor the lobby screening exit lane turnstiles for operational failures and attempts to enter the secure area via the exit lane. Operation of the lobby screening exit lane turnstiles by the security system is not required.

Weapons Screening

- Provide X-ray scanners and ADA-compliant magnetometers in the lobby to screen persons and belongings for weapons before entering secure space.
- Design screening lanes to provide ample space for equipment, conveyers and tables, and clearance for ADA-compliant magnetometers.

Secure Driveway and Parking Controls

- Provide vehicle gates and gate barrier arms at secure driveways to restrict public access and at secure parking entrances to restrict public access.
- Provide vehicle gates and gate barrier arms at secure parking areas to restrict access from the secure driveway.
- Ensure that vehicles cannot become trapped between gates, overhead doors, and gate barrier arms under any circumstances.

Cable Routing

- Route all security cabling in metallic conduit or raceway where run in walls and above hard ceilings. Above accessible ceilings, utilize cable tray where provided and J hooks elsewhere.
- Provide back boxes suitable for all field devices and terminations.
- Refer to Chapter 15 (Electrical Criteria) for specific conduit criteria.
- Refer to Chapter 17 (Unified Communications) for specific network cable requirements.

4.K BULLET-RESISTANT GLAZING AND PANELS

Exterior Windows

Where risk assessment stipulates bullet resistance, provide the following:

- Glazing: Glass-clad polycarbonate assembly. See Chapter 11 (Architectural Criteria).
- Panel in opening above or below glass: Bullet-resistant starch-oil woven roving ballistic-grade fiberglass panels to match the ballistic rating of the glazing.
- Threat level: UL 752 Level 3, three shots or greater, as stipulated by risk assessment.

Clerk/Public Transaction Counter

For counter outside building weapons screening, provide the following:

- Glazing: glass-clad polycarbonate assembly (see Chapter 11).
- Panel in opening above or below glass: bullet-resistant starch-oil woven ballistic-grade fiberglass panels to match the ballistic rating of the glazing.
- Threat level: UL 752 Level 3, three shots and forced entry or greater, as stipulated by risk assessment.

Table 4.1 Notes

M: Compliance Mandatory

RA: As Determined by Risk Assessment

For counter within the building weapons screening, provide the following:

- Laminated glass: Two glass layers with PVB interlayer (thickness determined by calculation for glass size and supporting structure).
- No bullet-resistant panels.
- Not bullet or forced entry resistant.

Judge/Clerk/Witness courtroom bench:

- Behind finish material: bullet-resistant starch-oil woven ballistic-grade fiberglass panels.
- Threat level: UL 752 Level 3, three shots or greater, as stipulated by risk assessment.

Table 4.1 Security Standards

	COMPLIANCE
Site Selection	
Maximize setback distance to street or adjacent buildings.	M
Locate building to minimize adjacency and configuration risks.	M
Provide setback distance other than that defined in section 4.E.	RA
Parking Security	
Restrict public parking locations in proximity to court building to satisfy setback requirements.	M
Restrict and control secure parking locations within defended perimeter.	M
Colocate parking garage and loading dock entries.	RA
Provide video surveillance at parking entries and exits.	RA
Locate critical and occupied space at least 25' away from secure parking, or harden enclosure for screened vehicle threat (charge weight to be specified by RA).	RA
Harden interior structure in parking for screened vehicle threat (charge weight to be specified by RA).	RA
Site Security	
Employ CPTED principles.	M
Place trash receptacles and mailboxes outside the setback distance.	M
Illuminate site perimeters, walkways, and drives.	M
Restrict height of landscaping.	M
Protect utilities (gas, power, telephone, etc.) at entrance to site.	M
Provide video surveillance of site.	M
Provide antiram barriers to enforce required building setback distance (moving vehicle threat). RA to indicate extent of antiram perimeter required and level of antiram resistance.	RA
Building Layout	
Provide only one public entrance.	M
Provide a secure path between judges' parking and chambers.	M
Separate high-risk areas from occupied spaces, critical systems, utilities, and egress.	M
Colocate loading dock and mailroom toward the building exterior.	M
Courtroom	
Provide silent duress alarm buttons for judge, CSO, and clerk.	M
Provide bullet-resistant panels within podium/bench for judge, CSO (depending on makeup of CSO station), clerk, and witness stand.	M
Provide video surveillance.	M
Provide bullet-resistant panels and glazing to counters accessible outside secured areas.	M
Minimize vision through windows with the line of sight from exterior into courtroom.	M
Provide bullet-resistant glazing.	RA

Table 4.1 continues on next page

Table 4.1 Notes

M: Compliance Mandatory

RA: As Determined by Risk Assessment

Table 4.1 Security Standards *continued*

	COMPLIANCE
Judge's Chambers	
Provide silent duress alarm buttons for judge and clerk.	M
Minimize vision through windows with the line of sight from exterior into chambers.	M
Provide bullet-resistant glazing.	RA
Jury Deliberation Room	
Provide silent duress alarm buttons.	M
Minimize windows with the line of sight into jury deliberation room.	M
Payment Counter	
Provide silent duress alarm buttons.	M
Provide video surveillance.	M
Provide two-way audio communications.	M
Provide bullet-resistant panels and glazing to counters accessible outside security screening.	M
Court Clerk Offices	
Provide silent duress alarm buttons where located in private corridor adjacent to chambers.	M
FCS Mediator Offices	
Provide silent duress alarm buttons in offices.	M
Provide video surveillance outside offices in adjacent corridors.	M
Child Waiting	
Provide silent duress alarm button at staffed position.	M
Provide video surveillance inside child waiting areas.	M
Provide video surveillance in corridor outside child waiting.	M
Lobby & Waiting Area	
Provide only one public entrance.	M
Eliminate potential areas of concealment in the unscreened areas.	M
Provide duress alarms, magnetometer, and package weapons scanner at screening station.	M
Design lobby to accommodate direct visual surveillance by security.	M
Design lobby to allow increased levels of security.	M
Provide barriers between lobby and secured areas of building.	M
Physically isolate unscreened lobby area.	M
Provide video surveillance of lobby and secured public circulation areas of building.	M
Provide minimum 6" architectural cover around interior columns.	M
Harden interior structure in lobby for hand-carried satchel threat (charge weight to be specified by RA).	RA
Harden lobby enclosure for hand-carried satchel threat (charge weight to be specified by RA).	RA

Table 4.1 Security Standards *continued*

	COMPLIANCE
Current Case File Storage Areas	
Locate within private circulation.	M
Provide silent duress alarms at staffed positions.	M
Provide card reader.	M
Provide video surveillance.	M
Provide dual authentication card reader with PIN.	RA
Provide remote door unlock.	RA
Evidence & Exhibit Storage Rooms	
Locate evidence room within private circulation.	M
Provide dual authentication card reader with PIN for evidence room.	M
Provide video surveillance of evidence room door.	M
Locate exhibit storage rooms within private circulation.	M
Provide hard ceilings in exhibit storage rooms and secure by lock and key.	M
Loading Dock/Mailroom	
Provide silent duress alarm button.	M
Provide video surveillance.	M
Provide space and driveway arrangement to permit manual screening of delivery trucks.	M
Provide minimum 6" architectural cover around columns if hand-carried threat is not specified.	RA
Physically isolate the loading dock and provide a means for venting gas pressures.	RA
Locate critical and occupied space at least 25' away from loading dock/mailroom, or harden enclosure for package threat (charge weight to be specified by RA).	RA
Harden interior structure in loading dock/mailroom for package threat (charge weight to be specified by RA).	RA
Provide package scanner in mailroom.	RA
Security Operations Center	
Utilize modular workstation furniture where an SOC is provided.	M
Provide SOC to operate and monitor electronic security systems.	RA
Duplicate functions of in-custody detection control room.	RA
Building Envelope	
Exterior doors shall be locked after-hours.	M
Minimize/eliminate operable windows.	M
Limit windows at critical areas.	M
Provide laminated glass.	M
Provide forced entry protection at the first floor (FE rating to be specified by RA).	M

Table 4.1 continues on next page

Table 4.1 Notes

M: Compliance Mandatory

RA: As Determined by Risk Assessment

Table 4.1 Security Standards *continued*

	COMPLIANCE
Building Envelope *continued*	
Provide video surveillance of building perimeter and all entrances.	M
Provide the minimum number of card readers at perimeter doors that will facilitate operations.	M
Monitor exterior doors and glass with an intrusion alarm system.	RA
Provide blast-resistant, bullet-resistant, or forced entry–resistant façade to meet performance requirements.	RA
Structural Systems	
Minimize floor-to-floor heights.	M
Minimize column bay spacing.	M
Avoid overhangs with occupied space above.	M
Limit or avoid large transfer girders.	M
Provide redundancy and alternative load paths.	M
Use ductile structural systems.	M
Design structures greater than two stories tall to resist progressive collapse using the alternate path method.	M
Exterior concrete masonry unit (CMU) walls as well as those around high-risk areas with an identified explosive threat shall be fully grouted and reinforced, with connections designed to allow full development of capacity at the supports.	M
Design structural members to satisfy performance requirements if explosive threats are specified, and detail the connections to prevent brittle modes of failure.	RA
Harden floor and/or walls to resist specified threat in high-risk areas.	RA
Use circular columns with spiral reinforcing for concrete buildings; encase columns in concrete for steel buildings.	RA
Design structural columns to resist specified explosive threat located 3' away.	RA
Use one-way wall elements spanning from floor to floor.	RA
Mechanical, Electrical & Fire Protection Systems	
Locate critical utilities as far as possible from high-risk areas.	M
Locate emergency generators at least 50' from the primary electrical source.	M
Avoid routing critical utilities next to parking areas.	M
Protect air intakes.	M
Protect critical utilities including service entrances.	M
Locate main and backup systems as far apart from each other as possible, a minimum of 50'.	RA
Isolate mailroom HVAC zone.	RA
Provide mailroom purging system.	RA
Provide redundancy of critical systems.	RA

Table 4.1 Security Standards *continued*

	COMPLIANCE
Electronic Security Systems	
Provide access control between public, private, and detention areas.	M
Provide electronic building perimeter protection.	M
Provide recording of all cameras.	M
Provide monitoring of intrusions and duress alarms.	M
Integrate security subsystems for automated responses to system events.	M
Security subsystems shall utilize court network infrastructure for intersystem communications and communications between MDF/IDF rooms.	M
Coordinate current and future infrastructure and control systems.	M

Table 4.2 Notes

R: Required

R1: Required as Applicable

P: Partial Requirement

D: Discretionary

M: Monitoring Only

C: Control

Table 4.2 Electronic Security Standards By Space Type

	Card Access	Card + PIN Access	Card Access—Long Range	Door/Gate Position Monitoring	Local Alarm	Video Surveillance	X-ray Screening	Magnetometer	Exit Control/Turnstile	Duress Alarm	Voice Communications at Door/Window	Vehicle Door/Gate	Gate Barrier Arms	Door Intrusion Detection	Glass Break Detection	Intrusion System Keypad	Security Monitoring and Control Workstation	Headend Equipment
Site																		
Secure Driveway Entrance	R		R	R		R					R	R	R					
Secure Driveway						R												
Secure Parking Vehicle Entrance	R		R	R		R						R	R					
In-Custody Driveway Entrance	R		R	R		R					R	R	R					
In-Custody Driveway						R												
Parking Driveway Entrance						R												
Utility Equipment & Access						R												
Generator and Fuel Storage						R												
Building Perimeter																		
Main Entrance Doors	R			R	R	R					P			R1	R1	R1		
Perimeter Doors	R1			R	R1	R					R1			R1	R1	R1		
Emergency Egress Doors				R	R	R								R1	R1			
Operable Windows, Hatches, Vents				R		R								R1	R1			
Secure Parking Area						R				R								
Secure Parking Building Entrance	R					R				R				R1	R1	R1		
Exterior Utility & MEP Rooms				R		R								R1				
Loading Dock	R1			R		R					R			R1				
Receiving	R			R		R	R1				R			R1				
Building Exterior						R												

Table 4.2 Electronic Security Standards By Space Type *continued*

	Card Access	Card + PIN Access	Card Access—Long Range	Door/Gate Position Monitoring	Local Alarm	Video Surveillance	X-ray Screening	Magnetometer	Exit Control/Turnstile	Duress Alarm	Voice Communications at Door/Window	Vehicle Door/Gate	Gate Barrier Arms	Door Intrusion Detection	Glass Break Detection	Intrusion System Keypad	Security Monitoring and Control Workstation	Headend Equipment
Interior Public Circulation																		
Public Queuing Area						R												
Weapons Screening Station						R	R	R	R	R								
Information Kiosk or Counter						R				R								
Courtroom Public Waiting						R												
Interior Private Circulation																		
Public to Private Area Doors	R			R	R	R												
Court Set																		
Courtroom Entry Door		R		R		R												
Courtroom Jury Door	R			R	R1													
Courtroom Bench Door	R1			R1	R1													
Courtroom Well and Spectator Area						R												
Judge's Bench										R								
Clerk's Stations										R								
Court Security Officer's Station										R								
Courtroom Holding Door						R												

Table 4.2 continues on next page

Table 4.2 Notes

R: Required

R1: Required as Applicable

P: Partial Requirement

D: Discretionary

M: Monitoring Only

C: Control

Table 4.2 Electronic Security Standards By Space Type *continued*

	Card Access	Card + PIN Access	Card Access—Long Range	Door/Gate Position Monitoring	Local Alarm	Video Surveillance	X-ray Screening	Magnetometer	Exit Control/Turnstile	Duress Alarm	Voice Communications at Door/Window	Vehicle Door/Gate	Gate Barrier Arms	Door Intrusion Detection	Glass Break Detection	Intrusion System Keypad	Security Monitoring and Control Workstation	Headend Equipment
Court Support																		
Chambers	R			R						R								
Court Reporter's Room	D			D														
Jury Deliberation Room	D			D						R								
Entry Vestibule		R		R		R												
Law Enforcement Waiting																		
Courtroom Exhibit Storage	R			R														
Evidence Storage		R		R	R	R												
Jury Assembly Facilities																		
Entry/Queuing						R												
Reception/Registration	R			R						R								
Jury Assembly	R1			R1	R1	R												
Court Administration																		
Public Counter Queuing						R												
Public Transaction Counter										R	R							
Records Viewing	R1			R1		R				R1								
Training Room																		
Active Records Storage	R			R														
Inactive Records Storage	R1			R1														

Table 4.2 Electronic Security Standards By Space Type *continued*

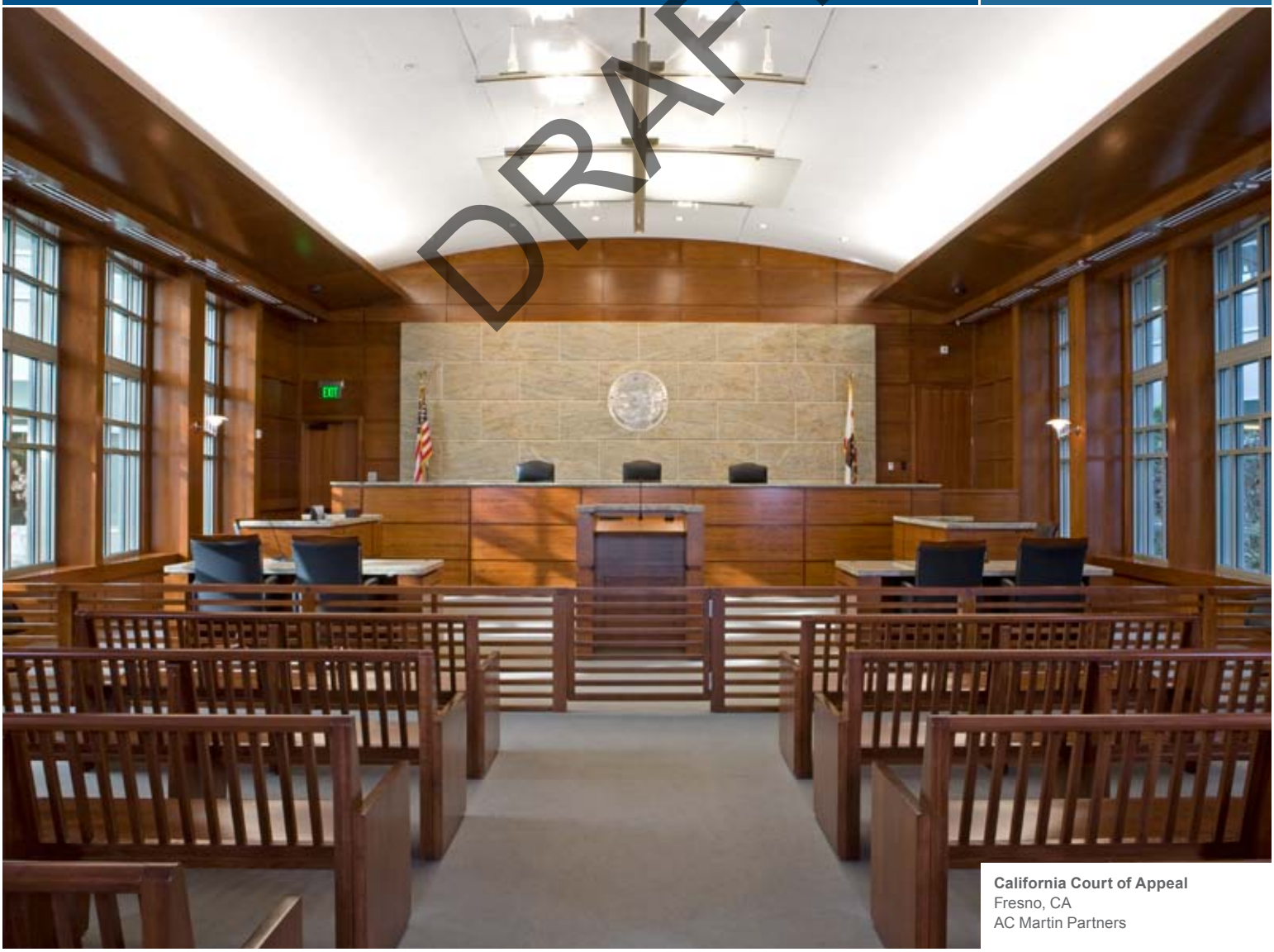
	Card Access	Card + PIN Access	Card Access—Long Range	Door/Gate Position Monitoring	Local Alarm	Video Surveillance	X-ray Screening	Magnetometer	Exit Control/Turnstile	Duress Alarm	Voice Communications at Door/Window	Vehicle Door/Gate	Gate Barrier Arms	Door Intrusion Detection	Glass Break Detection	Intrusion System Keypad	Security Monitoring and Control Workstation	Headend Equipment
Private Office																		
Executive/Director										R1								
Mediator										R1								
Family Law/Self-Help Center																		
Waiting						R												
Reception/Sign-in						R												
Orientation Room	R1			R1														
Workshop	R1			R1														
Mediation Room										R								
Child Waiting	R			R		R				R								
Alternative Dispute Resolution																		
Reception/Waiting										R								
Mediation/Arbitration Rooms										R								
Related Justice Agency Spaces																		
Multipurpose Rooms	R1			R1		R1												
Attorney Convenience Center	R1			R1		R1												

Table 4.2 continues on next page

Table 4.2 Electronic Security Standards By Space Type *continued*

	Card Access	Card + PIN Access	Card Access—Long Range	Door/Gate Position Monitoring	Local Alarm	Video Surveillance	X-ray Screening	Magnetometer	Exit Control/Turnstile	Duress Alarm	Voice Communications at Door/Window	Vehicle Door/Gate	Gate Barrier Arms	Door Intrusion Detection	Glass Break Detection	Intrusion System Keypad	Security Monitoring and Control Workstation	Headend Equipment
Building Support Services																		
Security Operations Center	R			R													R	
Loading Dock	R			R		R												
Trash and Recycling Area						R												
Media Area						R												
Trash and Recycling Area						R												
Media Area						R												
Mailroom						R	R1											
Maintenance Shop	R			R														
Furniture/Equipment Storage	R1			R1														
IS Workroom	R			R														
MDF and IDF Rooms	R			R														R
Telecommunications Storage Room	R1			R1														
Telecommunications Closet	R			R														
Electrical Room	R1			R1														
Electrical Closet	R1			R1														
Interior Media Space						R1												

5 COURT SET



California Court of Appeal
Fresno, CA
AC Martin Partners

The courtroom is the focal point of the judicial process, providing a formal setting for conducting the business of the court, and is the primary place where judicial officers, court staff, attorneys, and litigants or defendants interact.

Figures 5.21–5.24 are located at the end of this chapter

The court set includes courtrooms, judicial offices (subsequently referred to as chambers), chambers support space, jury deliberation rooms, witness waiting, attorney conference rooms, evidence storage, and equipment storage. A private corridor, with staff elevator and stairs, connects the chamber suites with staff offices and secure parking (see Figure 5.1). Emergency egress for the private corridor should be separate from the public corridor, but in some courthouses the private population may egress into the public circulation and then use the public egress stair. In courthouses where separate stairs are provided, private area stairs may be unsecured to allow staff intercommunication between floors, whereas public stairs should always be secured, allowing egress only. Specific space requirements are developed during the programming phase, consistent with area requirements described in Chapter 2 (Courthouse Organization).

5.A OBJECTIVES

The courtroom accommodates the judicial officer (judge, commissioner, or hearing officer), court clerk, reporter, court security officer (CSO), attorneys, witnesses, jury, and spectators. Special-purpose courtrooms may include some variation of these participants.

The design of each courtroom shall:

- Ensure that the participants in any proceeding are able to see and hear the witness, jury, judicial officer, court reporter, and attorneys.
- Protect witnesses and jurors from intimidation.
- Provide reasonable confidentiality for attorneys, defendants, litigants, and judicial officers.

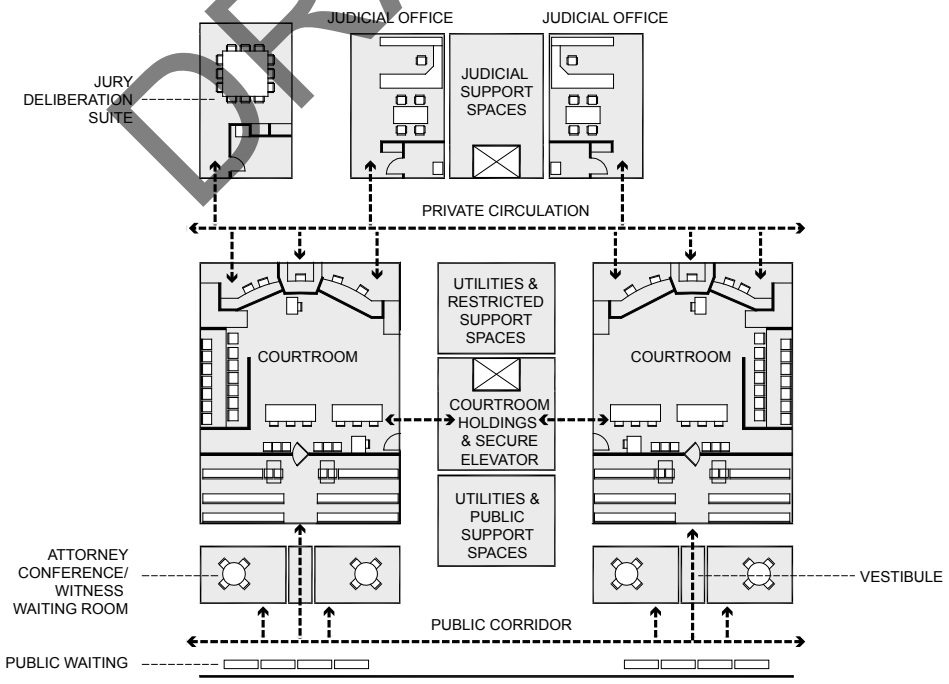


Figure 5.1 Typical Courtroom Floor Organization

- Provide full accessibility for persons with disabilities to the witness stand, jury box, and spectator areas.
- Provide security and safe emergency egress for judge and court staff.
- Provide ease of assistance to judge and court staff in emergency situations.
- Provide spaces with sufficient flexibility to allow change in future court operations.

5.B COURTROOM

Basic Courtroom Types

Courtrooms must function for a range of judicial proceedings. The Facilities Standards define three types of courtrooms (see Table 5.1):

- Multipurpose courtroom is the typical trial courtroom in California. It is sized and configured to offer facilities for a variety of judicial matters, including criminal, civil, law and motion, and public hearings. The multipurpose courtroom will accommodate a jury box and other courtroom components. Refer to Figures 5.21 and 5.22 for diagrams of multipurpose courtroom layouts.
- Large courtroom is typical for high-volume, high-profile, and multilitigant cases such as traffic or construction defect cases. A large courtroom may be high-volume due to increased public, attorney, and/or in-custody defendant loads. It can also be used for special proceedings that support court operations. Large courtrooms often have the provision to accommodate news media personnel for high-profile cases.
- Arraignment courtroom is the same size as the large courtroom. An arraignment is a court appearance in which the defendant is formally charged with a crime and asked to respond by pleading guilty, not guilty, or nolo contendere. Other matters handled at an arraignment include arranging for the appointment of a lawyer to represent the defendant and setting bail. The courtroom must accommodate large numbers of in-custody defendants in a secure arraignment area directly connected to the holding area and secure circulation system. As such, arraignment courtrooms are ideally located as close as possible to the central holding area to minimize the distance that in-custody defendants need to be transported. Refer to Figures 5.26 and 5.27 for diagrams of arraignment courtroom layouts.

Special Courtrooms

There are exceptions to the basic courtroom types for family, juvenile, mental health, domestic violence, high security, traffic, felony disposition, and drug courts, or for cases requiring multiple juries. Such courtrooms may require alternate fixtures or special configurations within the boundaries of multipurpose or large courtrooms. These should be clearly identified during the programming phase, since retrofitting later in the design stages can lead to compromised solutions.

Table 5.1 Courtroom Types

COURTROOM TYPE	SQUARE FEET	SPECTATOR SEATING	COURTROOM CLEAR WIDTH
Multipurpose	1,600–1,750	45–50	32'–38'
Large	2,100–2,400	96–100	36'–40'
Arraignment	2,100–2,400	96–100	36'–40'

A courtroom mockup is required before beginning casework design development documents, to ensure that sightlines and both functional and accessibility requirements are satisfied.

Courtroom Entries

All courtrooms, regardless of whether in-custody proceedings occur there, require three distinct points of entry:

- Public, for spectators, attorneys, parties, witnesses, and press through a vestibule from the public corridor.
- Private, for judicial officers, jurors, court personnel, and designated court participants through two doorways from a private court staff corridor.
- Detention, for in-custody defendants, detention officers, and CSOs through a controlled, secure entry near the CSO's station and defense attorney table from the detention (secure) circulation system.

Courtroom Adjacencies

- Locate courtrooms adjacent to court floor holding cells (or area reserved for the future addition of secure holding cells). In some instances, multipurpose courtrooms are used for civil proceedings and do not require access to court floor holding facilities.
- Locate courtrooms for easy access from judicial chambers. Group judicial chambers and related support space adjacent to the private corridor, providing judges and staff quick courtroom access.
- Courtrooms may be assigned to an individual judge. When courtrooms are not dedicated for use by one bench officer, chambers can be located remote from the courtroom.
- If chambers are colocated in an area remote from the courtrooms, such as on adjoining floors, a robing room and conference area may be necessary adjacent to the courtroom.

Corner Bench or Center Bench Layouts

California courtrooms may use either a corner bench or center bench configuration. Each offers different design and operational opportunities. Selection of either is a project decision, to be based on the following design and operational criteria:

- Optimum sightlines among the judge, jury, attorneys, and witness.
- Ease of accommodating two courtroom clerks.
- Ability to move paper documents between clerk and judge.

Table 5.2 Court Component Information

ELEMENT OR WORKSTATION	FURNITURE / CASEWORK WIDTH	FURNITURE / CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS	AREA SF
Judge	6'–7'	24"–30"	+12"–21"	1	64–80
Courtroom Clerk	10'	24"–27"	+0"–14"	2	75–85
CSO	4'	30"	+0"	1	25
Court Reporter	4'	30"	+0"	1	25
Witness Stand	6'		+0"–14"	1 or 2	33–43
Jury Box	N/A	N/A	(1st tier) +0"–7" (2nd tier) 6"–14"	14	144
Counsel Tables	7'–10'	3'–4'	+0"	2 ea.	90–110
Lectern	38"	2'	+0"	0	

Note: Heights of judge, clerk, and witness must be in strict relation—judge highest; clerk within 12" of judge; and witness at least 6" lower than judge.

- Sightlines to projected images.
- Full accessibility to the bench, other raised platforms, and areas of courtroom.
- Dignity and formality.
- Accommodation of courtroom technology and computer equipment.
- Space efficiency.

5.C COURTROOM ACCESSIBILITY

Floor levels of courtroom components vary. Maintaining sightlines among all components, while providing full accessibility, shall be a priority. The accessible path of travel to the judge's courtroom workspace (bench), courtroom clerk's workspace, witness box, and jury box must address the recommended floor heights discussed in Table 5.2. Separate paths of travel for persons with disabilities shall be avoided. The judge's circulation path must never be in front of the bench. Level changes can be achieved as follows:

- Ramps, with handrails as required by code based on the slope of the ramp, are the preferred solution for providing universal access and operationally functional spaces. However, a long ramp may be required in the private corridor, or the private corridor may be constructed at an elevation above that of the primary courtroom floor elevation. A multipurpose courtroom litigation area may accommodate up to 18 people, along with exhibits and a court reporter. Ramps to the courtroom clerk, witness box, and first level of the jury box shall not create a hazard or encroach into the litigation area.
- A two-stop lift to the judge's bench, with ramps to the witness area and the clerk at the courtroom floor level, is another approach. However, motorized lifts should not be used due to operation and serviceability concerns, except in retrofit situations where space is too limited to accommodate ramps.
- A three-stop lift to the witness's and judge's level of the bench may be the only choice in retrofit situations where space is extremely limited, but lifts are the least preferred method, because their use focuses attention on the person with disabilities, they may require staff assistance to function properly, and they require servicing and testing.
- A courtroom mockup is required before beginning casework design development documents, to ensure that sightlines and both functional and accessibility requirements are satisfied.

5.D COURTROOM COMPONENTS

The following design criteria shall apply to courtroom components.

Judge's Bench

The size, location, height, area, and design of the bench reinforce the role of the judge as the administrator of justice and as the principal controller of order in the courtroom. Design the bench to be the focal point of the courtroom without favoring any one party.

- Design the bench size and height to be proportionate to the courtroom and to ensure an unobstructed view from the entire courtroom. Raise the bench so that the judge's eye level when the judge is seated is higher than that of any standing participant or spectator. The height of the barrier between the judge's bench and the well is dependent on the actual height of the judge's platform above the well. The attorney's view of the judge's desk top needs to be considered if the judge's platform height is lower due to ramping and accessibility issues.
- Provide a work surface 72" to 84" wide by 24" deep maximum with a 3" high privacy screen in front. This area must be of sufficient size to keep paperwork and reference materials within reach and accommodate a computer monitor. Provide

Appropriate finishes and equipment in courtrooms should not be overlooked.

adequate bookshelves behind or under the bench. Provide an area for conferences between the judge and attorneys at the sidebar. (Sidebars are typically conducted on the side of the litigation area opposite the jury.) Provide built-in or movable undercounter storage drawers. Refer to Figures 5.2 and 5.3.

- A fixed barrier is required between the judge's area and the witness box, of sufficient width and height to prevent a witness from reaching the judge.
- Provide a minimum of 3'-6" between the edge of the judge's desk and the wall behind. This will accommodate a wheelchair or mobility device and allow the judge sufficient work area. Design the front and sides of the bench to facilitate transfer of documents and verbal communication between the judge, the courtroom clerk, and the court reporter.
- Design the bench with a custom casework wall, compatible with the courtroom design. Line the wall with bullet-resistant material that meets the criteria of UL Standard 752, Level 3. Provide underdesktop-accessible cable raceways to accommodate voice, data, power, and courtroom technology cabling.
- Consider an ergonomic adjustable desk system behind the casework shell in lieu of custom millwork. This component can be made from modular furniture, providing adjustable heights and angles of desktop.
- Provide areas for computer equipment, printer, storage, telephone, and outlets for data transmission. The bench requires

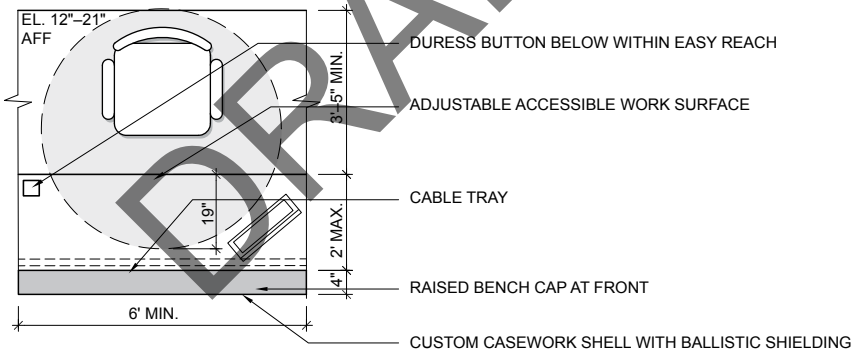


Figure 5.2 Judge's Bench Plan

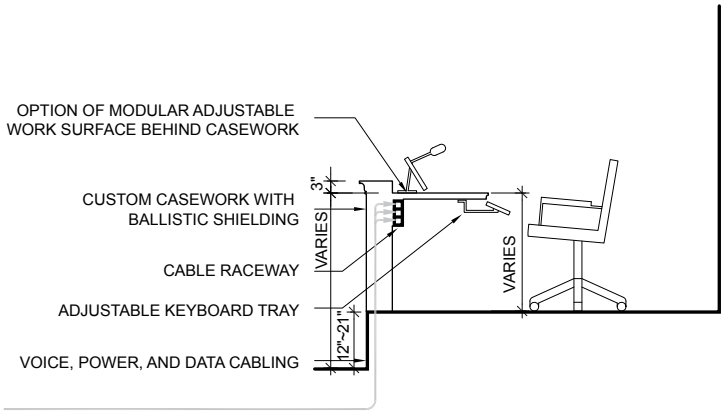


Figure 5.3 Judge's Bench Section

a microphone with a mute button, and may include the courtroom audio controls. Refer to Chapter 16 (Lighting Criteria) and Chapter 18 (Audiovisual Systems).

Courtroom Clerk's Station

The courtroom clerk is responsible for maintaining a record of case actions and files and for receiving and labeling exhibits. The courtroom clerk must be close to the judge, to transfer exhibit papers and files by hand and to communicate privately, and must be accessible to counsel for marking and introducing documents. The height difference between the clerk's station floor and the judge's bench floor should not exceed 12"; the constant transfer of files creates an ergonomic problem with a greater difference. Consider "pass-throughs" or other millwork solutions to assist in paper passing. See Figure 5.4. The clerk's station is located on the same side as the CSO and near a doorway to the private corridor.

- The clerk's workstation requires a 120" wide by 24" to 27" deep work surface and must accommodate two clerks. An optional 8" to 12" deep shelf in front of the workstation may be added to provide a writing surface and additional screening of documents on the clerk's desk. The clerk's workstation requires substantial area for placement of files, forms, supplies, and other material. Refer to Figures 5.5 and 5.6.
- Design the clerk's station similar to the judge's bench, compatible with the courtroom design. Provide a custom casework low front wall lined with bullet-resistant material that meets the criteria of UL Standard 752, Level 3, similar to the judge's bench. Behind the paneling, consider using a modular furniture work surface with adjustable height to provide flexibility. Locate a wireless duress alarm button in a discreet location under the work surface. Since this work area is used for all office functions, such as typing and writing, this area must meet all requirements for ergonomic office workspaces.
- The clerk's workstation must be cable-ready for electronic equipment and requires multiple telephone, data, and electrical outlets, and audio controls. Provide concealed, accessible raceways to incorporate voice, data, power, and audiovisual cabling.
- The clerk's workstation must be designed with space for a printer and possibly a fax/copier. Provide flexibility in terms of locating the printer; some clerks prefer

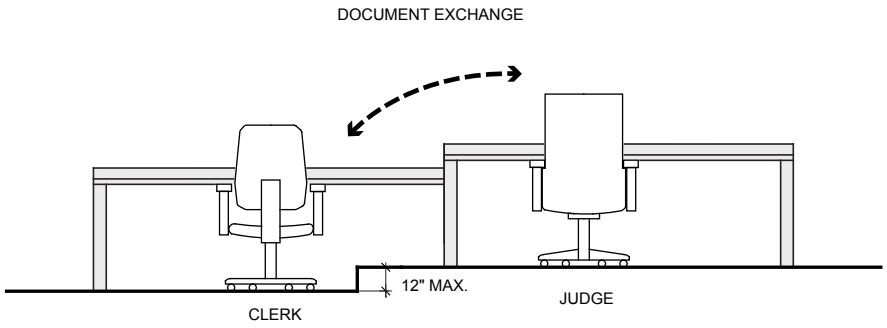


Figure 5.4 Bench and Clerk Elevation

The visual and physical relationships between the courtroom elements must be carefully planned to ensure a successful design

the printer located adjacent to their work surface, whereas others prefer it located behind their workstation, or immediately adjacent but not in the courtroom. Provide undercounter file drawers for files and forms, and provide file storage behind the workstation. Maximizing the amount of surface area behind the workstation is desirable for stacking case files and other material.

Witness Box

Locate so that the witness has a clear facial view of the judge, jury, court reporter, and counsel tables. The witness box shall be located between the judge and the jury.

- Design the witness box to comfortably seat the witness and interpreter (if required) and to accommodate a wheelchair or mobility device. The witness chair shall be height adjustable and movable, and in certain buildings shall be fixed. Refer to Figures 5.7 and 5.8.
- The witness box must accommodate many people throughout the day. Ramps are the most common and preferred means to provide wheelchair access to this area.
- Provide a low wall with a flat top area on which attorneys can rest files or evidence. Line the wall behind the paneling of the witness box with bullet-resistant material that meets the criteria of UL Standard 752, Level 3, similar to the judge's bench.

Court Reporter's Area

The court reporter provides verbatim recording of all court proceedings. Locate the court reporter's area so that anything said by

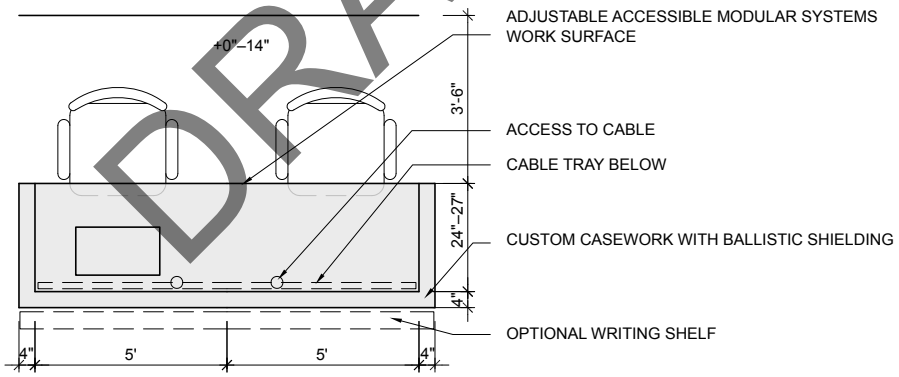


Figure 5.5 Clerk Station Plan

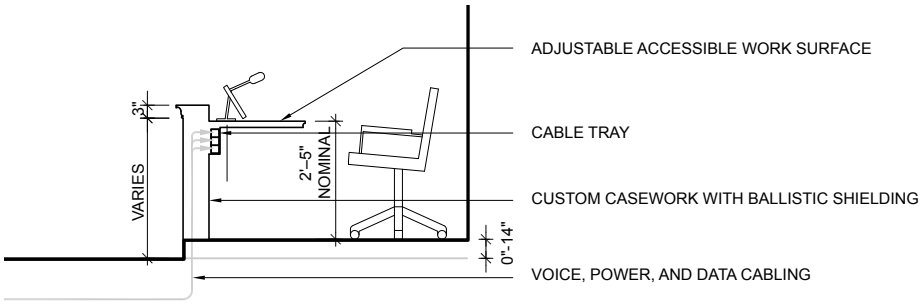


Figure 5.6 Clerk Station Section

participants can be heard by the court reporter. Ensure sightlines to the judge, witness, and attorneys.

- Provide a mobile (preferred) or stationary workstation that includes a work surface at least 24" deep, with a lockable drawer for storage and a modesty panel.
- The workstation shall be cable-ready for in-courtroom electronic recording and computer-assisted transcription. Provide concealed, accessible raceways to incorporate data, power, and audiovisual cabling.

Jury Box

Provide clear sightlines from each juror to the witness, attorneys, judge, and evidence display areas. The jury box cannot extend past either the witness box or the attorneys' tables. Provide direct access into the jury box from the private corridor to the deliberation room so that the jury does not have to pass in front of the bench or litigant tables. Refer to Figures 5.9 and 5.10.

- The jury box shall be two-tiered, accommodate people with disabilities, and sized to accommodate 14 people. The dimensions shall be approximately 8' by 18'. The first row of jurors may be at floor level or raised above the floor. If the first row is raised above the litigation well floor, additional space will be required for wheelchair maneuvering and ramps. Designers must weigh the advantage of locating the first juror tier at the courtroom floor level, against the disadvantage of attorneys literally speaking down to the jurors. When

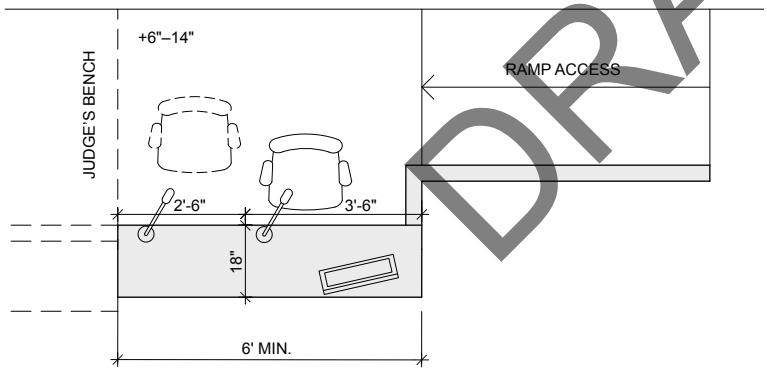


Figure 5.7 Witness Box Plan

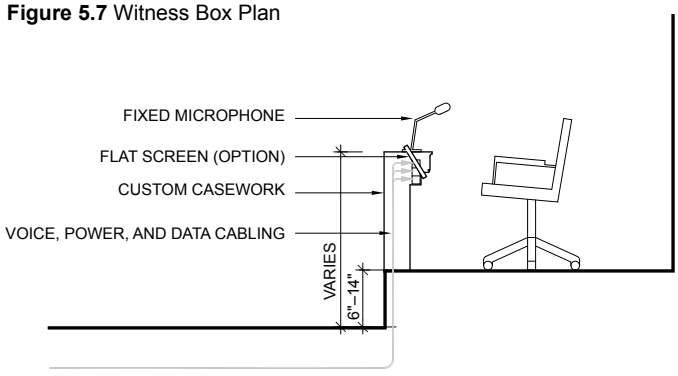


Figure 5.8 Witness Box Section

locating accessible seating space, provide sightlines equivalent to other jury seating, and integrate the accessible position into the overall seating layout so that it is equal in its location and opportunity to the other seats.

- Design the jury box to prevent communication between jurors and the spectators, and to guard against juror harassment. A space of 6' between jurors and the spectator area railing is recommended. This area may be used to accommodate prospective jury members sitting on movable, stackable chairs while a jury is being impaneled. Where space is insufficient, provide a physical separation such as a transparent panel between the jury and spectator seating.
- Provide comfortable, ergonomic jury chairs to accommodate people of all sizes. Chairs may be movable or fixed; however, fixed seating is recommended. The height should be adjustable from 16" to 20". Chairs must swivel and tilt, and be spaced so that the arms do not collide and the chairs do not strike the rear wall. Provide sufficient aisle space in front of each row of seats for juror legroom. Provide writing surfaces on the jury chairs. Provide a front modesty panel approximately 30" high separating the jury box from the litigation area. Handrails and footrails may also be provided. The rear row of seating should be far enough away from the back wall to avoid scuff marks from chair backs on the back wall. Provide a durable wall material behind the jury box that is resistant to scuff marks from chair backs and head prints from jurors leaning back.
- High-security courtrooms may incorporate additional elements in the jury box, such as glass panels, to secure the safety of the spectators, staff, and court personnel, and to ensure secure prisoner movement. Verify these requirements during the programming phase. In-custody defendants may not pass in front of the jury box on the way to and from the court floor holding area.

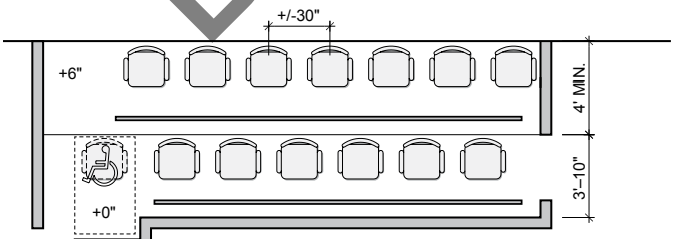


Figure 5.9 Jury Box Plan

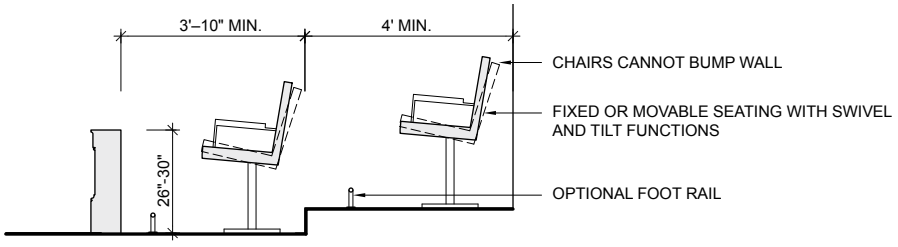


Figure 5.10 Jury Box Section

Litigation Area

The litigation area, or well, provides space for primary participants in activities of the judicial proceeding. Size varies, depending on courtroom type, and components within the well vary by the type of proceeding.

- Counsel tables: Locate counsel tables in the courtroom so that attorneys can be seen and heard by other attorneys, the judge, the witness, the court reporter, and the jury. Provide at least two movable, accessible counsel tables with space for comfortable, ergonomic, movable chairs. The counsel tables shall be either custom casework or predesigned tables and shall have either recessed outlets or concealed cable raceways for voice, data, power, and courtroom technology. Tables shall include a modesty panel to conceal defendant restraint devices. Provide an area behind the counsel tables and between the spectator area for a row of chairs along the railing for staff, paralegals, or other involved parties. Refer to Figures 5.11 and 5.12. If special counsel is required, particularly in juvenile and domestic cases, provide additional tables or seating at one of the counsel tables.
- Lectern: A movable, height-adjustable, universally accessible lectern shall be provided for each courtroom. The lectern

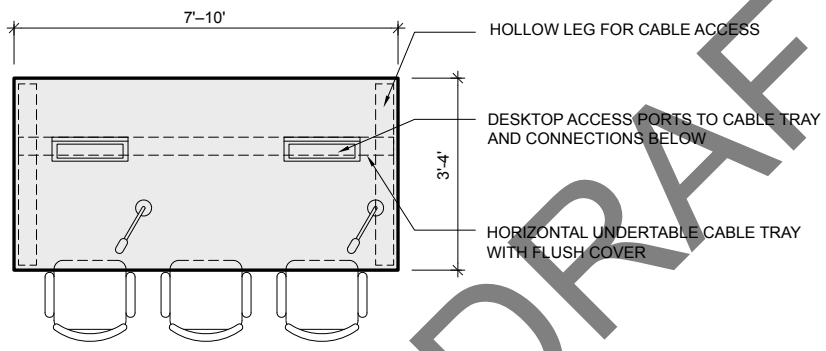


Figure 5.11 Counsel Table

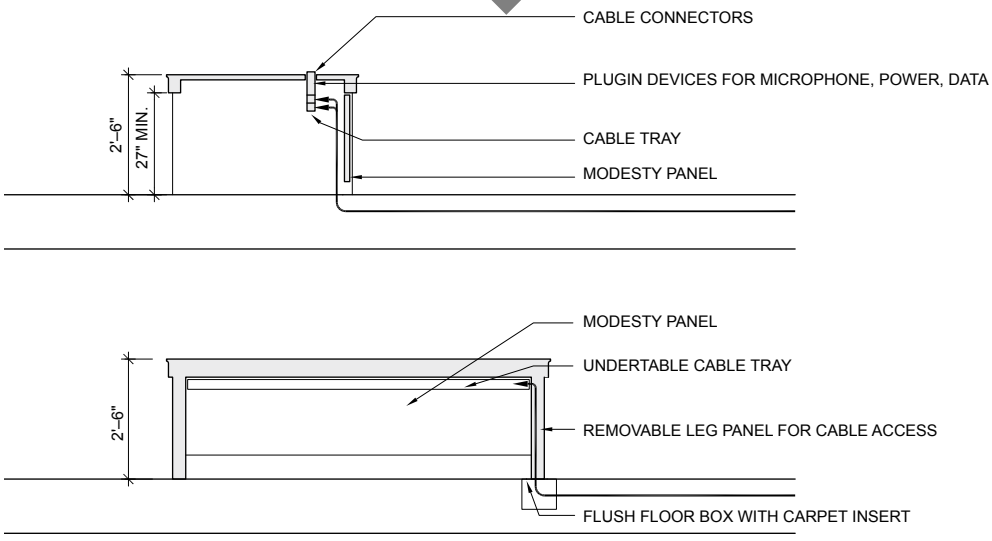


Figure 5.12 Counsel Table Section

shall be floor supported (not tabletop mounted). Provide shelf and space for a microphone and for an attorney's laptop. A separate rolling cart will contain a digital evidence presentation system (DEPS), a VCR, and a DVD player. Provide recessed floor boxes with outlets for voice, data, power, and courtroom technology near the lectern and equipment cart.

- Egress: Emergency egress from the litigation area may be either out the front of the courtroom to the public corridor or out the rear of the courtroom to the private corridor, or some combination of the two. Some courts may not require the doors to the private corridors to be secured, thereby allowing them to function freely as exit doors. Other courts may require controlled access on private corridor doors that still allows for emergency exiting. Delayed egress exit devices may be one way of achieving normally locked doors that still allow for emergency egress, provided that *all* the provisions of California Building Code Section 1008 for "delayed egress locks" are satisfied. This solution needs to be approved by the authority having jurisdiction, including the California Office of the State Fire Marshal. The California Building Code restricts the use of delayed egress locks in certain occupancy classifications, so courtrooms classified as occupancy Group A require the specific approval from the State Fire Marshal for using delayed egress locks as an alternate means of code compliance.

Exhibit Display Area

Provide space for exhibit display and a large ceiling-mounted projection screen, located to be clearly visible to all court participants. An alternative projection screen will be located behind the witness, ceiling mounted, if the witness box is provided with a display monitor (see Chapter 18: Audiovisual Systems, for screen size standards). Evidence boards shall be provided next to the witness box, which may be fixed to the wall, or space shall be provided for movable easels.

Court Security Officer (CSO) Station

Locate the CSO's station within the litigation area to the rear, and in front of the spectators' barrier. The CSO is typically located near the door to the in-custody holding area, and requires easy and quick access to the defendant's table.

- Provide the CSO station with a small work surface, a modesty panel, and a lockable desk suitable for storage of a service pistol and ammunition. A telephone equipped with a flashing light rather than a ringer is recommended. An electronic signaling system, connecting the CSO's station and the jury deliberation room, is required.
- Depending upon the makeup of the CSO station (i.e., stationary or movable), incorporate bullet-resistant material into the paneling. Regardless of the makeup of the CSO station, include a silent duress alarm system in the workstation design.

Spectator Area and Litigation Area Separation

The spectator area shall be separated from the litigation area to control movement and reinforce the hierarchy of the participants within the courtroom. This element, commonly called the "rail," may be custom millwork or predesigned and manufactured; it shall have a minimum 32" wide clear opening, with or without a swinging gate in compliance with accessibility requirements. The rail may be relocatable to allow (together with removable spectator seating) the litigation area to be expanded. In high-security courtrooms, the spectator and litigation areas may be separated by security glass or a folding glass partition.

Spectator Area

The spectator area provides seating for prospective jury panels, witnesses, and interested parties. The number of seats shall

be planned to accommodate voir dire panels for jury selection. Typical jury panels consist of 75 people. A multipurpose courtroom has seating in the spectator area for the majority of the jury panel; additional movable chairs can be provided inside the litigation area, and the jury box seating can be utilized during jury selection.

- Bench seating is preferred to individual theater-style seats, because more people of various sizes can be accommodated, and because bench seating is low maintenance. Benches shall be contoured and proportioned to provide comfortable seating; hardwood veneer and solid wood construction are preferred. Benches shall be anchored to the floor but removable for relocation. Individual theater-style seating system may be an alternative, with AOC approval. See Figures 5.13 and 5.14.
- Provide wheelchair spaces, companion seating, and semiambulatory seating in ratios required by law. Refer to Figures 5.13 and 5.14.
- In multipurpose courtrooms, accessible seating can be located in one area. In large courtrooms, accessible seating areas shall be provided in several locations to equalize sightline advantages. A wide central aisle allows flexibility to persons with disabilities.

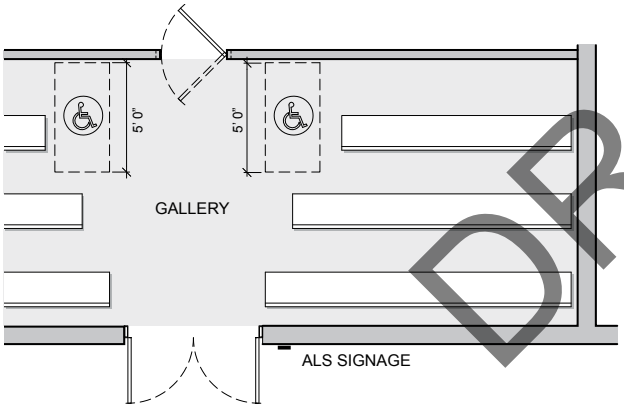


Figure 5.13 Bench-Type Spectator Seating

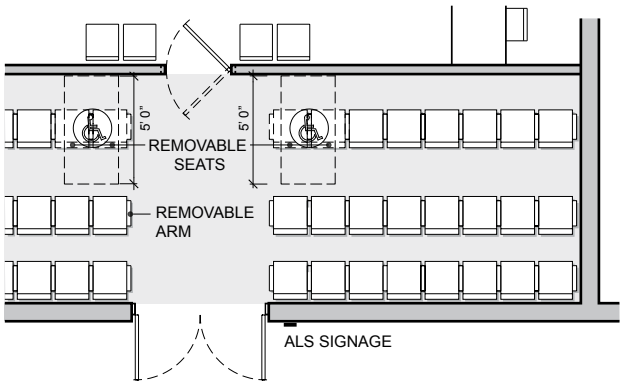


Figure 5.14 Theater-Type Spectator Seating

- A companion seat must be located adjacent to the wheelchair space. The wheelchair space must align with the companion seat. Refer to Figure 5.15.
- Provide space in front of and behind the wheelchair space for the spectator using a wheelchair or mobility device to roll forward or backward to allow other spectators to exit a row. The wheelchair or mobility device cannot permanently block exit from an aisle.
- Temporary seating, or a fold-down seat, may be placed in wheelchair spaces when not occupied, but this may not be preferred due to the logistical issue of how the temporary seats are removed when the space is needed for a wheelchair.

Sound Lock/Entry Vestibule

Provide a vestibule between the courtroom and the public circulation that will be a transition space and control noise. Place glass panels in the doors from the vestibule into the courtroom, but the doors from the public corridor into the vestibule should be solid. The outside doors from the corridor to the courtroom shall be lockable. It is preferable not to have panic devices and selectors on the doors from the courtroom to the vestibule due to noise considerations.

Exhibit and Evidence Storage

Provide a secure room or closet for storage of exhibits and evidence. For security, install a card reader entry system, camera surveillance, and hard ceiling. This space shall be accessible directly from the courtroom or from the private corridor. Two locking systems for all evidence storage are recommended to prevent a borrowed access card from allowing access. Wall construction around evidence should be secure and continuous from slab to slab to prevent access from above the ceiling.

5.E COURTROOM SUPPORT SPACES

Jury deliberation rooms and other support spaces off the private corridor may in the future accommodate staff offices or functions different from those in the original program. Therefore, the configurations and fixtures in these spaces must be flexible.

The private corridor and courtroom support spaces may be at a higher floor elevation from the courtroom well to reduce the ramping requirements within the courtroom.

Chambers

Chambers are the personal office/conference areas for the judges. Separate chambers shall be provided for each judge to conduct legal research and case study, and to hold meetings with attorneys or judicial personnel. Since

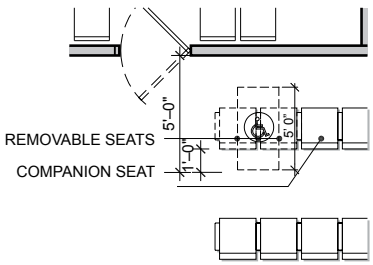


Figure 5.15 Companion Seating Adjacency

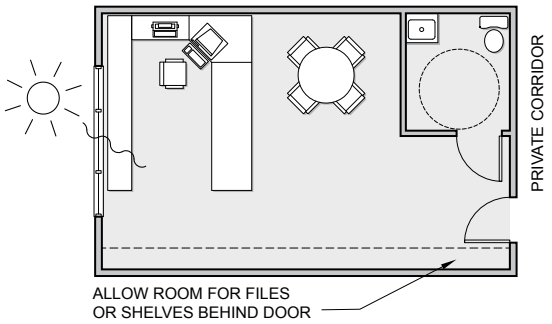


Figure 5.16 Judge's Chamber Plan

each judge requires a quiet work environment to perform these tasks, distraction-free surroundings are required.

- Depending on the number of judges in a facility, one or more additional chambers for use by judges who are not regularly assigned to the court may be provided.
- The chambers shall be designed with a private restroom. Provide adequate sound control between the chambers and the staff and reception areas to reduce sound transmission during sensitive conference sessions. Provide natural lighting to the chambers. Refer to Figure 5.16.
- Judicial chambers may be clustered for improved collaboration and to share support functions. If chambers are clustered, space may be conserved and costs reduced by providing a common restroom to be shared among judges and a separate shared restroom for staff. Refer to Figure 5.17.

Support Staff Workstations, Reception, and Waiting Areas

The judicial office may be adjacent to and entered through an anteroom that contains space for support staff who perform clerical functions, receive and screen visitors, and maintain legal files for one or more judges.

In some cases this area may function as an unstaffed waiting area. The size of this area depends on related functional requirements.

Copy, Workroom, and Supply Area

Provide a copy, workroom, and supply area, containing photocopy and fax machines to be accessible to judicial support staff, research attorneys, attorneys, and CSOs. A ratio of one copy workroom for every four to eight judges is required.

Court Reporter's Work Area

Court reporters transcribe court proceedings and review transcripts. Provide a separate court reporter's work area; grouping multiple court reporter workstations in a larger area is allowed. Locate on the private corridor on the same floor as the courtroom. Provide an area for locked transcript storage and general office supplies inside or adjacent to the court reporter's work area.

Conference Room and Law Library

A conference room and law library may be provided for judges as defined in the project program. This area shall include bookshelves for reference materials. In small courts, this area may be combined with the jury deliberation function, provided that legal books are not accessible to jurors.

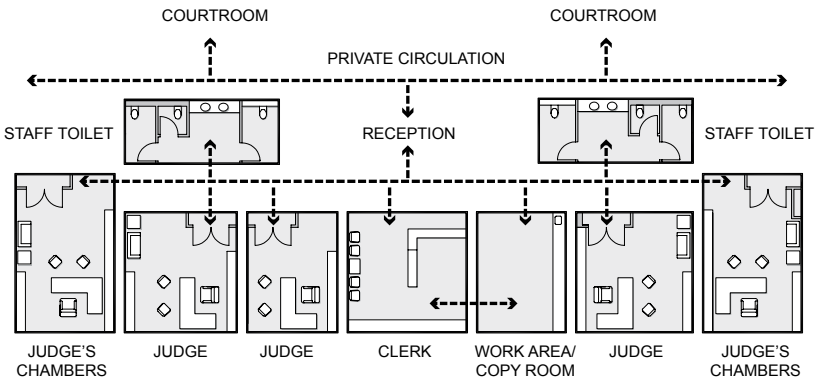


Figure 5.17 Combined Chamber Layout

Research Attorney Offices and Workstations

Space may be provided for research attorneys, who review case files and perform legal research for one or more judges.

Jury Deliberation Room

Provide jurors a private deliberation room that is free from distractions and outside interference, accessible from the private corridor. Refer to Figures 5.18–5.20.

- Provide juror deliberation rooms on the ratio of not more than one for two courtrooms, and consider one deliberation room for every three courtrooms. Verify this ratio during programming.
- Design the jury deliberation room to accommodate a table allowing all jurors, including persons with disabilities, to participate equally without hierarchy. Round or square tables are preferred to long rectangular tables.
- The jury deliberation room shall comfortably accommodate 12 jurors and allow use of charts, mounted exhibits, and mobile video monitors for evidence.
- Provide one accessible toilet room positioned so that the door opens from a vestibule. If space allows, consider providing separate male and female single-accommodation toilet rooms. Orient the toilet room door for sound attenuation and to provide reasonable privacy to the toilet room.
- Provide a counter with lower cabinet and space for a bottled water dispenser. Provide space for coat storage, which can be either a coat rack or a built-in closet space. The room shall have natural light; ensure that windows do not allow jurors to communicate with people outside the court facility.
- Jury deliberation rooms shall be designed in a flexible manner so that they can easily be converted into a chamber to accommodate assigned judges.

Attorney Interview/Witness Waiting Rooms

Provide interview rooms for attorneys and clients, and for conferences with victims and witnesses.

- Provide two attorney interview rooms for every courtroom. In larger court facilities, the ratio of interview rooms may be reduced.

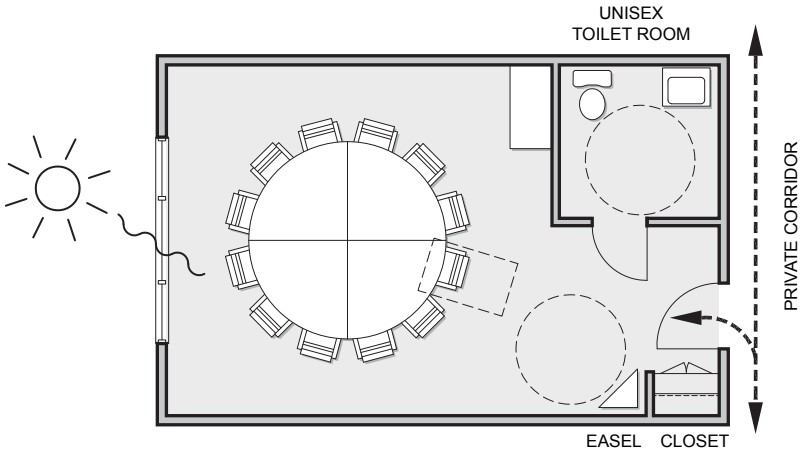


Figure 5.18 Jury Deliberation Room 400 SF

- Interview rooms may be accessible from the public corridor (if consistent with the court's security and operational procedures), or may be reached through the courtroom entry vestibule if access can be provided but controlled when the courtroom is not occupied.

Law Enforcement Waiting

A waiting room, located off the public corridor near the courtrooms, may be provided in criminal, traffic, and juvenile courts for law enforcement officers to wait in before court appearances and during court recesses. The waiting room shall be accessible from the public corridor.

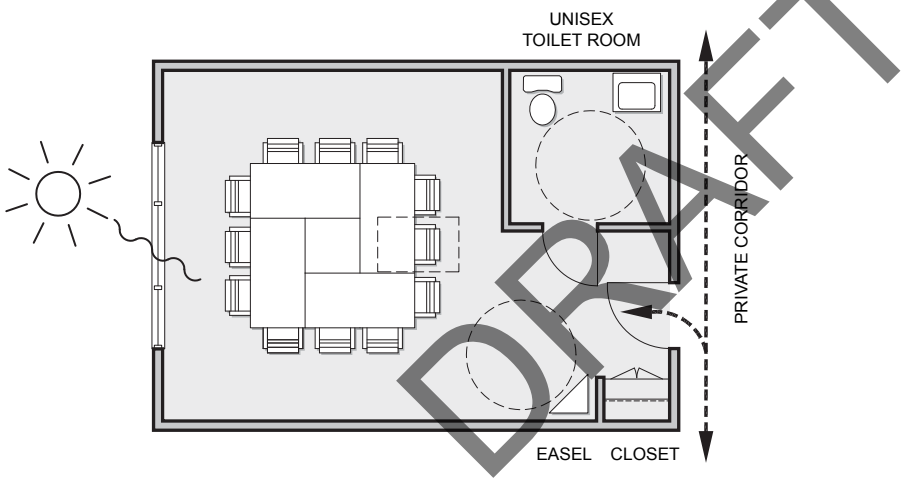


Figure 5.19 Jury Deliberation Room 345 SF

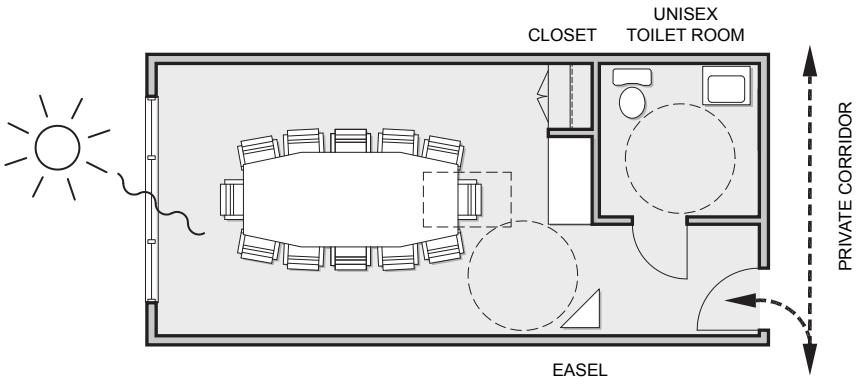


Figure 5.20 Jury Deliberation Room

Figure 5.21 Variations

- Clear courtroom width of 32' may be achievable if clerk's station and witness box are at +0" due to reduced ramping requirements, but this would dictate judge's bench being at +12" max.
- Clear courtroom width of 36' minimum is required if judge's bench is at +21" due to ramp lengths.
- Clear courtroom width of 38' is required if clerk's station is at +14" due to increased ramp lengths.
- Ramping requirements may be reduced for judge's bench and clerk's station if private corridor is at a higher floor elevation than the courtroom floor.
- Refer to spectator seating layout shown in Figures 5.23 and 5.24 for seating layout in large courtrooms.

Figure 5.22 Variations

- Clear courtroom width of 32' may be achievable if clerk's station and witness box are at +0" due to reduced ramping requirements, but this would dictate judge's bench being at +12" max.
- Ramping requirements may be reduced for judge's bench and clerk's station if private corridor is at a higher floor elevation than the courtroom floor.
- Refer to spectator seating layout shown in Figures 5.23 and 5.24 for seating layout in large courtrooms.

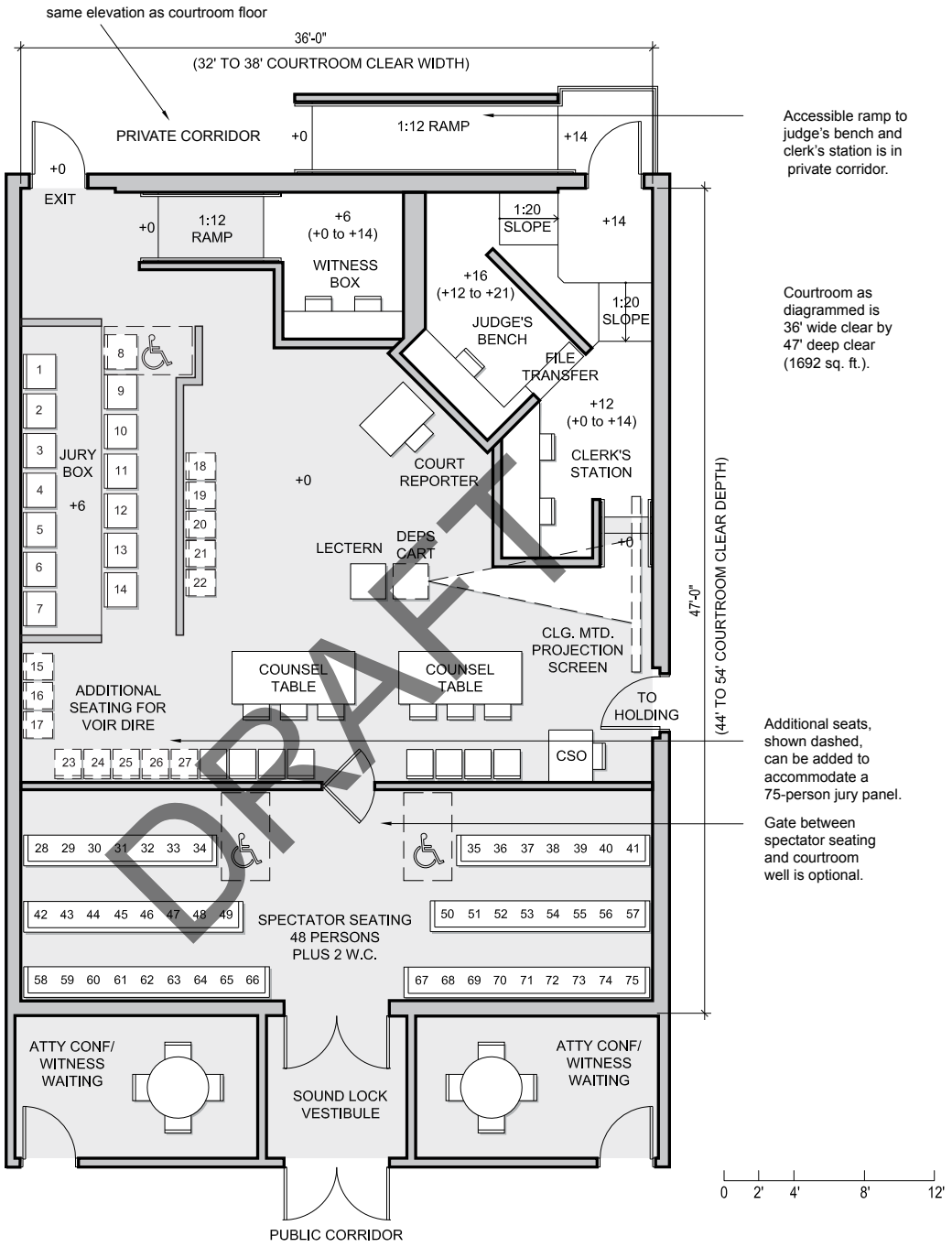


Figure 5.21 Multipurpose Courtroom (Corner Bench, seating for jury panel)

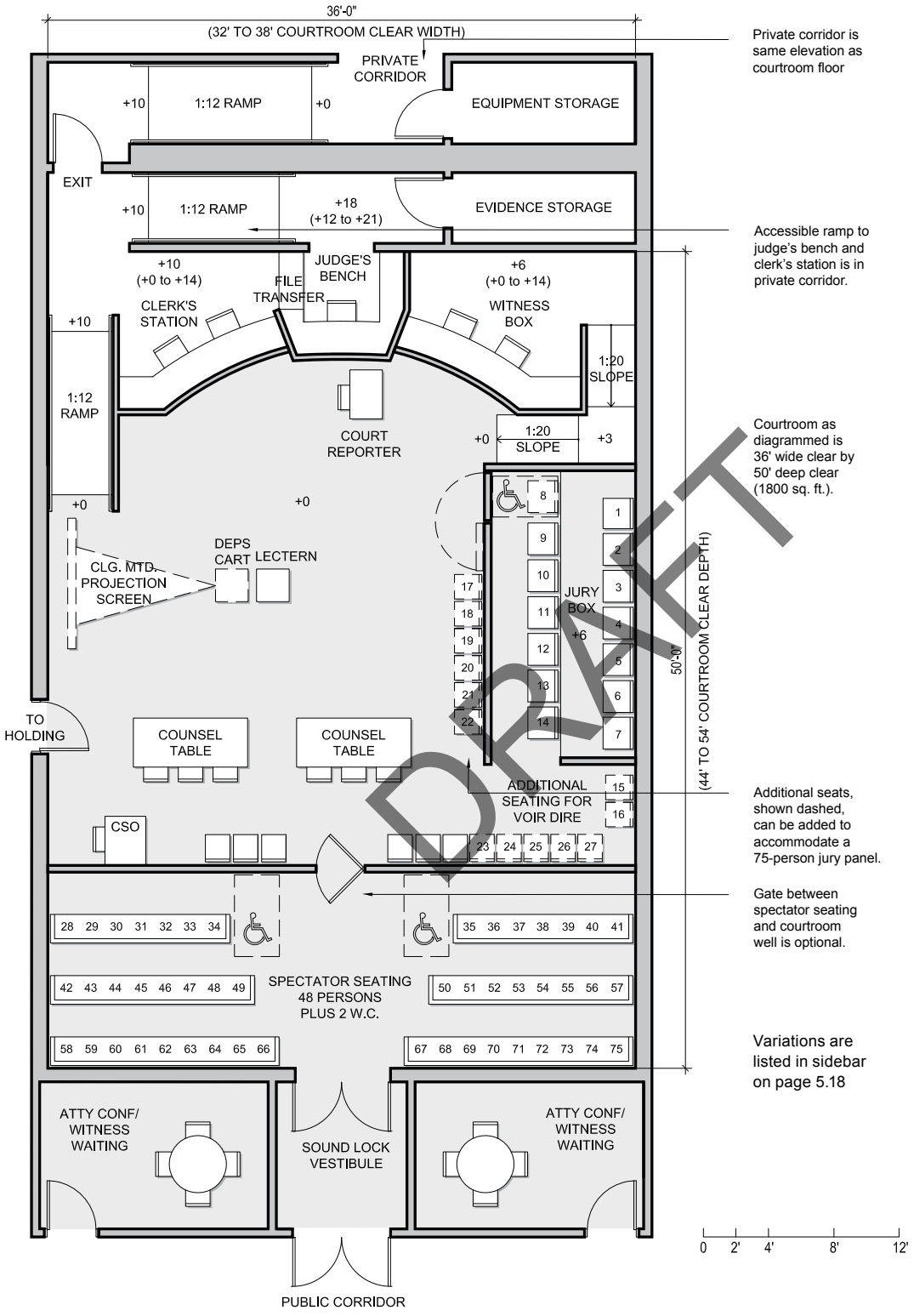


Figure 5.22 Multipurpose Courtroom (Central Bench—Symmetrical)

Figure 5.23 Variations

- Clear courtroom width of 38' is required if clerk's station is at +14" due to increased ramp lengths.
- Clear courtroom width of 40' minimum is required if judge's bench is at +21" due to increased ramp lengths.
- Ramping requirements will increase for judge's bench and clerk's station if private corridor is at the same floor elevation as the courtroom floor.

Figure 5.24 Variations

- Clear courtroom width of 38' is required if clerk's station is at +14" due to increased ramp lengths.
- Clear courtroom width of 40' minimum is required if judge's bench is at +21" due to increased ramp lengths.
- Ramping requirements will increase for judge's bench and clerk's station if private corridor is at the same floor elevation as the courtroom floor.

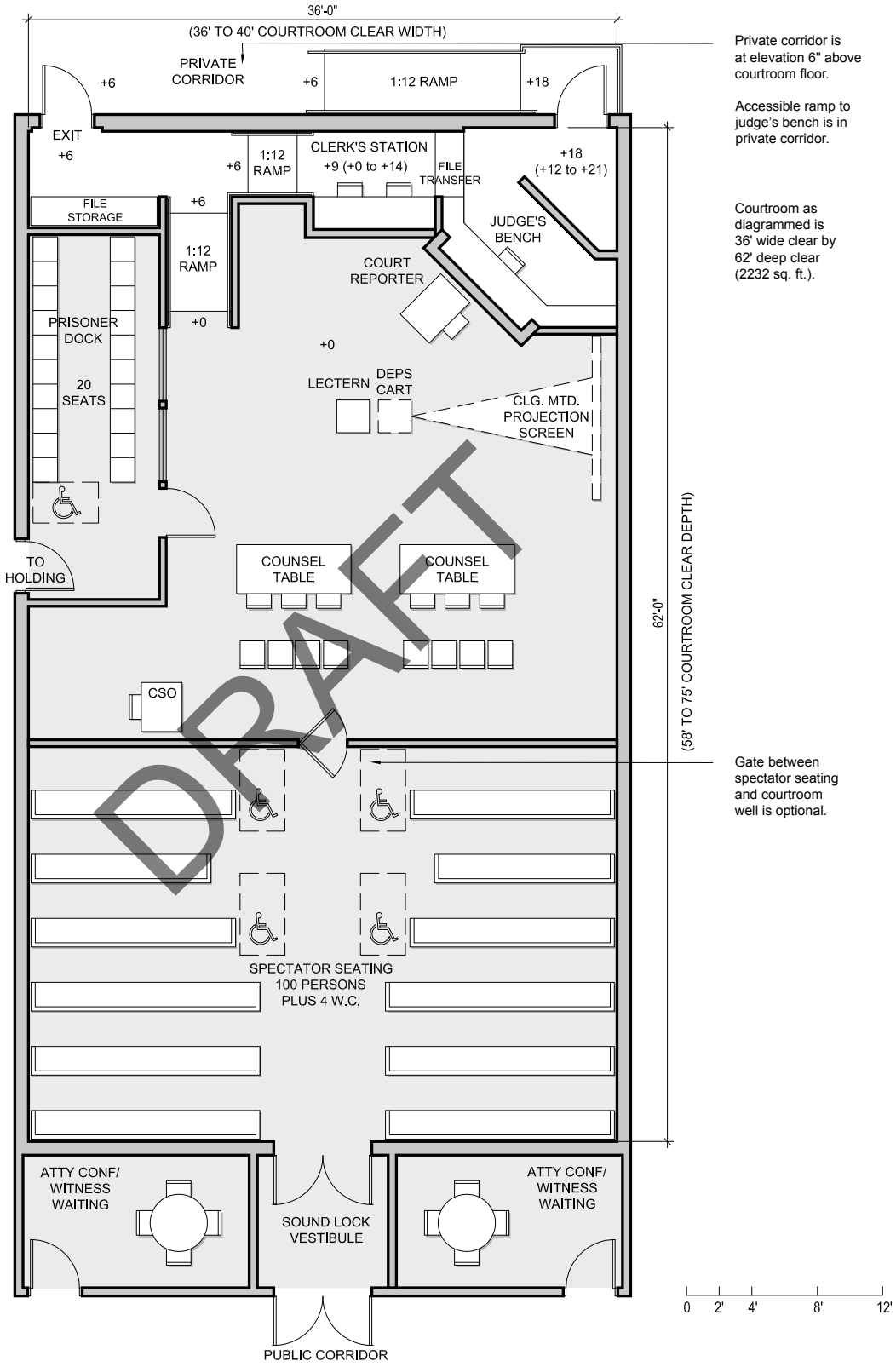


Figure 5.23 Arraignment Courtroom (Corner Bench)

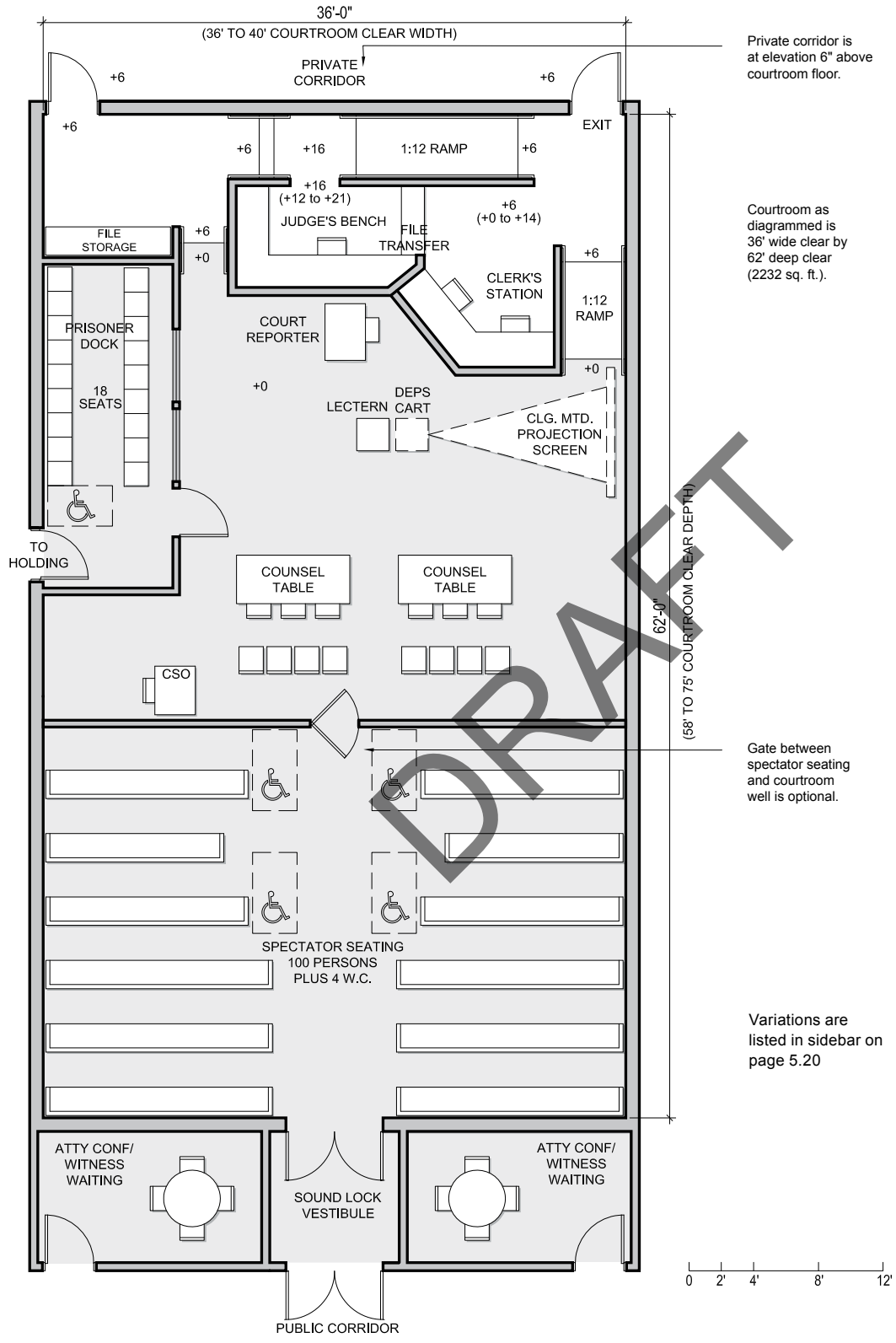
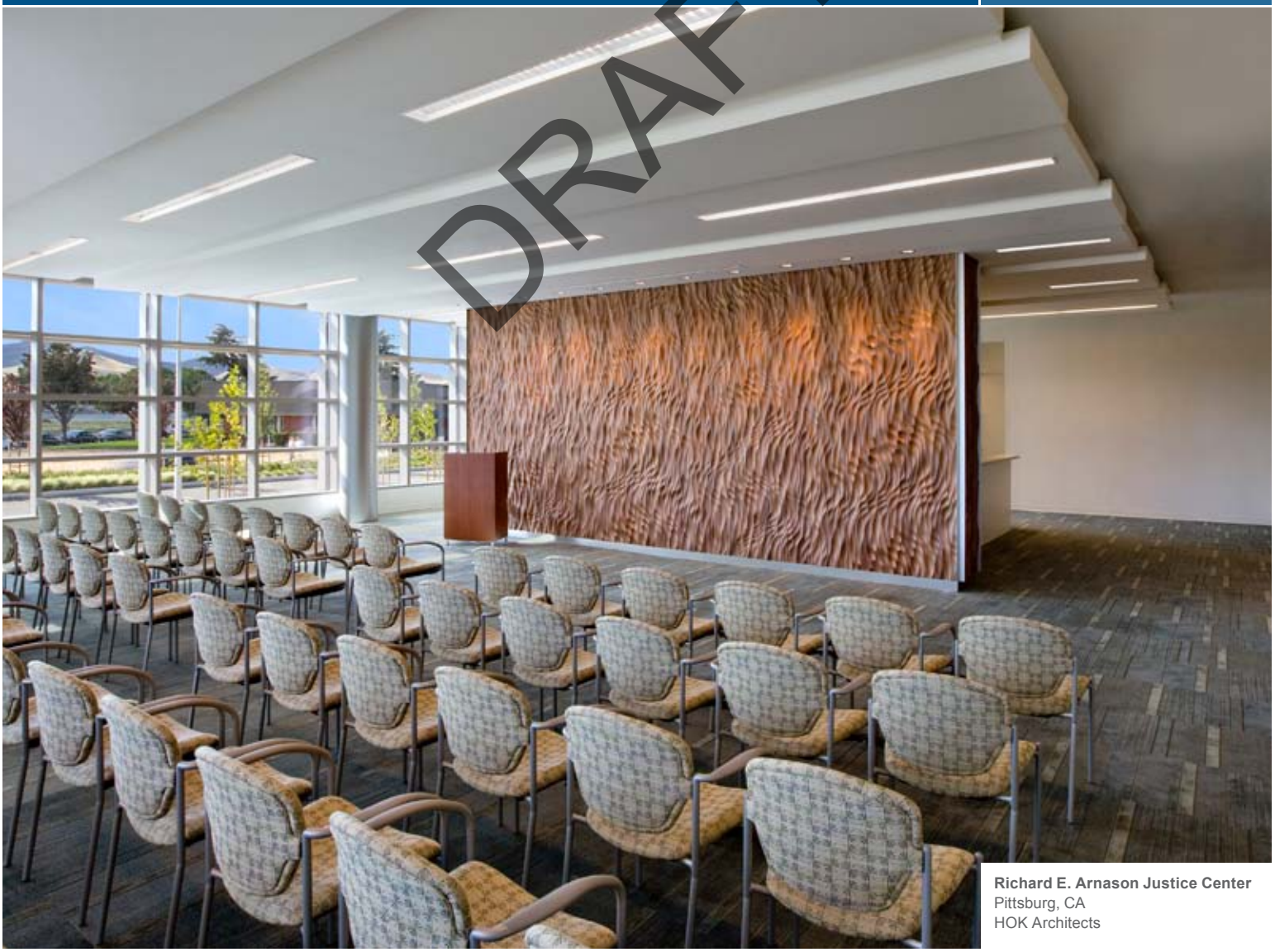


Figure 5.24 Arraignment Courtroom (Central Bench)

6 JURY FACILITIES AND COURT ADMINISTRATION



Richard E. Arnason Justice Center
Pittsburg, CA
HOK Architects

DAVID WAKELY PHOTOGRAPHY

Jury duty is a public service obligation. For many, jury duty is the citizen's only contact with the judicial system. The jury assembly area presents potential jurors with a physical symbol of the importance of their duty, and orients them to the process of the courts.

Jury Assembly Spaces

- Entry Queuing Area
- Reception, Check-in, Registration
- Jury Assembly Room, Information Presentation Area
- Forms Counter
- Coffee and Snack Area
- Jury Commissioner Office and Jury Staff Area
- Mail Center
- Call Center
- Grand Jury

The trial court's administrative organization combines the traditional public and case management functions of the clerk of court with the financial and administrative services of a modern business. Clerk responsibilities include case filing and tracking, records administration, calendar management, fines, fees collection, jury services, and public information. Business services include staff personnel functions, budget management, information services, statistical reporting, and purchasing. For jury deliberation room standards, refer to section 5.E (Courtroom Support Spaces).

The number of court staff varies by jurisdiction. Variables influencing court staffing include the number of judicial officers, number and type of case filings, number of court locations, and extent to which business services are provided internally or are contracted with other entities.

6.A JURY FACILITIES OBJECTIVES

- Plan and design the jury assembly rooms to be comfortable, efficient, and safe.
- Locate, size, and configure the spaces appropriately to facilitate use by potential jurors.
- Ensure that all jury assembly areas can be monitored by jury staff.

Technology and new operational models will continue to impact jury call and associated space needs. Jury assembly spaces should be designed to consider future changes that may include online jury summons processes that will reduce or eliminate the need for large jury assembly spaces. Jury assembly rooms should be designed to allow for easy conversion to other uses, particularly future courtroom or hearing room use.

6.B JURY ASSEMBLY SPACES

The jury assembly area is a high-volume public access function, and should be located on the building entry floor or lower floor connected by a communicating stair. All prospective and selected jurors must enter through the screening station. The entrance to the jury area must be easy to locate upon entering the courthouse and easily accessible from public corridors. Jury staff shall be able to control the entry into the jury assembly area.

Ensure that traffic to the jury assembly room does not interfere with or impact the security screening process, or interfere with public circulation in the lobby, stairs, or elevators.

- Plan movement of jurors to minimize juror contact with attorneys and litigants, and to preclude intimidation by and contact with the public.
- Protect assembly area from exterior viewing.

The jury assembly area consists of the following components.

Entry Queuing Area

Prominently placed signage shall provide clear directions to the jury assembly area. Jurors arrive simultaneously, so queuing areas will be required for prospective jurors waiting to sign in. Queuing area can be colocated with a lobby, waiting area, or building circulation.

Reception, Check-in, Registration

The reception, check-in, and registration area shall be immediately visible at the entry of the jury area. The size of this area will depend on the number of courtrooms and peak volume of anticipated jurors expected at sign-in times. Self check-in kiosks may be considered in this location.

Provide standard clerical support workstations (refer to Table 2.2).

Jury Assembly Room, Information Presentation Area

- Sufficient seating shall be provided for all prospective jurors. Provide movable ganged seating and lounge seating. The minimum number of seats will vary by the size and location of the facility. Provide wheelchair spaces, companion seating, and semiambulatory seating in ratios required by law.
- Provide areas for reading, studying, working, and watching television, designed as acoustically separated rooms or alcoves adjacent to the jury assembly area. Work areas shall include study carrels, Wi-Fi, and power connections for personal computers. See Figure 6.1.
- Rooms may serve as multipurpose community rooms in smaller facilities.
- Rooms in courthouses without dedicated training rooms shall be designed and constructed to the same standards as the training rooms to enable these rooms to be used for training and other collaborative activities with full multimedia capabilities. This includes the use of nonfixed, easily removable seating, to allow for flexible rooms setups. In addition, these rooms should be designed to allow use for training sessions without disturbing jury services staff.
- Provide sufficient restroom facilities adjacent to the jury assembly area.
- Provide a podium and infrastructure for wireless or cell phone access.

Figure 6.1 Work Carrels in Jury Assembly Room, San Francisco Civic Center Courthouse

At the information presentation area, provide for use of audiovisual equipment, computer data lines, and telecommunications systems to accommodate programs such as video orientation, automated jury management systems, and juror call-in programs.

Outdoor areas may be provided if they are within the building's secure perimeter and jurors are prevented from public contact.

Forms Counter

Provide counters for filling out forms.

Coffee and Snack Area

Provide space for a minimum of three or four vending machines, a table, chairs, and a space for water and coffee. Room size shall be proportionate to the number of people served; in larger facilities, the area may be increased commeasurably. Space for a vendor may be provided in some facilities. This area is usually provided in a separate alcove to contain food-related mess and minimize noise impact on the assembly and work areas. Depending on other food service in the building, this vending area may also need to be accessible to nonjurors.

Jury Commissioner Office and Jury Staff Area

A private office may be provided for the jury commissioner.

In larger courthouses, space for additional support staff not located in the jury reception area may be required. The size of the support space area will be proportionate to the size of the court facility. The office will be readily

Court Administration Spaces

- Public Counter and Counter Workstation
- Records Viewing
- Court Executive Officer's Suite
- Offices and Workstations
- Case Management and Assignment
- Information Systems (IS)
- Purchasing
- Revenue and Collections
- Human Resources
- Records Storage
- Conference and Training Rooms
- Mail Center
- Equipment Storage

accessible to the reception counter. Provide sufficient space for storage of jury records and files. See Figure 6.2.

Mail Center

If required, provide a work area where staff can prepare juror summonses, scan summons return information, and print checks. Most courts outsource summons preparation, printing, and mailing, or centralize this function with other mail activities.

Call Center

Provide a work area where staff can answer telephone queries. Larger facilities use call centers or interactive voice response (IVR).

Grand Jury

The grand jury is not a state court function but often shares superior court spaces.

6.C COURT ADMINISTRATION OBJECTIVES

- Colocate court administrative functions and provide convenient public access to areas with high public contact. These areas should be located on lower floors near the main entry and public elevators in a multistory building. Provide staff areas with easy access to the private circulation system. Connect the court administrative offices to private and public corridors, allowing controlled access to judicial officers, court personnel, attorneys, and the general public.
- The appearance of the court administration and case management area shall be consistent with the rest of the courthouse. The public side of the counter area must have high-quality, durable finishes. The counters, workstations, and public viewing stations shall make use of modular furniture where appropriate to maximize complete ergonomic and expansion flexibility. The court clerk's office shall be an open-office environment with modular furniture, architectural details, finishes, furniture, wall coverings, paint, and carpet appropriate for administrative offices in a public agency.
- Consider making rooms more flexible by providing telephone, data, and power outlets in areas that may be converted to workstations, offices, or conference areas. Electronic case management will affect future record storage areas that may be

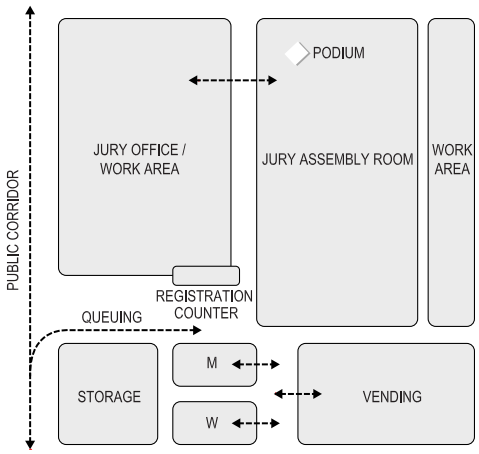


Figure 6.2 Jury Assembly Suite Adjacency Diagram

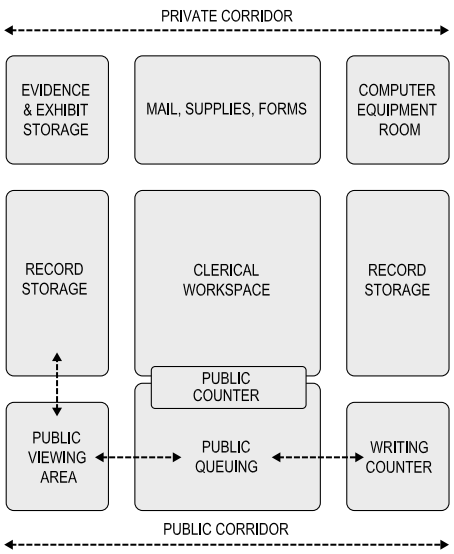


Figure 6.3 Clerk's Adjacency Diagram

required, and these areas must be designed with flexibility in mind for conversion to other program needs.

- Provide security to ensure the safety of the public, staff, records, and exhibits. Integrate security duress alarm notification systems into the courthouse security system. Consider security elements in the public service lobby. Incorporate glass and closed-circuit TV cameras at the public counter area. In locations not protected by a public entry weapons-screening station, provide bullet-resistant glass barrier systems and counter casework. Provide the evidence storage room and vault with locks and intrusion alarms, located in an area that allows constant supervision. Court clerk staff access shall be restricted by use of key cards or other devices.

6.D COURT ADMINISTRATION SPACES

The court administration area consists of the following spaces. See Figure 6.3 for a typical layout.

Public Counter and Counter Workstation

Design public service counters to encourage access to the judicial system, while providing security for office personnel. Counters allow sufficient work area to transact case filing activities, and they separate private staff office areas from public areas. Design spaces to ensure efficient and secure acceptance, exchange, review, and reproduction of high volumes of public documents.

Counters must be universally accessible, with the ability to accommodate wheelchair users on each side. Counter workstation design options include:

- Option 1: Staff workstations shall be designed at an elevation above the public floor that allows for seated, eye-level interaction with customers standing at the counter. Refer to Figure 6.4. An accessible writing surface is required on the public side, with depth to equal the length of the longest court form. A raised solid barrier between openings screens the view of computer and desktop items. The divider

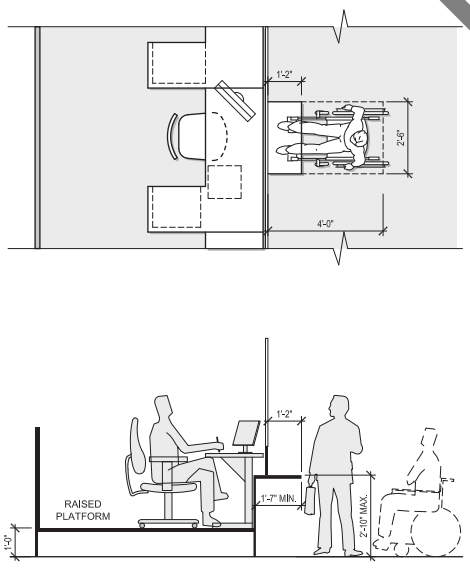


Figure 6.4 Transaction Height Counter

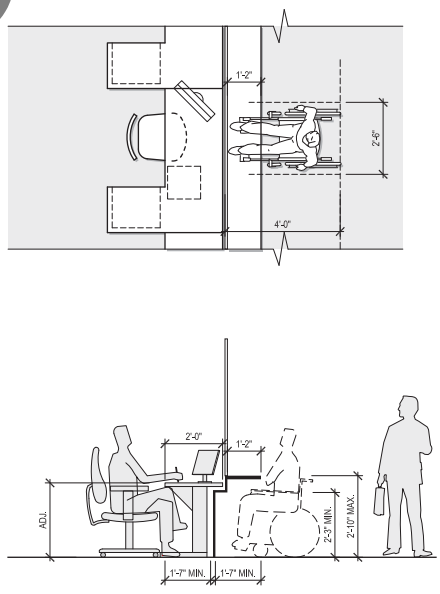


Figure 6.5 Universal Height Counter

height is limited by reach distance. If a raised platform is provided, consider the ability of clerks to obtain records easily.

- Option 2: Staff and public sides shall be accessible at a seated level. Refer to Figure 6.5. Provide a single-height writing surface that meets accessible height and depth requirements. This height will accommodate people standing and those in wheelchairs. Sightlines and sound levels when speaking must be considered in this model. For longer transactions, such as probate, movable seating may be provided for the public; the public may stand for short transactions.
- Staff assignments to counter workstations may be permanent, rotating, or walk-up counters. Permanent counter means the counter station is the dedicated and only workspace for the assigned staff, and needs to have all the support necessary for a clerk staff workstation. Rotating and walk-up mean that counter staff have dedicated workstations elsewhere.
- Each counter position will include the counter, staff workspace on the private side, and standing area on the public side.
- Workstations shall accommodate communication and data processing equipment and storage space. All counter stations will be configured and provided with power and data to allow cash and credit card transactions. Include outlets for credit card swipe, printer, cash drawer, and cameras. Locations shall facilitate communication and passage of documents between clerks and the public.
- Provide a silent duress alarm at each clerk counter position.
- See Chapter 16 (Lighting Criteria) for lighting suggestions.
- Provide permanent counter positions with a means of blocking the view from the public side when the staff member is off duty but still working in the position. Pull-down shades or movable screening devices are acceptable.
- Providing security with glass barriers is the preferred method. The glass presents a less friendly appearance but is preferred by staff to provide a layer of defense against the public.
- Provide voice transmission through 1¼" vertical slots on either side of the window. Provide a pass-through tray. If a glass barrier is not included, the design must include other means for defense, such as a restricted opening width, raised clerk station, or wider counter.
- When a queuing area is provided in the public area outside the counter, allow 10' minimum between the public entrance and the counter for the public queuing area. Provide additional space near the queuing area for a public writing counter for forms preparation. When a "take-a-number" system is utilized, provide adequate seating for the waiting public.
- Some public counters may be located on the nonsecure side of the security screening station. If counters for fast transactions, such as traffic and attorney filing, are located in the public lobby queuing area or outside, they must be protected with a glass barrier and cameras. Outside counters must be located under an overhang.
- Locate and design drop boxes for convenient public use. Locate drop boxes outside the building at curbside, in a drive-through, or within the courthouse public spaces. Review location and design of all drop boxes, regarding safety and security issues.

Records Viewing

Provide an area adjacent to the public service counter for public viewing of records. This area must be secure and visible to the staff at all times to prevent tampering with or theft of records.

- Provide public computers, copier, fax machine, microfilm readers and printers, inquiry terminal, and electronic devices designed to make records available for public review and duplication of court documents. These areas are usually enclosed rooms with direct view and access to one of the clerk's workstations.
- Provide coin-operated self-service duplication equipment in the public area. Establish a reasonable ratio of public computers to the number of counter stations.

Court Executive Officer's Suite

Office needs for the court executive officer's suite include an office for the court executive officer (CEO); a reception area; offices for assistant court executives; a conference room in close proximity to the CEO office; workstations for staff; and 40 to 60 NSF per staff member for files and office equipment. A separate restroom for the CEO is not required. This suite can be separate from the main clerk's office and is often located on an upper level in multilevel courthouses.

Offices and Workstations

Workstations and office furniture shall be modular furniture to enable complete ergonomic and expansion flexibility. Provide medium workstations with overhead storage. Low partitions, at 42" height, are encouraged for part of the enclosure, to promote communication and visibility to the public counter area. Some stations can be combined into a shared work area and shared central small conference area.

See workstation size standards in Table 2.2 in Chapter 2 (Courthouse Organization), and planning criteria below for office area requirements. Provide space for:

- Office equipment, files, storage, counters, and special work areas.
- Visitors, meetings, training, reception, and waiting areas.
- Dedicated conference and meeting rooms, unless staff can share other meeting spaces.

Case Management and Assignment

Workstations in the case management division will range from standard to large, depending on the staff position. This area includes counter workstation positions to assist attorneys, court clerks, and the public. Provide 40 to 60 NSF per staff member to accommodate files and office equipment.

Information Systems (IS)

Information systems include systems development, programming, information management, technical support, planning, and research operations. These functions are primarily nonpublic and require office and workstation environments. Larger jurisdictions maintain technical libraries, computer server equipment rooms, computer workrooms, and, occasionally, large mainframe computer operations. Provide an IS workroom and storage space with a 32" counter on two sides. Provide a 14" shelf 21" above the counter. This casework shall be plastic laminate finish. Above the counters, provide a continuous plugmold electrical unit.

Purchasing

Office space needs for purchasing staff include small to large workstations for buyers or other support staff and a medium office for management. Consider a small conference space for meetings or negotiations with vendors.

Revenue and Collections

The revenue and collections office area requires standard workstations. Provide a public reception area and counter space for information and payment transactions.

- Provide counter workstation positions and 40 to 60 NSF per staff member for files and office equipment.

- Provide space for multiple file cabinets for records and files and a small conference space within or adjacent to the revenue and collections functions.
- Provide acoustical separation of any public space and staff areas where confidential telephone and personal conversations occur.
- Consider providing separate storage with restricted access and a security camera for safety.

Human Resources

The human resources office area requires standard to large workstations. Provide space for multiple file cabinets for records and files and a small conference space within or adjacent to the workstations. Provide duress buttons at public counters and at any staff work area used for employee termination.

Records Storage

Provide space for microfilming and scanning documents for storage, and to accommodate future records storage and retrieval technologies.

Floors must be designed to accommodate file weight. Provide minimum aisle widths of 36". Consider providing nonliquid fire suppression protection of file storage areas. See Chapter 16 (Lighting Criteria) for lighting suggestions.

Some jurisdictions distinguish between active and inactive records for file storage purposes. Active records include open or regularly accessed files that are generally stored adjacent to the court clerk work areas. Active records are often maintained in indexed, open shelving units for easy access. Inactive records are often stored at a more remote location. Typically three to four years of records are maintained on-site. Records must be maintained, pulled upon request, routed, and interfiled. A microfilm and destruction program, if available, can help control growth of records storage.

Active Records Storage

Verify the functional and space requirements for active record storage in order to provide sufficient space. Active records must be easily accessible from the court clerk work areas and in a secure location. Functional requirements and policies of each courthouse will influence the location of the active file storage area; ground floor is preferred because of structural load issues.

- Adequate workspace must be included adjacent to the file storage equipment.
- High-density record storage is preferred for most active file storage because of the smaller footprint, but cannot be used in departments requiring constant file retrieval. Manual systems are preferred over electric because of maintenance and failure rates. Design with some fixed aisles so several aisles can stay open for staff access. A locking feature may be used to secure confidential files. Specify record storage seven shelves high.
- Optical disk processing substantially reduces file storage space while increasing file input and viewing capabilities.

Inactive Records Storage

If inactive files are stored on-site, an adequate and accessible storage area must be provided. Spatial requirements will vary in accordance with the number of records and the length of file retention schedules. Older inactive records should be stored off-site in order to economize on use of courthouse space.

- Warehouse shelving is recommended.
- The inactive record storage area must not fluctuate in temperature or humidity. Protect the file storage medium, whether paper, microfilm, or optical disk, against deterioration or damage from flooding or moisture.

Conference and Training Rooms

Provide conference rooms as specified by the program. Judges must be able to gather regularly for bench meetings or education purposes, and staff must be able to gather for meetings. The three conference room sizes listed in Table 2.2 do not preclude larger conference rooms in large court buildings or combining multiple rooms with folding walls.

Provide a training room, located for easy accessibility by staff. Design for flexibility with multipurpose furniture and a projection screen to accommodate training, conferences, and other meetings. See Chapter 16 (Lighting Criteria) for lighting requirements and Chapter 18 (Audiovisual Systems) for audiovisual requirements. Provide small conference rooms adjacent to workstation areas. Sharing of conference and training rooms between departments is encouraged.

Training rooms shall be located in the private circulation areas. One entrance to the room shall be accessible only by court personnel and judicial officers through a private corridor. A second entrance may be accessible via a public corridor.

Training room sizes shall be based on 40 sq. ft. per person. To determine the overall size of training rooms, the following formula should be used:

- 0–100 staff: 400 sq. ft. training room
- 101–300 staff: 800 sq. ft. training room
- 301+ staff: 1,200 sq. ft. training room

All training rooms larger than 600 sq. ft. should have the capabilities to be partitioned to allow for concurrent training events. To determine how many attendees can be accommodated in these spaces, typical layout scenarios and associated square footages are provided below:

- Computer training layout: 35–40 sq. ft. per person
- Hollow square layout: 30 sq. ft. per person
- Classroom-style layout: 20–22 sq. ft. per person
- Theater-style layout: 10–12 sq. ft. per person

In addition to the formula above, other factors should be taken into consideration when allocating space for training rooms, including:

- Availability of other training spaces in the area.
- Distance between other justice centers.
- Number of employees and judges in the area.
- Largest anticipated internal event, the frequency of such events, and the availability of space to accommodate these types of events.
- Average number of attendees for regularly offered training courses and meetings, and the frequency of these types of trainings and meetings.
- Anticipated demand for technical training.
- Ratio of open office space to private offices to help determine the demand for private meeting spaces.

Incorporate the relevant sections and recommendations of the AOC Training and Conference Room Standards report commissioned by the AOC and developed by the Huntsman Architectural Group. These standards include (but are not limited to):

- Architectural design, including room locations, proportions, and dimensions.
- Lighting designs based on room function and user comfort.
- Audiovisual systems including projectors, screens, and controls to activate these systems.
- Telecommunications criteria to support voice and data communications.

- Budgeting guidance for ongoing operations, maintenance, and replacement of equipment and systems.
- Best acoustical practices for sound insulation, speech privacy, and room acoustics.

Mail Center

Provide an area for intake, sorting, distribution of mail. Large facilities may require additional area for mechanical and electrical components to support HVAC biofiltration systems.

Other Support Areas

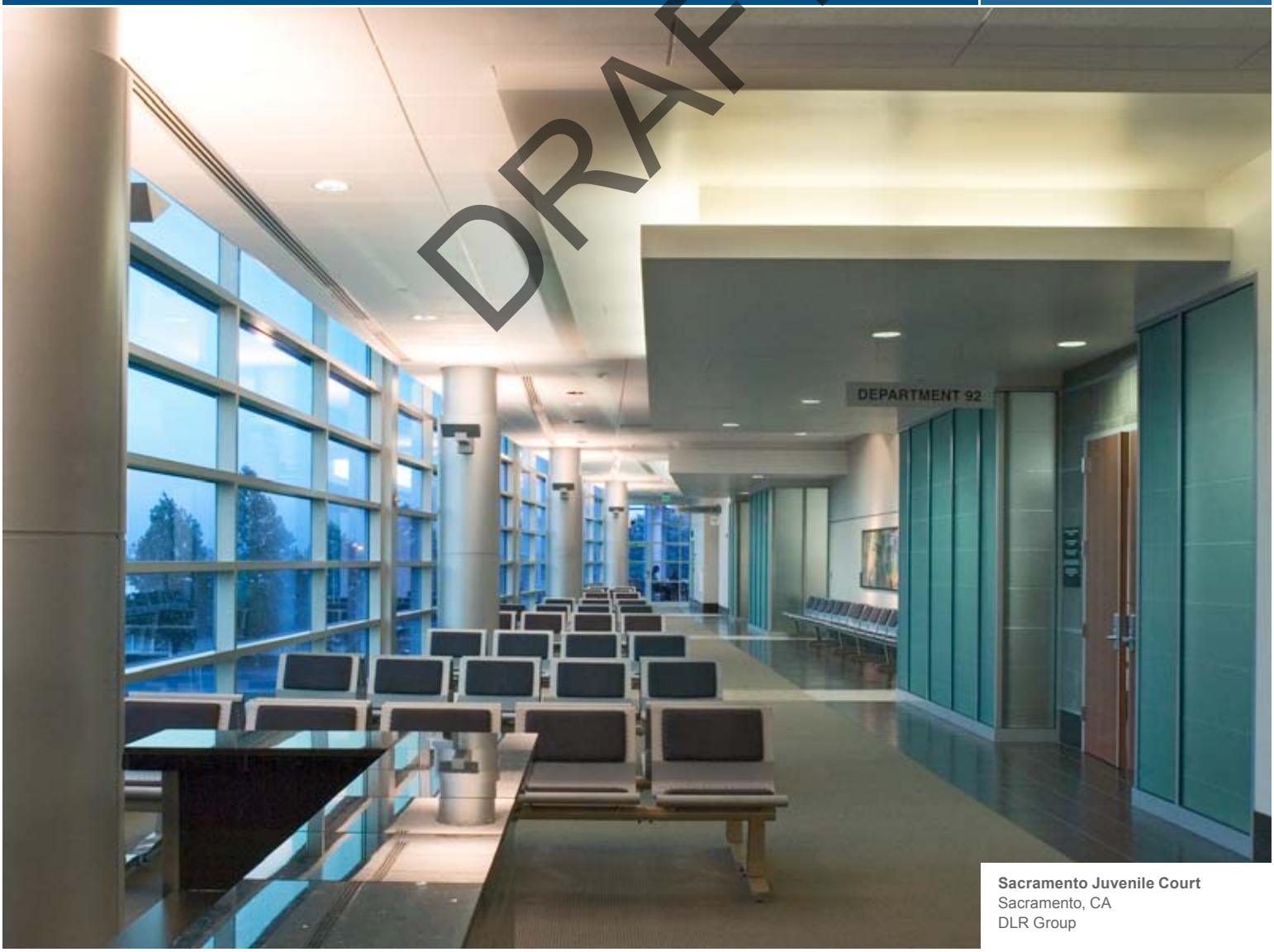
Other support areas may include copy facilities, supply rooms, restrooms, and break areas.

- Provide copy areas to accommodate high-volume copying. They must be ventilated to dissipate copier heat and fumes, and located to minimize noise disruption of other work areas. Depending on the size of the court facility and workload, convenience copiers may be located throughout the building.
- Provide an area with adequate shelving and work areas for storing office supplies.
- Allocate space for employee restrooms. Consider current and projected future staff composition when determining the number of toilet fixtures. Additional restroom facilities for female employees may be required.
- Provide a staff break room with a sink, disposal, and casework. Employees shall provide appliances.
- Provide a lactation room for employees.

Equipment Storage

Provide a locked area for equipment storage, including computer equipment.

7 SPECIAL SERVICES



Sacramento Juvenile Court
Sacramento, CA
DLR Group

WHITTAKER PHOTOGRAPHY

Family law facilitators guide litigants through the forms and procedures related to child support, spousal support, and maintenance of health insurance. They assist with cases involving the local child support agency, many of which are cases requiring reimbursement for public assistance. Many facilitators are involved in community outreach programs. Facilitators provide mediation services, in which they meet with both parents and help work out child support issues. Some courts have enlisted volunteer attorneys or provided additional funding that enables facilitators to assist self-represented litigants in other family law areas, including divorce, custody, and visitation.

Task Force on Self-Represented Litigants, highlights from report

FCS = Family Court Services

ADR = Alternate Dispute Resolution

Family law facilitators, self-help centers, family court services (FCS), juvenile dependency mediation, child waiting, and alternate dispute resolution (ADR) programs increase the efficiency of certain types of court cases. The litigant has better information, issues are settled more frequently, court appearances are minimized, and use of these services reduces paperwork. Related justice agencies (i.e., district attorney, public defender, probation, Child Protective Services) have significant business each day within the trial court. Therefore, accommodations for these agencies shall be determined during the programming phase. Spaces for related justice agencies may be multipurpose rooms for brief use or larger suites serving as the primary office for multiple staff and also including a public service function.

7.A OBJECTIVES

The following groups of spaces must be convenient to the public and must be located off the public corridor or public waiting. These areas must also have access to the private circulation system.

Since many family court services and ADR services are conducted after regular court hours, access to these offices and to restroom facilities during noncourt hours must be available without compromising the security of the remainder of the courthouse.

Ensure safety and security in the event of physical confrontation by means of duress alarms and sidelights at doors. Facilitate future flexibility by providing these features in all spaces. Duress alarms shall be inconspicuous but convenient to the user.

7.B FAMILY LAW FACILITATORS AND SERVICES FOR SELF-REPRESENTED LITIGANTS

Family law facilitator programs are a mandated service. Supervised by experienced family law attorneys, they provide self-help assistance to litigants with child support issues.

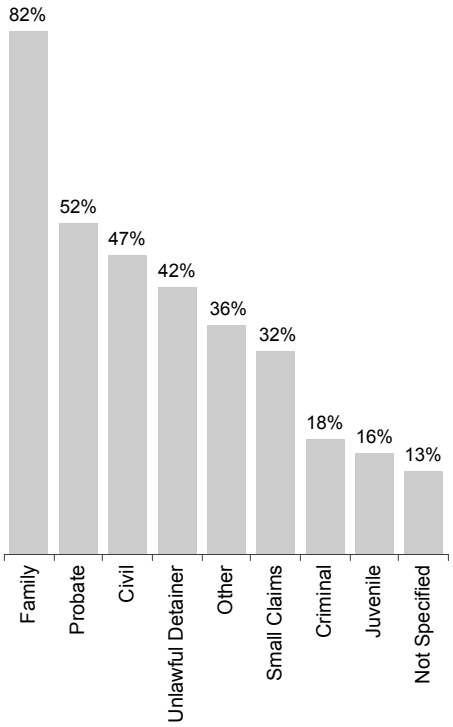
Most courts have expanded their family law facilitator's activities to provide other self-help assistance in family law, and a growing number of courts provide self-help in other areas. In the Statewide Action Plan for Serving Self-Represented Litigants, approved by the Judicial Council in 2004, attorney-supervised, staffed self-help centers are recommended for every court.

Table 7.1 shows a breakdown of self-represented litigants by case type.

Family law facilitators and self-help centers provide assistance and practical information about court procedures for "pro per" litigants (representing themselves in litigation) visiting or using the court. Locate self-help centers near the clerks' offices, easily accessible from a public corridor. See Figure 7.1.

Table 7.1 Self-Represented Litigants' Needs (by Case Type)

From Highlights from the report of the Task Force on Self-Represented Litigants



Reception, Waiting, and Triage Areas

- Provide public waiting for users and children, with child waiting, reception counter, and triage area. The volume for these services is extremely high. In large courts, seating should be available for 30 to 50 people.
- Furnishing and equipment needs include small tables for filling out forms or conferencing that can be reconfigured for classes; computer terminals located against the wall; brochure racks; shelving; storage; video monitors; and a coin-operated photocopier.
- Provide staff workspace with file storage, work counters, and equipment. Public counters and reception areas may be integrated into the work areas.
- Provide a duress alarm at counters.

Workshop Rooms

In jurisdictions with more than one family law facilitator, provide a workshop room. The room must accommodate reference materials, audiovisual equipment for workshops, and computers to allow litigants to complete typewritten forms. See Chapter 16 (Lighting Criteria) and Chapter 17 (Unified Communications) for technical requirements.

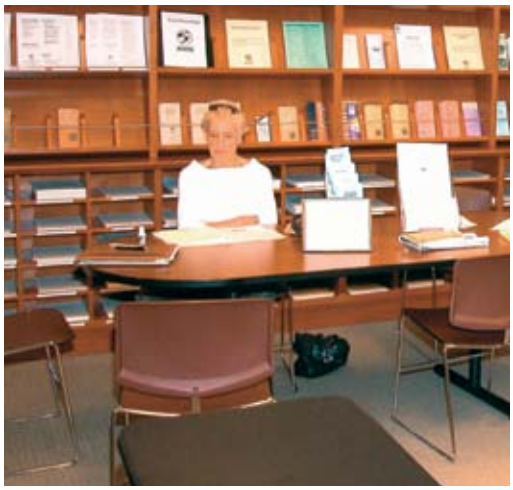


Figure 7.1 Self-Help Center, San Francisco

- In jurisdictions with at least one full-time facilitator, provide at least one conference room for services to be provided by volunteer attorneys, paralegal, and other staff supervised by the attorney facilitator/self-help center attorney's office.
- Provide one private office per facilitator and staff attorney. If separate interview or conference rooms are not provided for mediation, the private offices should be large enough to accommodate up to five people for this purpose.
- Provide a duress alarm in offices and at counters.

Small Courthouse Model

Provide one room designed so one staff member can provide supervision and control.

Impact on Courtroom

Provide brochure rack and video outside the pro per courtroom to instruct users on courtroom procedures.

7.C FAMILY COURT SERVICES

Courts are required to set contested child custody and visitation issues for mediation. Family court services (FCS) provide mediation, which must include a mandatory orientation as well as a mandatory intake process that screens for, and informs staff about, any restraining orders, dependency petitions under Welfare and Institutions Code section 300, and other safety-related issues affecting any party or child named in the proceedings. Rule 5.215 of the California Rule of Court requires FCS to conduct differential domestic violence assessments; make reasonable efforts to ensure the safety of victims, children, and other parties when they are participating in services provided by family court services; and, consistent with Family Code sections 3113 and 3181, offer separate mediation sessions at separate times when there is a history of domestic violence, or when a protective order as defined in Family Code section 6218 is in effect, or if domestic

violence is discovered while mediation or evaluation services are in process. A domestic violence support person may accompany a party protected by a restraining order to mediation and orientation. In child custody and visitation cases, FCS may also offer appropriate services as available, such as child custody evaluation, parent education, relevant education programs for children, booklets, videotapes/DVDs, or referrals to community resources. FCS offices also commonly offer such services as stepparent adoption, conservatorship, and guardianship investigations.

The family court services mediation area can generate considerable traffic flow. Locate FCS on a lower floor close to the main lobby or near elevators on an upper floor. Other civil mediation and arbitration services do not generate the same traffic load as FCS and may be located away from the main lobby. Parties using FCS often also use family law facilitator/self-help services; locating these services nearby would be helpful to the public. If possible, provide more than one exit from FCS, to provide alternate access for domestic violence victims who are participating in mediation.

The family court services consists of the following areas (for sizes refer to Table 2.2 in Chapter 2):

- Public counter and workstation space
- Mediator and evaluator offices
- Reception and waiting areas
- Orientation room
- Mediation room
- Conference and training room
- Children's waiting area
- Security station
- Equipment storage

Mediator Offices

Provide a private office for each mediator, to accommodate three additional people. If separate mediation/interview rooms are not provided for larger mediations, private offices shall accommodate up to six people.

- Provide sidelights at office doors.
- Provide acoustical treatment of office walls and doors.
- Provide a duress alarm in each office, because of the potential for physical confrontation.

Reception and Waiting Areas

Provide reception and waiting areas with seating sized for the court's needs.

- Provide a vision panel at the suite entry door.
- In large jurisdictions, provide a reception counter and sign-in area, with a counter position.
- Provide duress alarms in support staff areas and at counters.
- Provide an area for copy and fax machines adjacent to clerical staff and mediators.
- Provide space for FCS files and records adjacent to clerical staff.
- Reception area shall provide sufficient space to accommodate mandatory screening, intake, and differential assessment. Private space should be available to safely consult with vulnerable parties, such as victims of violence.
- If possible, provide separate waiting areas for different parties in mediation. One or two reception and waiting areas will serve several mediation offices. Separate FCS waiting areas should be available for domestic violence victims, so that they do not have to be in the same area as the alleged perpetrators.

Orientation Room

Provide an orientation room with seating for four to six people, for orientation sessions before participation in mediation or other ADR services. This room can serve as multipurpose for additional waiting and conferencing.

In large facilities, provide larger areas, with a television monitor for video orientation at one session, and seating for 20 people.

Mediation Room

Provide a mediation room. In some jurisdictions, a combination of large and small mediation rooms will accommodate large family groups and allow involvement of social workers and other staff. This room can also be used for interview purposes.

- Provide acoustical treatment of office walls and doors, because of the confidential and sometimes vocal exchanges associated with these discussions.
- Provide a duress alarm.
- Provide video cameras to allow remote observation of proceedings.

Conference and Training Room

In jurisdictions with more than eight FCS mediators, provide a conference and training room of 200 NSF, and increase size proportionate to the number of mediators. The room must accommodate reference books and related materials needed by mediators to conduct their business. See Chapter 16 (Lighting Criteria) and Chapter 18 (Audiovisual Systems) for audiovisual requirements.

- One room may be used for mediation, orientation, conference, and training.
- Provide a duress alarm.

Children's Waiting Area

If no other children's waiting area is available or convenient, provide a separate children's waiting area near FCS to be used when children or their parents or guardians are involved in court proceedings. See Figure 7.4 and refer to section 7.D for standards for this area.

Security Station

Security provisions for the FCS area vary based on the size and location of the function. If remote from the court security staff, the FCS area may require a separate security post. If security staff is stationed at FCS, provide a post with workstation and security equipment. If the FCS area is not within the secure perimeter, a separate security screening station may be required.

Equipment Storage

Provide an area near the mediation rooms for storage of equipment and furnishings, such as video monitors, used in mediation.

7.D CHILD WAITING

Standards of Judicial Administration recommended by the Judicial Council require provision of a safe place for children to play while their parents conduct their court business. Provide a child waiting room in all court facilities. These spaces are required under the rules of court at left.

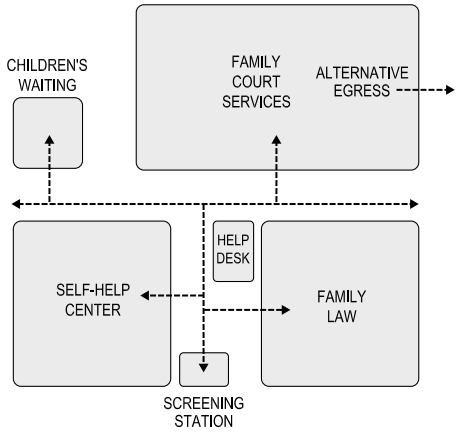


Figure 7.4 Special Services Adjacency Diagram

Each court should endeavor to provide a children's waiting room located in the courthouse for the use of minors under the age of 16 who are present on court premises as participants or who accompany persons who are participants in court proceedings. The waiting room should be supervised and open during normal court hours. If a court does not have sufficient space in the courthouse for a children's waiting room, the court should create the necessary space when court facilities are reorganized or remodeled or when new facilities are constructed.

California Rules of Court Section 1.3

- Provide an area of 120 NSF for two or three children, increasing in area by 15 NSF per child. The waiting area must be located near the security station but in a semiprivate corridor. Space needs will vary with court caseloads. Consider providing separate areas for adolescents.
- Provide a check-in workstation with a duress alarm and a view of entire room, to allow supervision by one staff person; design must facilitate safe check-in and check-out of children. Provide file storage for administrative records, forms, and brochures.
- Do not allow outside visual access or windows; the public shall not be able to look into the room. The children must be in a controlled situation. Access doors shall be locked with a remote buzzer operated from the check-in workstation.
- Provide one or two restrooms, one with a changing table.
- Provide a second door into a secure corridor. Small facilities can use a multipurpose room.
- Provide space for child-sized tables, chairs, couch, and floor games.
- Provide storage space for toys and games.
- Provide space for information racks about community resources for service referrals and community resources (housing, health care, child care, literacy, and education).
- Provide a quiet room with sink, locking cupboards, refrigerator, and microwave.

7.E ALTERNATIVE DISPUTE RESOLUTION

Alternative dispute resolution (ADR) services are an increasingly important part of the judicial process. In the civil case context, ADR includes the traditional civil case settlement process involving a judicial officer, attorneys, and the litigants; mediation, involving a facilitator and the parties, sometimes without attorneys; and arbitration, involving an arbitrator, attorneys, and the litigants.

In family court, ADR commonly takes the form of court-mandated mediation provided by family court services (FCS) involving a mediator, family members including children, and occasionally others, such as social workers. Family court services mediation generally occurs in court facilities.

Civil case mediation and arbitration services may be provided privately and occur outside the court facility. Civil case settlement conferences often take place in a courtroom or conference area. Court-sponsored mediation and arbitration services may increasingly be provided in court facilities.

Provide space for civil case settlement conferences and mediation and arbitration services within the court facility when required by the program. Requirements for these functions may vary considerably depending on anticipated volume of usage. In larger jurisdictions with formal ADR programs, consider multiple rooms of various sizes and capacities. For sizes refer to Table 2.2. If provided, space for these functions may include the following.

Mediation and Arbitration Rooms

Provide one or more conference rooms for mediation, arbitration, and settlement conferences to accommodate a minimum of six participants. Each room must accommodate a mediator, parties, and attorneys. In addition, provide a caucus room. Provide a duress alarm in each room and at the reception counter.

Mediator's Office

Provide area for a workstation, file storage, and a small conference table or seating area. Positioning of the elements is per mediators' collective preference for security and comfort.

Mediation and Arbitration Coordinator's Office

Provide area for a workstation for the individual responsible for scheduling and coordinating attorneys and clients.

Reception and Waiting

Provide an area with seating for six to eight people, where attorneys and litigants can be seated while waiting for a mediation room. This area can serve one to four mediation rooms and may be increased in size according to the number of additional mediation rooms required.

7.F MULTIPURPOSE ROOMS AND OFFICES

Provide multipurpose rooms, to be assigned by the trial court to related justice agencies or others. The character and quantity of rooms shall be determined during programming. Locate rooms adjacent to the public corridor, potentially with controlled access to the private circulation system; provide keypad locking so the superior court can reassign the use easily. Provide telecommunications infrastructure separate from the trial court's LAN. Representative uses of multipurpose rooms include:

- Related justice agency drop-in offices: rooms suitable for installation of modular workstations, for staff use while at the courthouse. Staff may use the rooms to prepare and read court papers, make telephone calls, and conduct other court-related activities.
- On-site drug testing suite: a toilet room used for drug testing adjacent to the courtroom with an anteroom for supplies and sample storage.
- Attorney convenience center: a work and waiting area, with power and data communications for laptop connections, similar to drop-in offices for related justice agencies
- Multiagency and volunteers convenience center: workstations for volunteers. In larger counties with comprehensive or centralized volunteer programs, provide a coordinator's office. May be located on a semiprivate corridor. Volunteers may also be located within specific court departments.
- Law enforcement and waiting: Law enforcement waiting areas must be located off public corridors near courtrooms. Access to the law enforcement waiting area must be secure. Provide lounge seating and a table.
- Victim waiting: Victim waiting areas must be located off public corridors near courtrooms. Provide chairs and a table. This room may be used for remote testimony to the courtroom. Provide power, lighting, and configuration to allow audiovisual equipment to obtain proper images for victim to testify remotely.
- Court interpreters convenience center: Interpreter waiting areas must be located off public corridors near courtrooms. Provide bullpen with lockers, carrels, tables, manager's office, shared phones, secure storage, and a TTY machine.
- Blood draw/DNA swab room at family court: Provide a chair and locked cabinet.
- Fingerprinting: Provide a pass-through to the family law clerk's area. Provide a desk and a camera area to take headshot photos. Locate adjacent to criminal court, with a secured door.
- Government attorneys: Local child support agencies often meet with litigants before and during child support calendars to try to reach stipulations. Given the high volume of these calendars, a large conference room should be provided with computers and printers available to calculate child support and print out agreements.

- Paralegal: A drop-in center to assist families with child support issues requires room for a desk, file storage and three or four guest chairs.
- Resource room for social services: Locate near courtrooms so that litigants who are referred to social services can get immediate assistance for problems such as substance abuse.

7.G OFFICES FOR RELATED JUSTICE AGENCIES

Certain trial court buildings may include office suites for related justice agencies to improve access to justice, trial court efficiency, and public service. Such office suites may accommodate multiple administrative and professional staff as well as public services. They are in general differentiated from the trial court to reinforce the independence of the judicial branch, and shall use the public circulation system and the main public building entrance, not the private circulation system.

The telecommunications and infrastructure shall be separate from that of the trial court. These spaces should be designed with flexibility for possible re-assignment to other agency or court use.

The amount of public visitation to a related justice agency shall be considered in determining the location of the suites in the building and in the elevator service calculations.

These Facilities Standards shall not apply to the interior development of the related justice agency offices. However, the chapters on Architectural, Structural, Mechanical, Automatic Control Systems, Electrical, and Fire Protection Criteria shall apply to the basic building infrastructure and services for these suites.

8 IN-CUSTODY DEFENDANT RECEIVING, HOLDING AND TRANSPORT

California Court of Appeal
Santa Ana, CA
Carrier Johnson + Culture

COSTEA PHOTOGRAPHY

Important Terms

Circulation: Public, Private, Detention

Control Rooms: For more information, see Security Operations Center section in Chapter 4: Courthouse Security and Detention Control Room section in Chapter 8: In-custody Defendant Receiving, Holding and Transport.

Detention and holding are used interchangeably in this chapter.

Chapter 8 is a stand-alone chapter addressing the requirements for all in-custody areas. It is organized as follows:

8.A: Objectives

8.B: Planning Criteria

8.C: Functional Overview Describes relationships between in-custody transport and holding areas and other courthouse functions.

8.D: Program Components Defines the functional scope, operational considerations, access, adjacency, and design considerations for specific program components.

8.E: Technical Criteria Establishes minimal acceptable performance criteria for finishes, fixtures, and equipment.

8.F: Electronic Detection Control System Establishes minimal acceptable performance criteria for the integrated security electronic systems.

The United States Constitution makes the provision for defendants involved in criminal proceedings to confront the witnesses against him/her. Therefore, trial courthouses must include accommodations for those defendants in custody. Criminal courts must have secure facilities to receive, hold, and transport in-custody defendants to and from the courtroom. In small court facilities, this may amount to a few holding cells and a secure corridor to the courtrooms. In larger criminal court facilities, this may consist of a large receiving and detention facility. Similarly, family and juvenile court facilities must maintain safe and secure movement of in-custody defendants.

8.A OBJECTIVES

The objective is to provide a safe and secure environment for the transport and accommodation of in-custody defendants while in the courthouse as well as to maintain the safety and welfare of the judiciary, staff, and public visitors in the building, and to prevent the infiltration of contraband.

The local sheriff, under contract with the superior court, manages all in-custody holding and transport areas and operates the security electronic systems relating to the in-custody holding, detention, transport, and detention circulation areas within the courthouse. Superior courts are responsible for funding the sheriff's staff to supervise courthouse holding areas. Therefore, every design solution must optimize operational and staffing efficiencies. While these standards establish criteria for the in-custody holding area, during the design process the sheriff must also provide an "Operational Program Statement" as required by the California Corrections Standards Authority. The design and the Operational Program Statement are developed together and influence one another.

8.B PLANNING CRITERIA

From a physical security standpoint, several basic rules of thumb apply to the design of secure holding and circulation areas:

- Maximize the direct line of sight allowing sheriff personnel to supervise inmates and to minimize reliance on video surveillance cameras.
- Minimize protrusions into detention circulation areas and corridors that create blind spots.
- Organize functional components to avoid circulation "eddies." The in-custody holding areas are process driven. Designs must achieve a logical flow for managing the process, movement, and separation of in-custody defendants.

Local sheriffs will have protocols, or a classification system, for how they manage the separation of individuals in custody. Classification determines if it is appropriate to accommodate an individual in a group holding cell or if a single holding cell is required for the safety of the inmate and those around the inmate. The separation or isolation of an inmate can be due to a number of factors, such as the inmate being a danger to others or requiring protection from others. In addition, separate holding areas are required for maintaining the separation of males and females in custody.

There are circumstances in which juveniles are in custody and must be present at court proceedings. Provisions must be made in the design of holding areas to maintain "sight and sound separation" between in-custody juveniles and in-custody adults. In-custody juveniles should not come into contact with in-custody adults as they enter, are held in, and circulate to and from the courtrooms during the course of normal operations. Together, the building plans and operational program must demonstrate a good faith effort to maintain the required separation through the course of foreseeable circumstances.

A number of design features are inherent with accomplishing proper sound and sight separation:

- Central holding must have separate areas for juveniles and adults. It is not enough to have separate cells accessed from the same corridor.
- There should be separate access to adult and juvenile holding areas from the vehicular sallyport. A single, centrally controlled pedestrian sallyport does not violate this principle, but it is not acceptable to circulate juveniles or adults through one another's holding areas to reach their own.
- Detention control coordinates use of in-custody elevators and shared detention corridors such that either group can be reliably cleared prior to use by the other.

Refer to Appendix for background and additional information related to this separation requirement.

For security and durability reasons, materials in the holding areas result in "hard" surfaces. Special care must be taken to manage the acoustics. Minimizing reverberation within in-custody holding and transport areas is essential in reducing stress among in-custodies and staff. The design solution must prevent the transmission of sound from a central holding area into any adjacent departmental areas. Most critical is to prevent the transmission of sound between courtroom holding areas and the courtroom. Acoustical requirements are defined in Chapter 19 (Acoustical Criteria).

The information contained in the following chapter is intended to provide each architectural/engineering team a perspective on how the in-custody receiving, holding, and transport functions integrate into the overall courthouse; a general understanding of the program components that pertain to these areas; and performance criteria for finishes, equipment, and security systems.

These standards are intended to supplement the requirements addressed in the Corrections Standards Authority, Title 15 and 24. The design of all in-custody areas must adhere to requirements prescribed in Title 15 and 24.

8.C FUNCTIONAL OVERVIEW

The business of the courts includes motions, hearings, and trials involving in-custody defendants (in-custodies). Courthouses do not include provisions for booking in-custody defendants, since this procedure typically occurs at a different detention facility prior to transporting the defendant to the courthouse. As such, courthouses must provide safe and secure accommodations for receiving individuals coming from secure detention facilities; for holding them before their courtroom appearances; and for moving them to and from the courtroom itself. Courthouse detention facilities do not house in-custodies overnight, since in-custodies are only present in the courthouse during the normal hours of operation for the court. Space allocations for detention functions within the building include holding cells, both centrally located and on the courtroom floors, and a system of dedicated elevators and/or corridors contained within the secure perimeter of the in-custody holding and transport areas. Standards require that all court facilities provide a secure pathway for in-custody movement from the transport vehicle, through pedestrian sallyports, to holding areas and the courtroom—using dedicated circulation to avoid cross circulation with judges, staff, and the public.

All transport vehicles delivering in-custodies access the courthouse proper through a secure vehicle sallyport. Individuals are escorted from the vehicle sallyport into the facility through a pedestrian sallyport pedestrian sallyport. Where in-custodies are escorted on foot (e.g., from a colocated detention facility), the entrance includes a pedestrian sallyport that provides direct, controlled access to the secure circulation on the courthouse side.

Important Term

Sallyport: A secured, controlled entryway.

Important Design Elements

The secure perimeter is a physical barrier which prevents the unauthorized and uncontrolled movement of persons, contraband, and weapons into/out of in-custody areas.

In-custodies proceed to the central holding area (directly from the pedestrian sallyport or through secure circulation), where paper check, pat search, and/or staging may occur before being placed in the holding cell. Both individual and group holding cells are provided to allow for containment of various in-custody populations and for efficient grouping and movement to the designated holding cells located on the courtroom floors. The area must be configured to provide for required sight and sound separations of cells and related circulation paths.

The number, size, and configuration of holding cells will vary based on the type of courthouse and/or the scale. For example, small facilities (one to four courtrooms) may not need both central holding and courtroom holding cells, as volume and physical proximity may be such that in-custodies can be moved directly from reception into courtroom holding cells. Large, multistory facilities, however, need a designated central holding area to manage the influx of what could be hundreds of in-custodies daily, and to manage the movement of them from central holding to the courtroom holding cells distributed on the courtroom floors.

When court call approaches, in-custodies move from the central holding area to the courtroom holding cells located immediately adjacent to the courtrooms. Movement is via a secure, dedicated elevator and/or corridor, and may or may not be escorted.

Larger facilities may have courtrooms that are dedicated to special dockets, such as arraignment, felony disposition, drug court, hearings, and family and civil court cases. In smaller courthouses, a single courtroom may be used for arraignment for part of the day and for trials or hearings the rest of the day. While different courtroom types may present different courtroom holding needs, courtroom holding should be provided between each pair of courtrooms in a shared "core." The core space includes individual holding cells, noncontact interview booths, sound lock vestibules into each courtroom, and the dedicated secure elevator stop, if applicable.

If adjacent courtroom holding is not provided for courtrooms initially designated for civil cases (which typically do not require courtroom holding), the space must be configured (horizontally and vertically) so that holding could be added between a pair of these courtrooms if the designation changes.

For courts that have high-volume in-custody access and have rapid case turnover, such as arraignment court, consideration should be given to larger holding areas adjacent to the courtroom, or locating the courtroom adjacent to central holding, thereby eliminating the intermediate step of dedicated courtroom holding altogether. Where this is not possible, locate these courtrooms as close as possible to the central holding area (i.e., in larger courthouses, locate arraignment courts on lower floors closer to basement-level central holding) to minimize the transport time and travel distance for the large numbers of in-custody defendants.

At the conclusion of the courtroom proceeding, in-custodies are returned to the central holding area to await transport back to the detention center. Based on local preference and demand, remand cells may be designated for individuals who came to court on the public side, but have been remanded to jail as a result of the hearing.

8.D PROGRAM COMPONENTS

Secure Perimeter

The secure perimeter is a physical barrier between in-custody holding and transport areas and the building exterior and/or other nondetention departmental areas within the courthouse. The secure perimeter prevents the unauthorized and uncontrolled movement of persons, contraband, and weapons into/out of in-custody areas. An access control point (sallyport) facilitates the movement of authorized persons between the secure and

nonsecure sides of the secure perimeter barrier. The secure perimeter barrier comprises maximum security construction for partitions (full-height, slab-to-slab), windows, doors, and floors; man-bars at any vertical and/or horizontal penetrations 8" or larger in any direction; and sallyports at all access points.

Vehicle Sallyport

Vehicular access to the courthouse proper is via an enclosed vehicle sallyport vehicle sallyport. While a "drive-through" vehicle sallyport is preferred, not all sites and building configurations will be able to accommodate one. The optimal configuration must be determined on a project-by-project basis. In any case, the vehicle sallyport must be of secure construction and must minimize views into and out of the vehicle sallyport area. The vehicle sallyport should be designed with careful consideration of traffic flow and vehicle turning radii; backing maneuvers and three-point turns for large custody vehicles are to be avoided.

Provide a secure access gate at the entry point and a second egress gate. A personnel gate is also to be provided. The vehicle sallyport gates are interlocking and are electronically monitored and controlled at the detention control room. The primary means of communication/coordination between an arriving in-custody transport vehicle and the detention control room is via radio. However, provide an audio call station/pedestal for outside agency use. Include video monitoring at access and egress points. Access and egress gates/doors shall be detention grade and must be sized (width and height) to accommodate the largest transport vehicle expected (car, van, or bus).

The vehicle sallyport must provide adequate space for the temporary parking of transport vehicles for the loading and unloading of in-custodies. The number and type of transport vehicles to be accommodated in the vehicle sallyport will vary by project. For example, courthouses that are adjoined to the primary detention facility by tunnel or secured walkway would have considerably less vehicular transport and may require no more than a few parking spaces for sedans. In a major criminal court facility located remotely from the jail, the vehicle sallyport may require parking for several large-capacity vehicles, vans, and cars.

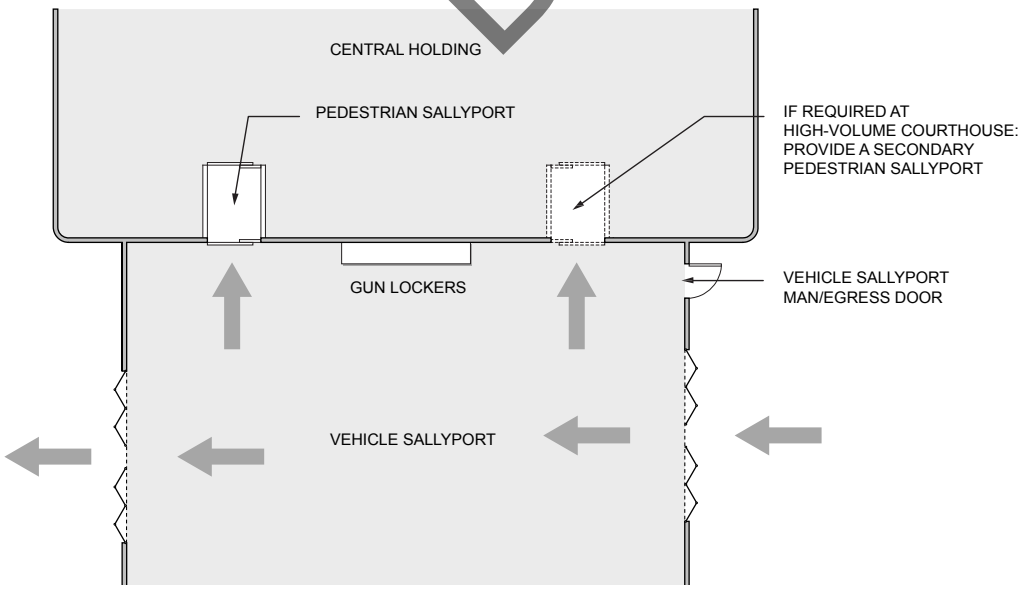


Figure 8.1 Vehicle Sallyport

The functions of the detention control room and security operations center may be combined in small court facilities, but this is dependent on the Operational Program Statement provided by the local sheriff's department responsible for the security of both the holding areas and the overall courthouse.

When the functions of the detention control room and security operations center are combined, coordinate the detention control room requirements with the security operations center requirements prescribed in Chapter 4: Courthouse Security.

Provide a wall-mounted gun locker in the vehicle sallyport for securing transport staff weapons outside the secure perimeter. Such weapons lockers shall be equipped with individual compartments, each with an individual locker device.

Sight and sound separation of adult and juvenile in-custodies must be maintained at the point of reception in the vehicle sallyport and into the building via the secure pedestrian sallyport. Depending on the size courthouse and anticipated in-custody volume, more than one pedestrian sallyport may be required to accomplish this.

Pedestrian Sallyport

In-custodies are off-loaded from the transport vehicle in the vehicle sallyport vehicle sallyport and are escorted into the secure area of the courthouse via a pedestrian sallyport pedestrian sallyport. The capacity of the pedestrian sallyport should be determined based on the expected volume of in-custodies to be processed at one time, with a minimum width of 8'.

A pedestrian sallyport is also required at all points of entry or egress into/out of the secure perimeter of the in-custody holding and transport areas. The pedestrian sallyport provides control of movement to and from adjoining areas, and prevents infiltration to these areas by unauthorized persons, or escape of in-custodies. The doors at each end of the pedestrian sallyport are interlocked, meaning that one door must be in the locked position before the other can be opened. Pedestrian sallyport doors are monitored and controlled by the detention control room staff. Provide a voice and video connection. Provide glazing to facilitate visual observation of the pedestrian sallyport entry and within by the detention control room officer. Pedestrian sallyports must meet secure perimeter construction requirements.

Detention Control Room

The detention control room is responsible for all circulation in/out the secure perimeter of the secure transport and holding areas; detention circulation corridors for moving in-custodies to/from courtroom holding areas; and elevators dedicated to in-custody movement. Detention control will control and monitor doors and locking devices; video surveillance systems; duress alarm system; intercom and paging systems; lighting; and other functions dedicated to all in-custody secure holding and transport areas throughout the courthouse. Detention control has monitoring capabilities for doors within the in-custody holding and transport areas that are equipped with card access devices.

The system's main point of control shall be located at the detention control. In larger courthouse facilities, the secure holding areas will have a dedicated control room (detention control) located within central holding. In courthouses with a segregated holding area for juveniles, a separate control station may be required for the juvenile section, since juveniles are typically monitored and handled by probation officers, different personnel from the sheriff's department personnel who control the adult in-custody populations. This may be a desk with a control panel in the control room for probation officers to operate doors remotely within the juvenile area.

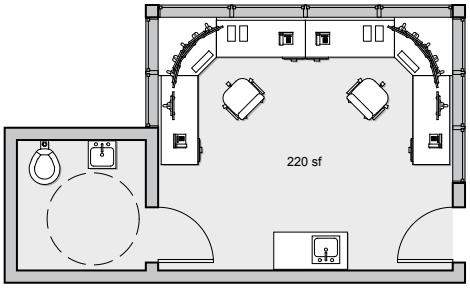


Figure 8.2 Detention Control Room

In some cases, the local sheriff and probation departments may request that probation officers have a completely separate control room for the juvenile area.

A separate security operations center for managing overall courthouse building security will be located elsewhere in the building, typically adjacent to the primary screening area in the main building lobby. Refer to Chapter 4 (Courthouse Security).

Smaller courthouses may not warrant two separate control rooms. The goal of achieving staffing and operational efficiencies should be kept in mind. The functions of the detention control room and security operations center may be combined in small courthouses, but this is dependent on the Operational Program Statement provided by the local sheriff's department responsible for the security of both the holding areas and the overall courthouse. In the event of a single central control room that services the entire courthouse, the control room shall be located outside the secure perimeter of the in-custody holding areas.

Whether the detention control room is within the in-custody holding area secure perimeter or elsewhere in the courthouse, the detention control room shall be constructed with security-grade partitions extending to the underside of the structure above. Access to the detention control room will be limited and controlled by the detention control room itself. The detention control room should be inaccessible to the in-custodies at all times. The detention control room should be equipped with a pantry station and a toilet room, and must be accessible to persons with disabilities

When located within central holding, the control workstation within the detention control room shall be located so that the detention control officer has direct line of sight into holding areas and the main circulation areas within central holding. The line of sight must work from a seated position.

The detention control room environment must reduce stress and fatigue, as well as enhance the staff member's efficiency. Sound-absorbing material must be used to reduce sound reverberation and harshness of noise inside the room. Lighting design must reduce glare and reflection with provision of a dimmer switch to control the lighting levels.

The detention control room will be equipped with workstations that accommodate all equipment associated with monitor, control, and surveillance functions. The number of control workstations will be determined on a project-by-project basis. Control workstations should be flexible to accommodate the integration of future technologies and shall integrate wires and cabling within an enclosed, accessible housing. The use of modular or systems furniture is preferred. An ergonomic layout is very important. Monitors for video, productivity applications, and detention control should be uniform in size and mounted on articulating arms.

Only electronic devices related to the user interface layout are accommodated at control workstations. The PLC equipment, servers, and supporting equipment must be located in a nearby technology closet or MDF or IDF room; access to the technology closets shall be located outside the in-custody secure perimeter. An equipment room dedicated to housing the electronic detection control systems is not required.

Central Holding

In-custodies are detained in a secure central holding area pending transport to the courtroom floor. Some staging may occur before placement in a holding cell, including a paperwork check and/or pat search. Provide a counter for completing paperwork and benches for in-custody defendants awaiting processing.

Both individual and group holding cells are provided in this area, allowing for separation of juveniles and by gender. Several factors

Footnote

[1] 40 sq. ft. for a single occupant; add 10 sq. ft.for each additional occupant.

[2] See *Separation Between In-Custody Juveniles and In-Custody Adults in Courthouses* by Greg Allen Barker, Jay Farbstein & Associates listed in Appendix

A sallyport is required at any penetration allowing access in/out the secure perimeter and shall be controlled by detention control.

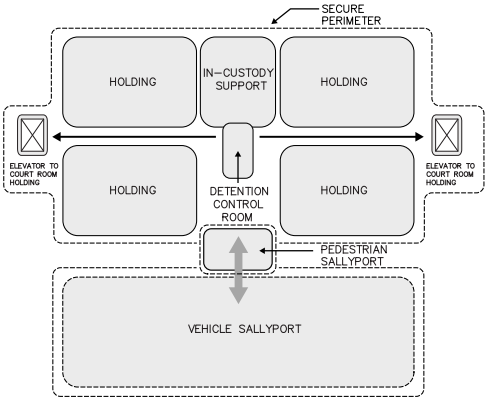


Figure 8.3 Central Holding

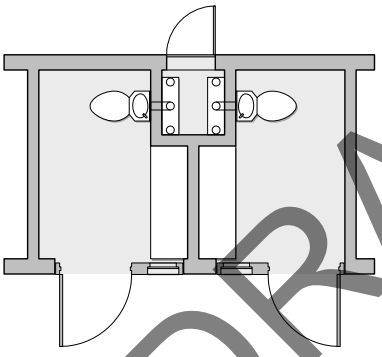


Figure 8.4 Single Holding Cells

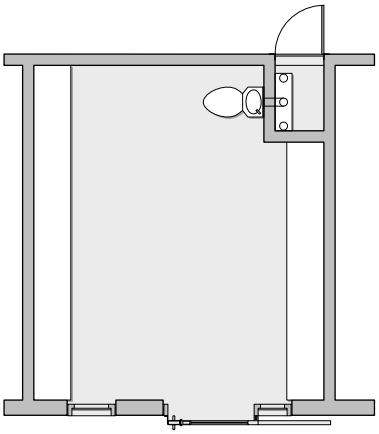


Figure 8.5 Group Holding Cell

influence the number of central holding cells required. Where the courthouse is connected to a jail, for example, in-custodies can be escorted to the court more frequently and in smaller groups. The number of vehicular court transports—morning and afternoon runs vs. once a day—can also reduce the amount of central holding space required, which is some of the most costly construction in the building.

Central holding is operational during daytime hours only; there is no overnight use of the holding cells. Still, all cells must comply with the requirements of CCR Title 24 and Title 15 for temporary holding facilities:

- Contain a minimum of 10 sq. ft. of floor area per inmate.
- Be limited to no more than 16 inmates.
- Be no smaller than 40 sq. ft.[1]
- Have a clear ceiling height of 8' or more.
- Contain seating to accommodate all inmates.
- Contain a toilet, a wash basin, and a drinking fountain.
- Be equipped with an audio monitoring system.

Cells must be of secure construction. Fixtures and furnishings should be antiligature (suicide resistant). Accessible holding cells must be available in the central holding area. Provide a minimum of one for each area of separation: male, female, and juvenile.

Access to the central holding area is controlled by detention control room staff. Cell doors are controlled remotely by detention control room staff, with manual (key) fail override. If swinging doors are used instead of sliders, they must swing out to prevent the occupant's ability to barricade the door. Cells should be positioned to avoid blind spots and provide optimal sightlines for staff working in the area. Provide glazed cell fronts to maximize visibility. Toilets should be positioned in

cells to allow for surveillance by staff while still providing modesty for the occupants. California Correction Standards Authority requirements allow a direct sightline of the side view of toilets from the corridor door, but toilets with a frontal view sightline from the door must be provided with a partial-height privacy screen. Supervision shall be supplemented by video surveillance in the cell area. Cameras should be positioned so as to allow for privacy of the toilet component.

Sight and sound separation between adults and juveniles in central holding requires separate areas[2]. It is not enough to have separate cells accessed from the same corridor. It should also be noted that juvenile probation staff are, generally, responsible for the supervision of in-custody juveniles in central holding; some space for probation staff may be required in this area.

Secure Circulation and Elevators

All in-custody holding and circulation must be separated from public and private circulation paths and spaces. The areas associated with in-custody holding and circulation are contained within the secure perimeter. A sallyport is required at any penetration allowing access in/out the secure perimeter and shall be controlled by detention control.

In courthouses with multiple court sets per floor that are multistory and/or where central holding is not colocated on a courts floor, a dedicated detention circulation path is required to transport in-custodies from the central holding area to in-custody elevator(s) serving the courtroom holding areas (refer to Chapter 2: Courthouse Organization). Detention corridors shall be a minimum of 8'-0" wide and shall minimize turns to facilitate direct line of sight and avoid blind spots created by protrusions. All secure circulation corridors shall be built to detention-grade standards.

The detention control room monitors and controls access and movement of in-custody elevators. In-custody elevators must include video and intercom capabilities and be able to accommodate a gurney; the baseline standard shall be 4,000-pound capacity cab with a minimum clear inside dimension of 5'-8" x 7'-1". (Alternate capacity cabs and cab dimensions may be appropriate for certain courthouses, but this is dependent on the size of the courthouse, the number of holding cores, and the Operational Program Statement for the specific courthouse.)

Attorney/Client Interview Rooms

Attorney/client interview rooms provide the opportunity for counsel to consult privately with their in-custody clients. A "noncontact" visitation arrangement is required to prevent the exchange of contraband. Attorneys do not enter the secure perimeter of the in-custody holding areas.

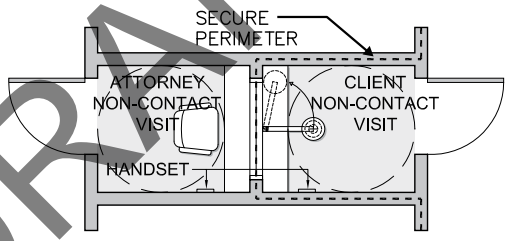


Figure 8.6 Attorney/Client Non-Contact Interview

FRANK OOMS PHOTOGRAPHY/OOMS INC.

Figure 8.7 Attorney/Client Non-Contact Interview

The door leading to the courtroom from courtroom holding shall be designed to match the courtroom decorum and is operated by the bailiff.

Where possible, cell plumbing fixtures shall not be located adjacent to courtroom partitions. The cell toilet fixture shall have secure plumbing readily serviceable by technician from outside the cell.

Footnote

[3] 40 sq. ft. for a single occupant; add 10 sq. ft. for each additional occupant.

In-custodies enter the interview room from the secure side (within-secure perimeter), and attorneys enter from the public circulation or a courtroom. Both entries shall be separated and enclosed from adjacent spaces to promote confidentiality. The entry on the in-custody side shall have glazing to facilitate visual observation by the courtroom holding officer. The wall between the in-custody and the attorney must meet secure perimeter construction requirements. The two parties view each other via a glazed opening. A handset or approved communication device allows the two parties to communicate. Fixed writing surfaces shall be provided for both parties.

Noncontact attorney interview rooms should be sized for wheelchair movement on both the attorney and in-custody sides, and have a movable seat or stool and adaptable communication devices. In-custodies may not be expected to open and close doors themselves in holding areas that are manned or have remotely controlled operators. In this case, door approach, handles, and force requirements may be able to be waived.

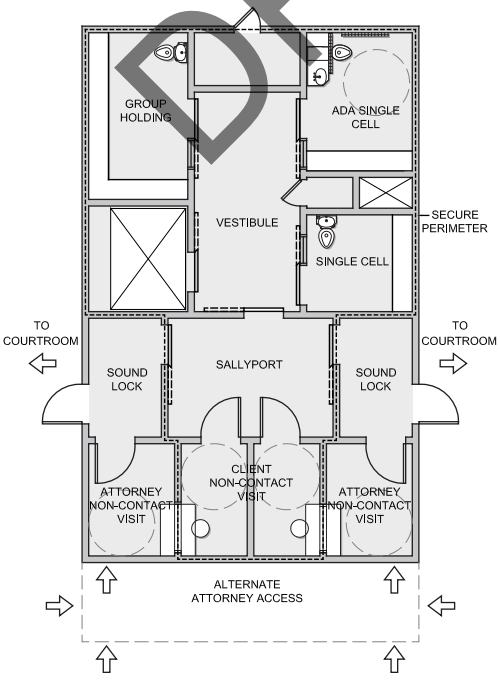


Figure 8.8 Courtroom Holding

Spaces should be treated to manage reverberation of sound within, as well as the transmission of sound to adjacent spaces, as conversations held in these rooms are confidential.

Attorney/client interview rooms are adjacent to courtroom holding areas. In-custody access is from the courtroom holding circulation area. Attorney access is from the public circulation or from the courtroom itself. Determining the location of attorney entrances is based on local court preferences and security staff efficiencies.

In some instances, typically associated with larger courthouses, local users might request attorney/client interview rooms at the central holding area. This scenario necessitates provisions for public circulation (corridor and/or elevators) to extend to the central holding where attorneys would access attorney/client interview rooms from public circulation. The detention control room shall have direct line of sight to attorney/client interview rooms located within the central holding area.

Courtroom Holding

Each courtroom shall have direct access to a courtroom holding core that includes a soundlock vestibule, in-custody holding cells, and an attorney/client interview room. Courtrooms shall be paired, sharing a courtroom holding core.

A soundlock vestibule acts as sound buffer between the courtroom and the holding area and screens views from the courtroom into the holding area. In addition, the soundlock serves as a sallyport for managing controlled movement between the two areas. The door leading to the courtroom from courtroom holding shall be designed to match the courtroom decorum and is operated by the bailiff. As such, it does not typically require

detention-grade hardware. The inner door leading to the holding area is detention grade and is operated by in-custody from the detention control room.

The courtroom holding cells shall:

- Contain a minimum of 10 sq. ft. of floor area per inmate.
- Be limited to no more than 16 inmates.
- Be no smaller than 40 sq. ft.[3]
- Have a clear ceiling height of 8' or more.
- Contain seating to accommodate all inmates.
- Contain a toilet, a wash basin, and a drinking fountain.
- Be equipped with audio monitoring system.

Cells shall have glazed cell fronts to manage sound from within the cells and to maximize supervision of in-custodies by staff. The detention control room operates cell doors remotely. Cell doors are equipped with a manual key override. All cell doors must swing out (or be sliding) to prevent an in-custody from barricading the door. Provide a minimum of one accessible cell per courtroom holding area. All holding cells have penal-grade plumbing fixtures.

In-custodies access the noncontact attorney/client interview room from within the courtroom holding circulation area.

The design and arrangement of the courtroom holding cells and circulation areas shall facilitate supervision and shall avoid blind spots. Measures shall be taken to manage sound reverberation within the courtroom holding core as well preventing the transmission of sound between the courtroom holding core and the adjacent courtroom. Where possible, cell plumbing fixtures shall not be located adjacent to courtroom partitions.

Secure In-Custody Holding Support Areas

Several program components are essential to the daily operations of the in-custody holding and transport areas. While essential, they are not accessible to in-custody defendants.

Armory: Located within the in-custody secure perimeter, the armory provides for the secure storage of tactical defense equipment. The armory is constructed of security-grade partitions that extend to the underside of the structure above. Access is limited to authorized personnel only. The armory is equipped with monitoring and surveillance devices. Detention control is responsible for monitoring the security of the armory. The need for an armory is dependent on the size of the court facility.

Safety Equipment Storage: A secure area shall be provided for the storage of safety equipment such as fire extinguishers, self-contained breathing apparatus, emergency lights, wire and bar cutters, and emergency lights. Room should lock securely.

Lunch Storage: Provide the ability to store lunches for in-custodies who are scheduled to spend a full day at the courthouse. Requirements and protocol for the types of lunches, the quantity of lunches, and how lunches are brought to the court facility are determined on a case-by-case basis. For the storage of in-custody meals, anticipate providing provisions for refrigerated storage, a sink, and a general dry storage area. The quantity of storage required is dependent on the size of the court facility.

Staff Break Room: Although located within the secure perimeter, the staff break room should be located away from and not be visible to in-custodies in the central holding area. Locating the break room within the secure perimeter eliminates the need for staff to move in and out of the secure perimeter. The break room does not require detention-grade finishes or equipment. It should accommodate storage, vending machines, coffee area, refrigerator, and table and chairs. The size of and need for a staff break room is dependant on the size of the court facility.

Janitor Closet: Courtroom holding areas do not require a janitor closet. In the central holding area, at least one securely lockable janitor closet shall be located within the secure perimeter. The janitor closet shall be equipped with a mop sink and sufficient storage for cleaning implements.

Storage Room: One or more storage rooms shall be provided to accommodate supplies and other materials. Court holding facilities may be excluded from the California Title 24 storage space requirement for personal and institutional clothing, since institutional clothing is issued at a different facility.

8.E TECHNICAL CRITERIA

General Information/Overview

The purpose of the technical criteria section is to provide detailed description and technical design direction for the secure construction of the holding areas, including doors, frames, locks, wall construction, surface material finishes, equipment, and fixtures.

Each secure holding area with multiple rooms whether central or adjacent to the courtroom will require a secure perimeter of grouted and reinforced concrete masonry units constructed to the underside of the structure with a limited number of 8" x 8" or larger penetrations and equipped with security locks and vestibules.

All rooms must have a minimum clear ceiling height of 8'-0" to the underside of surface-mounted light fixtures or other elements. Higher ceilings are preferred when possible to allow the installation of sprinkler heads and smoke detectors farther from the in-custody defendant.

Construction/Finishes

Floor Construction

- The floor construction at all areas within the security perimeter of the central and courtroom holding areas will be concrete. Also, to help prevent flooding of the holding areas, slope the floor to the floor drains. If possible, floor drains should be located outside all inmate cells.

Concrete Floor Finishes

- Sealed concrete floor finish consists of a chemical hardener/sealer finish. This finish is used at noninmate traffic areas and areas that typically see a low volume of foot traffic. These areas include but are not limited to janitor closets, mechanical rooms, and storage rooms.
- Polished concrete floor finish consists of a combination of diamond grinding and polishing using a chemical hardener/sealing agent to get the desired level of concrete finish. This finish is used in inmate circulation areas where a high volume of inmate traffic is expected. These areas include but are not limited to corridors, sallyports, and staging areas.
- Epoxy resinous floor system consists of an elastomeric primer, two intermediate coats of clear mixed liquids with aggregate, and a final clear glazing coat. This finish is used at all inmate cells and inmate/attorney visiting areas. This finish can also be used at corridors, sallyports, and staging areas.

Wall Construction

- 8" inch concrete masonry units grouted solid with 3,000 psi grout, including vertical and horizontal reinforcing to the underside of structure. This wall construction is used at all central, courtroom holding, and detention control room secure perimeter walls.
- 8" or 6" concrete masonry units grouted solid with 3,000 psi grout and vertical reinforcing to a height of 10'-0" above the finished floor and extended to the underside of structure with 3⅝" 20 gauge metal studs at 16" o.c. with secure metal lath and ⅝" high impact-type 'X' gypsum board on both sides of the metal studs. This wall system is used at walls inside the security perimeter that are required to extend to the underside of structure such as rated corridor walls.

- 8" or 6" concrete masonry units grouted solid with vertical reinforcing to a height determined by the design team and generally extended a minimum of 8" above the finished ceiling. This wall system is used at walls inside the security perimeter that are not required to extend to the underside of structure such as nonrated corridor walls. If these walls are part of the secure envelope, they must be tied into the secure ceiling.
- Precast concrete wall panels with a thicknesses based on the level of security can be used for walls both forming and inside the security perimeter.
- Metal wall panel detention system has a typical panel thickness that is 2" with 10 gauge face plates on each side and 10 gauge base, wall, and ceiling channels. Panels are also grouted solid with 3,000 psi grout. This wall system can be used at cell fronts, cell backs, and cell demising walls. Limitations would be height of panels and fire ratings over one hour.

Wall Finishes

- Fiber-reinforced epoxy abrasion-resistant coating system consists of a surface preparation followed by a prime coat, a body coat, and a final coat. This finish system is used in all holding cells and inmate/attorney interview rooms. This finish can also be used in circulation areas.
- Epoxy paint system is a low-odor product consisting of a block filler and two top coats. This finish is used as an 8" high base at all latex enamel painted walls and can be used at all circulation walls.
- Latex enamel paint system is a low-odor product consisting of a block filler and two top coats. This finish is used at all circulation areas and all non-inmate-accessible areas.
- Stainless steel finish is used on all inmate elevator cab walls.

Ceiling Construction

- Secure cement plaster with expanded metal lath consisting of a flat diamond mesh 1/2 number 16 lath on a grid system. This system is painted in the field and is used at areas such as janitor closets and staff toilet rooms.
- Precast concrete with all ceiling joints grouted solid. This system is painted in the field and can be used at all areas except where acoustic ceilings are required.
- Acoustic steel roof/floor deck consists of a cellular deck profile with a ribbed deck welded to an acoustic perforated bottom plate. The deck thickness is typically 1½" or 3" with a lightweight concrete topping slab. Factory-installed sound-absorbing insulation is installed into the cells of the deck. This system comes with a primer and is final painted in the field. This system is used at all holding cell and inmate/attorney visiting areas.
- Acoustic panel deck consisting of a one-piece galvanealed steel plate with 5/32" diameter perforated holes. The deck is typically 14 gauge with a heavy duty steel frame. Anti-Microbial and Sound-Deadening insulation is installed on top of the panels. The system comes with a durable powder coat finish and is used at all circulation areas.
- Acoustic metal ceiling panel detention system is the ceiling system for the metal wall panel detention system. The typical panel thickness is 2" with a perforated acoustic bottom plate and sound-absorbing insulation installed in the panels. The system comes with a primer and is final painted in the field.
- Acoustic ceiling tile either a 2' x 2' or 2' x 4' size on a suspension grid with hanger wires. This system comes with a factory finish and can be used at non-inmate-accessible areas. This system can also be

used in inmate circulation areas where the ceiling height is greater than 10'-0" and hold-down clips are provided.

- 5/8" high impact gypsum board on a suspension grid with hanger wires. This system will be painted in the field and is used in non-inmate-accessible areas such as staff toilets and janitor closets.
- Stainless steel is a factory finish and is used in inmate elevators.
- Exposed construction would have no finish and could be used in a mechanical or electrical-type room.

Detention Doors

Detention Swing Doors
See Table 8.2 for Locations and Type.
Fabricate detention hollow metal doors from 14 gauge galvanealed steel face sheets spot welded to the internal core construction. The top and bottom edges of the door shall be closed with a continuous closing channel. The vertical edges of the door shall be reinforced by a continuous steel channel, not less than 12 gauge, extending the full length of the door. Edge seams shall be continuously welded and finished smooth such that there are no visible seams. All metal doors shall have a flush top and bottom edge channel and shall be welded to the closing channel. Provide cuff passes at the edge of all cell and inmate attorney doors. The door finish is to match the wall finish on that side of the door. All cell doors must swing out of all cells and attorney visiting rooms.

Detention Sliding Doors
See Table 8.2 for Locations and Type.
Provide sliding detention door device assemblies, including locking device, receiver, overhead door hanger, bottom door guide, lock column, and enclosure as a complete assembly. Provide cuff passes at the edge of all cell doors. The door finish is to match the wall finish on that side of the door.

Detention Swing and Sliding Door Types

- Detention hollow metal flush door
- Detention hollow metal flush door with cuff pass
- Detention hollow metal half glass door
- Detention hollow metal half glass door with cuff pass
- Detention hollow metal vision panel door
- Detention hollow metal vision panel door with view shutter

Detention Electric Locks
Swinging Cell Doors, Electrical Operation, Maximum Security

- Frame-mounted 115 VAC, continuous duty solenoid operated.
- Bolt is retracted electrically by icon at the control panel and remains retracted until door is opened.
- Bolt is retracted manually by mogul key on outside and/or inside.
- Internal switches monitor status of bolt to show deadlocked and unlocked conditions.
- Provide galvanized case at exterior installations.
- Provide a key cylinder extension for locks keyed both sides or keyed stop side.

Circulation Swing Doors, Motor Operation, Maximum Security

- Frame-mounted 115 VAC, motor operated.
- Bolt is retracted electrically by icon at the control panel and remains retracted until door is opened.
- Bolt is retracted manually by mogul key on outside and/or inside.
- Internal switches monitor status of bolt to show deadlocked and unlocked conditions.
- Provide a key cylinder extension for locks keyed both sides or keyed stop side.

Detention Mechanical Locks
Detention Access Panels and Cuff Passes—Mechanical Operation

- Door-mounted deadbolt.
- Bolt is retracted manually by paracentric key on outside only.
- Provide door strike.
- Provide with hollow metal lock mounting, escutcheon, and security screws.

Swinging Doors—Mechanical Operation

- Door-mounted, paracentric key deadlocking latchbolt with three hardened steel pins.
- Bolt is retracted manually by paracentric key on outside and/or inside.
- Supply with hollow metal lock mounting, escutcheon, and security screws.
- Provide door strike.
- Provide galvanized case and cylinder shields at exterior installations.

Electromechanical-Locking, Electromechanical-Door-Movement, Sliding Door Device Assemblies
Operated from remote-control panel that activates electric motors to unlock sliding doors and motorized rack-and-pinion drive mechanisms to open and close doors. Doors lock in open position and deadlock when closed. Provide factory-wired cable harness with plug connectors for each motor unit.

Each door can be individually unlocked locally or from a remote panel, or unlocked from a remote panel with other doors as a group. In an emergency or if power fails, each door can be manually operated from a pilaster release adjacent to receiving jamb of each door operated by paracentric key; doors shall not relock in any position.

Electric key switch: Operated by paracentric key and providing electric control of detention sliding door operation at door location, where indicated.

Detention Door Hardware
The hardware listed below are minimum requirements for detention doors with the understanding that additional hardware that is not listed may be required on detention doors.

- Detention hinges shall be cast stainless steel leaves with integral security studs, nonremovable stainless steel pins, stainless steel ball bearings, three knuckle with "HT" hospital tips.
- Concealed door closers shall have full hydraulic, rack and pinion action with high-strength cast iron cylinder.
- Concealed door position switches shall be a mortise installation overhead mounting with switch contacts housed in the door frame and actuating magnet mortised into the top of the door.
- Keeper switches shall be a mortise installation with limit monitoring switch housed in door frame. All manual locks shall utilize keeper switches.
- Push plates shall be 3/16" thick stainless steel 32" wide x 16" high with 7/8" lip projection at bottom. Attach with stainless steel security rivets.
- Pull-loops shall be cast bronze satin chrome plated with a dimension of 8¾" long x 12" clearance.
- Pull-flush shall be cast bronze satin chrome plated with a dimension of 4" wide x 5" high x 1" deep.
- Door stops shall be black silicone rubber 2" diameter, mounted on a 5/8" x 2½" steel shank for permanent attachment in grout-filled masonry or concrete.
- Door cuff passes shall be 16" long x 5" high with 10 series lock and continuous hinge. Cuff passes to be flush with the door face.
- Cylinders, Keys, and Keying: The detention locks will incorporate two separate keying systems: one for lever tumbler (paracentric) and one for pin tumbler

(mogul cylinder) locks. Each keying system's keys shall be dye stamped for identification. For all individual key designations there shall be three keys each provided. For each master key designations, there shall be four keys each provided.

Detention Hollow Metal Frames

Fabricate frames from 12 gauge steel, with mitered corners continuously welded through head inside corner and miter ground smooth. All frames shall be provided with approved jamb anchors, floor knees, plaster boxes, removable angle spreaders, and door silencers by the manufacturer. All frames are to be grouted solid with frame anchors tied to rebar. All glazing stops and fasteners are to be installed on the noninmate side of the frame. The frame finish is to match the wall finish on that side of the frame.

Detention Hollow Metal Frame Types

- Controlled swing/slider door
- Controlled swing/slider door with sidelight
- Noncontrolled door
- Noncontrolled door with sidelight
- Borrowed light frame
- Control room borrowed light frame

Detention Benches

Detention benches are provided at all holding cells and other areas where detention seating may be required. All benches must meet ADA requirements for height and depth.

- The metal bench can be part of the metal wall panel detention system and would be constructed to meet the wall panel requirements. The bench would come primed and would need to be final field painted.
- The concrete top with masonry base will be constructed out of a minimum 4" thick concrete and minimum 6" concrete masonry unit base grouted solid and reinforced. The concrete top will be finished with sealer/hardener, and the masonry base will be finished to match the wall finish surface.

Miscellaneous Detention Equipment

Detention Equipment Types

- Paper pass shall be provided with a built-in bottom made from stainless steel. The size will be 16" long x 10" wide x 2" high x 1½" deep. The finish is a factory finish.
- Pistol lockers shall be made up of a six compartment lockers with 3⁄16" shell and doors. Compartments are lined with 1⁄8" felt with swing-out compartment doors on continuous hinges. Provide each compartment with snap locks, each compartment individually keyed and masterkeyed. The unit comes primed and will require a final field painting.
- Gun locker shall be provided in the armory and shall be capable of holding a minimum of six rifle-type weapons with a 3⁄16" shell and doors. Compartment has felt lining and a secure door that is keyed. The unit either comes primed or with a factory finish.
- Detention Access Panels
  - Fire-rated detention access panels to be rated for 90 minutes. The frame shall be constructed out of 16 gauge cold-rolled steel with 1" wide surface-mounted trim. The door shall be constructed out of 14 gauge cold-rolled steel with 2" of fire-retardant insulation enclosed in sheet metal. Provide a continuous piano hinge and an automatic self-latching door closure. The panels come primed and will require a final field painting.
  - Nonrated detention access panels to have a 3" x 2" x 3⁄16" steel angle frame with 1" x 1" x 1⁄8 " angle stops on three sides. Door construction to be 3⁄16" steel with 1¼" flange on all four sides. Equip each panel with two hinges. The panels come primed and will require a final field painting.

- Provide safety chain on swing-down ceiling-type detention access panels.
- Avoid locating detention access panels in holding cells or other areas where inmates may be left alone.

Security Glazing

Security Glazing Locations

- Detention doors
- Detention glazed frame
- Control room
- Inmate/attorney interview
- Court dock area

Security Glazing Types

See Table 8.2 for Locations and Type.

Glass-clad polycarbonate glazing manufactured to comply with the following requirements:

- Consisting of a layer of strengthened glass; a polycarbonate core; and a layer of strengthened glass.
- Bullet resistance: H.P. White – TP – 500 – Level A, Weapon 38 Special (three shots).
- Forced-entry resistance: H.P. White – TP – 500 – Level II and ASTM F1915 Grade 2.
- Provide tinting film at control rooms.

Laminated polycarbonate glazing manufactured to comply with the following requirements:

- Consisting of a layer of polycarbonate mar-resistant outer layer; a polycarbonate core; and a layer of polycarbonate mar-resistant outer layer.
- Bullet resistance: H.P. White – TP – 500 Level A, Weapon 38 Special (three shots).
- Forced-entry resistance: H.P. White – TP – 500 Level I and ASTM F1915 Grade 2.

Light Fixtures

Security Light Fixture Types

- Maximum security type can be either recessed or surface mounted with a 12 gauge one-piece seamless doorless unit and a prismatic polycarbonate lens. Recessed fixtures must maintain the continuity of the security ceiling and not be removable. The light fixture comes with a factory finish. These light fixtures will be located at all cells, all attorney interview rooms, and court dock area.
- Medium security type can be either recessed or surface mounted with a 14 gauge one-piece seamless doorless unit and a prismatic lens. Recessed fixtures must maintain the continuity of the security ceiling and not be removable. The light fixture comes with a factory finish. These light fixtures will be located at all inmate circulation areas and other areas where inmates have access.
- Architectural-grade fixtures can be recessed or surface mounted and come with a factory finish. These light fixtures can be used in areas where inmates have no access such as administration areas.

Plumbing Fixtures

Security Plumbing Fixture Types

- A standard rear-wall-mounted chase accessible unit shall be installed at all inmate areas where an accessible unit is not required. The unit will be constructed out of 14 gauge, type 304 stainless steel cabinet and toilet bowl. Include a toilet paper holder, an antiflood device, and a penal hemispherical bubbler. The unit comes with a factory finish. The cell toilet fixture shall have secure plumbing chase inaccessible to in-custodies but readily serviceable by technician from outside the cell.
- An accessible rear-wall-mounted chase accessible unit shall be installed at all inmate areas where an accessible unit is required. The unit will be constructed out of 14 gauge, type 304 stainless steel cabinet and toilet bowl. Include a toilet paper holder, an antiflood device, a penal

hemispherical bubbler, and a grab bar assembly. The unit comes with a factory finish. The cell toilet fixture shall have secure plumbing chase inaccessible to in-custodies but readily serviceable by technician from outside the cell.

- Architectural-grade plumbing fixtures such as toilets and lavatories can be used in all areas where inmates have no access such as administration areas. These fixtures come with a factory finish.
- Provide floor drains in all holding areas per the plumbing with detention drain covers and fasteners. If possible, do not locate floor drains in inmate cells.

Sprinkler Heads

Security Sprinkler Head Types

- Provide a horizontal sidewall sprinkler head or a pendent sprinkler head in all inmate-accessible areas. The heads will be quick response spray sprinklers and will be tamper resistant in nature. The sprinkler heads come with a factory finish.
- Provide non-detention-type sprinkler heads in all areas where inmates have no access such as administration areas.

Mechanical Grilles

Security Mechanical Grille Types

- Wall- and ceiling-mounted grilles in all inmate-accessible areas. Provide a risk-resistant grille with a nonvision core consisting of a 3⁄16" face plate with louvers, vertical mullions, sleeve, and four-sided mounting frame. The grilles come with a factory finish.
- Provide non-detention-type grilles in all areas where inmates have no access such as administration areas.
- Provide detention duct bars at all openings larger than 8" x 8". Duct bars to be tool-resistant 7⁄8" diameter steel bars spaced so that no opening is bigger than 5" in diameter.

Security Sealants

Security Sealant Types

See Table 8.1.

Security joint sealant shall be a two-component, premium-grade, polyurethane-based, elastomeric sealant.

Security epoxy resin gap filler (low-mod gel) shall be a two-component, 100 percent solids, moisture-tolerant, low-modulus, nonsag, paste-consistency epoxy resin binder.

Tamper-Proof Metal Fasteners

- Torx-head (star design with center pin) security fasteners. Finish shall match that specified of the item anchored. Fabricate removable tamper-proof fasteners to allow removal only by tools produced by fastener manufacturer or other licensed fabricator specifically for individual tamper-proof fastener design. Limit size and shape variations such that no more than six different tools are required for each type of tamper-proof fastener used on project.
- Provide at all central and court holding areas where inmates have access.

Detention Toilet Accessories

- Grab bars with underslung plate to prevent suicides
- Recessed toilet paper holder if not part of toilet fixture
- Detention mirror with embedded mounting plate
  - Mirror frame dimension shall be 12½ " x 16½ ", fabricated from 16 gauge mild steel. 5⁄16" x 1" mirror frame to be chrome plated. Mirror opening shall be 10½ " x 14½ ", and mirror shall be made of 20 gauge stainless steel polished for high reflectivity. Embedded mounting plate to be constructed of 1⁄4" plate steel with two 11 gauge x 3" wide bent steel

anchors with minimum 1" bend. Embed plate shall be drilled and tapped for security fasteners. For accessible mirrors, use either two mirrors or one longer mirror for both applications.

Detention Door Signage

- Provide low/no VOC paint, exterior alkyd gloss enamel on interior/exterior ferrous surfaces.
- Provide 6" high numbers on the face of all controlled and monitored doors within the central and court secure perimeters.
- Provide 6" high numbers on both sides of the face of all doors that are in circulation areas within the central and court secure perimeters.

8.F ELECTRONIC DETENTION CONTROL SYSTEM

Overview

The electronic detention control system (DCS) consists of integrated electronic subsystems that provide holding area monitoring and control from a detention control room (DCR) and from alternate locations where designated in larger facilities, such as a security operations center (SOC). The DCS's electronic subsystems include programmable logic controls, video surveillance, intercom, and a distributed antenna system. The systems are designed to enhance manual processes and staff safety while maintaining a secure and protective environment for in-custodies awaiting trial.

Table 8.1 Sealant Matrix

LOCATIONS	ALL CELLS, INTERVIEW & CONTROL ROOMS	CORRIDORS & COURT DOCK AREAS	ADMIN, STAFF& COURTROOM AREAS
Detention Hollow Metal Frames	SGF	SGF	SGF
Arch. Door & Window Frames	SJS	SJS	LJS
Mech. Grilles/Diffusers	SGF	SJS	LJS
Water Closets & Lavatories	SGF	N/A	LJS
Sprinkler Heads/Plumbing	SGF	SGF	N/A
Security Light Fixtures	SGF	SJS	N/A
Exposed Conduit/Raceways	SGF	SJS	N/A
Switch/Outlet	SGF	SJS	N/A
Inmate Duress Plates	SGF	SJS	LJS
Misc. Detention Equip. (Mirrors)	SGF	N/A	N/A
Interior Wall Systems At Base	SGF	SGF	SGF
Wall & Ceiling Joint	SGF	SJS	N/A
Intercom Call Stations	SGF	SJS	LJS

LJS/latex joint sealants. These are typical architectural sealants.

SJS/security joint sealant. See page 8.18.

SGF/security epoxy resin gap filler. See page 8.18.

N/A: Not applicable.

Table 8.2 Technical Matrix

	Single Holding Cell	Group Holding cell	Holding Control Room	Inmate Circulation	Inmate Sallyport	Pedestrian Sallyport	Vehicle Sallyport	Sallyport Staging	Inmate Interview Room	Attorney Interview Room	Inmate Search	Armory
Swing and Sliding Door Types												
Detention Hollow Metal Flush Door						•						•
Detention Hollow Metal Flush Door with Cuff Pass												
Detention Hollow Metal Half Glass Door			•					•	•	•		
Detention Hollow Metal Half Glass Door with Cuff Pass	•	•										
Detention Hollow Metal Vision Panel Door				•	•		•					
Detention Hollow Metal Vision Panel Door with View Shutter											•	
Hollow Door Frame Types												
Controlled Swing/Slider Door			•	•								
Controlled Swing/Slider Door with Sidelight	•	•			•	•	•	•				
Noncontrolled Door											•	•
Noncontrolled Door with Sidelight									•	•		
Borrowed Light Frame									•	•		
Control Room Borrowed Light Frame			•									
Security Glazing Types												
Glass-clad polycarbonate glazing manufactured (requirements on page 8.17)					•				•	•	•	
Laminated polycarbonate glazing manufactured (requirements on page 8.17)	•	•		•			•	•				•
Glass-clad polycarbonate with tinting for one-way vision			•									
Benches												
Detention Benches (see page 8.16)	•	•			•			•			•	
Detention Equipment												
Paper pass (requirements on page 8.16)			•									
Gun locker (requirements on page 8.16)												•
Pistol Lockers					•	•	•	•				

Transport Driveway

Transport vehicles delivering in-custodies access the vehicle sallyport through a secure driveway. Secure driveway access and egress are controlled by sliding or swinging gates and barrier arm gates. Gates are controlled remotely from the DCR or from a card reader located at the secure driveway.

Vehicle gate entry and exit sequences employ sensors and programming to detect vehicles and prevent them from being stranded or trapped between vehicle control points. Sensors employed include inground vehicle detector loops, photoelectric beams, and leading edge gate and barrier arm sensors.

Transport Driveway Entry

When a transport vehicle approaches the secure driveway, the driver communicates with the DCR to request access either from the vehicle or from a pedestal-mounted intercom. Alternatively, the driver may use a card reader for automated entry. A vehicle detection loop is provided to detect vehicles, enable the gate card reader, and call up adjacent surveillance cameras. Entrance gate card readers are otherwise deactivated. Vehicle pedestals are provided with single and dual height pedestal heads to accommodate a variety of vehicles, and vehicle types must be coordinated at each site to ensure that appropriate security pedestals are provided.

The DCR monitors secure driveway surveillance cameras and gate status, and controls vehicle gates from a DCS touch-screen computer. When the DCR grants secure driveway access, the entrance gate and barrier arm open and the transport vehicle enters. The barrier arm and vehicle gates close immediately after the transport vehicle has cleared their respective safety sensors and entered the secure driveway.

Transport Driveway Exit

When a transport vehicle approaches the secure driveway exit gate, it passes over a vehicle detector loop, which opens the gate. The barrier arm and vehicle gate close after the transport vehicle has cleared their respective safety sensors and exited the driveway. The DCR can manually control the exit gate and barrier arm via the DCS.

Vehicle Sallyport

Vehicle sallyport entry and exit sequences employ sensors and programming to detect vehicles and prevent them from being stranded or trapped between vehicle control points. Sensors employed include inground vehicle detector loops, photoelectric beams, and leading edge door sensors.

Vehicle Sallyport Entry

The transport driver communicates with the DCR to request entry on approach to the vehicle sallyport. An inground vehicle detection loop is located at the sallyport entrance to detect vehicles and call up and display an entry surveillance camera in the DCR. The DCR operator may manually call up vehicle sallyport cameras via the DCS.

The DCR monitors sallyport surveillance cameras and doors and controls sallyport doors from a touch-screen computer. When sallyport access is requested, the DCR confirms whether sallyport doors are secure. If sallyport doors are secure, the sallyport may be opened to allow transport vehicle access. If any sallyport door is not secure, no other sallyport door can be opened. The entry door may be closed after the transport vehicle has cleared the door safety sensors and entered the sallyport. If a safety sensor is activated while the door is closing, the door will stop and reverse to the open position, and the DCS generates an alarm. The door may be closed after safety sensors are cleared.

Open, stop, and close manual override door controls are provided in a locked and monitored enclosure at the sallyport door. The open function opens the door, the stop function stops door in its current position, and the close function closes the door.

Vehicle Sallyport Exit

The transport vehicle driver communicates with the DCR to request exit from the vehicle sallyport.

The DCR monitors sallyport surveillance cameras and doors, and controls sallyport doors from a touch-screen computer. When sallyport exit is requested, the DCR confirms whether sallyport doors are shown as secure on the DCS touch-screen computer. If sallyport doors are secure, the sallyport may be opened to allow transport vehicle exit. If any sallyport door is not secure, no other sallyport door can be opened. The exit door may be closed after the transport vehicle has cleared the door safety sensors and exited the sallyport. If a safety sensor is activated while the door is closing, the door will stop and reverse to the open position, and the DCS generates an alarm. The door may be closed after safety sensors are cleared.

Open, stop, and close manual override door controls are provided in a locked and monitored enclosure at the sallyport door. The open function opens the door, the stop function stops door in its current position, and the close function closes the door.

Pedestrian Sallyport

When sallyport access is requested, the DCR operator confirms whether sallyport doors are secure. If sallyport doors are secure, the sallyport may be opened to allow officer access. If any sallyport door is not secure, no other sallyport door can be opened. After the officer accesses the sallyport, manual doors are closed by the officer, and motorized doors are closed via the DCS.

Central Holding Door Operation

Central holding door types include corridor doors and holding cell doors. These may be swinging doors or sliding doors as defined in 8.E (Technical Criteria) above.

When an officer communicates with the DCR by intercom requesting central holding door access, a graphic of the door is automatically displayed on the DCS touch-screen computer, and the door surveillance camera is automatically displayed on a video monitor.

When an officer communicates with the DCR by other means, the DCR operator selects the appropriate graphic map icon from the DCS touch-screen computer, which will display a graphic map of the door location on the touch screen and display the relevant surveillance camera on a video monitor.

The DCR monitors central holding surveillance cameras and doors, and controls central holding doors from a DCS touch-screen computer. When central holding door access is requested, the door is opened from the DCR to allow officer access to the corridor or holding cell. After the officer accesses the central holding door, manual doors are closed by the officer, and motorized doors are closed via the DCS.

Card Reader Controlled Detention Doors (Card In / Card Out)

When the DCS is in night mode, central holding perimeter doors may be card reader controlled to facilitate cleaning, maintenance, and inspection. Card reader control is provided through an interface between the access control system and the DCS. In no case shall a card access control system be used for primary control of operation of in-custody detention areas.

DCS Day Mode: Holding area perimeter door is locked and closed. The DCS rejects access control system unlock signals.

DCS Night Mode: The following is the entry and exit sequence of operation:

- Door is locked and closed.
- On a valid entry or exit card read, the access control system signals the DCS to unlock the door and bypass door and lock position sensor alarms.

- After the door unlocks and is opened, the DCS detects the open door status and releases the latch-bolt to relock the door when closed.
- When the door is closed and locked, the DCS detects door closed status and rearms door and lock position sensors.

Court Holding Vestibule

Court holding vestibule doors include the secure elevator door, cell doors, and courtroom sound lock doors. Court holding vestibule doors are monitored and controlled from the DCS touch-screen computer.

When a court security officer (CSO) requests in-custody transport to a courtroom, the in-custody is transported to the court holding vestibule in the secure elevator.

When a CSO communicates by intercom, a graphic of the court holding vestibule is automatically displayed on the DCS touch-screen computer, and a vestibule surveillance camera is automatically displayed on a video monitor.

When a CSO communicates by other means, the DCR operator selects an appropriate graphic from the DCS touch-screen computer, which will display a graphic map of the vestibule on the touch screen and display a vestibule surveillance camera on a video monitor.

When the DCS confirms that all court holding vestibule doors are secure, the secure elevator door may be opened from the DCS touch-screen computer. If any holding vestibule door is unsecure, the secure elevator door cannot be opened from the DCS. When the DCR confirms that other court holding vestibule doors are secure, the cell door may be opened from the DCS touch-screen computer. If other holding vestibule doors are unsecure, the cell door may not be opened.

When the DCR confirms that other court holding vestibule doors are secure, the courtroom sound lock door may be opened from the DCS touch-screen computer. If other holding vestibule doors are unsecure, the courtroom sound lock door may not be opened. After the officer accesses the court holding door, manual doors are closed by the officer, and motorized doors are closed via the DCS.

Secure Interview Rooms

Call buttons located in the holding area interview rooms provide notification to the DCR that an in-custody is ready to be escorted back to his/her cell. These doors are monitored and controlled as a central holding door.

Secure Circulation and Elevators

Secure elevators are controlled from the DCS touch-screen computers. The DCS monitors elevator door and floor status, and controls floor selection and door operation. The DCS touch screen incorporates a virtual elevator return panel that displays elevator location and status and duplicates the elevator return panel controls in each cab.

When an officer communicates with the DCR by intercom requesting secure elevator access, a graphic map of the elevator floor and virtual return panel is automatically displayed on the DCS touch-screen computer, and an elevator surveillance camera is automatically displayed on a video monitor.

When an officer communicates with the DCR by other means, the DCR operator may select an appropriate graphic map from the DCS touch-screen computer, which will display a graphic of the elevator floor and virtual return panel on the touch screen and display an elevator surveillance camera on a video monitor.

When the elevator is clear and secure, the DCR operator selects the requested floor. If the court holding vestibule is secure, the elevator door icon may be selected to open the door. If any court holding vestibule door is unsecure, the elevator door cannot be opened. Secure elevator doors must not automatically open upon arrival to a floor.

When in-custody passengers enter the elevator, the DCR operator closes the elevator door and selects a destination floor from the DCS touch-screen computer. The touch screen displays the elevator location while in transit. When the elevator arrives at the selected floor, the touch screen and surveillance camera displays are automatically updated to view the selected floor.

If the court holding vestibule is secure, the elevator door icon may be selected to open the door. If any court holding vestibule door is unsecure, the elevator door cannot be opened until secured. After all persons have exited, the elevator door is closed from the DCS.

Holding Control

DCS Workstations

- Multiple DCS workstation positions are located at the DCR for redundancy. DCS workstation positions include a modular workstation desk, DCS touch-screen and video surveillance system computers, video surveillance system monitors, and an intercom master station.
- The workstation positions must also support control room equipment required by other sections of the Facilities Standards.

Unified Control

- DCS computers will be capable of controlling all holding areas to eliminate operational conflicts between workstations.
- DCS computers will be capable of providing unified control when independent control is not required.

Independent Control

- A dedicated juvenile holding DCS computer will be provided at facilities requiring independent juvenile holding area control. The designated juvenile DCS touch-screen computer is fully functional and capable of providing unified control, but operational control is limited to the juvenile holding area.

Day/Night Mode

- During day mode, the DCS locks all holding area doors, and holding area access is granted only by DCS touch-screen computer or with a key.
- During night mode, select central holding perimeter doors and holding area doors are card reader controlled by an interface between the access control system and the DCS. The DCS unlocks designated holding area interior doors to facilitate cleaning, maintenance, and inspection.

Detention Office Monitoring

- Detention office DCS computers may be required at holding area support offices to monitor holding area cameras. Detention office DCS computers do not provide holding area control.

Fail-Over Holding Control

- In larger facilities, additional fail-over DCS computers may be required at alternate locations such as a security operations center (SOC). This ensures holding area control redundancy and continuity if DCS operation is not possible from the DCR.
- Fail-over equipment must be located to maintain and ensure holding area privacy, and it must be located in areas where public viewing of detention surveillance cameras is not possible.

Operational Descriptions and Installation Criteria

DCS Core Equipment

- Core DCS equipment includes file server, central processing unit (CPU), touch-screen computers, programmable logic controllers (PLCs), intercom exchange, intercom master stations and substations, and a distributed antenna system for two-way radio communication.
- DCS network communications utilize a converged building TCP/IP network utilizing VLANs to provide secure DCS communications.

- The PLC and intercom servers, integrated with the court facility VSS headend equipment, form the DCS. Systems integration shall be via the court network and provide seamless monitoring, control, and operation of detention areas from the DCR and other designated locations.
- DCS integration with the video surveillance system shall provide automated camera call-up and display based upon DCS commands, intercom substation calls, and holding area alarms.
- Integrate the DCS with secure driveway gates and barrier gate arms to provide gate control from the DCR. The DCS gate position sensor alarms monitored by the card access control system shall be bypassed while the gates are under DCS control.
- The DCS file server and intercom exchange server are rack mounted in an MDF or IDF room on the same floor as the DCR.

DCS Programmable Logic Control

Programmable logic control is provided via standardized PLCs. PLCs are the only acceptable means of providing DCS monitoring and control of detention doors. PLCs are tailored to each facility's size and unique requirements. PLCs interface all DCS system inputs and outputs for operator control from DCs touch-screen computers.

- PLC—Local: Central holding area PLC equipment will be located outside the holding area perimeter. Locate the PLC server in a fully enclosed and locked equipment rack. Wall-mount local (central holding) PLCs, power supplies, interface cabinets, and network connections in the same room as the PLC and intercom servers.
- PLC—Remote: Wall-mount remote (i.e., court holding) PLCs, power supplies, interface cabinets, and network connections in an IDF room on the same level as the remote holding area they control.
- PLC inputs include vehicle and pedestrian door position monitoring, latch bolt position monitoring, gate position and safety sensor monitoring, secure elevator floor status and door position monitoring, and inputs from interfaces to other systems.
- PLC outputs include vehicle and pedestrian door control, secure elevator call and floor select control, secure elevator door control, vehicle gate control, and outputs to interfaces with other systems.

DCS Touch-Screen Interface

- Locate the DCS touch screens on the workstation furniture monitor tree with the VSS monitors. Locate touch screens so they are easily accessed from a seated or standing position.

DCS Door Monitoring

- Holding area door latch monitor switches are provided to confirm that doors are latched.
- Holding area door position monitoring is provided with triple bias high-security detention-grade magnetic door position switches.
- Vehicle door position is monitored with commercial-grade surface-mounted position switches.
- Vehicle gate position is monitored with commercial-grade surface-mounted position switches.
- Door monitoring circuits must be home run from each door position switch to a PLC input via an interface termination cabinet in the same room as the PLC equipment. Door monitoring and lock status may share the same PLC input circuit. Where low-voltage door monitoring circuits are run in the same conduit as high-voltage lock power circuits, the door monitoring circuit input to the PLC must be electrically or optically isolated from the field wiring to prevent damage to the PLC input circuitry from transient voltages and induced currents.

DCS Lock Control

- PLC outputs control DCS locks at sallyports, central holding, secure circulation, and courtroom holding areas.
- PLC outputs switching 120VAC locks shall be NEC Class 1 rated, electrically isolated relay circuits to protect PLC outputs and shall have individually fused disconnect terminal blocks to prevent a short circuit on one door lock circuit from affecting any other doors on the same branch circuit. Shield and isolate all connections to ensure a "finger safe" maintenance environment.

DCS Video Surveillance System

- The video surveillance component includes client computers, monitors, and cameras that are an extension of the court facility video surveillance system (VSS). Refer to Chapter 4 (Courthouse Security) for specific information regarding the court facility VSS.
- Video surveillance monitoring shall be password protected to prevent unauthorized viewing and control of detention cameras. Authorized monitoring of detention cameras outside detention areas must not be observable by the public.
- Cameras in common detention areas and secure elevators must be vandal resistant. Cameras in detention cells must be high-security detention type. Cameras must be installed in compliance with the requirements of this chapter. In all other respects, detention area cameras must be compatible and consistent with the building VSS design.
- VSS client computers must be located in secure cabinets within the DCR modular workstation furniture. VSS monitors will be located on a monitor tree, oriented to allow easy viewing and to minimize operator fatigue.
- The VSS system provides camera call-up at DCR touch-screen computers using a graphic icon for each camera.

DCS IP-based Intercom System

- The intercom system includes rack-mounted intercom exchange and modular expansion chassis equipment rack mounted in an MDF or IDF room on the same level as the DCR.
- The intercom substations shall utilize POE network connections from MDF and IDF rooms to each intercom field device.
- The intercom system shall provide call initiation from the DCS touch-screen computers, master stations, and substations for two-way voice communications between master stations and substations.
- The intercom system provides monitoring of substations from DCS touch-screen computers and master stations.
- The intercom system provides notification of call button activation at master stations and DCS touch-screen computers.
- The intercom system provides annunciation of substation calls at DCR touch-screen computers with a graphic icon and audible notification. Intercom substation calls may be placed from the DCR touch-screen computer by selecting a graphic substation icon on the touch screen.
- The intercom system interfaces with VSS for automatic display of cameras viewing the calling substation each time a call is initiated from that substation.
- Sallyport, central holding, secure circulation, and courtroom holding area intercom substations incorporate one-touch push-button operation, vandal-resistant construction, and integral tamper alarms.
- Sallyport, central holding, secure circulation, and courtroom holding area detention door intercom substations are preferably located in the detention door frames.
- Intercom master stations will be located adjacent to DCR touch-screen monitor at

DCR modular workstation furniture and will incorporate an alphanumeric display and programmable push-button keypad.

DCS Workstations

- Modular or systems furniture will be provided at DCS workstation locations that are secure or located in a DCR. Workstation monitors shall be uniform in size and specification and will be located on a monitor tree.
- Detention-grade furniture will be provided at DCS workstation locations that are unsecure or located within a detention area. Equipment and desk accessories will be minimized and will be securely attached to the furniture.

Infrastructure Wire and Cable

- Protect DCS wire and cable in metallic raceway, conduit, enclosed cable tray, or enclosed cable ladder where exposed, readily accessible, or inside walls. Plastic raceway is unacceptable.
- All TCP/IP network cabling and connectivity shall be in accordance with Chapter 17 (Unified Communications) and Chapter 18 (Audiovisual Systems).
- Point-to-Point
  - Low-voltage power cabling shall be two-conductor, 18 AWG, stranded and unshielded. Typical applications include 24 volt DC lock power and 24 volt AC camera power (i.e., analog cameras).
  - Alarm point cabling will be one twisted pair, 18 AWG, stranded and unshielded. Typical applications include door contacts and latch monitoring.
- VSS Cameras
  - Interior IP camera cabling shall be in accordance with Chapter 17 (Unified Communications) and Chapter 18 (Audiovisual Systems).
  - Analog cameras shall utilize UTP interfaces to transmit camera and control signals over a network cabling infrastructure.
  - Secure elevator cameras shall utilize UTP interfaces to transmit camera signals via the traveler cable and network cabling infrastructure.
  - Exterior camera signal cabling will be fiber optic unless the routed distance is within the maximum length allowed in Chapter 17 (Unified Communications) for copper cable.

Infrastructure Power

- Normal power will be provided for DCS components with a low-voltage power supply incorporating a four-hour-battery backup power source.
- Emergency generator power will be provided at large court buildings for DCS components that are not supported by UPS.
- Uninterruptible Power Supply (UPS)
  - UPS will be provided at large court buildings for DCS equipment located in the DCR, MDF, and IDF rooms.
  - At small court buildings with no history of chronic power interruption, UPS will be provided to ensure orderly facility shutdown.

Table 8.3 Notes

R: Required

R1: Required as Applicable

P: Partial Requirement

D: Discretionary

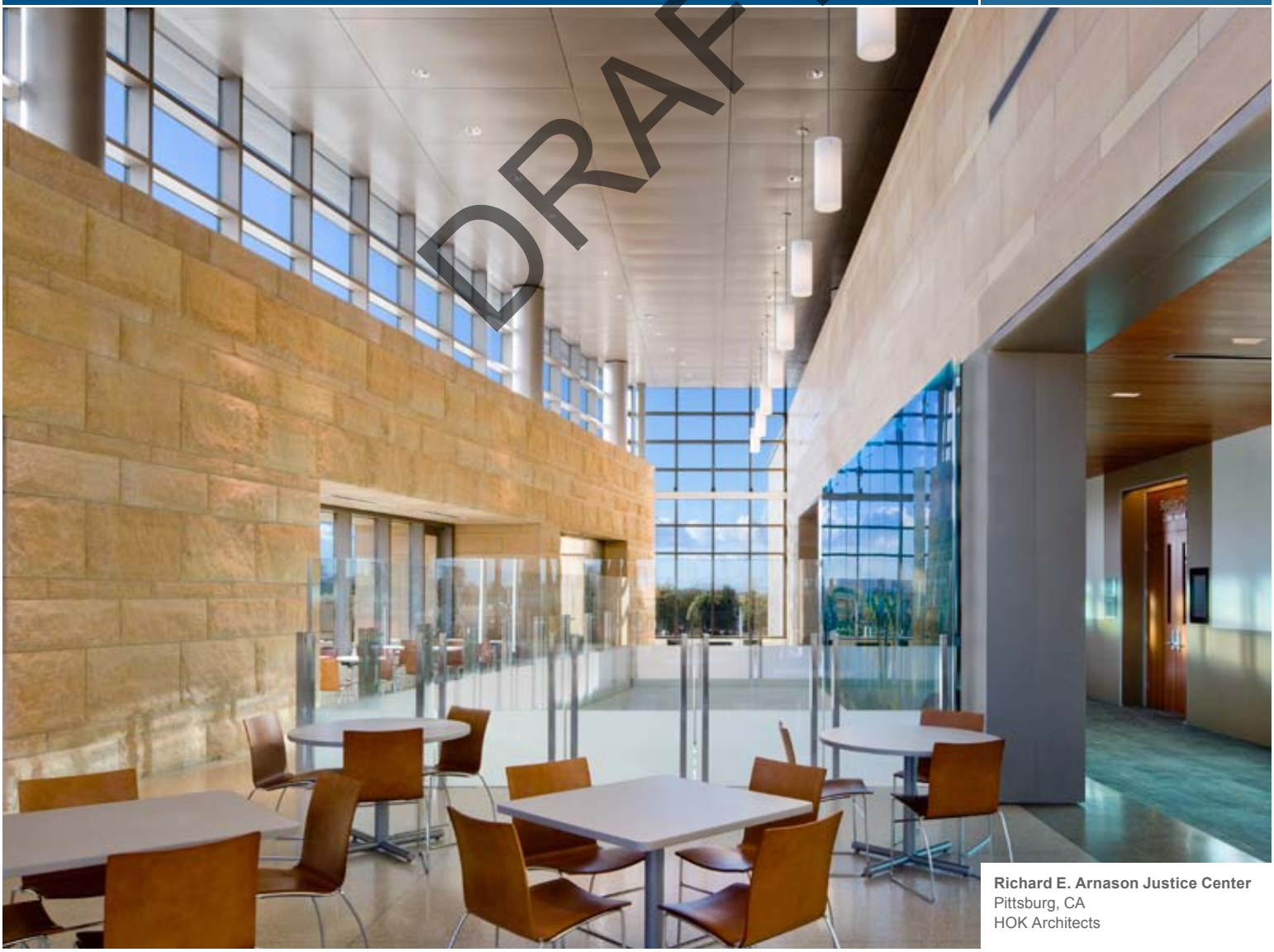
M: Monitoring Only

C: Control

Table 8.3 Electronic Detention Control Requirements

	Locking—Local	Locking—Remote	Door Interlock	Cameras	Video Recording	Audio Monitoring	Audio Communication	Call Button	Monitoring & Control	Card Access	Card + PIN Access	Gate Control
Secure Driveway				R	R		R			R		R
Sallyport—Vehicle	R		R	R	R	R	R		R			
Sallyport—Man Door	R		R	R	R	R	R		R	R1		
Holding Cell—Group	R		D	P	R	R	R		R			
Holding Cell—Individual	R		D	P	R	R	R		R			
Courtroom Holding Vestibules	R		R	R	R	R	R		R			
Courtroom Holding Cells	R		R	R	R	R	R		R			
Interview Rooms	R		D	D	R1			R	C			
Elevator	R		R	R	R	R	R		R			
Stairwell	R		R1	R	R	R	R		R			
Corridor	R		R1	R	R	R	R		R			
Armory	R			R	R						R	
Holding Control	R		R1						R	R		
Auxiliary Control				M	M							
Remote Holding Control		R1							R	R		

9 PUBLIC SPACES



Richard E. Arnason Justice Center
Pittsburg, CA
HOK Architects

DAVID WAKELY PHOTOGRAPHY

Public spaces provide courthouse visitors with a first impression of the justice system and the court facility.

Public Courthouse Spaces

- Primary Building Entrance
- Public Lobby
- Information Kiosk or Counter
- Courtroom Public Waiting Areas

9.A OBJECTIVES

Planning and design of public spaces are critical to the successful operation of a courthouse. The primary objective is to provide simple and clear movement of visitors and staff into and throughout the courthouse, while limiting access beyond public zones. Public spaces should also provide an open and spacious experience for users, who are often under stress, and to convey the importance and authority of the courts.

Strategically placed, clear, and legible graphics and signage, visible upon entry, will provide first-time visitors with information about where to find various functions and how to get there. Wayfinding techniques shall provide visual cues about the location of important public spaces and services.

The court facility must maintain a safe and secure environment for all people and property. Court security includes active and passive measures, encompassing design, technology, and operations. See Chapter 4 (Courthouse Security).

9.B PRIMARY BUILDING ENTRANCE

The front door of each court building has important symbolic and functional attributes. This main ceremonial entrance is the single point of entry for staff, visitors, and the public.

- Provide a single primary entry with universal access. In a very large courthouse, a dedicated staff entry may be considered.
- Provide an attractive and user-friendly environment as a first impression to court visitors and staff.
- Design the entrance and entrance doors to accommodate peak-hour lines of prospective jurors and courthouse visitors. Lines may extend out the door. Provide outside protection from inclement weather. Some climates may require a vestibule. Refer to Chapter 11 (Architectural Criteria).
- Building entries, especially the main public entry, must accommodate persons with disabilities in the same manner as the general public. Entry doors shall meet the closer requirements of applicable codes. Power-assist doors or balanced doors shall be provided. Power-assist doors are preferred because they can be used only when needed, but are a universally accessible solution.

9.C PUBLIC LOBBY

The public lobby serves as the focal point for the building and provides visual orientation to the other areas through visual cues and signage. See Figure 9.1.

- Provide a public lobby sized to accommodate a queuing area and weapons screening station(s). Attention should be given to integrating the security screening stations into the lobby design to avoid the appearance of an intrusion or afterthought.
- Provide clear signage and graphics immediately upon arrival in the courthouse public lobby. Many courthouse visitors will require directions to courtrooms or hearing rooms. Provide large, easily readable court calendar monitors. Areas where courtroom assignments are posted

Figure 9.1 Public Lobby, Southwest Justice Center, Temecula

must be accessible without impeding the security screening process or blocking public circulation paths.

- Provide climate and glare control.

Security Screening Station

Building users and nonexempt staff shall enter the facility through a public entry screening station. See Figure 9.2. Screening of the public occurs between the exterior entrance and interior rooms, corridors, elevators, or stairwells. Provide one security screening station, or lane, for full-time operation. See Figure 9.3. Provide additional lanes as required to operate during peak usage, in mornings and after lunch. Screening stations shall include space for the following:

- An interior or covered area for queuing of the projected peak volume of people entering the building. Distance between the security screening station and the building entrance should be at least 20 linear feet.
- A magnetometer, or metal detector, through which visitors pass for detection of metal objects.
- An X-ray scanner for screening contents of visitor briefcases, handbags, and personal possessions.
- Where multiple screening lines are required, a ratio of one magnetometer per pair of package screening units (1:2) shall be standard, subject to confirmation with a project-specific security operations program.
- A table or counter for secondary inspection of scanned items.
- A magnetic wand inspection area.
- Security staff posts to assist individuals through the magnetometer screening and X-ray scanning. In multiportal screening areas, a third security post may be needed to oversee the screening process and assist security staff. Provide power, data, and voice communications to the security post.

Design the screening area to be consistent with the court public spaces and project a positive first impression to court visitors. Do not make screening equipment the main focus of the space. Provide a casework screen for the scanning position, constructed of durable materials to withstand the stress of a high-traffic area, and lined with nonricochet, bullet-resistant material that will absorb multiple firings of a large-caliber handgun.

Figure 9.2 Screening Station, Southwest Justice Center, Temecula

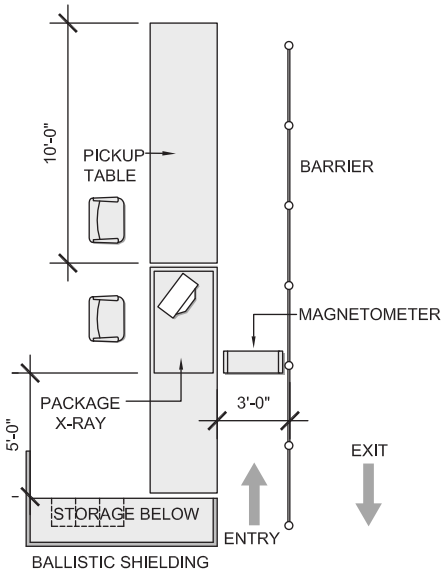


Figure 9.3 Single Lane Screening Station Diagram

During the early planning and design phases, involve the sheriff's department or court security officers, to ensure compliance and cooperation from planning through design and occupancy.

The accessible path of travel shall include the lobby security screening area. Wheelchair users shall not travel a separate and unequivalent path through the screening process and area. Persons with disabilities will pass through a magnetometer, along with the general population. The magnetometer's 32" clear opening will accommodate wheelchairs and scooters.

Provide gun lockers for law enforcement officers entering the facility, consistent with local security procedures.

Design each security screening area to allow visual observation by security staff of all public exits to ensure that individuals entering the building do not circumvent the screening process. Directionally sensitive motion-detection systems may be used to provide an alarm notification of the entry of individuals through the exits.

Staff-only exits not located at staffed security screening stations shall be electronically monitored and alarmed. Use video cameras to continuously record activities at the public exits and to provide secondary monitoring by the command center security staff. Position power and data outlets for each camera location, considering lighting and glare to ensure that the user is not silhouetted and that picture quality is effective.

9.D INFORMATION KIOSK OR COUNTER

A clearly identified information kiosk or counter may be used to provide direction and basic information to individuals unfamiliar with the court facility or court system. Refer to Figure 9.4. The kiosk or counter must be located in a highly visible place near the main entrance but beyond the screening area. Design the information area consistent with the public spaces.

The information area must be used in conjunction with directional signage to provide courthouse visitors information about referrals to and location of services.

If a kiosk is used, it may be an automated system with touch-screen technology, or a combination of automated signage with a staff member so that the kiosk still provides information if the staff member is not present. If the counter is staffed, provide adequate accessible workspace. Staff may be volunteers.

9.E COURTROOM PUBLIC WAITING AREAS

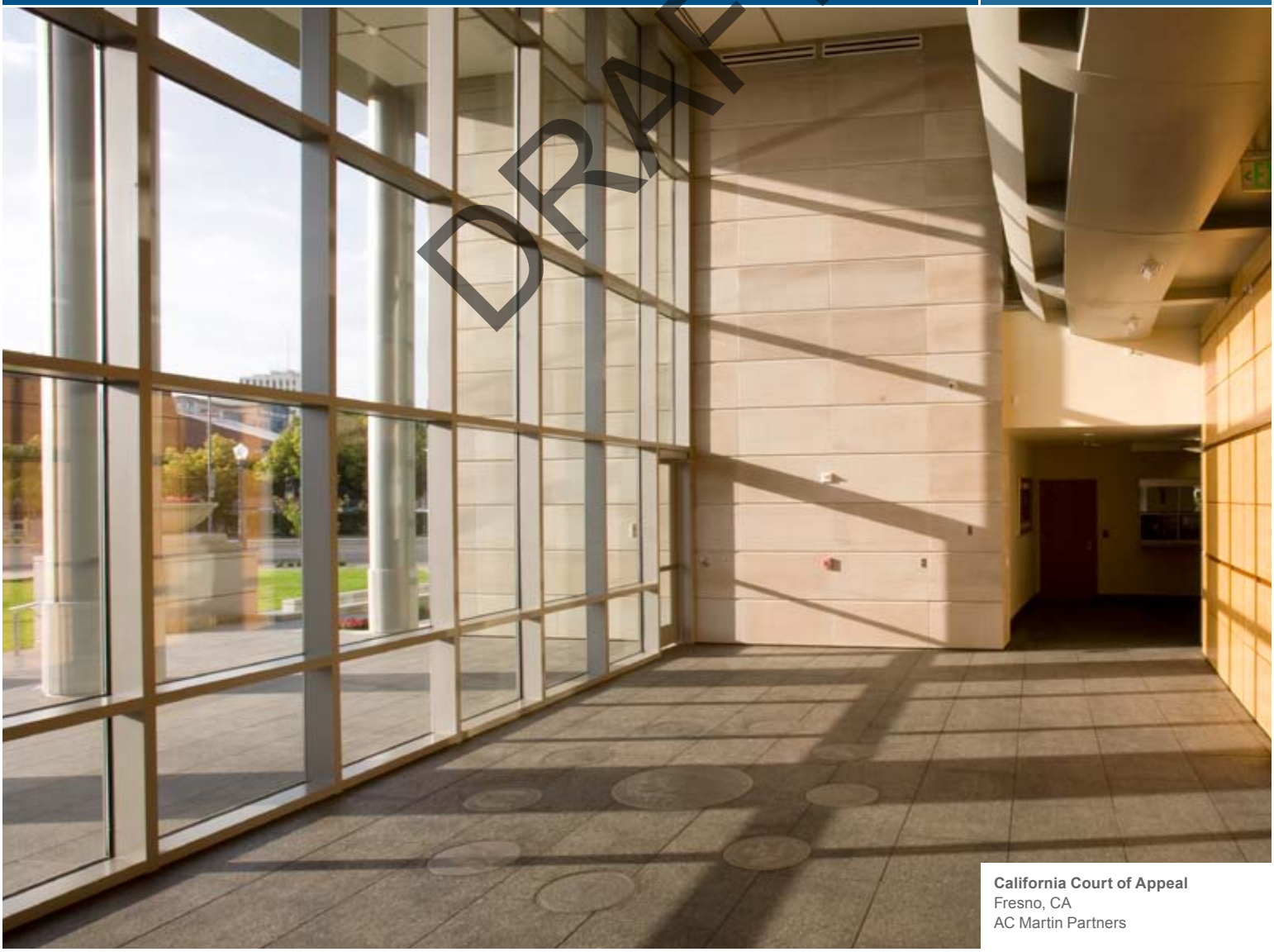
Public waiting areas shall include sufficient comfortable seating and be located near areas of highest public use, with easy access to restrooms and water fountains. Waiting areas shall be proportional to the population served. Provide natural light in waiting areas when possible.

- Corridors may be used as public waiting areas if they are wide enough to accommodate bench seating and if a vestibule with a sound lock is provided at courtroom entrances.
- Provide sufficient space and power for a temporary magnetometer to be located in each vestibule at each courtroom entry.
- Family law, arraignment, traffic, and juvenile courts require larger public waiting areas.

DAVID WAKELY PHOTOGRAPHY

Figure 9.4 Information Desk, Richard E. Arnason Justice Center, Pittsburg

10 BUILDING SUPPORT SERVICES



California Court of Appeal
Fresno, CA
AC Martin Partners

Building support services ensure that necessary routine maintenance and operational functions occur on a daily basis within the court facility. Support services include deliveries, collection and removal of trash or recycled materials, and storage of fixtures and equipment.

The character and size of building support spaces shall be determined during programming and early design phases, with input from the Office of Court Construction and Management (OCCM) building operations staff.

10.A JANITOR CLOSETS

Provide janitor closets on each floor of the court building, except for small facilities or on floors with limited occupied spaces. Provide a service sink, tool racks, and wall-mounted shelving. Access to janitor closets may be from within public restrooms, but this is not preferred.

In large facilities, provide a janitorial storage room for central inventory of supplies. Locate near staff locker rooms and management office.

10.B LOADING DOCK

Large facilities require a raised loading dock to accommodate deliveries, trash, and recycling trucks, as determined by the program. Some facilities may utilize an on-grade loading area equipped with a motorized platform dock lift. Interstate large trailer rigs need not be accommodated in the loading dock. The building location shall allow easy delivery and efficient distribution of goods throughout the facility.

- Locate the loading dock near the freight elevator but away from general office areas of the court.
- Locate air intake ducts to avoid intake of fumes from idling trucks.
- Provide a staging area so that all deliveries can be scanned or examined before entering the building.

Access from the street must be through a restricted vehicle circulation system. The driveway, the loading dock, the loading dock apron, and any exterior staging areas must be within the security perimeter and fully enclosed by fencing.

Provide closed-circuit television to monitor the driveway, loading dock, loading dock apron, and exterior staging area. Provide telephone or other annunciation system at the gateway to the service driveway. If the gate is remotely operated, provide a manual backup system. Refer to Chapter 4 (Courthouse Security).

Paper and office supplies can be delivered on an as-needed basis. Provide space for pallet delivery and storage near the loading dock.

Dedicate one truck bay within a secure loading area to trash and recycling. This area will include collection and compaction bins and locked, covered roll-off containers. This bay will include a covered area for temporary storage of delivered supplies, equipment, and recyclable materials.

- Provide a file shredding area near the loading dock. If this process is contracted out, provide a secure area to store materials awaiting pickup.
- Provide a 10' by 10' area for used copier/printer cartridge storage.

10.C NEWS MEDIA FUNCTIONS

The courthouse must accommodate the media, inside and outside the facility. For technical requirements, refer to Chapter 17 (Unified Communications) and Chapter 18 (Audiovisual Systems).

Interior Media Area

Where required, provide an interior space off a public corridor, not necessarily near the courtrooms, with appropriate power, data, and telecommunications support systems, including audio, video, or other feeds to the main distribution frame. The media room may be multipurpose, but must be available for the news media in courthouses, especially during high-profile cases.

Exterior Media Area

Designate an exterior area with parking for multiple satellite trucks. If possible, the area should face south for satellite exposure. The location can be beyond building security standoff. For urban areas where no parking can be designated for satellite trucks, provide an exterior connection box for video and audio accessibility on the south side of the building or at the loading dock.

10.D MAILROOM

Most facilities receive daily packages and mail through the public entry, where an X-ray machine may scan them. A large facility may require a dedicated mail opening room with biohazard control capabilities.

Locate the mailroom and mail opening room near the central receiving or loading dock and near a service or freight elevator, to allow staff to transport mail to other parts of the building.

10.E MAINTENANCE SHOPS AND OFFICE

Provide an office for court-based maintenance staff. The office shall be sized to accommodate workstations for project and facilities management staff and space for visitors. Provide furnishings for storing and reviewing building plans and for reference catalog shelving. Locate a staff restroom for easy access by maintenance staff. Locate the office in the basement or in a nonpublic location.

In large facilities, locate a maintenance shop on the ground floor, near the freight elevator. Provide walls that minimize noise transmission.

In large facilities, provide a lunchroom for custodial workers.

10.F STORAGE

Provide a furniture storage area in medium and large facilities, near the freight elevator. Building supplies and materials, such as carpet, shall be stored there.

10.G MECHANICAL EQUIPMENT ENCLOSURES

Mechanical and electrical equipment, outside of the nominal building envelope, shall be protected from weather and environmental elements within an architectural equipment enclosure that allows suitable access for maintenance personnel. Equipment enclosure on a building roof shall be integrated with the overall building design and comply with other sections of these standards. Equipment enclosures on a building roof shall be accessible via a permanent dedicated industrial stair from the top occupied building floor to the roof. It is preferable but not required for the stair to terminate inside the equipment enclosure. Such stair shall be wide enough to afford access for maintenance personnel carrying hand tools or small parts. Ladders, ships ladders, or similar steep-angled assemblies shall not be employed to provide access to equipment enclosures.

Air-handling unit outside air intakes, relief air and exhaust air, shall be ducted directly to the outside of the roof equipment enclosure. Toilet exhaust (or other product conveying exhaust) fans should not be located within the roof equipment enclosure.

The following assemblies or equipment are generally exempt from the above enclosure standard if the equipment is in the building or vault:

- Cooling towers
- Emergency generator sets (see section 15.C)

Equipment located outside shall be screened, but not enclosed per above:

- Water backflow and detector check valves
- Irrigation controllers
- Utility company electrical transformers

For more information, refer to Chapter 20: Fire Protection Criteria.

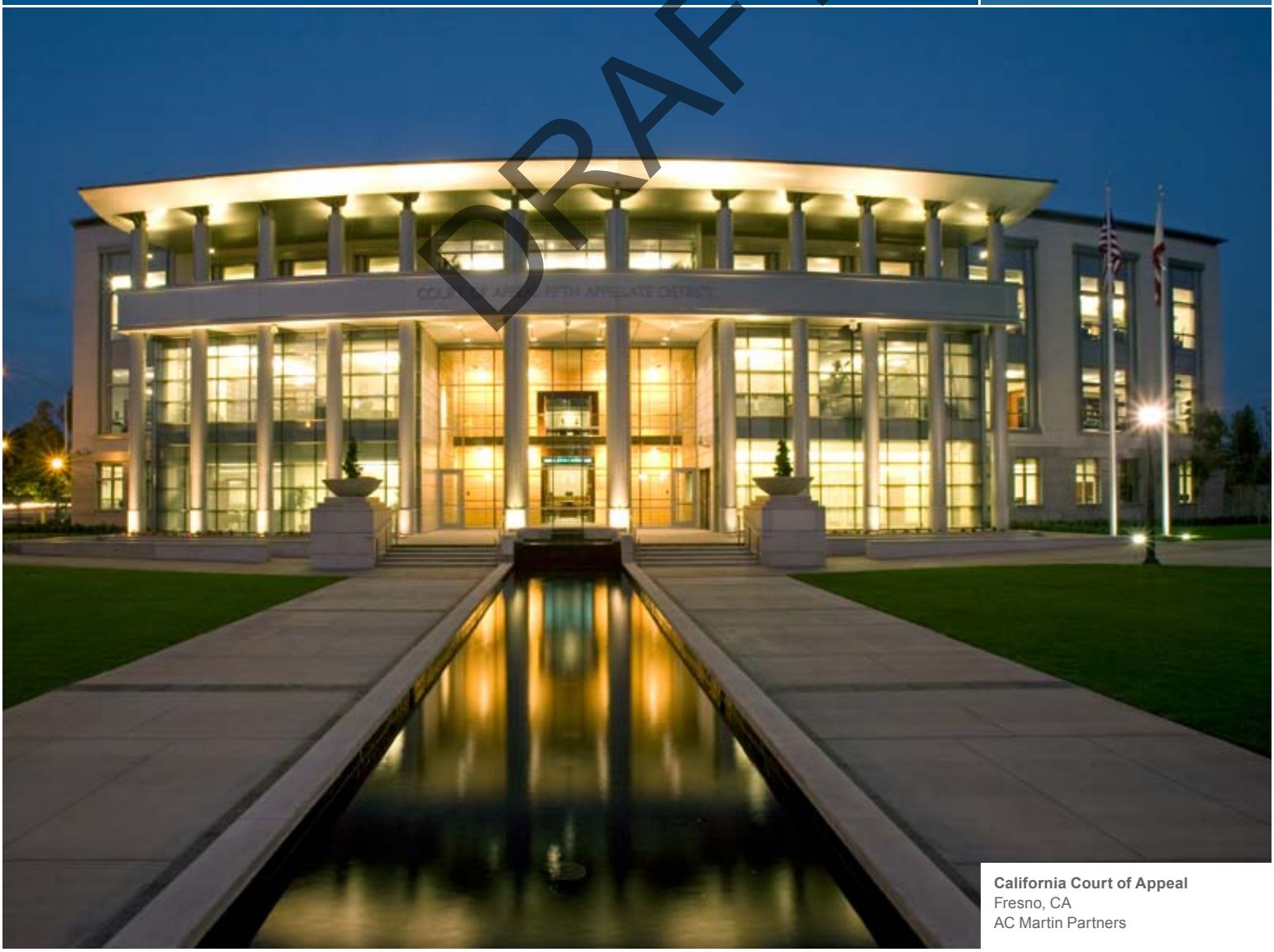
10.H TELECOMMUNICATION AND SERVER EQUIPMENT ROOM

The telecommunication and server equipment room must be a minimum of one-hour resistive construction. All walls (four sides) terminate at the structure above so a sealed enclosure is created. No intermediate ceiling is required. Adjoining rooms should not be electrical, UPS, fire pump, switch gear, transformer, generator, or other high-combustible/fire-risk rooms.

10.J FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM CONTROL ROOM

Equipment that is installed in non-high-rise buildings must be located within a room separated from the remainder of the building by not less than a one-hour fire resistance-rated fire barrier with one-hour fire resistance-rated opening protection. This room must be located after consultation with the AHJ (fire department) and approved by AOC. The room must be a minimum of 100 sq. ft. with a minimum dimension of 8'.

11 ARCHITECTURAL CRITERIA



California Court of Appeal
Fresno, CA
AC Martin Partners

Courthouses are prominent civic buildings, and as such, they should use materials that are both dignified to reflect the courthouse's stature in its community and durable enough to withstand sustained public use.

The architectural criteria provide performance standards for selected architectural components, building assemblies, and finishes.

11.A OBJECTIVES

The performance standards and criteria listed in this chapter provide functional solutions to objectives listed in Chapter 1 (General Principles): design excellence, sustainability, physical durability and functional life span, and energy efficiency.

11.B ARCHITECTURAL CRITERIA

California court facilities shall use quality materials and finishes in all elements, and exhibit consistency in the design throughout. The performance of architectural elements shall be consistent with the functional lifetime defined in Table 1.1 (in Chapter 1), and the selection of elements, systems, or materials shall be consistent with the construction budget and efforts to reduce the overall maintenance and operation costs of the building over its lifetime.

11.C BUILDING ELEMENTS: EXTERIOR CONSTRUCTION

Design the exterior building envelope, including roofs, exterior walls, foundations, retaining walls, and door and window assemblies, to be weatherproof. Design to exclude leaks and other defects for all moisture protection systems, including exterior sealants, vapor barriers, underslab moisture barrier systems, exterior cladding systems, roofing, and waterproofing. All window designs must anticipate water infiltration and condensation, and provide means to direct water to the exterior and allow it to escape.

Wind Analysis

The forces of wind and weather shall be considered in architectural design based on specific project site conditions. A pedestrian-level wind analysis may be required to determine wind effects, on the court building and surrounding buildings, sidewalks, plaza, and entrances, and the need for a main entry vestibule. The effects of wind should also be considered in the selection of entry door systems and hardware to ensure that doors will securely latch closed. The recommendation of a wind analysis shall be addressed by the architectural design. Snow and ice accumulation analysis may be required for court buildings in cold regions of the state. An air quality wind analysis may be required to determine the optimum location of air intakes and exhaust stacks, but in all cases, building exhausts should be located away from building entries and ventilation air intakes.

Exterior Building Walls

The exterior wall design shall present a consistent image, character, and permanence. The design shall include architectural detailing, including the use of different materials, textural inlays, wall plane articulation, and pedestrian-level detail. Scoring, control joints, and other wall plane relief shall be considered and incorporated into the design. The building cladding system requires high-quality, long-lasting, durable components that can accommodate movement, are designed for low maintenance, and have a functional lifetime defined in Table 1.1.

Moisture and Damp Proofing

Provide an exterior envelope system, including roofing, that is a complete weather- and moisture-proof assembly that will prevent infiltration into the building's occupied or unoccupied areas. Design the building exterior systems to prevent the introduction or long-term growth of mold or other pathogens that could adversely affect the indoor environmental quality or work environment. Design exterior wall systems that provide two distinct lines of protection against water penetration and one line of protection against air infiltration. Provide a complete moisture- and damp-proofing system at all concrete slabs on grade,

retaining walls, and other below-grade structures. No wooden elements shall be exposed to rain.

Barrier Walls and Drainage Plane Walls
The defining feature of a barrier wall is that protection from sun, water, and wind is provided at the single outermost surface of the wall, whereby the system that faces the environmental forces is the same system that repels water. In contrast, a drainage plane or cavity wall has the primary water-resistant weather line behind the exterior surface system, which provides the environmental protection, and a secondary water barrier.

Traditional barrier walls rely on mass to absorb moisture and evaporate it slowly to the exterior and on physical shielding, such as roof overhangs, window setbacks, and drip edges, to protect vulnerable joints from weather exposure. Typical exterior materials include cast-in-place concrete and cubic stone.

Contemporary surface barrier walls rely on the surface material or coatings, and sealant joints, to keep water at the exterior, but since such walls have little mass or physical shielding, it is better to design a contemporary surface barrier wall with the redundancy features of a drainage plane wall. Typical exterior materials include aluminum and glass curtain wall systems, thin stone or ceramic tile, brick, precast concrete panels, concrete masonry units, and composite metal panels. Weather enclosure performance can be problematic with contemporary barrier walls designed with the exterior surface as the single water-resistant barrier, due to their reliance on superior construction craftsmanship in order to maintain a consistently watertight surface. Since the consequences of leakage through the exterior of court buildings are unacceptable to AOC, surface barrier walls shall be designed with a second line of protection against water penetration (i.e., sheet flashing or other weather-resistive barrier) behind the surface material so that exterior walls of new court buildings are in effect designed as drainage plane or cavity wall systems, regardless of the primary exterior surface material.

Drainage plane walls shall provide internal drainage by using separate surfaces, or planes, for water protection and for environmental protection. The water protection layer, made up of a weather-resistive barrier (WRB) and flashings inside the wall behind the exterior finish, provide an initial weather protection barrier. These walls recognize the inevitability of water entry past the outermost exterior surface.

Components of a drainage plane wall are:

- Exterior veneer and seals: Shed most water; protect the WRB from sun and excessive water exposure.
- Air space: Separates the inner and outer walls; provides a drainage pathway and drying of veneer anchors and weather barriers.
- Sheet flashing or other WRB: A continuous membrane located behind the exterior surface veneer with all joints and penetrations sealed against water infiltration. This membrane serves as the primary water-resistant weather line in a drainage plane wall system.
- Flashings around openings and penetrations: Interrupt the downward flow of water and direct it to the outside. Flashings are located at all openings and wall penetrations that are transverse to the WRB, extending to beyond the veneer, sloped to drain, and panned up at inboard edges.

Cement Plaster
Cladding Systems: Cement plaster exterior walls can function as modified drainage plane walls. The following standards and criteria shall be used for the design of cement plaster cladding for building envelopes. This system can be expected to have a service life similar to that of other cladding systems.

Cement Plaster Cladding

This section is adapted from a paper: Kenneth E. Klein P.E, "Cement Plaster Cladding Systems for Building Exteriors," Simpson Gumpertz & Hager Inc., Consulting Engineers, 2005.

Conventional exterior portland cement-based plaster cladding is an allowable cladding system for a court building of one or two stories. Use of cement plaster cladding for buildings greater than two stories requires special considerations and AOC approval.

Cement plaster cladding for court buildings shall consist of three layers of cementitious material with a total thickness of 7/8", applied to lath that is installed over a weather-resistive barrier. The exterior plaster functions as a modified cavity wall. Water that penetrates through the exterior plaster is captured by a secondary weather barrier and drained to the outside through weep screeds, drainable control joints, and flashings. Plaster protects the secondary weather-resistive barrier from direct exposure to environmental elements and degradation. The cement plaster cladding shall inhibit the majority of moisture covering the exterior from reaching the secondary weather-resistive barrier. The secondary weather-resistive barrier (WRB) and the flashings are intended to accommodate only incidental amounts of moisture.

A building clad with exterior plaster must be completely weather-resistive before the installation of cement plaster. Completely weather-resistive barriers include all surfaces that are to be covered by the plaster; all penetrations, such as windows and doors; and all terminations, such as parapets and the base of walls. Two-layer WRB for exterior plaster cladding is required. The choice of WRB material will depend on project conditions, including sheathing material.

Before specifying a WRB material on court buildings where cement plaster is the primary exterior cladding system, the designer shall perform a computer-aided check of the transitional moisture vapor flow through the wall for a minimum two-year cycle, beginning at the end of construction, to ensure that the vapor-impermeable barrier will not cause the accumulation of moisture in the wall cavity, leading to interior condensation.

Flashing

Concealed flashing systems that cannot be easily replaced shall be permanent, stainless steel, copper, or other metal flashing systems not subject to corrosion. Provide flashing systems consistent in material, detail, scale, and quality with the facility design. If flashings are exposed, they shall be designed utilizing noncorrosive materials that are consistent and harmonious with the design intent. Flashing systems should be removable when installed adjacent to other systems requiring periodic inspection and/or replacement (i.e., flashing systems adjacent to roofing terminations).

Expansion Joints

Develop the structure to limit movement and suit the requirements for expansion joints. Expansion joints should be designed to allow for all anticipated building movement, plus a safety factor of 25 percent, without resulting in any damage to the joint. Where required, design expansion joints to be minimally visible and watertight. Joint cover assemblies shall meet all code requirements for impact, loading, and fire protection.

Windows and Doors

Provide the best-proven institutional-grade window systems. Glazed entry systems shall be constructed of colored or finished aluminum or other metal systems. All glazing shall be insulated units for optimum thermal and acoustic performance, tinted or coated as required. Windows shall be fixed or operable, consistent with sustainability standards.

Architectural metal and glass curtain walls are a special class of drainage plane wall with pathways, flashings, and sealants internal to the framing elements. Architectural curtain walls may be designed as drainage plane walls with internal seals, gutters, and drainage channels that function as the primary water penetration weather line. For this reason, the engineering, detailing, testing, and construction of glass and metal curtain walls for California court buildings shall follow the highest recommended industry practices.

Consider operable windows for certain areas to support a sustainable design objective. Small operable windows may not significantly impact mechanical system performance, depending on size and quantity. Large operable windows may adversely impact building and space pressurization and temperature. The use and specification of operable windows shall be coordinated with HVAC system design and be consistent with the court facility security plan.

Public entrances require doors that are easy to operate and securely latch closed in a variety of environmental conditions. Balanced swinging doors, power-assisted swinging doors, or power-activated sliding doors are appropriate for courthouse public entries. Certain site environmental conditions may require vestibules or revolving doors to address site environmental conditions and to maintain interior comfort and cleanliness.

Provide aluminum, stainless steel, or other approved metal institutional-grade door systems with matching frames for public entries. Painted aluminum frames and doors are not allowed for high-volume entrances. Provide flush panel metal doors with welded steel heavy-duty matching frames and institutional-quality hardware and finishes at service and staff doors and frames. Hardware on exterior doors shall be stainless steel.

Shading and Glare Control
Control glare and heat gain at all work areas and public spaces. The glazing in the public lobby shall be mitigated for temperature and glare control so that security screeners and any other staff can work and see monitors in comfort, and security cameras can produce quality photographs.

Protection of Building Entrances
Protect building entries from exposure to weather. Provide exterior canopies, building recesses, or overhangs at all exterior entrances to protect doorways from exposure to rain and snow.

Exterior Stairs and Ramps
Often the entry levels of court facilities are raised above street level and require universal access via permanent stairways and ramps serving all courthouse users. Provide a system of guardrails and handrails, as required by code, of stainless steel, bronze, or other permanent material that has a design and finish consistent with the facility design. Steel with epoxy finish coating can be used for guardrails and handrails not subject to high-volume use.

Walk-off Mats and/or Grilles
Walk-off mat/grille systems are required to improve indoor air quality through the reduction of dirt and dust tracked into the building, and to reduce the maintenance of indoor floor coverings. Provide a system of exterior and interior walk-off mats and/or grilles flush with the floor surface directly in front of the main entry doors and immediately after entering the public lobby. Mats shall be removable, cleanable, and replaceable. Grilles shall be constructed from corrosion-resistant durable materials, such as stainless steel, and the assemblies shall include a recessed catch basin with the grilles being removable to allow for cleaning of the catch basin. Minimum dimensions of walk-off mats and/or grilles shall be the width of doorway and 10' total in length in the direction of travel, which can be split between the interior and exterior side of the doors.

Exterior Flagpoles
Provide two flagpoles, to accommodate a State of California flag and a United States flag, near the courthouse public entrance.

Dedication Plaque and/or Cornerstone
Provide a dedication plaque and/or cornerstone with relevant project information and dates that is permanently attached to the building. A cornerstone is appropriate for a prominent exterior location near the building entry, whereas a dedication plaque could be located either on the exterior or at a prominent interior location in the lobby or other public space.

Roofs

Low-Slope Roofing System
The roof shall be weather-tight and provided with a positive drainage that will effectively dispose of rainwater. The roof shall be insulated so that the heat transfer values from roof to occupied area comply with CCR title 24, part 2. Low-sloped roofs shall provide a minimum slope in accordance with the manufacturer's warranty for the specified roof system, but a slope of ¼" per foot is the target recommended slope to drain along valleys. Roof drainage slopes may be achieved by the elevations of the roof structure, or with built-up fill material under the membrane.

Roofing Systems: Provide a continuous-membrane roofing and flashing system with compatible components that will not permit the passage of liquid and will withstand wind loads, building movement, flotation loads, thermally induced movement, and exposure to weather without failure. The selected roofing system should have a manufacturer's warranty for a minimum period of 10 years. Hot fluid-applied protected membrane roofing (PMR) systems and modified bitumen sheet roofing SBS (styrene-butidien-styrene) with mineral granular surface sheet, applied with hot asphalt and reflective coating to achieve an Energy Star® rating, are acceptable systems for low-slope roofs.

The roof membrane will be replaced occasionally over the life span of the building. To facilitate reroofing, relatively large uninterrupted roof planes are preferred. Flashing assemblies at curbs and roofing terminations should be removable and reinstallable (i.e., a two-part system with removable reglet and counterflashing) to maintain the integrity of the overall building envelope weather line after a roofing replacement. Mechanical and electrical rooftop equipment and rooftop screens shall be designed to permit reroofing in the future. Curbs and equipment bases on roofs shall be a minimum of 8" high to allow adequate space for roof membrane terminations and flashing systems.

Single ply roofing is not recommended.

Roof drains shall be recessed below the roof level to form a collection basin; roof drain bodies shall be a two-part cast iron type that allows the waterproof membrane to be clamped between drain body parts, so that water infiltrating the roofing layers can drain into the system.

Provide additional protection at walking surfaces for rooftop service routes.

Rooftop Equipment
Rooftop equipment shall be kept to a minimum. Locate equipment in rooftop penthouses or behind visual screens. Integrate the location, size, and finish of rooftop penthouses and visual screens with the architectural design. Install critical rooftop equipment to permit roof system replacement without unreasonable disruption of equipment operation. Satellite antennae and telecom equipment may be located on the roof, and a point of entry into the building and a distribution pathway through the building should be considered when establishing a roof location for this equipment.

Roof Access
Provide an interior permanent dedicated industrial stair (not a ships ladder) and access hatches to the roof of all court facilities with a roof slope of less than 1:4. This stairway can be an extension of the building exit stair system. Provide access to the roof via the freight elevator if the roof includes significant mechanical equipment that requires regular maintenance or the transport of heavy replacement parts. Maintenance worker safety shall be a prime design consideration in the development of roof access and roof parapets. The rooftop access shall be of sufficient size to allow the transport of required tools and materials.

Building Maintenance

All roofs that will have predicted or regular maintenance, or on which window or exterior maintenance equipment will operate, shall have parapets or guardrails around the entire perimeter that comply with the building code. Guardrails or parapets at the minimum height required by code are preferable to other types of fall-arrest systems, since guardrails do not require any special rigging or preparation to be effective.

All elevated areas (roof, balconies) without parapets or guardrails shall have safety anchorages (definition: a secure point of attachment for lifelines, lanyards, or other fall-protection deceleration devices, which comply with the State Building and Safety Codes) within 6' of the edge.

Roofs with a slope greater than 1:4 shall have safety anchorage integrated into adjacent eaves or gable end walls to facilitate maintenance work.

Window Washing and Façade Access Equipment
Multistory buildings require special facilities, which must comply with state regulations for regular maintenance of the exterior skin and window washing. Design the building exterior to accommodate safe, cost-effective window washing and maintenance procedures. Buildings above a certain height are required by code to have an in-place window washing system permanently mounted on the building, whereas shorter buildings may have other options available for providing façade access from the ground. Both operational and equipment costs shall be considered in determining the most economical and cost-effective system in accordance with the building's design and the frequency of the exterior maintenance schedule. Provide features necessary for maintenance worker safety in accordance with occupational safety codes and regulations. Where necessary, provide required davits and sockets, tie-offs, guardrails, and relocatable, motorized platforms to reach the windows on all building elevations. Provide a clear path around the base of the building at the ground level for ground-rigged maintenance platforms that need to be rigged to / transferred between the roof-mounted davits. For low-rise buildings, provide a clear path at ground level for motorized articulated lifts to reach to all exterior windows.

Bird Roosting and Nesting Control
Design exterior façades and roof overhangs to inhibit bird roosting and nesting. Provide means of preventing bird roosting or nesting on horizontal surfaces greater than 6" deep, especially in protected or covered areas. This includes bird species known to nest in the underside of overhangs and soffits.

11.D BUILDING ELEMENTS: INTERIOR CONSTRUCTION

The following criteria shall apply.

Interior Building

Daylighting
Provide natural light to all primary public waiting areas, the main lobby, and work areas. Plan and design interior spaces to allow glare-free natural light at all work areas. Develop methods to share glare-free natural light through the use of interior glazing, sidelights, borrowed light, and light wells. Consider the solar orientation of the building, and provide methods of shading and glare control on façades with excessive solar exposure.

Workplace Environment
Standards for lighting, acoustics, heating, ventilation, air-conditioning, and other building systems shall be applied to enhance the work environment and to support a sustainable design objective. Design spaces to reduce energy and materials consumption.

Floor-to-Floor Heights
The standard floor-to-floor, or slab-to-slab, dimension for multistory courthouses shall be 14' to 16'. Refer to section 2.D, Chapter 2 (Courthouse Organization), for requirements for relative building volume.

Balance the needs for security with openness, transparency, and natural light.

Provide a quality work environment that is conducive to and suitable for performing the required tasks of the building occupants.

Plenum Spaces
Provide space above all finish ceiling areas for the HVAC supply and return distribution, electrical distribution, mechanical equipment, fire sprinkler systems, voice, data, low-voltage cable, and other devices. Size plenum spaces to allow for future modification of these systems.

Coordinate the size, access, and clearance requirements of systems located in plenum spaces with the depth of structural elements to allow required clearances for all systems to all parts of the building.

Provide access to all plenum spaces for servicing all components. Provide access to plenum spaces above courtrooms for maintenance of utilities and to allow modification to cabling and outlets, which serve the floor above.

Interior Partitions
The minimum standard for steel studs in multilayered gypsum wallboard assemblies is 20 gauge unless a lighter gauge is required for acoustical reasons. Comply with manufacturer's recommended criteria for deflection and span with interior pressure loading based on tested industry standards. Provide fire and/or smoke rated interior partitions, where required, in accordance with accepted industry standard tested assemblies and approved manufacturer's designs for assemblies satisfying the test criteria.

Provide a system of concealed, permanent, secure, and appropriately designed backing, supports, and anchorages for all handrails, wall-hung cabinets, court seals, and other surface-mounted fixtures, equipment, systems, and building specialties.

Provide corner guards where required.

Refer to Chapter 19 (Acoustical Criteria) for additional partition requirements.

Ceilings
Ceilings are an important visual feature of building interiors, and shall be designed for optimal visual, lighting, and acoustical performance. Refer to Chapters 16 (Lighting Criteria) and 19 (Acoustical Criteria). Courtroom ceilings shall have design attention equal to the vertical elevations of the room, but shall not distract attention from the proceedings. Integrate required technical features with the use of ceiling soffits, coffers, and materials to accommodate acoustical material, lighting, sprinklers, speakers, cameras, projectors, and projection screens.

Design ceilings of Judicial officer offices and conference rooms to present a quality appearance and to integrate acoustic panels and lighting.

Public and Private Toilet Rooms

Public toilet rooms are heavily used and require durable, washable, and easily maintained materials and finishes. For high-volume public restroom entries, consider the use of doorless vestibules with integrated sound and visual screening. Minimum finishes include coved ceramic tile floors; glazed ceramic tile wall surfaces up to a minimum 4' wainscot height; solid-surface countertops; undercounter-mounted lavatories; stainless steel or monolithic plastic floor-mounted or ceiling-hung-and braced institutional-quality toilet stall dividers and doors and wall-hung urinal screens; institutional-quality toilet fixtures; institutional-quality stainless steel toilet accessories; wall-mounted mirrors behind the lavatory tops; diaper-changing table in each restroom; gender-specific fixtures; and semigloss-painted washable wall and ceiling surfaces. Monolithic sealed stone surfaces are also an acceptable finish for countertops, but materials requiring a multitude of joints (i.e., ceramic tile) are not, due to the ongoing maintenance implications of cleaning surfaces with joints.

Provide toilet accessories in a noncorrosive durable material (such as stainless steel) that are readily serviceable and consistent with the building design.

Provide one shower/changing area (for each gender) in a staff toilet room off the private corridor on the first floor or lower level of the building. The dressing area shall have wall-mounted hooks.

Elevators

If the project contains more than one floor or level change, the building shall include vertical conveyance systems. Courthouses typically require three elevator systems: public, private (staff), and detention (in-custody defendants). Public and staff elevators shall have a recommended interval of 45–50 seconds (wait time of 26–32 seconds) and a handling capacity of 15 percent of the building population served. All passenger elevators must meet the design requirements of the building code for access by persons with disabilities and emergency personnel. If high-volume areas are located at any other level than the first, provide extra capacity to move large numbers of people to and from that level.

If the project contains more than one floor or level change, a shared or dedicated elevator for staff, freight, and service is required for deliveries, staff vertical movement, trash transport, document transport, and building maintenance. Staff elevators can double as a freight/service elevator in smaller courthouses, but in larger court buildings, a dedicated service elevator is preferred with its own vestibule on every floor. As required by code, at least one building elevator should be large enough to accommodate a paramedic's stretcher, and this may be the service elevator in buildings with a dedicated service elevator. In-custody elevators may require an independent control system if their operation is remotely controlled from the central holding control room.

Hydraulic elevators are permitted for two- or three-story facilities, but machine-room-less elevators are preferred. Facilities that are four stories or taller shall have traction elevators.

Passenger elevator car interiors shall have durable and vandal-resistant finish materials consistent with the building design. Cab wall and ceiling panels shall be replaceable. One cab in the building shall have the capacity to accommodate extra-long deliveries such as rolls of carpet, and this may be the service elevator cab. A typical car interior ceiling height is 9'-0" to 10'-0".

Stairs

Provide convenient stairs that encourage walking to other floors in support of the sustainable design objective by reducing demand on the elevator systems. Communicating stairs can be provided in both the public areas and the private circulation system. Required exit stairs may be designed to encourage use by staff for normal circulation, with materials and finishes similar to the private corridors and introduction of natural lighting, when appropriate.

Provide a public connecting stair to access high-volume public uses on the second and third floors of courthouses, in addition to elevator access. Design and finish open stairways that connect public lobbies to the upper floors in harmony with materials used in the public lobby. Pre-engineered steel stair and railing systems are acceptable for exit and communicating stairs (not for ceremonial high-volume public stairs). Stair treads and intermediate landings shall be pan-type filled with concrete or terrazzo, or have dimensional stone paving; channel or flat plate stair stringers are acceptable. Provide architectural railings for communicating stairs; a manufacturer's standard railing system might be adaptable for this purpose.

Doors Frames and Hardware

Provide one-piece, welded steel door frames at permanent locations requiring oversized or heavy doors or having significant traffic, including courtrooms.

Provide prefinished aluminum door frames in partitions subject to periodic remodeling. Tempered glass full-height 12" to 18" wide

Integrated Interior Design

The design professional shall select, integrate, and coordinate the size, color, style, and finishes of movable furniture and equipment with the other interior elements.

sidelights or glazed doors may be provided at private offices and conference rooms, except in judicial chambers, jury deliberation rooms, and offices that require privacy.

Provide flush solid core doors for typical interior conditions where allowed by fire codes. Door construction shall meet or exceed AWI premium grade for courtrooms; custom grade for chambers suite offices, department entrances, and private offices; and paint grade for all other doors. Courtroom public entrances may have stile and rail doors with glass vision panels. Courtroom entry doors may have vision panels allowing a view into the courtroom, but the courtroom vestibule doors off the public corridor should be solid.

All hardware provided shall be institutional grade. Pins and hinges on all doors located on corridors, lobbies, atriums, and other public spaces shall be installed on the secure side of the door or shall be fixed. Latch and locksets shall be full mortised type; locks shall have removable key cylinders. Locks shall be grand-mastered and master-keyed. Provide multiple keys for every lock type. Certain locks off-master shall be specified. Hardware specified for courtroom use shall be of the highest quality and shall be selected for quiet, acoustically optimal operation. Selected doors require electric locksets or strikes and proximity reader card key locking systems.

Courtroom Platforms

Raised platforms in courtrooms shall be of a construction method not requiring underfloor fire sprinklers. Handrails, if required at stairs and/or ramps, shall be discreet and integrated into courtroom design.

Flooring

Carpet: Consistent with the expected functional lifetime, select carpet that is durable and low maintenance, and with 20 percent minimum recycled content. Specify carpet appropriate to the traffic expected in the space. Courtrooms and offices are to be (midgrade) minimum 26 oz. to 28 oz. loop pile and minimum 1/10 gauge; chambers are to be (premium) minimum 28 oz. and minimum 1/10 gauge and may be cut pile. Specify nylon, olefin, or polyester products for durability with three- or four-ply yarn. Loop pile is to be solution-dyed nylon. Hybrid carpet systems with attached pad may be used. Specify a carpet available in broadloom and carpet tiles to facilitate replacement. Broadloom shall be minimum 12' wide to minimize seams. Carpet tiles may be standard 24" square, but larger tiles are preferable for their improved tendency to remain in place. For higher acoustic values, specify urethane-backed tile or urethane cushion on broadloom. Products must meet the Carpet and Rug Institute standards for indoor air quality. Carpet on ramps or courtroom platforms shall meet wheelchair access requirements.

Impervious Flooring: Public corridors and lobbies carrying significant foot traffic and providing major circulation pathways throughout the building shall have extremely durable, slip-resistant materials that require low maintenance.

Window Coverings

Provide window coverings appropriate for visual screening, glare control, and use in work areas and courtrooms. Courtrooms with skylights, windows, or borrowed light require window coverings to prevent glare and visual distractions, and to allow light control during audiovisual presentations. Consider the method of operation for window coverings in terms of its appropriateness for the function of a space. Manually operated shades may be acceptable for private offices and open office work areas, but not public corridors and lobbies. Synchronized, motorized shades are appropriate for courtrooms and larger jury assembly spaces. Consider the exterior image of building when selecting the color and materials of window coverings, to provide an image consistent with interior and exterior design intent.

Modular Furniture and Workstations

Modular systems furniture (MSF) is composed of freestanding partition panels,

worktops, files, components, and integrated circuitry and access raceways for provision of electrical power, voice, and data cabling. The building shall be designed to allow for flexible rearrangement of MSF and connection to building systems. The electrical, telecommunications, data systems, and capacities must be designed to ensure compatibility with MSF design requirements.

High-Density Files
Where required, provide a mobile high-density filing system. Locate on ground floor or adequately reinforced floor structure, near the clerk's counter. Coordinate high-density filing systems with building structure for distribution of gravity loads and seismic bracing requirements as a function of the height and configuration of the system. Specify fixed rows for every six movable rows or as determined by AOC to allow access to multiple rows of files. Provide a locking feature for confidential files. Specify seven-shelf-high cars. Filing system shall be accessible to persons with disabilities, and shall be coordinated with structural slab depressions so that base of filing system is flush with adjacent finish floor elevation.

State Seal
Provide the official seal of the State of California in each courtroom, in metal or composite material, with a minimum size of 32" diameter. The appearance and location must reflect the dignity of the court.

Flagpoles
Provide two flagpoles and holders in each courtroom, to accommodate a State of California flag and a United States flag. Flagpoles may be wall or floor mounted. Location shall not interfere with bench accessibility.

Interior Finishes and Materials

The Facilities Standards specify four levels of interior architectural finishes corresponding to the component's target functional lifetime, required use, architectural importance, durability requirements, and surrounding interior context. Brief descriptions of example interior finish levels are provided below for reference; however, the design professionals shall propose finishes for each project. See Table 11.1 for suggested finishes for the four levels.

- Level I Interior Finishes: Specified for building components with long functional lifetimes and high aesthetic importance. Level I finishes have quality, long-term durability, ease of maintenance, and ability to sustain aesthetic appeal over a long period.
- Level II Interior Finishes: Specified for high-volume public service areas with midrange functional lifetimes and increased architectural importance. Level II finishes offer midrange durability, yet require regular maintenance and refurbishment, such as occasional repainting.
- Level III Interior Finishes: Specified for building components with midrange functional lifetimes and moderate architectural importance, yet require regular repair, maintenance, and refurbishment, such as repainting.
- Level IV Finishes: Specified for building components that may have long functional lifetimes. These are typically utility or support areas that have relatively low architectural importance. Level IV finishes are durable and maintainable.

Architectural Woodwork for Courtrooms

Provide premium wood paneling and casework to convey a dignified appearance.

Veneer Panels and Casework
Provide hardwood veneer panels with solid hardwood trim and edge banding, with shop-applied stain and finish with three coats of transparent sealer per Architectural

Table 11.1 Notes

Arraignment courts may have combination of carpet and hard surface flooring. Hard surface flooring might be appropriate under spectator bench seating.

Painting and gypsum board are appropriate above wainscot level in corridors and in combination with other materials in courtrooms. Painted gypsum board would be standard above tile in toilet room walls.

Table 11.1 Finish Matrix

	FLOOR						WALLS						CEILING					METAL	
	Premium Carpet	Stone Tile or Terrazzo	Midgrade Carpet	Ceramic Tile	VCT/Linoleum	Sealed Concrete	Paneling (Wood or Stone)	Premium Acoustical Wall Panels	Ceramic Tile	Painted Gypsum Board	Premium Base (Wood or Stone)	Rubber Base	Architectural Soffits	Premium Acoustical Panels	Midgrade Acoustical Panels	Painted Gypsum Board	Exposed Structure	Premium Clear Coated Metal	Painted Metal or Stainless Steel
Level I																			
Courtroom 1, 2	•	•	•		•		•	•	•	•	•		•	•		•		•	•
Public Lobby		•					•			•	•		•	•		•		•	•
Public Corridor		•	•	•	•		•			•	•		•	•		•		•	•
Public Restroom				•			•		•	•	•					•			•
Level II																			
Jury Assembly Room			•							•	•	•	•	•	•	•			•
Clerk's Public Counter		•	•							•	•		•	•	•	•			•
Self-Help Center		•	•							•	•		•	•	•	•			•
Child Waiting Area			•	•						•	•	•	•	•	•	•			•
Level III																			
Judicial Officer Private Office	•		•							•	•		•	•					•
Staff Office/Workstation			•							•		•			•				•
Jury Deliberation Room			•							•		•			•				•
Conference Room			•							•		•	•	•					•
Employee Breakroom					•					•		•			•				•
Staff Toilet				•	•				•	•					•				
Restricted Corridor			•							•		•			•				•
Restricted Communicating Stair			•	•	•	•				•		•				•			•
Copy Room					•					•		•			•				•
Level IV																			
Loading Dock						•						•					•		
Emergency Egress Stair						•						•					•		
Mechanical Rooms						•						•					•		
Telecom Equipment Room						•						•					•		
Storage					•	•				•		•				•	•		
Janitor Closets					•	•						•					•		

Woodwork Institute (AWI) premium-grade requirements. Wood shall be from a certified sustainable source. The use of nonsustainable tropical hardwoods is prohibited. Solid wood base to match courtroom panels may be used in public spaces and chambers. Courtroom built-in components may include judge's bench; courtroom clerk's, court reporter's, and court security officer's stations; jury box; public bench seating; counsel tables, rails, and gates; and accessible lectern. (Note: bench seating, counsel tables, and lectern may be standard furniture customized to match courtroom finish.)

All other courtroom desktop work surfaces, whether modular or custom-built, shall be wood or plastic laminate.

Cabinets and Casework
Provide (minimum) AWI premium-grade plastic laminate casework with ADA-compliant base cabinets and plastic laminate tops.

11.E SIGNAGE

Clear, legible, and strategically placed graphics and signage are essential design elements for a court facility. Signage directs visitors and staff to where they need to go, and contributes to a positive experience in the courthouse, by orienting users and minimizing confusion. The many functions and high volume of daily users in the facility underscore the need for a successful signage program. An integrated, complementary, and comprehensive signage program shall address both code-required signage (such as exit signs, exiting plans, and room numbers) and non-code-required signage (building directories, notices). The graphics and signage programs shall be developed during early design stages to integrate signage with the design concept, functional program, and building circulation zones. Attractive, legible signs showing directions and information shall be incorporated into the design of all public areas. Locations for uniform static signage vs. dynamic signage should be considered in the early design stages and based on precedents such as completed well-functioning court projects. Additionally, electronic displays of graphic information offer an orderly and flexible solution for the changing needs of certain spaces.

All signage must meet the requirements of the Americans With Disabilities Act and the most recently adopted provisions of the Uniform Building Code and CCR, title 24, regarding accessibility. Provide prominent multilingual posting of public notices and informational material.

Number rooms logically and consecutively to enable visually impaired persons to make assumptions about where their destination is located. Public room numbers shall be sequential and predictable. Base courtroom labels on a predictable sequence, not the internal administrative department labels. For example, a second-floor courtroom shall be labeled Courtroom 200 or Room 200, not Division 200.

Position room label signage at doorways, where sight-impaired persons expect to find information. Locate signage of building management rooms, which are not accessible to the public, in different areas than accessible signage. For example, locate electrical closet room numbers above the door, rather than to the side. Signs that designate permanent rooms or spaces must comply with the highest standards of the ADA.

The following guidelines shall apply to signage and graphics in various locations within the building.

Building Entry

Clearly mark the courthouse entrance with signs indicating that all persons and articles entering the facility are subject to search, that no weapons of any kind are allowed within the facility or on the grounds of the facility, and that violators are subject to fine and arrest.

Restrict all other signage at entry to preserve a unified and attractive façade.

Signage

Grouping too many signs in one place, at entries, in lobbies, and in corridors, is unsightly, results in confusion among first-time visitors, and undermines the dignity of the judicial system.

Maintain brief, clear, and polite messages in signage.

The signs at entry must include state or superior court seal, court name, address, accessible symbol, and hours of operation. If some functions, such as traffic payment windows, are located before the screening area, provide directional signage.

Building Directory

Locate a building directory near the main public entrance. The directory shall contain a diagram listing all major building components. This directory shall be located in an area seen by the public after they have been screened, and may be integrated into an information booth or kiosk. Provide smaller directories at each elevator lobby with information about various occupancies on that floor. Provide a directory before security screening if there are functions located outside the screening area. Consideration should be given to locating calendars (prescreening) to relieve anxiety.

Court Calendar Postings

Provide a display of calendar information in the entry lobby so information can be viewed before the screening process. Larger courts shall provide wide-screen digital monitors; smaller courts may use other means of information display. Calendar information may be displayed at courtroom entries. This display shall be uniform in appearance; postings shall be limited to the display area. Electronic calendars should be standard practice at entries and courtrooms.

Public Notice Boards

A consistent, controlled system of freestanding or wall-mounted notice boards shall be used throughout the facility to allow public postings. All computer-generated signs, handwritten signs, and notices will be restricted to these areas. Provide public notice boards in consistent, public locations to prevent staff from taping signs to walls. Design of these places for temporary information should be integrated architecturally with the overall interior space.

Courtroom Entry Signage

All signs outside courtroom doors shall be of uniform appearance and integrated with calendar information displays. The courtroom numbering system shall be displayed at the top and in the largest font size where possible, though ADA requirements take precedent. The judge's name shall be below, in a sign allowing nameplate modifications. Architects/engineers shall consider displaying the names of the judges as part of the electronic display. All other signage will be posted on a notice board below, according to the needs of the court. Consideration should be given to creating a display panel that will allow paper inserts—easily printed by the court. No signage shall appear on courtroom doors except as noted. The design consultant shall work with court representatives to minimize signage.

Examples of court-specific entry signage include (could be displayed electronically):

- "Calendar Postings"
- "Jurors and Witnesses Please Remain in Hallway Until Called"
- "Before Entering With Children, Please See Court Staff"
- "Closed Hearing"
- "No Cell Phones or Beepers, Please"

Courtroom Signage

Provide a consistent, controlled signage system within the courtroom to prevent individual postings by court personnel.

Examples of court-specific signage include:

- "No Communication with Inmates." This sign shall be posted on the cage inside the courtroom facing the audience or be located in an area seen by the public after they have an audience.
- Jury seat numbering
- Courtroom conduct
- Typical questions for jurors

Other Signage Considerations

Provide a consistent, controlled system of other signs, such as restricted access warnings, directional signs, signs designating services for persons with disabilities, and procedural guides. If high-volume functions, such as the jury assembly room and the public counter, are not immediately visible from the entry lobby, clearly displayed graphics shall be prominently displayed to guide users to these areas.

Ideally, signs should use English and pictograms to establish consistency across all courts, yet it is suggested that a discussion should take place early on with the court and the AOC team to determine if bilingual signs are appropriate.

12 STRUCTURAL CRITERIA

Sacramento Juvenile Court
Sacramento, CA
DLR Group

WHITTAKER PHOTOGRAPHY

Structural design goals for new trial courts facilities shall reflect functional and programmatic needs, adaptability for future technology, and the ability to withstand potential damage and to minimize impact on disruption of building services and operations from disasters and rare events.

The AOC shall determine the regional importance and any performance objectives above code expectations for all new facilities.

This chapter describes general and technical criteria for structural systems in new AOC buildings.

12.A OBJECTIVES

Serviceability

The structure shall provide support for the intended occupancies, including floors of adequate level and flatness, stiffness, and vibration control from environmental and internal sources.

Adaptability

The structure shall be adaptable to local changes of use and occupancy or the installation of new information technology or mechanical, electrical, and plumbing systems due to changing technology. Adaptability features include gravity systems with capacity to accommodate most nonspecialized courthouse occupancies, those that enable local strengthening, and those that facilitate additional floor and wall penetrations.

Performance in Rare Events

Most AOC facilities incorporate specialized features that will not allow relocation to alternative spaces without considerable preparation and alteration. Therefore, it is important to estimate the nature of damage that could be caused by rare, but possible events such as high wind, extreme snow, flood, and earthquake, and the possibility the building will not be available for occupancy for an extended length of time.

12.B STRUCTURAL SYSTEMS

There are no specific limitations on use of gravity and lateral load resisting structural systems other than as prescribed by the state building codes. The structural engineer shall submit written documentation to the architect describing how the recommended gravity load and lateral load system will respond to the performance objectives.

New Technology

Structural components and systems not specifically covered by the applicable code are permitted for use as alternate means of compliance. Criteria for such components or systems shall be reviewed by one or more peer reviewers acceptable to the engineer of record and AOC, and shall be submitted to AOC for approval.

12.C CRITERIA FOR SERVICE LOADS

The following criteria and performance goals shall apply to courts facilities.

Gravity Loads

The court facilities shall be designed for the maximum expected loads but shall in no case be less than the minimum uniformly distributed unit live load of 80 psf, plus other appropriate superimposed dead loads and self-weight of the structure. The live load shall be based on the use and room occupancy of the building area under consideration inclusive of movable partitions. The superimposed dead load shall include ceilings, mechanical/electrical equipment, plumbing, raised floors, ramps, platform assemblies, built-in partitions, finishes, cladding, etc. Areas that require heavier loading, such as libraries, storage areas, computer or communications rooms, and mechanical rooms, shall also be considered in the gravity floor design. Live load reductions shall not be used for horizontal framing components on each floor, transfer girders for columns, or columns supporting the roof or top floor.

High-Density Files

Areas that support high-density files shall be designed for the maximum expected loads with a minimum uniformly distributed unit live load of 150 psf for floors that support fixed file stacks and 250 psf for floors that support movable file stacks.

Effective Seismic Weight

The effective seismic weight of a structure shall include the dead loads and shall consider the special live loads as specified in ASCE 7-05 Section 12.7 (ASCE, 2006). In areas used for storage, a minimum of 25 percent of the floor live load shall be included. Where the inclusion of storage loads adds no more than 5 percent to the effective seismic weight at that level, it need not be included in the effective seismic weight. For partitions, the actual partition weight or a minimum weight of 10 psf of floor area shall be used in the calculation of seismic mass.

Floor Vibration—Human Comfort

Floors shall be designed to limit the floor acceleration by controlling floor vibration from footfall to achieve acceptable human comfort performance levels. The following recommended criteria are based on the dynamic response of floor systems to walking excitation. The acceleration limits are based on the AISC Design Guide 11 (AISC, 2003). The floor system shall be considered satisfied if the peak acceleration, a_p, due to walking excitation as a fraction of the acceleration of gravity, g, does not exceed the acceleration limit, a_0/g, for the appropriate room occupancies as shown in Table 12.1.

Floor Vibration—Equipment

Vibration from reciprocating equipment will be controlled locally by isolation under the direction of others, such as the mechanical engineer, acoustical consultant, or equipment supplier. The structural engineer shall confirm with the architect that there are no special requirements for the structure intended to minimize vibrations in the structure from sources other than footfall.

Table 12.1 Human Comfort Performance Levels
Floor Vibration Acceptance Criteria (AISC, 2003) Recommended Values of Parameters and a_0/g Limits

BUILDING OCCUPANCY	CONSTANT FORCE, P_0	DAMPING RATIO, β	ACCELERATION LIMIT, a_0/g x 100%	QUALITATIVE PERFORMANCE LEVEL
Typical, UNO	65 lb	0.05	0.5%	Slightly Perceptible
Courtroom	65 lb	0.05	0.5%	Slightly Perceptible
Jury Assembly	65 lb	0.05	0.5%	Slightly Perceptible
Offices	65 lb	0.05	0.5%	Slightly Perceptible
General Assembly	65 lb	0.02	1.5%	Distinctly Perceptible
Corridors	65 lb	0.02	1.5%	Distinctly Perceptible
Monumental Stair	92 lb	0.01	1.5%	Distinctly Perceptible
Footbridge—Indoor	92 lb	0.01	1.5%	Distinctly Perceptible
Footbridge—Outdoor	92 lb	0.01	5.0%	Strongly Perceptible

Notes: Peak acceleration, a_p, due to walking excitation:

$$\frac{a_p}{g} = \frac{P_0 \exp(-.35 f_n)}{\beta W}$$

P_0 = Constant force representing the excitation.

f_n = Fundamental natural frequency of a beam or joist panel, a girder panel, or a combined panel, as applicable, modal damping ratio, and effective weight supported by the beam or joist panel, girder panel, or combined panel, as applicable.

β = Modal damping ratio.

W = Effective weight supported by the beam or joist panel, girder panel, or combined panel, as applicable.

LCCA is a useful indicator in evaluating return on investment of design alternatives over a 25-year or greater useful life of the facility and identifies cost alternatives.

ASCE = American Society of Civil Engineers

MCE = Maximum Considered Earthquake

PSHA = Probabilistic Seismic Hazard Analysis

DSHA = Deterministic Seismic Hazard Analysis

DE = Design Earthquake

NSC = Nonstructural Seismic Coordinator

12.D CRITERIA FOR RARE LOADS

Earthquake

The normal seismic performance of all new AOC facilities is intended to be above average for buildings designed in accordance with prescriptive code provisions. This will be achieved through design and quality assurance.

The AOC will designate specific buildings to be designed for enhanced seismic performance. Enhanced performance refers to controlling earthquake damage to a building in order to limit the expected loss of use.

Site-Specific Seismic Ground Motions
Site-specific seismic ground motions shall be considered in developing earthquake hazard design criteria for the project site in comparison with mapped CBC design spectra. Site-specific ground motions shall be determined as required by ASCE 7-05 Chapters 11 and 21. A maximum considered earthquake (MCE) response spectrum shall be developed accounting for the subsurface site conditions, expected recurrence rates and magnitudes of earthquakes, and other geological, geotechnical, and seismological characteristics of the site through probabilistic seismic hazard analysis (PSHA) and deterministic seismic hazard analysis (DSHA). The design earthquake (DE) response spectrum shall be developed based on the MCE response spectrum and subsurface site class.

Normal Seismic Performance, Structural
Normal structural seismic performance objectives will be met by thorough conformance with the principles and provisions of the applicable code using either mapped seismic acceleration parameters required by ASCE 7-05 Chapter 11 or site-specific seismic ground motions above. The Importance Factor, I, shall be determined based on the Occupancy Category, or as specified by AOC. In determining the Occupancy Category in accordance with the CBC, the court building shall not be considered to contain "jails and detention facilities" occupancy.

Normal Seismic Performance, Nonstructural Components
Acceptable performance of nonstructural components and systems shall be achieved by implementing code requirements during design and construction phases. An Importance Factor of 1.0 shall be used, except where higher values are required by the applicable code. An Importance Factor of 1.5 shall be used for all CBC Occupancy Categories in the design of "life safety" components to be required to be functional after an earthquake, including fire protection sprinkler systems and hazardous materials.

Enhanced Seismic Performance, Structural
During preliminary design, the structural engineer shall develop detailed seismic criteria to meet AOC seismic performance goals. Analysis and design methods shall explicitly account for nonlinear behavior of the designated lateral force resisting system members using site-specific ground motion design criteria (for example, as described in ASCE 41-06, *Seismic Rehabilitation of Existing Buildings*). The AOC will review and approve the seismic design criteria and may appoint an independent peer reviewer to review the criteria.

Enhanced Seismic Performance, Nonstructural Components
Acceptable performance of nonstructural components and systems shall be achieved by implementing code requirements during design and construction phases. An Importance Factor of 1.5 shall be used.

Nonstructural Seismic Coordinator (NSC)
For each project, AOC shall designate an NSC, knowledgeable and experienced in the seismic protection of nonstructural components and systems. The NSC may be in the firm of the project architect or project structural engineer, or may be an independent design or construction professional. The NSC shall review and coordinate provisions in the construction documents that provide for seismic protection of nonstructural components as required by code.

The NSC shall ensure that the construction documents contain provisions for protection, such as anchorage or bracing, that are clear, coordinated, and practical to implement. During construction, the NSC shall monitor the project to ensure compliance with seismic protection requirements and report noncompliance to AOC.

In addition, the NSC shall identify equipment critical to continued building function and occupancy, as specified by the applicable code or AOC. The AOC shall determine requirements for prequalification of such equipment.

Blast

See Chapter 4 (Courthouse Security) for blast criteria.

Wind

Wind design shall be in accordance with applicable codes, unless otherwise specified by AOC. Because of enhanced performance objectives or siting conditions, AOC may select certain buildings for site-specific wind studies. This analysis will determine design parameters for the structural system, exterior cladding, roof systems, ornamentation, and pedestrian-level wind environment. Wind analysis and modeling shall be based on local climate, wind environment, and orientation of critical wind direction in compliance with ASCE 7-05 (2003) provisions.

Snow

Parameters for design for snow loading shall be in accordance with requirements of the jurisdiction having authority.

12.E LIFE CYCLE COST ANALYSIS

Objectives

Selection of building components, materials, and structural systems must consider long-term capital cost impacts of estimated losses resulting from expected earthquakes and other rare and damaging events. Loss estimates shall be evaluated using life cycle cost analysis (LCCA). AOC will consider analysis estimates in determining acceptability of design alternatives along with other factors.

Methodologies and Standards

Established and standardized life cycle cost analysis methodologies shall be utilized in evaluating and estimating project cost impacts to maintain consistency over time applied to AOC facilities. The LCCA methodology should be able to synthesize hazards, fragilities, and consequences to provide measurable and useful estimates of capital losses and impacts due to business interruption. The LCCA should be able to estimate benefit-cost analysis and return on investment for design options and alternatives. The LCCA should be based on known and established methods and techniques, including simulations to estimate probable losses at various confidence levels for individual event scenarios or over a considered time frame. Seismic risk assessments should be developed using tools that have been validated for intended use with due consideration in the interpretation of results based on limitations of programs, methodologies, assumptions, and variables. Available programs and tools include HAZUS (FEMA), PACT (ATC-58), or other equivalent tools.

Seismic Hazard Risk Assessment

In estimating losses from expected earthquakes, the LCCA shall be based on probabilistic performance-based seismic hazard risk assessments. The LCCA should consider losses due to the following:

- Structural damage
- Nonstructural damage
- Damage to building contents
- Disruption of building functions—loss of use
- Long-term environmental impacts

Estimates of return on investment and benefit-cost ratios may be utilized to provide relative comparisons of alternative options with respect to a baseline option. Project cost estimation should be used to establish the baseline option costs with respect to alternative option(s) costs in evaluating design options in the LCCA. During early design phases, consideration should be given to evaluating various options using LCCA. Comparative results should be used to evaluate overall cost impacts and architectural trade-offs resulting in consideration of various structural system configurations and options. These may include comparisons such as normal vs. enhanced seismic performance objectives, use of moment frames vs. braced frames, impact of column size on floor plan and program, impact of beam depth on typical floor-to-floor height, and steel vs. concrete construction alternatives.

Environmental Impacts

Sustainable design strategies (see section 1.B) shall also utilize life cycle cost analysis to assess relative environmental impacts of selected structural system options and alternatives. LCCA is a useful tool in determining lowest-cost structural system alternatives in the consideration and implementation of "state-of-the-practice" sustainable and environmental design principles. For structural systems, analysis is emphasized for "embodied energy," or the life cycle raw material extraction, transport, manufacture, assembly, installation, disassembly, and deconstruction and/or decomposition that make up the base building's materials.

13 MECHANICAL CRITERIA

Morgan Hill Courthouse
Morgan Hill, CA
RossDrulisCusenbery Architecture

RIEN VAN RIJTHOVEN ARCHITECTURAL PHOTOGRAPHY

This chapter identifies the program and criteria for heating, ventilating, and air-conditioning (HVAC) and plumbing and piping systems.

Maintainability and reliability are essential requirements of AOC in facility operations. Systems shall have above-average reliability over the 25-year life span.

13.A OBJECTIVES

Design mechanical systems to meet building performance objectives, including performance, sustainability, and energy conservation; maintenance and reliability; and flexibility for changes.

Performance

The design solutions shall not sacrifice the basic needs of one program area to optimize another. Instead, the mechanical designs must optimize the program to ensure attainment of all critical performance goals.

Sustainability and Energy Conservation

The design of mechanical systems shall combine with other component design to produce a building that meets the project's programmed sustainability and energy efficiency goals, as referenced in Chapter 1 (General Principles).

Maintenance and Reliability

Maintainability and reliability are essential requirements of AOC in facility operations. The design and installation of all mechanical equipment shall allow sufficient space for removal and replacement of components, including major equipment such as boilers, chillers, cooling towers, pumps, motors, building automation controllers, fire life safety dampers, and air-handling equipment. Systems shall have above-average reliability over the 25-year life span.

Flexibility for Change

Design systems to provide optimum flexibility in scheduling the use of all principal spaces in the court building.

Standby Capacity

Standby capacity shall be designed into mechanical systems, enabling continuous operation during repair or replacement of a failed piece of equipment or components. Standby units shall not be redundant equipment but sized at half design capacity and used in multiples of two, and used as part of the operating system with equal time cycling through automatic control sequencing. Standby capacity is mandated only in the case of critical systems and associated equipment identified as critical to the life safety and communication systems in the building program. For example, depending on size of the MDF room (specifically for medium and large courthouse projects), consider using coolant distribution units (CDUs)—server-rack-mounted cooling units. This will reduce the physical size of an airside cooling solution, which will also reduce impact on the environment outside the room: acoustic impact, congestion above-ceiling, or valuable floor space for floor-mounted computer room air-conditioning (CRAC) units.

13.B HVAC CRITERIA

Indoor Design Conditions

See Table 13.1 for requirements.

Temperature Control Zone

Interior control zones shall not exceed 1,500 gross sq. ft. for open areas, or a maximum of three enclosed offices. Perimeter zones shall not exceed 400 gross sq. ft., or a maximum of two enclosed offices. Corner offices shall be independent zones. Provide independent zones for each courtroom, chambers suite, jury deliberation room, entrance lobby, mailroom, staff lounge, conference room, atrium, child waiting area, and equipment rooms.

Air Distribution

Based on size and complexity of the building, air distribution systems will be semi-custom air-handling units (AHU) or custom-designed, built-up central air-handling systems, with the decision based on the LCCA and whole building cost analysis. Blow-through type AHUs are preferred.

Table 13.1 Indoor Design Conditions

ROOM TYPE	HEATING TEMP	COOLING TEMP	OCCUPANT DENSITY	LIGHTING DENSITY	POWER DENSITY	AIRFLOW
Lobby	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	33 ft²/ person	1.9 W/ft²	0.5 W/ft²	5 CFM/person +0.06 CFM/ft²
Offices	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	150 ft²/ person	1.1 W/ft²	2.5 W/ft²	5 CFM/person +0.06 CFM/ft²
Jury Services	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	32 ft²/ person	1.4 W/ft²	1.0 W/ft²	5 CFM/person +0.06 CFM/ft²
Hearing Rooms	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	26 ft²/ person	1.1 W/ft²	0.5 W/ft²	5 CFM/person +0.06 CFM/ft²
Judicial Chambers	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	150 ft²/ person	1.1 W/ft²	0.5 W/ft²	5 CFM/person +0.06 CFM/ft²
Break Rooms	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	20 ft²/ person	1.1 W/ft²	1.1 W/ft²	5 CFM/person +0.06 CFM/ft²
IDF Rooms	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	150 ft²/ person	1.1 W/ft²	TBD	5 CFM/person +0.06 CFM/ft²
Waiting Rooms	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	33 ft²/ person	1.4 W/ft²	0.5 W/ft²	5 CFM/person +0.06 CFM/ft²
Public Gallery/ Passage	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	50 ft²/ person	1.1 W/ft²	0.5 W/ft²	5 CFM/person +0.06 CFM/ft²
Parking Garage	—	—	—	—	—	Exhaust 0.75 CFM/ft²
Public Toilet Rooms[1]	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	200 ft²/ person	1.1 W/ft²	1.1 W/ft²	Exhaust 70 CFM/fixture
Mechanical Rooms	—	Ventilated	200 ft²/ person	1.1 W/ft²	1.1 W/ft²	5 CFM/person +0.06 CFM/ft²
Holding Cell with Toilet[1]	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	40 ft²/ person	0.9 W/ft²	—	5 CFM/person +0.06 CFM/ft²
Transformer/ Switchgear Room	68°F ± 2°F	95°F ± 5°F, or as required by utility co.	—	—	—	—
Telephone Equipment Room	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	200 ft²/ person	—	50 W/ft²	5 CFM/person +0.06 CFM/ft²
Janitor Closets[1]	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	200 ft²/ person	—	—	5 CFM/person +0.06 CFM/ft²
Basement Holding[1]	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	40 ft²/ person	1.1 W/ft²	—	5 CFM/person +0.12 CFM/ft²
Copy Rooms	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	200 ft²/ person	1.1 W/ft²	20 W/ft²	Exhaust 1.0 CFM/ft²
Day Care	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	40 ft²/ person	1.1 W/ft²	1.5 W/ft²	5 CFM/person +0.18 CFM/ft²
Storage	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	200 ft²/ person	0.5 W/ft²	0.5 W/ft²	5 CFM/person +0.12 CFM/ft²

1. 100% OA–once through air only

Table 13.1 continues on next page

Important References

ASHRAE 62.1

ASHRAE 90.1

NEC = National Electrical Code

NFPA = National Fire Protection Association

SMACNA = Sheet Metal and Air Conditioning Contractors National Association

Table 13.1 Indoor Design Conditions *continued*

ROOM TYPE	HEATING TEMP	COOLING TEMP	OCCUPANT DENSITY	LIGHTING DENSITY	POWER DENSITY	AIRFLOW
Courtrooms						
Standard Criminal	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	18 ft²/person or (# fixed seats)	1.6 W/ft²	0.5 W/ft²	5 CFM/person +0.06 CFM/ft²
Probate	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	21 ft²/person or (# fixed seats)	1.6 W/ft²	0.5 W/ft²	5 CFM/person +0.06 CFM/ft²
Family	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	21 ft²/person or (# fixed seats)	1.6 W/ft²	0.5 W/ft²	5 CFM/person +0.06 CFM/ft²
Double-Jury Criminal	72°F ± 2°F	75°F ± 2°F 50% ± 5% RH	14 ft²/person or (# fixed seats)	1.6 W/ft²	0.5 W/ft²	5 CFM/person +0.06 CFM/ft²

AHUs provide flexible zone control through use of multiple smaller units. AHU casing construction details are included in Tables 13.1 and 13.2. Central systems will incorporate components similar in quality to those in Tables 13.1 and 13.2.

Design air ventilation rates shall comply with latest adopted version of ASHRAE 62.1 (Indoor Air Quality Standards). Demand control ventilation (DCV) utilizing carbon dioxide (CO^2) sensors per occupancy zone shall be applied appropriately as defined by the building code occupancy classification per individual programmed space. The indoor CO^2 levels set point for each individual programmed space shall be 350 PPM (parts per million) greater than the CO^2 levels measured outside (with a maximum set point of 1,000 PPM).

Variable Air Volume (VAV) terminal boxes: Provide ARI Standard 880 Certification, the ARI seal, and a five-year warranty on VAV terminal boxes. If fan powered, the terminals shall be designed, built, and tested as a single unit including motor and fan assembly, primary air damper assembly, and any accessories.

The VAV terminal boxes selected shall be pressure-independent type units. VAV terminal boxes and their associated building automation system (BAS) controllers shall be located in an accessible manner for replacement and maintenance. VAV terminal boxes shall incorporate Belimo (or equal) direct digital control (DDC) actuator including a five-year warranty.

Diffusers: All terminal ceiling diffusers or booted-plenum slot diffusers shall be specifically designed for VAV air distribution. Booted plenum slots shall not exceed 5' in length unless more than one source of supply is provided. Diffuser spacing selection shall be based on the predominant air volume range. Ensure that the air diffusion performance index (ADPI) values remain above the specified manufacturer's minimum. Diffusers shall be high entrainment type (3:1 minimum) to maximize air velocity at low flow rates.

All motors shall be premium efficiency as per ASHRAE Standard 90.1 and the energy code. All 0.5 HP and larger motors shall incorporate polyphase configuration. All motors 0.5 HP and smaller shall be single phase. All motors

regardless if they are operated with variable speed drives shall be provided with inverter-duty motors with Class-F insulation per NEC and NFPA.

The VAV supply fan shall be designed for the largest block load, not the sum of the individual peaks. The air distribution system up to the VAV boxes shall be medium pressure, designed by using the static regain method; downstream of the VAV boxes, the system shall be low- and medium-pressure construction, designed using the equal friction method.

The primary air ductwork (fan connections, risers, main distribution ducts) shall be medium-pressure classification as a minimum. The secondary air ductwork (branches from main to terminal boxes and distribution devices) shall be low-pressure classification as a minimum. The ductwork downstream of the final distribution devices (VAV and CV boxes) shall not be duct leak tested except for duct sections specified by the energy code.

Design and construct supply, return, and exhaust air ducts to allow no more than 3 percent leakage of total airflow in systems up to 3" WG at design static pressure. In systems from 3.1" WG through 10.0" WG, limit leakage to 1 percent of the total airflow at design static pressure. The pressure loss in ductwork system shall be designed to comply with the criteria stated above. Mitered elbows are not permitted where duct velocity exceeds 2,000 FPM. Ductwork leakage testing and construction shall comply with SMACNA Duct Construction Standards.

Fabricate ductwork from galvanized steel and/or aluminum sheet metal, depending on applications. Water-based sealants are not permitted; use low-VOC duct sealant with EPA listings. A factory-made UL Class 1 listed acoustical flex duct may be used for low-pressure ductwork connected to air devices. The length of the flex duct shall not exceed 8' or contain more than two 45-degree bends. Joint sealing shall be accomplished using airtight, mechanical joint draw bands.

The use of UL-approved reinforced fiberglass-backed tape material or metal foil-based tapes with factory-applied mastic material is permitted.

Test ductwork leakage before final acceptance. Each section tested must have a minimum of a 20' length straight-run, a minimum of two elbows, and a connection to the terminal. The stated static test pressures represent the pressure exerted on the duct system and not the total static pressure developed by the supply fan. The static test pressure shall be 100 percent of the design pressure exerted on the duct system and not to exceed the designated duct pressure construction class.

Plenum and Ducted Returns: Air drawn through the most remote register must reach the air-handling unit. No more than 1,000 cfm shall be collected at any one return grille. When deemed necessary, all plenums shall be sealed airtight with respect to the exterior wall and roof slab or ceiling deck to avoid creating negative air pressure in exterior wall cavities that would allow intrusion of untreated outdoor air. Where fully ducted return systems are used, consider placing returns low in walls or on columns to complement ceiling supply air. Double-wall ductwork with insulation in between shall be considered in lieu of sound lining for a minimum 5' before connecting to the air-handling unit or a return air duct riser.

Air distribution access doors shall have a low leakage, double wall, and internally insulated, gasketed access door at 40' intervals along the main air distribution system to allow for inspection and cleaning of the entire system.

Building Pressurization

Design system to provide a slight, but continuous, positive pressure with respect to the outdoor environment. Principal spaces are to maintain positive pressure relative to circulation spaces; circulation spaces and building entrances and public lobbies are to maintain positive pressure relative to the outdoors.

Important References

ASHRAE Handbook of Fundamentals

California Climate Zone Design Conditions at the project location should be the basis for all calculations.

For information on Life Cycle Cost Analysis, see Chapter 1: General Principals

Air Intake and Exhaust

The placement and location of outside air intakes must comply with ASHRAE Standard 62n and the building security requirements (refer to Chapter 8: In-Custody Defendant Receiving, Holding, and Transport). The intake design shall minimize the entrainment of exhaust air. The outside air intake louvers shall be drainable stationary storm louver type in accordance with AMCA 500L.

Internal Heat Gains

Occupancy: For courtrooms, auditoriums, assembly rooms, and other high-occupancy spaces, occupancy loads shall be based on the number of fixed seats available. For office spaces, the average density of the floor area of a building is one person per 120 usable sq. ft. The workstations occupancy load can be as dense as one person per 75 usable sq. ft. Sensible and latent loads per person shall be based on the latest edition of the ASHRAE Handbook of Fundamentals. Suggested interior design conditions are provided in this section.

Equipment: Internal heat gains from all appliances (electrical, gas, or steam) shall be determined by manufacturer-provided heat gain and usage schedules if available; heat gains from office equipment shall be based on the latest edition of the ASHRAE Handbook of Fundamentals.

The cooling load estimated for the connected electrical load shall be based on the electrical and lighting load analysis and the estimated demand loads.

Diversity

The designer should consider diversity, matched to the specific project and based on individual consideration. While AOC cannot suggest specific diversity criteria for the coincidence of weather (design cooling days), occupancy, court operation, justice offices, lighting and other functions within the building, the following general ideas are suggested:

- Diversity at the AHU (system) level is appropriate and should be taken to prevent unneeded (wasted) capacity.
- This diversity should not be taken at the zone level.
- Greater diversity should be considered at the central plant or with applications of district energy.
- All lighting will not be energized at the same times throughout the entire building. At least 10% of the lights can be assumed to be off on a system basis. Advanced lighting controls, when used, can generate even more significant savings.
- Court operation and occupancy will vary significantly through a month and a week. The impact of this should be considered based on past operational performance and project team judgment.
- Justice offices will likely be generally occupied, yet conference functions that support these will generally share occupancy (an office occupant may also be a conference participant, so avoid 'double counting').
- Simultaneous operation of all of these individual diversified operations should also be considered (further combined diversity).

Air-Conditioning Cooling Systems

Chilled Water Systems

District chilled water, if available, shall be used if it is determined to be economical and reliable through a life cycle cost analysis. In the life cycle cost analysis, use high-efficiency chillers with COP and IPLV ratings that exceed 6.4 (0.55 KW/ton). The feasibility of thermal storage chillers and absorption chillers shall be considered for demand shedding and thermal balancing of the total

system. Chiller leak detection systems shall be connected to the HVAC building control system with remote alarms.

If perimeter spaces require individual fan coil units, specify a four-pipe fan coil unit with cooling coil, heating coil, 35 percent efficiency filters, internal condensate drain, and overflow drain. Fan coil units shall be capable of operating with unit-mounted or remote-mounted temperature sensor. Fan coils shall be provided with energy-efficient EBM motors.

Where chillers are required, the cooling system shall consist of two chillers equally sized for 50 percent of the design load, with a third chiller provided as backup (subject to AOC approval). Chillers shall be equipped with multistaged compressor sections and variable frequency drives to achieve/optimize the peak load efficiency and NPLV available when deemed appropriate based on California Climate Zone Design Conditions. The design chilled water temperature difference (Delta T) across the chillers evaporators shall be at least 15°F. Variable supply air set point control shall be applied to reduce loads and increase efficiency of chiller plant. All chillers shall be piped to a common chilled water header with provisions to sequence chillers online to match the load requirements. All required auxiliaries for the chiller systems shall be provided with expansion tanks, heat exchangers, water treatment, and air separators. When multiple chillers are used, automatic shutoff valves shall be provided for each chiller. Chiller condenser piping shall be equipped with recirculation and bypass control valves to maintain incoming condenser water temperature within chiller manufacturer's minimum requirement.

Multiple cell cooling towers and isolated basins are required. The number of cells shall match the number of chillers. Supply piping shall be connected to a manifold to allow for any combination of equipment use. Multiple towers shall have equalization piping between cell basins. Equalization piping shall include isolation valves between each cell. Supply and return lines for each cell shall be provided with automatic isolation valves. Cooling towers shall have ladders and platforms for inspections and replacement of components. Variable speed pumps or fans for multiple cooling towers shall not operate below 25 percent of rated capacity.

Pumps shall be of a centrifugal type and shall generally be selected to operate at 1,750 RPM. Both partial load and full load must fall on the pump curve. The number of primary chilled water and condenser water pumps shall correspond to the number of chillers, and a separate pump shall be designed for each condenser water circuit. Variable volume pumping systems shall be considered for all secondary-piping systems with pump horsepower greater than 10 KW (15 HP). The specified pump motors shall not overload throughout the entire range of the pump curve. Each cooling tower and chiller group pumps shall be arranged with piping, valves, and controls to allow each chiller-tower group to operate independently of the other chiller and cooling tower groups.

Direct Expansion Systems

Air handlers with air-cooled package chillers are preferable to field-piped (split system) direct expansion (DX) systems. Field-piped DX evaporators with condensing units are not allowed unless, in the schematic design phase, a case can be made to prove that the chilled water system application does not have a favorable life cycle cost, or it can be demonstrated that the application requires a DX approach. When the total connected design load exceeds 150 tons, the HVAC designer is required to first consider and rule out using chilled water concepts before specifying any high-efficiency DX refrigeration equipment.

Heating Systems

- Water heating systems: Low-temperature water heating is the preferred system. Supply temperatures and the corresponding temperature drops for space heating hot water systems must be set to best suit the

Vibration and Acoustical Isolation

Refer to Chapter 19: Acoustical Criteria, which shall govern in case of conflict. Refer to and incorporate the basic design techniques as described in ASHRAE Applications Handbook, Sound and Vibration Control. See "Design Guidelines for HVAC-Related Background Sound in Rooms" in the (latest version) ASHRAE Application Handbook, and "Selection Guide for Vibration Isolation."

equipment being served. The temperature drop for terminal unit heating coils shall be 52°F. Design water velocity in piping so as not to exceed 8' per second, or design pressure friction loss in piping systems not to exceed 4' per 100', whichever is larger, and not less than 4' per second.

All boilers for hydronic water heating applications shall be condensing type with a working pressure and maximum temperature limitation stated, and shall be installed in a dedicated mechanical room with all provisions made for chimney, flue stack, and combustion air. In general, three boilers each sized for 40 percent of the full cold start preheating load shall be provided. For installations where the ASHRAE winter design is 34°F and above, a minimum of two equally sized units at 55 percent of the full cold start preheating load shall be provided. All boilers shall have a minimum efficiency of 81 percent as per ASHRAE standard 90.1. All boiler emissions shall comply with local air quality regulations. The products of combustion from fuel-fired appliances and equipment shall be terminated to the outside of the building through the use of chimneys. All boilers shall be piped to a common heating water header with provisions to sequence boilers online to match the load requirements. All required auxiliaries for the boiler systems shall be provided with expansion tanks, heat exchangers, water treatment, and air separators. Variable supply air set point control shall be applied to reduce loads and increase efficiency of boiler plant.

- Radiant heating systems: Areas that experience infiltration loads in excess of two air changes per hour at design heating conditions shall incorporate radiant heating systems. Isolate the radiant heating systems from the main heating system with a plate and frame heat exchanger.
- Fin-tube heating system: When fin-tube radiation is used, the design shall incorporate individual zone thermostatic control capable of connecting to a self-contained microprocessor and a HVAC building control system.
- Variable volume reheat boxes: A variable air volume system with hot water reheat shall be used for perimeter zone applications. VAV shutoff boxes may be used with the perimeter air distribution systems in order to eliminate the need for reheat.
- Variable volume with fan-powered boxes: Fan-powered boxes may have water heating coils for maintaining temperature conditions in the space under partial load conditions. Fan-powered boxes located on the perimeter zones and on the top floor of the building shall contain water coils for heating.
- Heat pump: A console perimeter heat pump system may be considered for the perimeter zone. For the interior zone, either a packaged heat pump variable volume system or a central station air-handling unit with cooling-heating coil with VAV boxes shall be considered. Condenser water loop temperatures shall be maintained between 60°F and 80°F year-round, either by injecting heat from a gas-fired, modular boiler if the temperature drops below 60°F or by rejecting the heat through a cooling tower if the temperature of the loop rises above 95°F dry bulb. Outside air shall be ducted to the return plenum section of the heat pump unit. Heat pumps shall be provided with filter/filter rack assemblies upstream of the return plenum section of the air-handling unit.

Vibration and Acoustical Isolation

- Mechanical room isolation: Floating isolation floors shall be considered for major mechanical rooms located in penthouses or at intermediate levels of mid-rise construction.

- Mechanical shafts and chases shall be closed at top and bottom, as well as at the entrance to the mechanical room. Any piping and ductwork shall be isolated as they enter the shaft to prevent propagation of vibration to the building structure. All openings for ducts and piping must be sealed. Shafts dedicated to gas piping must be ventilated.
- Isolators shall be specified by type and by deflection, not by isolation efficiency. Specifications shall be worded so that isolation performance becomes the responsibility of the equipment supplier.
- Concrete inertia bases shall be delineated for reciprocating and centrifugal chillers, air compressors, all pumps, axial fans above 300 RPM, and centrifugal fans above 37 KW (50 HP).
- Ductwork: The design shall delineate the methods to reduce fan-generated noise immediately outside any mechanical room wall by acoustically coating or wrapping the duct. The ductwork design shall appropriately address the airborne-generated equipment noise, equipment vibration, duct-borne fan noise, duct breakout noise, airflow-generated noise, and duct-borne crosstalk noise. All ductwork connections to equipment having motors or rotating components shall be made with aligned, 6" long, double-walled UL labeled, flexible connecters. All ductwork within the mechanical room shall be supported with isolation hangers.
- Piping hangers and isolation: The design shall delineate the isolation hangers for all piping in mechanical rooms and adjacent pipe rack spaces. The pipe hangers closest to the equipment shall have the same deflection characteristics as the equipment isolators. Other hangers shall be spring hangers with ¾" deflection. Positioning hangers shall be specified for all piping 8" and larger throughout the building. Spring and rubber isolators are recommended for piping 2" and larger hung below noise-sensitive spaces. Floor supports for piping may be designed with spring mounts or rubber pad mounts. For pipes subject to large amounts of thermal movement, plates of Teflon or graphite shall be installed above the isolator to permit horizontal sliding. The piping and equipment anchors and guides for vertical pipe risers usually must be attached rigidly to the structure to control pipe movement. Flexible pipe connectors shall be designed into the piping before it reaches the riser.
- Noise control in VAV systems: The system-generated sound levels at maximum flow must be carefully evaluated to ensure that acoustical performance conforms to project-specific targets. Inlet guide vanes shall be evaluated for noise in their most restricted position. Duct noise control shall be achieved by controlling air velocity, by the use of sound attenuators, and by not oversizing terminal units. Terminal units shall be selected so that design air volume is approximately three-quarters of the terminal box's maximum capacity. Volume dampers in terminal units shall be located at least 6" from the closest diffuser, and the use of grille-mounted balance dampers shall be restricted except for those applications with accessibility problems.
- VAV box sound attenuation: The VAV boxes and associated attenuation lining shall incorporate fiber-free insulation or foil-faced insulation duct materials. The attenuation materials shall be appropriately sealed and either covered with reinforced aluminum laminated foil liner or coated with water-based sealant tested and approved for air erosion per UL 181 or ASTM C1071. The materials shall not promote or support the growth of fungi or bacteria, in accordance with UL 181 and ASTM G21 and G22. All exposed edges shall be sealed with sealant approved per NFPA 90A.

13.C HUMIDIFICATION AND WATER TREATMENT

Humidifiers and Direct Evaporative Coolers

Courthouse spaces shall not be humidified unless severe winter conditions are likely to cause indoor relative humidity to fall below 30 percent the majority of the time. Where humidification is necessary, atomized hot water, clean steam, or ultrasound may be used and shall be generated by electronic or steam-to-steam generators. To avoid the potential for oversaturation and condensation at low load, the total humidification load shall be divided between multiple, independently modulated units. Single-unit humidifiers are not acceptable. Humidifiers shall be centered on the air stream to prevent stratification of the moist air. All associated equipment and piping shall be stainless steel.

The makeup water for direct evaporation humidifiers and direct evaporative coolers, or other water spray systems, shall originate directly from a potable source that has equal or better water quality with respect to both chemical and microbial contaminants. Humidifiers shall be designed so that microbiocidal chemicals and water treatment additives are not emitted in ventilation air. All components of humidification equipment shall be stainless steel. Air washer systems are not permitted for cooling.

Relative Humidity Controls Criteria

Summer: Unless noted to the contrary in the project program, inside relative humidity is not to be directly controlled. Dehumidification is a byproduct of the cooling process. However, the cooling equipment and systems shall be selected and sized to produce 45 percent relative humidity +/-10 percent in the conditioned space when the design outside conditions prevail and other design parameters are fulfilled.

Winter: Do not add moisture to the air stream. When the program document indicates that humidification in the winter is required, the humidification equipment shall be sized to avoid condensation on inside surfaces, visible or concealed.

Water Treatment

A qualified specialist shall design the water treatment for all hydronic systems, including humidification systems. The water treatment design system shall address the three aspects of water treatment: biological growth, dissolved solids and scaling, and corrosion protection. The water treatment systems shall produce, at a minimum, the following characteristics; hardness: 0.00; iron content: 0.00; dissolved solids: 1,500 to 1,750 ppm; silica: 610 ppm or less; and a pH of 10 or above. The system shall operate with an injection pump transferring chemicals from solution tank(s) as required to maintain the conditions described. The chemical feed system shall have self-contained microprocessor controls capable of connecting to and interoperating with a direct digital control HVAC building control system. The methods used to treat the system makeup water shall have prior success in existing facilities on the same municipal water supply and follow the guidelines outlined in the ASHRAE Applications Handbook. The use of nonchemical water treatment is not permitted.

13.D MECHANICAL REQUIREMENTS FOR SPECIFIC SPACES

- For security equipment, see Chapter 4 (Courthouse Security). For tele-communication equipment rooms, see Chapter 17 (Unified Communications).
- Building entrance vestibules and lobbies shall have sufficient heating and cooling to offset the base load plus the infiltration to the space.
- Systems dedicated to spaces with intermittent occupancy, such as elevator machine rooms, telephone equipment

rooms, and similar spaces, shall be exempt from the requirement of an economizer cycle. A waterside economizer system shall be employed where an airside economizer is not practical or feasible.

- The HVAC system serving detention areas shall be designed for continuous operation and shall be independently controlled and zoned. All ductwork and air circulation openings penetrating the secure area envelope, including prisoner circulation areas, shall be designed for maximum security, with security bars and tamper-resistant diffusers with openings no greater than $^{3}/_{16}$" in diameter. Holding areas shall be negatively pressurized with regard to adjacent spaces and exhausted directly outdoors.
- Mailrooms shall be provided with once-through air and 100 percent exhausted from the facility. Mailrooms shall be maintained under a negative pressure condition relative to surrounding spaces if required by the risk assessment.
- Mechanical rooms shall be mechanically ventilated. Water lines shall not be located directly above motor control centers or disconnect switches. The mechanical rooms shall have sloped floors with floor drains in proximity to the equipment served.
- Electrical and communication equipment rooms: No water lines are permitted in or overhead in electrical and communication rooms, except for fire sprinkler piping protecting the room or chilled water and condenser water piping serving the dedicated cooling equipment in the room.
- Elevator machine rooms: A cooling or ventilating system must be provided to maintain elevator machine room temperature and humidity as required by geographical location. If hoist way venting is required by code and if the building is a high-rise, provide an automatic damper that is controlled by the smoke detector in the hoist way.
- Emergency generator rooms: The environmental systems shall meet the requirements of NFPA Standard 110 (Emergency and Standby Power Systems) and meet the combustion air requirements of the equipment. Rooms must be ventilated sufficiently to remove heat gain from equipment operation. The air supply and exhaust shall be located so air does not short-circuit. Generator exhaust shall be carried up to roof level. Horizontal exhaust through the building wall shall be avoided.
- UPS-designated battery rooms: Design space to accommodate battery and exhaust requirements per code.
- Loading docks and sallyports: The entrances and exits at loading docks and service entrances shall be designed to reduce infiltration and collection of outside debris. Loading docks must be maintained at negative pressure relative to the rest of the building. Enclosed vehicle sallyports shall be ventilated to prevent buildup of engine exhaust fumes and transferring of fumes into the building. Sallyports shall be equipped with ventilation fans controlled by carbon monoxide detection and control system to automatically purge the sallyport when unsafe levels of carbon monoxide are detected. The carbon monoxide sensors shall be uniformly located throughout the enclosed space and near each stairwell or exit.
- Toilets: Multiple fixture and public toilets shall have dedicated exhaust systems. Single and occasional use toilets shall have point of use fans connecting to a common exhaust header.
- Janitor and housekeeping closets: The janitor and housekeeping closets shall maintain negative pressure in the rooms relative to the surrounding spaces.
- Copy areas: All copy areas shall have a localized exhaust adjacent to high-volume reproduction machinery and shall be negative in pressure to the surrounding areas.

Configure mechanical rooms with clear circulation aisles and adequate access to all equipment. The mechanical rooms shall have adequate doorways or areaways and staging areas to permit the replacement and removal of equipment without the need to demolish walls or relocate other equipment.

Criteria for Mechanical Spaces

Service access shall be provided in ventilation equipment, ductwork, and plenums for on-site inspection and cleaning. Access doors or panels shall be readily operable and sized to allow full access. Access doors and panels in courtrooms must be positioned so as not to impede judicial proceedings. Make provisions for removing and replacing major equipment over the life of the building, without damage to the structure. Provide adequate access to all devices with maintenance service requirements. Provide walkways or fixed ladders for all major equipment that cannot be maintained from floor level. Where maintenance requires the lifting of 50 pounds or more, provide and install hoists and hatchways.

- Roof-mounted equipment: No mechanical equipment except for air handlers, cooling towers, air-cooled chillers, evaporative condensers, and exhaust fans shall be permitted on the roof of the building. The equipment shall be skid mounted on structural base rails supported off the roof waterproofing membrane. The roof-mounted equipment shall have permanent code-compliant access.
- Housekeeping pads: The housekeeping pads shall be at least 6" wider on all sides than the equipment they support and a minimum height of 3½" above the roof level or finished floor. The pad shall be of adequate height to trap and drain condensate from heat transfer coils to the condensate drain.

13.E PLUMBING AND PIPING SYSTEMS CRITERIA

Pump Systems for Fire and Hydronic Heating Water

Provide a parallel piping system with a two-pipe main distribution system arranged in a reverse return configuration. Series loop piping for terminal or branch circuits shall be equipped with automatic flow control valves at the transfer units. Each terminal unit or coil shall be provided with isolation valves, on both supply and return lines, and a flow-indicating balance valve on the return line. Isolation valves shall be provided on all major pipe branches, such as at each floor level, building wing, or mechanical room. Each pumping system shall be provided with two pumps, one operating while the other is in standby mode, and shall be configured for automatic lead/lag operation. Each boiler shall be provided with a control and piping arrangement, which protects the boiler from thermal shock. A primary-secondary piping arrangement with a modulating mixing control valve and higher primary flow rate shall ensure that the boiler return water temperature does not drop too low, as commonly occurs with night setback.

If required by risk assessment, the plumbing design shall provide features to minimize the impact of localized airborne attacks. Locate plumbing and piping vents to minimize the entrainment of fumes, moisture, and particles from the vent discharge piping to the building HVAC system air intakes.

Hydronic hot water space heating pumps shall be selected to operate at 1,750 RPM.

Variable volume pumping systems shall be provided for all secondary-piping systems with pump horsepower greater than 15 HP.

Air separators and vents must be provided on hot water systems to remove accumulated air within the system. Automatic bleed valves shall only be used in accessible spaces in mechanical rooms where they can be observed by maintenance personnel, and must be piped directly to open drains.

Manual bleed valves shall be used at terminal units and other less-accessible high points in the system. Air vents shall be provided at all localized high points of the piping systems and at each heating coil. Likewise, system drains shall be provided at all localized low points of the heating system and at each heating coil.

Hydronic Closed Loop Systems
Closed piping systems are unaffected by static pressure; therefore, pumping is required only to overcome the dynamic friction losses. Pumps used in closed loop hydronic piping shall be designed to operate to the left of the peak efficiency point on their curves (higher head, less flow). This compensates for variations in pressure drop between calculated and actual values without causing pump overloading. Pumps with steep curves shall not be used, as they tend to limit system flow rates.

Variable Flow Pumping
Variable flows occur when two-way control valves are used to modulate heat transfer. The components of a variable volume pumping system include pumps, distribution piping, control valves, and terminal units, and shall also include boilers and chillers unless a primary-secondary arrangement is used. All components of the system are subject to variable flow rates. It is important to provide a sufficient pressure differential across every circuit to allow design flow capacity at all times. Flow may be varied by variable speed pumps or staged multiple pumps. Pumps shall operate at no less than 75 percent efficiency on their performance curve. Package systems, complete with pumps and controls, shall be factory tested before shipment. Chillers and most boilers may experience flow-related heat exchange problems if flow is not maintained above a minimum rate. For this reason, separate, constant flow primary water pumps are recommended for variable volume pumping systems.

Primary and Secondary Pumping
Primary and secondary systems are recommended for larger buildings (circulation of more than 500 gpm) and multiple building facilities. Pumping circuits are separate, with neither having an effect on the pumping head of the other. The primary circuit serves source equipment (chiller or boiler), while the secondary circuit serves the load. Primary and secondary pumping arrangements allow increased system temperature design drops, decreased pumping horsepower, and increased system control. The primary loop and pumps are dedicated and sized to serve the flow and temperature differential requirements of the primary source equipment. This permits the secondary pump and loop to be sized and controlled to provide the design flow rate and temperature differential required to satisfy the heating or cooling loads.

Piping Systems

All piping systems shall be designed and sized in accordance with the ASHRAE Fundamentals Handbook and the ASHRAE HVAC Systems and Equipment Handbook. Materials acceptable for piping systems are black steel and copper. No PVC or other types of plastic pipe are permitted.

Piping Accessories

Isolation of Piping at Equipment
Isolation valves, shutoff valves, bypass circuits, flanges, and unions shall be provided as necessary for piping at equipment to facilitate equipment repair and replacement. Equipment requiring isolation includes boilers, chillers, pumps, coils, terminal units, and heat exchangers. Valves shall also be provided for zones off vertical risers.

Piping System and Equipment Identification
All pipes, valves, and equipment in mechanical rooms, shafts, ceilings, and other spaces accessible to maintenance personnel must be identified with color-coded bands and permanent tags indicating the system type and direction of flow for piping systems or type and number for equipment per ANSI color and labeling standards and the plumbing code. The identification system shall also tag all valves and other operable fittings. Gas piping and sprinkler lines must be identified as prescribed by the fire code.

Domestic Water Supply Systems

Water hammer arrestors shall be provided at every branch to multiple fixtures and on every floor for both hot and cold water.

Cold Water Service
A pressurized piping distribution system shall incorporate a separate supply line from the tap in the existing outside water main to the equipment area inside the building. The water meters furnished by the local department of public works shall meter water service inside the facility property boundaries. Incoming service shall have an approved backflow prevention device. The irrigation systems must be sub-metered for deduct billing of the sewer system. The internal distribution system shall include equipment that is capable of maintaining adequate pressure and flow in all parts of the system in accordance with plumbing code. A duplex booster pumping system shall be utilized if the water pressure is not adequate to provide sufficient pressure at the highest, most remote fixture. The water pressure at the fixture shall be in accordance with the plumbing code.

Hot Water Service
Heaters utilizing natural gas, electricity, or steam as an energy source shall generate hot water. Selection shall be supported by an economic evaluation incorporating first cost, operating costs, and life cycle costs in conjunction with the HVAC energy provisions. Domestic hot water supply temperature shall be generated at 140°F, and shall be capable of tempered water to at least 121°F using a three-way mixing valve, before supplying to all plumbing fixtures. Heat pump water heaters shall be used where possible to save energy. Circulation systems or temperature maintenance systems shall be included. Hot water shall be available at the farthest fixture from the heating source within 30 seconds of the time of operation.

The application of point-of-use instantaneous hot water (IHW) generators is permitted for isolated or incidental use at terminal fixtures and single accommodation toilet rooms.

Sanitary Waste and Vent Systems

Waste Pipe and Fittings
A complete sanitary collection system shall be provided for all plumbing fixtures, floor drains, and kitchen equipment designed in compliance with applicable codes and standards. Piping shall be cast iron soil pipe with hub and spigot joints and fittings. Aboveground piping may have heavy-duty no-hub joints (ASTM C1540-02) and fittings.

Floor Drains
Floor drains shall be provided in multiple fixture toilet rooms, mechanical equipment rooms, locations where condensate from equipment collects, and parking garages and ramps. Single fixture toilet rooms do not require floor drains. In general, floor drains shall be cast iron body type with 6" diameter nickel-bronze strainers for public toilets, kitchen areas, and other public areas. Equipment room areas shall require large diameter cast iron strainers, and parking garages shall require large diameter tractor grates. Drainage for ramps shall require either trench drains or roadway inlets when exposed to rainfall. Automatic trap primer system shall be provided for all floor drains and air handler P-traps where drainage is not routinely expected from spillage, cleaning, continuous condensate, or rainwater.

Sanitary Waste Equipment
Specific drains in kitchen areas (not employee break rooms) shall discharge into a grease interceptor before connecting into the sanitary sewer in accordance with the requirements of the state health department, and local authorities will determine which drains. Floor drains or trench drains in garage locations are to discharge into sand/oil interceptors.

Automatic Sewage Ejectors
Sewage ejectors shall only be used where gravity drainage is not possible. If they are required, only the lowest floors of the building shall be connected to the sewage ejector; fixtures on upper floors shall use gravity flow

to the public sewer. Sewage ejectors shall be nonclog, screenless duplex pumps, with each discharge not less than 4" in diameter. They shall be connected to the emergency power system if available.

Rainwater Drainage System
Pipes and fittings shall be in compliance with local codes and sized based upon local rainfall intensity. Roof drains shall be cast iron body type with high dome grates and membrane clamping rings, manufactured. Each roof drain shall have a separate overflow drain located adjacent to it. Overflow drains shall be the same drains as the roof drains except with a damming weir extension.

Plumbing Fixtures
All plumbing fixtures and faucets shall be water-efficient, commercial-grade type, similar to hotel-type fixtures. Provide permanently wired automatic flush valves with optional manual flush activation for water urinals, water closets, and automatic faucets in public toilet rooms. For detention fixtures see Chapter 8 (In-Custody Defendant Receiving, Holding, and Transport).

Fuel Piping

Natural and Propane Gas Systems
Service Entrance: A gas piping entering the building must be protected from accidental damage by vehicles, foundation settlement, or vibration. Where practical, the entrance shall be above-grade and provided with a self-tightening swing joint before entering the building. Gas piping shall not be placed in unventilated spaces, such as trenches or unventilated shafts, where leaking gas could accumulate and explode. The provision of a seismic gas shutoff valve is not required for facilities that conform to the following provisions of the building and fire codes:

- The building structure is classified as a one-hour rated classification.
- The building has an approved and operational fire sprinkler system.

Gas shall not be piped through confined spaces, such as trenches or unventilated shafts. All spaces containing gas-fired equipment, such as boilers, chillers, and generators, shall be mechanically ventilated. Vertical shafts carrying gas piping shall be ventilated. Gas meters shall be located in enclosed rooms that comply with local utility regulations. All gas piping inside ceiling spaces shall have plenum-rated fittings.

Fuel Oil Systems
Fuel oil–piping systems shall use at least schedule 40 black steel or black iron piping. Fittings shall be of the same grade as the pipe material. Valves shall be bronze, steel, or iron and may be screwed, welded, flanged, or grooved. Double-wall piping with a leak detection system shall be used for buried fuel piping. Duplex fuel oil pumps with basket strainers and exterior enclosures shall be used for pumping the oil to the fuel-burning equipment.

Underground fuel oil storage tanks shall be of double wall, nonmetallic construction or contained in lined vaults to prevent environmental contamination. For all underground tanks and piping systems, a leak detection system with monitor and alarm systems shall be required. The installation must comply with local, state, and federal requirements.

The fuel storage capacity of each generator system shall be determined by the availability of timely fuel deliveries, the determination of the appropriate operational/climatic durations, and the emergency response plan scenarios of the system. The location of the generator system exhaust discharge shall be selected to minimize the potential of entrainment of exhaust fumes into the outside air intakes. Any additional external fuel tanks for the generator system shall be located adjacent to the generator in compliance with current and applicable fire code, UL listings for double containment tanks, regulatory leak detection systems, and local environmental groundwater and air regulations.

All insulation shall comply with fire and smoke hazard ratings indicated by ASTM-E84, NFPA, and UL. Accessories such as adhesives, mastics, cements, tapes, and so forth shall have the same or better component ratings.

13.F INSULATION

Piping Insulation

Insulation shall be provided on all cold surface mechanical systems, such as ductwork and piping, where condensation has the potential of forming and in accordance with ASHRAE Standard 90.1 and the energy code. Insulation that is subject to damage or reduction in thermal resistivity if wetted shall be enclosed with a vapor seal (such as a vapor barrier jacket). Insulation shall have zero permeability. All chilled water piping systems shall be insulated with nonpermeable insulation (of perm rating 0.00) such as foam glass or polyisocyanurate materials. All exposed and concealed piping shall have PVC jacketing. All insulated piping exposed to the weather shall be protected with aluminum jacketing and seams sealed.

Duct Insulation

All duct insulation materials used as internal insulation exposed to the airstream shall be in accordance with UL 181 or ASTM C 1071 erosion tests. The materials shall not promote or support the growth of fungi or bacteria. All exposed externally insulated ductwork shall have sealed canvas jacketing. All concealed externally insulated ductwork shall have foil face jacketing. All supply air ducts must be insulated, in accordance with ASHRAE Standard 90.1 and the energy code. Supply air duct insulation shall have a vapor barrier jacket. The insulation shall cover the duct system with a continuous, unbroken vapor seal. Insulation shall have zero permeability. All ductwork exposed to the weather shall be protected with aluminum jacketing and seams sealed. All return air and exhaust air distribution systems shall be insulated in accordance with ASHRAE Standard 90.1 and the energy code. The insulation of return air and exhaust air distribution systems shall be evaluated for each project and for each system to guard against condensation formation and heat gain/loss on a recirculating or heat recovery system. All equipment, heat exchangers, converters, and pumps shall be insulated as per ASHRAE Standard 90.1 and the energy code.

Equipment Insulation

All equipment including air-handling units, chilled and hot water pumps, and heat exchangers must be insulated in accordance with ASHRAE Standard 90.1 and the energy code. All exposed pumps in unconditioned spaces shall have jacketing.

Thermal Pipe Insulation for Plumbing Systems

All sanitary sewer vents terminating through the roof shall be insulated to prevent condensation from forming and shall include a vapor barrier jacket on this insulation. All domestic water piping shall be insulated in accordance with ASHRAE 90.1 and the energy code. All cold water and storm water piping exposed in plenums or above ceilings shall be insulated to prevent condensation.

13.G THERMOMETERS AND GAUGES

Major mechanical equipment shall be provided with instrumentation that includes ISA data sheets and permanent test ports to verify critical parameters, such as capacity, pressures, temperatures, and flow rates. Following are the general instrumentation requirements: Thermometers and pressure gauges are required on the suction and discharge of all pumps, chillers, boilers, heat exchangers, cooling coils, heating coils, and cooling towers. To avoid pressure gauge tolerance errors, a single pressure gauge may be installed, with a valve to sense both supply and return conditions. For coils with less than 10 GPM flows, provide permanent provisions for use of portable instruments to check temperatures and pressures. Duct static pressure gauge assemblies shall be provided for the central air-handling unit air supply fan discharge, for branch take-offs of vertical supply risers, and at all duct locations at which static pressure readings are being monitored

to control the operation of a VAV system. Differential static pressure gauge assemblies shall be placed across filters in air-handling units and to measure building pressure relative to the outdoors. A temperature gauge is required at the outside air intake of each air-handling unit.

Airflow Measuring Devices

Airflow measuring grids are required for all central air-handling units. Measuring grids shall be provided at the outside air supply duct, supply air duct, return air duct, main distribution ducts to branch mains by floor or major zone, and outside air duct by accurate "DP" sensor or VFD-controlled injection fan. Airflow measuring grids must be sized to give accurate readings at minimum flow.

Water Flow Measuring Devices

Water flow or energy measuring devices shall be required for each chilled water refrigeration machine, hot water boiler, pump, and connections to district energy plants. Individual water flow or energy measuring devices shall be provided for chilled water lines serving computer rooms and chilled water and hot water lines to outleased spaces. Flow measuring devices shall be capable of communicating with the central HVAC building control system. Water flow and airflow measuring devices shall confirm or validate the energy code and ASHRAE 90.1 requirements.

Testing Stations

Provide a permanent testing station for airflow and water flow, with connections designed so temporary testing equipment can be installed and removed without shutting down the system.

Table 13.2 AHU Matrix (Airflow Ranges 2,500 to 9,999 CFM)

AHU COMPONENT ITEMS	MINIMUM REQUIREMENTS
Prefilters	ASHRAE 52.2-1999, rigid filters, 25–30% rated >MERV 8, low pressure drop, rated at 500 FPM: 0.08" W.C. clean, 1.0" W.C. dirty, >150 grams minimum dirt holding capacity
Outside Air Make-Up Dampers	Low-leakage control dampers
Preheat Coils (Optional TBD)	Copper tube/Copper fins; >0.049"/.010" >6 fins/inch
Preheat Coil Drain Pan (Optional TBD)	Stainless steel 304, double sloped—no standing water design, >¼"/ft. Minimum slope, 16 gauge construction or approved equal
Steam Humidifier Section (Optional TBD)	Stainless steel 304 Grid Type (Dri-Steem, Ultrasorb, or approved equal)
Supply and or Return Fan Systems TBD by Engineer	TBD by Engineer
Supply Fan Type	Aluminum airfoil type—direct drive, continuous welded scroll section, no bolts or screws protruding into the air stream
Fan Wheel Protection	Fan wheel enclosure and fenced inlet and outlet, Cal OSHA Title 8, General Industrial Safety Orders, Subchapter 7, Group 6, Article 41
Fan Isolation (Vertical/Horizontal)	>2" spring height with seismic rated captive housing
Cooling Coil Bypass Section with Low Leakage Damper Assembly	Low leakage dampers with shaft seals and 5-year warranty motorized damper motor
Cooling Coils (10 fins maximum)	Copper tube/copper fins: >0.030/0.006" (Heatcraft, Precision, or approved equal)
Cooling Coil Fins	0.006", Maximum of 10 fins/inch
Coil Casing	Stainless steel 304 construction
Coil Access	Field cleanable and side access removable without cutting and welding
Cooling Coil Drain Pan	Stainless Steel 304, 18 gauge construction, double sloped—no standing water design, >¼"/ft. minimum slope, pan extends at >1" downstream and >1" upstream of the coil face sections or approved equal
Prefilter Frames	Front or side loading type: galvanized steel construction, incorporating close cell gasket edge with permanently attached 316 stainless steel, hinged or locking clips that interlocking with filter header, <5% bypass leakage at 2" of static pressure
Postfilter Frames	Front loading type: powder coated finish construction, aluminum construction, or 316 stainless steel construction, incorporating knife edge tongue and groove mating system with permanently attached powder coated finish aluminum or 316 stainless steel, hinged clips, that interlocking with filter header, <1.0% bypass leakage at 5" of static pressure
Prefilter Media Gaskets	Closed cell Neoprene or EPDM Gasket, Bonded to filter track header

Table 13.2 AHU Matrix (Airflow Ranges 2,500 to 9,999 CFM) *continued*

AHU COMPONENT ITEMS	MINIMUM REQUIREMENTS
Postfilter Media Gaskets	Closed cell neoprene or EPDM gasket, bonded to filter media assembly or filter track header
AHU Casing: Double-Wall Construction, Internal Wall Insulation, Solid Smooth Interior, Wipe Down and Cleanable Surfaces	Aluminum or galvanized Steel; manufacturer shall provide calculations certifying the Internal insulation meets or exceeds a 0.12 U factor (BTU/HR/FT 2/F°).
AHU Door Access	Lockable doors
AHU Door Gaskets	Closed Cell Neoprene or interlocking EPDM gaskets embedded along the entire door assembly
AHU Flooring (⅛" minimum thickness). The design shall prevent floor oil canning with 250 pound—single point load over 1 sq. ft. area	Aluminum with aluminum casing or galvanized steel with galvanized steel casing
AHU Interior Lighting	Interior light fixture, NEMA 3R housing with exterior mounted control switch
Supply Fan Motors (TEFC) (1200–1800 RPM)	Label for inverter duty, high efficiency, TEFC <2 HP, premium high efficiency, TEFC >3 HP with sealed grease bearings
Fan Access for >20 HP Motors	Overhead support beam to allow for the removal motor and fan assemblies
AHU Door Access	Each section—double gasket closed cell neoprene
AHU Under Floor Insulation	Equal to U-factor of walls
Final Filtration Requirements	ASHRAE 52.2-1999, high capacity, low pressure drop, pleated, pocket or rigid bag filters, 70-75% Rated >MERV 12, rated at 500 FPM: 0.20" W.C. clean, 1.0" W.C. dirty, >1070 grams minimum dirt holding capacity
Indoor Air Quality/Threat Reduction Modules (TBD)	Germicidal, high performance, low pressure air purification system, high voltage charged, grid modules, >MERV 15 rated
AHU Minimum Frame Rail Height	>3" height—vertical flange to flange edges
AHU Frame Deflection	>1/240 of overall length
Cooling Coil Velocity (Design)	<475 FPM
Filter Face Velocity (Design)	<475 FPM
AHU Casing Leakage	<3% of total design air flow
Smoke Detector	UL/CSA listed (low velocity type 200–650 FPM)
AHU Test Ports	½" I.D. port with threaded cap for each access door
AHU VSD Inverter	Allen Bradley Powerflex or ABB ACH 550 with integral bypass switch assembly or approved equal
AHU Drain Pan Void Insulation	Expanded foam type or approved equal
AHU Under Floor Insulation	Compressed fiber or expanded foam type or approved equal
AHU Bottom Plate	TBD by engineer

Table 13.2 continues on next page

Table 13.2 AHU Matrix (Airflow Ranges 2,500 to 9,999 CFM) *continued*

AHU COMPONENT ITEMS	MINIMUM REQUIREMENTS
Seismic Design (California)	Zone TBD , C-Factor >TBD
AHU Airfoil Dampers	Low leakage type with shaft seals
AHU Coil Piping	Gasketed casing penetrations with I.D. labels
AHU Cooling Drain Pan Piping	Piped and sloped to exterior for connection
AHU Coil Section Drain Piping	Floor drain capped and pipe and slope to exterior with thread cap
AHU Sound Criteria (at 1 Meter)	<78 DBA ±3
Electrical Services	TBD, 3 phase & 120 volts, 1 phase
Electrical Conduits	EMT or PVC
Electrical Safety	Manual disconnect and emergency stop button per NEC
Electrical Controls	Install all designated interconnection color coated/ numbered wiring between electrical components for testing and factory commissioning.
Factory Acceptance Testing and Precommissioning Documentation Reports	• 125% of design static pressure testing of unit casing and water leak test • Design airflow leak test @ <3% percent and sound test • 8 hour VFD Ramp Test, 0.33 Mil P-P vibration test
Warranty	12 months from date of shipment from factory; 8 months from completion on site acceptance testing
Factory Cleaning & Packaging for Shipping	Surface wipe down of interior; vacuum clean interior; provide protection of openings; exterior shrink wrap for shipping; dedicated trucking to the jobsite

Table 13.3 AHU Matrix (Airflow Ranges 10,000 to 60,000 CFM)

AHU COMPONENT ITEMS	MINIMUM REQUIREMENTS
Prefilters	ASHRAE 52.2 -1999, rigid filters, 25-30% rated >MERV 8, low pressure drop,: rated at 500 FPM: 0.08" W.C. clean, 1.0" W.C. dirty, >150 grams minimum dirt holding capacity
Outside Air Make-Up Dampers	Low-leakage, thermal break, insulated control dampers
Preheat Coils (Optional TBD)	Copper tube/copper fins; > 0.049"/.010" >6 fins/inch
Preheat Coil Drain Pan (Optional TBD)	Stainless steel 304, double sloped—no standing water design, >¼"/ft. minimum slope, 18 gauge construction or approved equal
Steam Humidifier section (Optional TBD)	Stainless steel 304 grid type (Dri-Steem, Ultrasorb or approved equal)
Supply and or Return Fan Systems	TBD by engineer
Supply Fan Type	New York or Twin City or approved equal; aluminum airfoil type—direct drive, continuous welded scroll section, no bolts or screws protruding into the air stream
Fan Wheel Protection	Fan wheel enclosure and fenced inlet and outlet, Cal OSHA Title 8, General Industrial Safety Orders, Subchapter 7, Group 6, Article 41
Fan Isolation (Vertical/Horizontal)	>2" spring height with seismic rated captive housing
Cooling Coil Bypass Section with Low Leakage Damper Assembly	Low leakage dampers with shaft seals and 5-year warranty motorized damper motor
Cooling Coils (10 fins maximum)	Copper tube/copper fins:> 0.035/0.008" (Heatcraft, Precision or approved equal)
Cooling Coil Fins	0.008", maximum of 10 fins/inch
Coil Casing	Stainless steel 304 Construction
Coil Access	Field cleanable and side access removable without cutting and welding
Cooling Coil Drain Pan	Stainless steel 304, 14 gauge construction, double sloped—no standing water design, >¼"/ft. minimum slope, pan extends at >2" downstream and >1" upstream of the coil face sections
Prefilter Frames	Front or side loading type: galvanized steel construction, incorporating close cell gasket edge with permanently attached 316 stainless steel, hinged or locking clips that interlocking with filter header, <3% bypass leakage at 2" of static pressure
Postfilter Frames	Front loading type: powder coated finish construction, aluminum construction, or 316 Stainless Steel construction, incorporating knife edge tongue and groove mating system with permanently attached powder coated finish aluminum or 316 Stainless Steel, hinged clips, that interlocking with filter header, <1.0% bypass leakage at 5" of static pressure
Prefilter Media Gaskets	Closed cell neoprene or EPDM gasket, bonded to filter track header
Postfilter Media Gaskets	Closed cell neoprene or EPDM gasket, bonded to filter media assembly or filter track header

Table 13.3 continues on next page

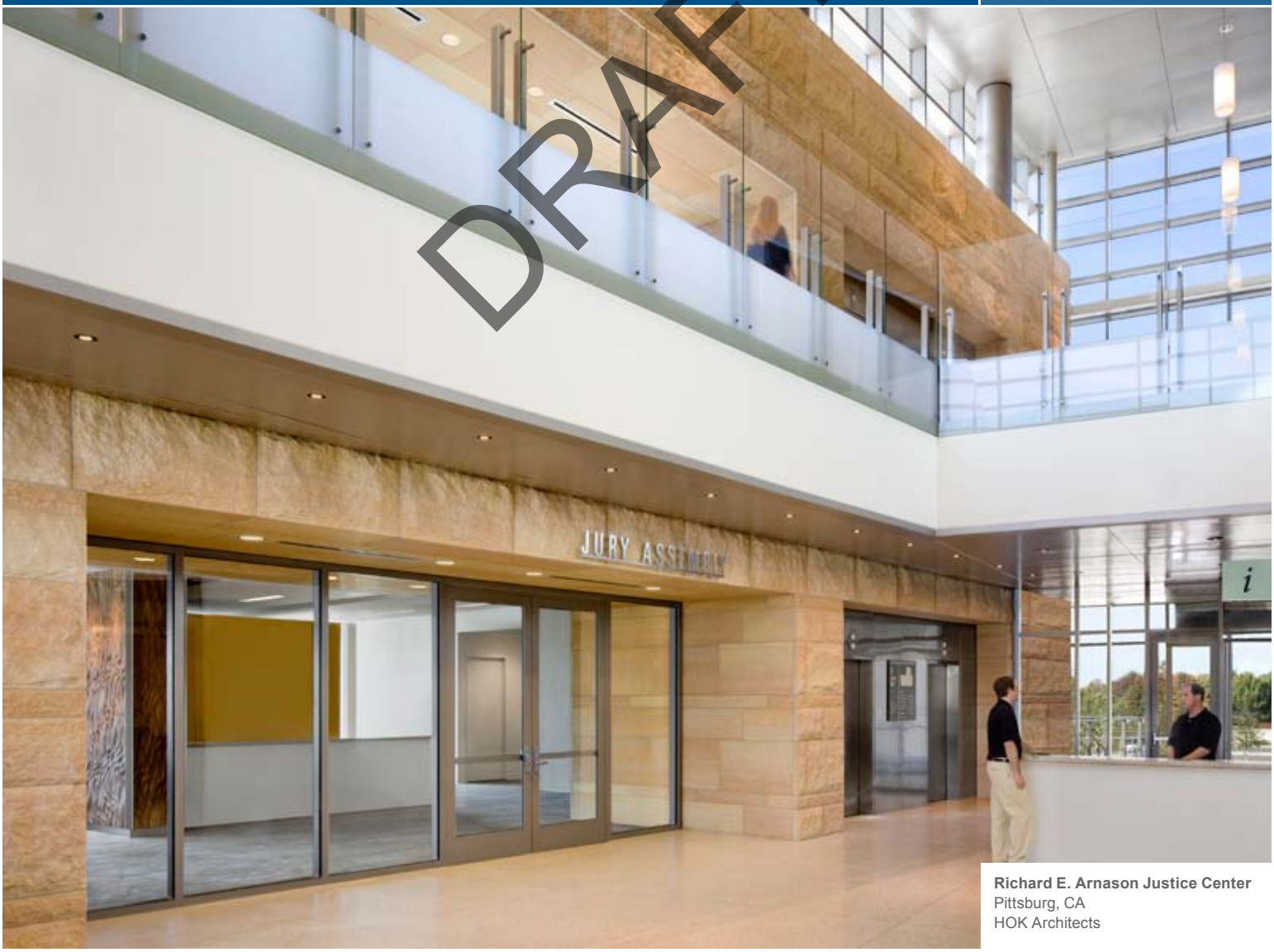
Table 13.3 AHU Matrix (Airflow Ranges 10,000 to 60,000 CFM) *continued*

AHU COMPONENT ITEMS	MINIMUM REQUIREMENTS
AHU Casing: Double-wall Construction, Internal Wall Insulation, Solid Smooth Interior, Wipe Down and Cleanable Surfaces	Aluminum or galvanized steel, manufacturer shall provide calculations certifying the internal insulation meets or exceeds a 0.08 U factor (BTU/HR/FT 2/F°).
AHU Door Access	Lockable doors
AHU Door Gaskets	Closed cell neoprene or interlocking EPDM gaskets embedded along the entire door assembly
AHU Flooring (1/8" Minimum thickness). The design shall prevent floor oil canning with 250 pound—single point load over 1 sq. ft. area	Aluminum with aluminum casing or galvanized steel with galvanized steel casing
AHU Interior Lighting	Interior light fixture, NEMA 3R housing with exterior mounted control switch
Supply Fan Motors (TEFC) (1200–1800 RPM)	Label for inverter duty, high efficiency, TEFC <2 HP, premium high efficiency, TEFC >3 HP with sealed grease bearings
Fan Access for >20 HP Motors	Overhead support beam to allow for the removal motor and fan assemblies
AHU Door Access	Each section—double gasket closed cell neoprene
AHU Underfloor Insulation	Equal to U-factor of walls
Final Filtration Requirements	ASHRAE 52.2-1999, high capacity, low pressure drop, pleated, pocket or rigid bag filters, >70-75% Rated >MERV 12, low pressure drop, rated at 500 FPM: 0.20" W.C. clean, 1.0" W.C. dirty, >1070 grams minimum dirt holding capacity
Indoor Air Quality/ Threat Reduction Modules (TBD)	Germicidal, high performance, low pressure air purification system, high voltage charged, grid modules, >MERV 15 rated
AHU Minimum Frame Rail Height	>4" high—vertical flange to flange edges
AHU Frame Deflection	>1/240 of overall length
Cooling Coil Velocity (Design)	<475 FPM
Filter Face Velocity (Design)	<475 FPM
AHU Casing Leakage	<1.5% of total design air flow
Smoke Detector	UL/CSA listed (low velocity type 200–650 FPM)
AHU Test Ports	1/2" I.D. port with threaded cap for each access door
AHU VSD Inverter	Allen Bradley Powerflex or ABB ACH 550 with integral bypass switch assembly or approved equal
AHU Drain Pan Void Insulation	Expanded foam type or approved equal
AHU Underfloor Insulation	Compressed fiber or expanded foam type or approved equal
AHU Bottom Plate	TBD by engineer
Seismic Design (California)	Zone TBD , C-Factor >TBD

Table 13.3 AHU Matrix (Airflow Ranges 10,000 to 60,000 CFM) *continued*

AHU COMPONENT ITEMS	MINIMUM REQUIREMENTS
AHU Airfoil Dampers	Low leakage type with shaft seals
AHU Coil Piping	Gasketed casing penetrations with I.D. labels
AHU Cooling Drain Pan Piping	Piped and sloped to exterior for connection
AHU Coil Section Drain Piping	Floor drain capped and pipe and slope to exterior with thread cap
AHU Sound Criteria (at 1 Meter)	<75 DBA ±3
Electrical Services	TBD, 3 phase & 120 volts, 1 phase
Electrical Conduits	EMT or PVC
Electrical Safety	Manual disconnect and emergency stop button per NEC
Electrical Controls	Install all designated interconnection color coated/ numbered wiring between electrical components for testing and factory commissioning.
Factory Acceptance Testing and Precommissioning Documentation Reports	• 125% of design static pressure testing of unit casing and water leak test • Design airflow leak test @ 1.5% percent and sound test • 8 hour VFD ramp test, 0.33 Mil P-P vibration test
Warrantee	18 months from date of shipment from factory; 12 months from startup; 8 months from completion on-site acceptance testing
Factory Cleaning & Packaging for Shipping	Surface wipe down of interior; vacuum clean interior, provide protection of openings; exterior shrink wrap for shipping, dedicated trucking to the jobsite

14 INTELLIGENT BUILDING SYSTEMS CRITERIA



Richard E. Arnason Justice Center
Pittsburg, CA
HOK Architects

DAVID WAKELY PHOTOGRAPHY

While a variety of systems make up an intelligent building, this chapter focuses on the building management system. The criteria as outlined in this chapter shall be used in designing and selecting the HVAC building control system.

14.A OBJECTIVES

This section identifies the criteria for systems that provide integrated control, monitoring, and communication of multiple systems within a court facility.

California superior court facilities have multiple electronic systems that should be integrated on a common platform to provide universal functionality and enhanced value. Such systems include:

- Control of building heating, ventilating, and air-conditioning (HVAC) systems, a building management system (BMS), also commonly referred to as a building automation system (BAS).
- Lighting control, which may or may not be part of a BMS (including exterior lights).
- Security (including detention locking system and duress alarms).
- Audiovisual (including closed-circuit TV).
- Courts (general, WLAN, wireless, sheriff/police/fire, satellite/cable TV, telephone, broadcast, etc.).

Other chapters of the Standards contain information for various related components that apply to this overall intelligent building objective.

Such a system is not required for every court building project; before a decision is made, the size and complexity of the HVAC system, number of pieces of equipment, expected energy savings, and availability of trained staff shall all be considered for three size categories:

- Projects between 1 and 6 courts—where a stand-alone BMS may not be warranted. Packaged equipment and systems (with integral controllers) may be used. The building engineer may be off-site, so alarms and warning should be remotely reported.
- Projects between 7 and 19 courts—where the BMS may likely be stand-alone and tie into most equipment. Packaged equipment having integral controllers shall use the BMS to enable and disable operation in a coordinated fashion. The building engineer may be off-site, so alarms and warning should be remotely reported.
- Projects larger than 19 courts—where a fully functional BMS, integrated into all building functions, is provided. Buildings of this size may require high-rise life safety as defined by code, and BMS operation will be coordinated with fire alarm. (Note that wherever BMS and fire alarm jointly control equipment, the fire alarm will be given absolute priority, so that in a life safety event the fire alarm will be the only entity controlling a device.) The building engineer is on-site, so alarms and warnings are locally and remotely reported.

In all cases, the means and content of information to be reported remotely shall be discussed with AOC and the project team.

The control system shall be designed to automatically respond to local climatic conditions and energy efficiency opportunities by providing cost-effective energy conservation measures while ensuring set point control. A new control system shall be nonproprietary for interoperability (meaning the ability of disparate control system devices to work together through the digital exchange of relevant information). The system will allow third-party protocol acceptance and processing of inputs from devices supplied by different vendors.

The BMS control system shall consist of direct digital controls that are capable of communicating over a network. The BMS shall be based on an "open systems" nonproprietary configuration version of Echelon "LON" architecture bound by a Microsoft Visio-based Echelon Turbo LONWORKS binding tool. The BMS shall consist of following:

- LonMark certified control components to allow total facility control to manage, monitor, trend, schedule, download, and upload data to and from building MEP

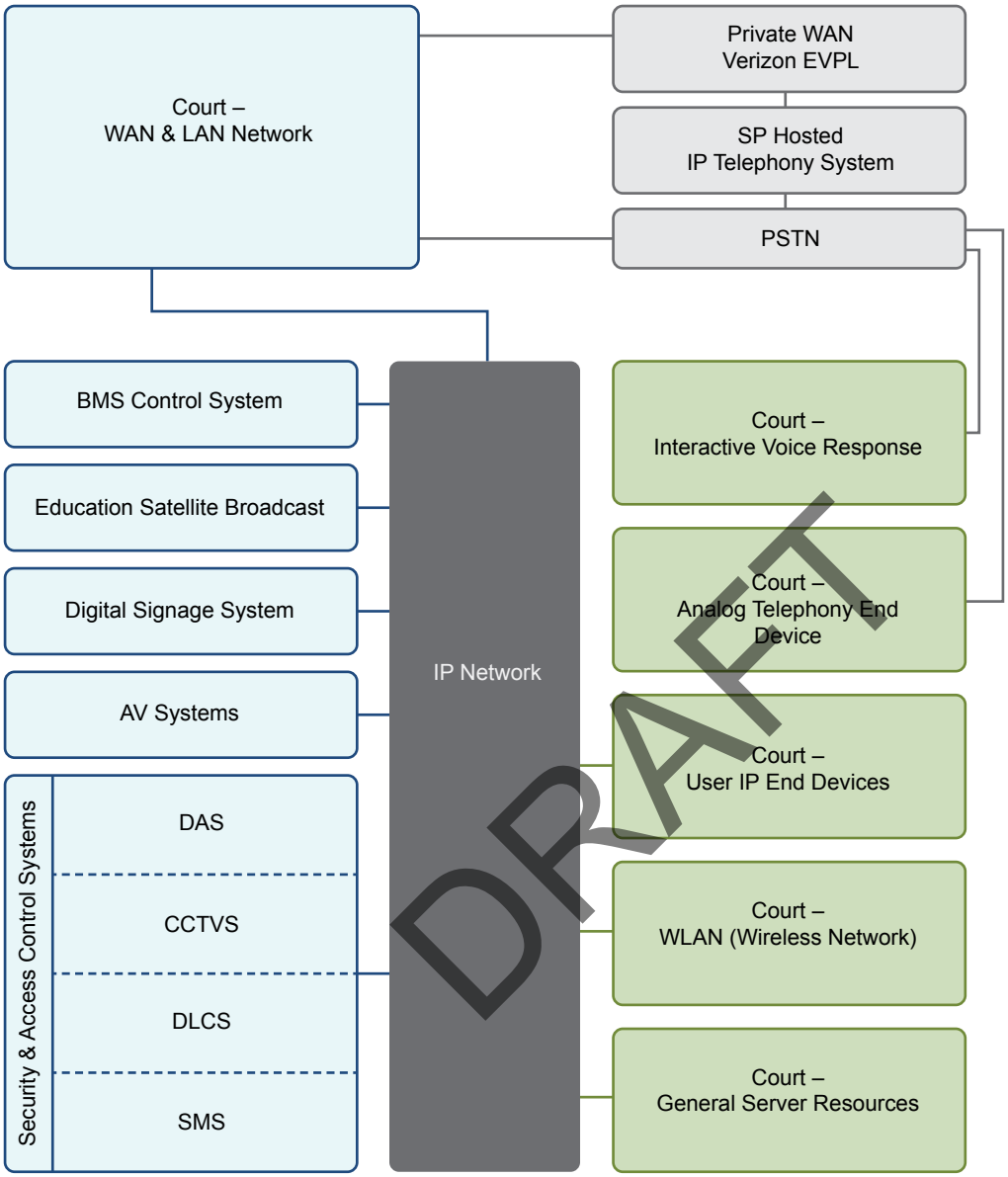


Figure 14.1 IP Network Systems Integration Diagram

The building HVAC control system device protocols and software will provide the following functions:

- Data collection
- Data archiving
- Data trending
- Calendar scheduling
- Temperature-based reset scheduling
- Programming of system-functional set points
- Adjustment of set point range
- Automatic and manual control of addressable field devices
- Access to building systems flow diagrams, with navigation using GUI
- Energy management monitoring and curtailment
- Password reset
- Alarm-level notification

systems network devices and the ability to communicate using the AOC wide area network (WAN) or the Internet.

- Rack-mounted servers with mirrored drives, accessible from a remote workstation that includes a monitor with capabilities to manage and monitor networked building microprocessor-based controlled subsystems.
- Capability to communicate using a Loytec LON to Intranet Protocol middleware translator to a Linksys/Cisco 4-port Gigabit Security Router with virtual private network (VAN) capabilities.
- Graphic user interface (GUI) display, which shall include:
  - Equipment pictorial diagrams of network component devices.
  - Interactive color coordinate graphical status symbols.
  - Component-level status notifications on demand.
  - Execution of password-protected global and component-level commands.
  - Multiple-level alarm notifications as defined by the user.
  - Network component devices: HVAC, plumbing, heating, utilities generation, electrical, lighting, daylight harvesting, alternative energy generation, waste processing, etc.
  - Network component device fault detection and diagnosis system data/alarm collection.
  - Energy/utility consumption data collection.
  - Environmental data collection.
  - Optional wireless communication of disparate and nondisparate systems.
  - Optional seismic response data collection.

Where approved by AOC, a fully BACnet-compliant BMS solution (BTL certified) shall be provided on a specific project. Reasons to consider such a solution include:

- Existing installation.
- General industry familiarity and approach in the region of the project. Multiple LON system (more than two) control firms within 150 miles of the project (allowing competitive selection for AOC).
- Other representative installations for at least five other projects in the last five years.

Other applicable codes are CCR, Title 24/NEC, UL916, and FCC part 15, subpart J, class A.

The control system shall consist of a series of direct digital microprocessor controllers and have a central processing station, all interconnected by a high-speed local area network (LAN). It shall have a graphical user interface that provides trending, scheduling, downloading instructions to field devices, real-time "live" colored graphic programs, parameter changes of properties, set point adjustments, alarm notification, alarm event information, confirmation of operators, data collection, data storage, and execution of global commands. The control system design shall include a cabling network that complies with EIA/TIA-862: Building Automation Systems Cabling Standards for Commercial Buildings.

14.B LEVEL OF INTEGRATION

The building HVAC control system shall not control the fire alarm systems, security systems, lighting systems, or court systems. These systems shall have independent control panels and network interfaces. The HVAC system shall, however, be able to monitor the status of these systems in order to prompt emergency operating modes of the HVAC building system.

The control system shall be designed to use the available energy efficiently and to assist in

troubleshooting the malfunction conditions of numerous addressable and nonaddressable devices.

The control system design shall allow information retrieval at high speed so that any data can be retrieved within 3 seconds and trending can be received within 30 seconds of the browser click at a remote station. The software will allow a critical alarm to be directed to a predetermined destination.

The control system shall be able to monitor building occupancy, individual area occupancy, and time-of-day cycling of equipment. The ability to make unauthorized adjustments shall not be allowed at addressable local devices.

The programming of the control system shall be performed from the facility operation center or via a Web browser. Both require a password for access, and the latter shall have firewall protection.

All nonproprietary energy management software and firmware shall be resident in field hardware and shall not be dependent on the operator's central control system terminal. Therefore, if the central control system fails, local control devices will continue to operate at the last control set point.

The system must include the ability to log data created by user-selectable features. In new facilities and major renovations, the HVAC building control system shall have at least 25 percent spare memory capacity for future expansion.

The use of modular design of the control system for maximum flexibility is encouraged.

The use of nonproprietary, addressable field devices is preferred.

All new systems shall be native protocol neutral and shall use no gateways for communication with controllers, except for the existing controllers if required.

The design shall specify quality actuators that include a manufacturer's warranty for five years for control applications on valves and dampers.

14.C ENERGY CONSERVATION DESIGN

The HVAC control algorithms shall include optimized start/stop for chillers, boilers, air-handling units, and all associated equipment and feed-forward controls, based on weather prediction programs as defined by the energy code.

The optimal start/stop programs will calculate the earliest time that systems can be shut down before the end of occupancy hours and the latest time that systems can start up in the morning, to minimize equipment run time without letting space conditions exceed the comfort set points during occupied periods. The BMS shall also control space ventilation so that pre- and post-occupancy ventilation is provided in accordance with the building code.

The weather prediction programs, based on stored historic weather data in the HVAC building control system processor memory, shall use this information to anticipate peaks or partial load conditions.

The system's economizer programs, based on the site's or region's environmental conditions, shall operate the economizer cycles and heat recovery equipment in an efficient manner, in accordance with the energy code.

The HVAC building control system shall be user programmable to monitor and control pumps, fans, and compressors in either operating or standby modes on a scheduled basis.

Energy Measurement Instrumentation

The HVAC building control system shall have the capability to perform automatic measurement of energy consumption and to monitor performance.

An overall approach to future building energy monitoring and verification (M&V) needs to be developed during design.

Energy Management Data Collection Requirements

- Electrical values such as V, A, kW, KVAR, KVA, PF, kWh, KVARH, frequency, and percent THD shall be monitored.
- Mechanical values such as CHW flow and pressure, HW flow and pressure, equipment status, and equipment capacity shall be monitored, measured, and stored.
- The collection of data shall be maintained for trending for at least two years locally on the central HVAC building control system.
- Energy management measurements shall have the capability to totalize and mark trends in both instantaneous and time-based numbers for chillers, boilers, air-handling units, exhaust fans, and pumps.
- Energy-monitoring data shall be automatically converted to a user-defined standard database, transmitted to a designated interface PC, and presented in a color spreadsheet format on demand.

14.D CONTROL SYSTEM DESIGN FEATURES

Specific control features and points will be dictated by project-specific design requirements. The following general features shall be considered:

- DDC drill down to zone level
- Intelligence at zone level "close loop" controls
- Cascading close loop for sequencing to minimize heating and cooling
- Cascading control loop (valve control for heating)
- VAV zone cascading control (no overlapping of heating and cooling)
- AHU controls (cascading set point reset per ASHRAE Standard 55 where applicable)

Demand Base Reset Control

- Supply temperature
- Supply pressure
- Building pressure
- Minimum outside air supply
- Reducing supply air from VAV systems to meet (but not exceed) ventilation air levels

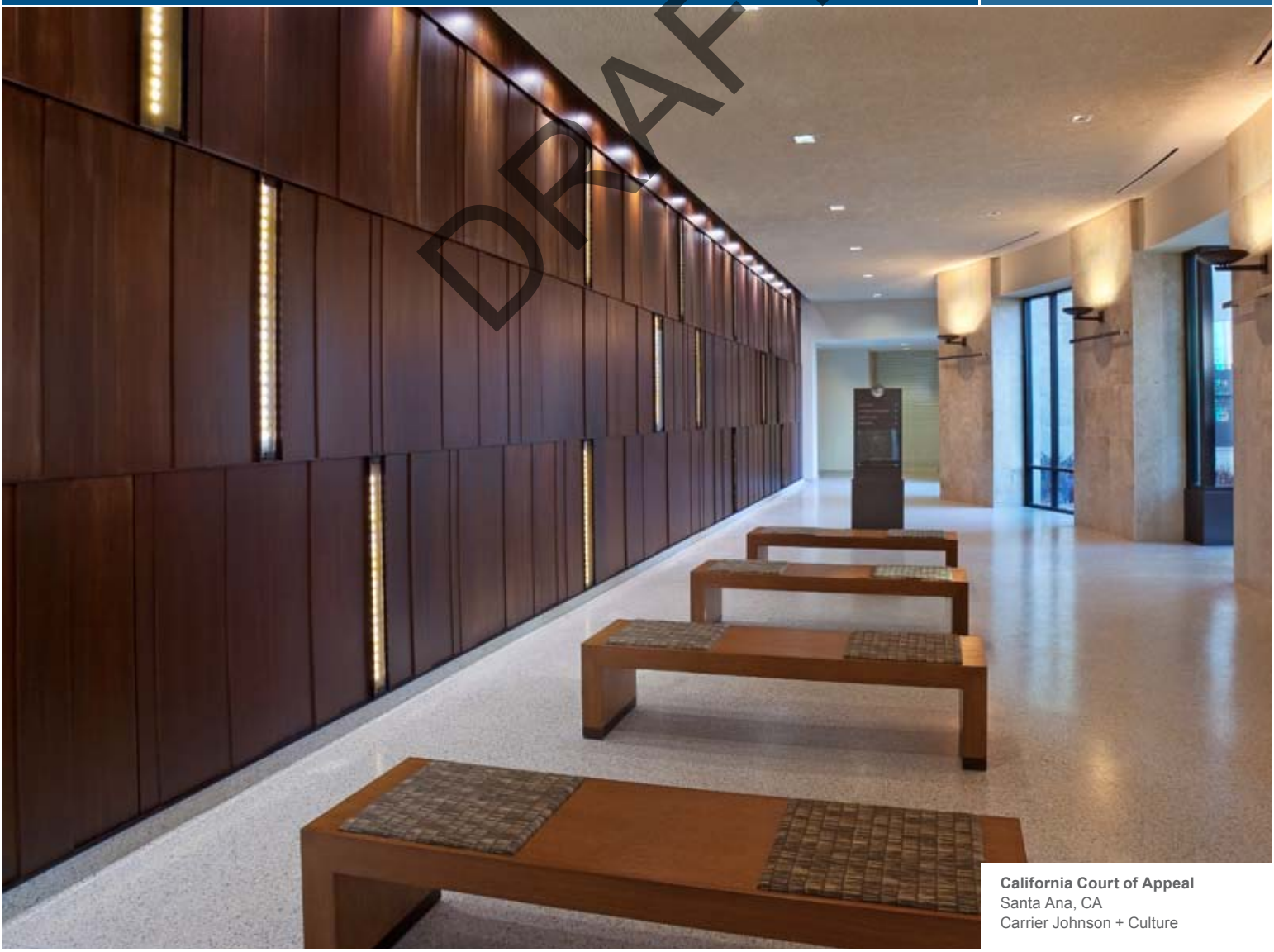
Outside Air Control Methods

- Injection fan, VFD controlled
- Accurate direct measurement (such as "DP" or flow cross) measurement at outside air damper/plenum assembly

CO^2 Demand Control

- Use of occupancy sensors to index occupied and nonoccupied conditions

15 ELECTRICAL CRITERIA



California Court of Appeal
Santa Ana, CA
Carrier Johnson + Culture

COSTEA PHOTOGRAPHY

Designers shall use the criteria to develop electrical power systems for new buildings, retrofit of existing buildings, and interior renovation of existing buildings.

This section defines the general and technical criteria for the building normal power system and the emergency and standby power systems. It encompasses recommendations and minimum acceptable performance criteria for the normal power distribution system and the emergency and standby power systems.

15.A OBJECTIVES

Designers shall use these criteria to develop building electrical power systems and standby electrical power systems, including emergency generator and uninterruptible power system (UPS) design. The electrical system design shall provide safe installation and operation of the electrical power supply and distribution through standardization of design, installation, and testing requirements, based upon sound engineering principles, applicable building codes, and field experience. For the renovation projects, at Schematic Design, the designer shall identify a specific list of standards deviations that are proposed due to the existing system configurations and the extent of renovations included in the project.

These criteria set the minimum acceptable requirements for design and installation of electrical power systems. While new technologies or alternate arrangements may be used, they shall not lower the level of safety prescribed by these criteria and the applicable state building codes.

When the criteria are applied to interior renovations of existing structures, the designer shall provide systems that meet the design parameters of the existing power system and the requirements of these criteria, whichever result in a better system and also satisfy the applicable building codes.

15.B ELECTRICAL CRITERIA

Basic Requirements

Table 15.1 is intended to provide the design professional with a starting point for the design of electrical system distribution equipment using the following minimum load power densities.

Spare Capacity: All electrical panels, including the main building electrical service, shall be adequately sized to power all the building loads, in addition to providing the spare capacity listed in Table 15.2.

The spare positions shall be complete with full-length copper bus and hardware for future breaker installation. The designer shall demonstrate at the turnover of 100 percent Construction Documents that the required spare capacity and spaces have been preserved.

Table 15.1 Minimum Load Power Requirements

AREA	LIGHTING (VA/SF)	RECEPTACLES (VA/SF)
Courtrooms	2.5	2.0
Holding Detention	2.5	2.0
Offices	1.3	4.0
Conference Rooms	2.0	2.0
Public Circulation	1.0	0.5
Toilet Rooms/ Locker Rooms	0.7	0.5
Storage/File Rooms	0.7	0.5
Loading	1.3	1.0
Kitchens (grab-and-go)	1.6	10.0
Dining	2.0	0.5
MDF Rooms	0.7	100.0
IDF Rooms	0.7	75.0
Support/Back of House	0.7	0.5
Parking	0.5	0.5
Judge's Chambers	1.3	2.0
Motorized File	0.7	20.0
Security Control Center	1.3	50.0
Jury Deliberation Rooms	1.3	2.0

The spare capacity shall also be provided at each of the following system elements:

- Distribution transformers
- Distribution bus risers
- Distribution feeders and breakers

Provide space in the electrical room layouts for the future addition of equipment. For each switchboard lineup in a new facility and for switchboards rated 800 amp and higher, include space for one additional switchboard section. All switchboards shall have full-sized horizontal bussing to allow for additional section(s) to be added.

Where panelboards are mounted recessed flush in wall, maintain fire integrity of wall. Provide one empty ¾' EMT conduit stubbed up into nearest accessible ceiling location for every three spare or space positions.

The distribution transformers feeding receptacle power for office areas shall be K-13 rated to compensate for harmonics generated by office equipment. The distribution transformers feeding MDF and IDF rooms shall have K ratings appropriate for the proposed equipment loads. The neutral conductors on the secondary of K-rated transformers shall be sized at 200 percent of phase conductor rated ampacity.

Full-sized neutral conductors shall be utilized throughout the project for three-phase, four-wire service, power, and lighting feeders.

"True" RMS meters shall be used wherever meters are specified on switchgear and distribution boards.

In office areas, the ceiling space shall typically be used for the distribution of power, data, and communication systems. The distribution drops shall be contained in columns and walls to offices and workstation spines. Power, voice, and data poles may be used on a case-by-case basis if approved by AOC. Fire-rated pokethrough floor outlets may be used only where ceilings below are accessible and the occupancies below are not compromised by their installation. In such cases, route the branch circuit conduits to the closest wall to route up the ceiling of the floor served in order to limit the amount of conduit in the ceiling below. Inslab floorboxes may be used for limited areas where layouts are not subject to change such as main lobbies.

The electrical equipment and systems shall be specified to include startup, testing, and adjusting per the applicable codes, recognized industry standards, and equipment system manufacturer requirements.

Switchboards, distribution panels, transformers, disconnects, and branch circuit panelboards shall be of commercial grade and manufactured by one manufacturer throughout the building. All panelboards shall include door-in-door trim. All outdoor equipment enclosures shall be NEMA-3R or 4X depending on the application.

All electrical motors above ½ HP shall be 460 volts, 3-phase. This requirement shall be coordinated across the project with other disciplines.

Wiring Devices: All power receptacles and switches for general-purpose circuits shall

Table 15.2 Spare Capacity Requirements

EQUIPMENT	SPARE LOAD CAPACITY	BREAKER SPARES	BREAKER SPACES
Main Switchboards	15%	One for each installed frame size	25%
Distribution Panelboards & Motor Control Centers	15%	One for each installed frame size	25%
Lighting (Branch Circuit) Panelboards	20%	10%	15%

be NEMA specification grade, manufactured by one manufacturer, and rated for specific environment and application. Outlets served from an emergency power system shall be red.

All indoor floor-mounted equipment, MCC, and panels shall be installed on minimum 4" high concrete housekeeping pads. At outdoor locations, a minimum of 6" housekeeping pads shall be provided.

The criteria for the following systems shall be specified in accordance with the following chapters of the Facilities Standards:

- Chapter 4 (Courthouse Security)
- Chapter 13 (Mechanical Criteria)
- Chapter 16 (Lighting Criteria)
- Chapter 17 (Unified Communications)
- Chapter 18 (Audiovisual Systems)
- Chapter 20 (Fire Protection Criteria)

For areas where high-speed computer and digital equipment are used in the building, specify the following requirements:

- For branch circuits supplied for these equipment areas, the neutral and ground conductors shall not be shared between phases A, B, and C. A separate neutral conductor and ground conductor shall be specified for each phase, feeding computer and electronic office equipment within buildings.
- For three-phase feeders, specify double the size of the neutral conductor.
- The design shall include equal distribution of load on each phase for the feeders, balanced within 15 percent between phases, documented with the 100 percent Construction Documents submission.

Conductors

The following types of conductors shall be specified based on each one's application:

- All wire, cable, and equipment shall be new.
- All wire #8 and larger shall be stranded copper. Wire used in fire alarms shall be solid copper per NEC.
- All wire and cable for secondary power distribution shall be 600 volt insulated, type THHN, or THWN for #8 and smaller. Type THW, THHN, and XHHW for #6 and larger and for wet, underground, and exterior locations. Type RHH or THHN 90°C standard used for fixture wire and circuit runs within fixtures.
- All wire #10 and smaller shall be color-coded throughout. The system conductors shall be identified as to phase connections by means of color-impregnated insulation or approved colored marking tape.
- Power and lighting branch circuits shall be specified not less than #12 wire gauge (AWG).
- Signal and control circuits shall be specified not less than #14 AWG.
- The cabling for fire alarm, security, telecommunication, and audiovisual systems shall be specified in accordance with the respective section requirements.
- Specify that the cable ducts for power are not shared with data and communication systems.

Conduits

The following shall be specified as a minimum requirement for the conduits:

- Minimum acceptable EMT conduit size shall be ¾" diameter. Exceptions: Short runs to a single outlet, or a single fixture may be ½".
- Indoor locations subject to physical damage: Use rigid steel or intermediate metallic conduit (IMC) with zinc

coating inside and out with hot-dipped galvanizing and shall conform to ANSI C80.1 and UL. Couplings and unions shall be electroplated steel, threaded type.

- Interior spaces in dry locations: Electrical metallic tubing (EMT), cold-rolled steel tubing, with enamel coating inside and zinc coating outside and galvanized steel fittings. Steel armored metalclad (MC) cable shall be permitted for distribution of branch circuits where routed in concealed locations and installed with hangers and supports specifically approved for MC cable systems. MC cable shall be independently supported and shall not rely on ceiling or wall framing for support. MC cable shall not be used in exposed locations. MC cable is not permitted for circuit homeruns.
- Underground electrical service and underground distribution: PVC-coated galvanized rigid steel, concrete encased or Schedule 40 PVC, concrete encased. Elbows shall be PVC-coated rigid steel. All underground feeders shall be installed with spacers for proper support. Where installed under building slabs, concrete slurry shall be permitted in lieu of concrete duct banks.
- In wet and outdoor locations: Specify cadmium-plated cast malleable iron liquid-tight fittings with insulated throat.
- Flexible metallic conduits of limited lengths may be used at power terminations to equipment in indoor and dry locations. For outdoor and wet locations, they shall be liquid-tight with plastic jacket extruded over the outer zinc coating.

Quality Assurance

All materials, devices, and equipment shall be commercial grade, new, and Underwriters Laboratories (UL) listed.

The electrical system design shall be in conformance with the applicable codes and standards and the requirements of these criteria.

Certain material, equipment, apparatus, or other products may be specified by manufacturer's brand name, type, or catalog number. In such case, the designated product shall meet the established standards for quality, style, utility, and performance.

The main switchboard, distribution panels, transformers, disconnects, and branch circuit panelboards shall be manufactured by a recognized manufacturer with minimum 10 years' experience in the manufacture of such equipment and shall be manufactured to commercial-grade specifications.

Identification

Electrical system shall be specified to include identification and signage in accordance with ANSI standards. Specify identification at all power service switchboards, power distribution panels, transformers, conduits, branch circuits, pull boxes, outlet covers, and J-boxes using industry-standard materials and methods.

Electrical light fixtures and convenience outlets on emergency power circuits shall be identified with a unique identification system. The identification tags shall be applied on location and be easily identifiable and uniformly applied throughout the building.

Coordination

The electrical work shall be coordinated with the work of all other divisions to interface power and control requirements to equipment, devices, lighting, control systems, and other systems specified under the respective divisions.

Power Distribution System

For new facilities, the power service will be taken from the 277/480V 3 PH 4W distribution system via transformers in a transformer vault or on a pad. (Exception: Small buildings where this voltage is not available from the

supplying utility within the building demand rate structure; 120/208V, 3 PH, 4W shall be used for these locations.) The location of the transformer shall be properly coordinated with the local utility company, depending on the project location. The designer shall coordinate with the utility company on proper sizing of the service to ensure there is 15 percent spare capacity available for future growth.

Branch circuit panelboards will be located throughout the facility. The 277/480V panels will be fed from breakers in the main switchboard or from distribution panelboards. The K-13 (harmonics rated) dry-type step-down transformers will be provided where required, which will in turn feed 120/208V 3 PH 4W distribution-type panelboards or via distribution panels. The 120/208V branch panelboards located throughout the facility will be fed from breakers in these distribution panels. Large air-conditioning and motor loads will be supplied at 480V 3 PH from the new main switchboards and distribution boards.

Lighting fixtures will be connected to 20A1P circuit breakers in 277/480V 3 PH 4W branch circuit panelboards.

Convenience and special power receptacles will be provided as required throughout the facility. Convenience receptacle and miscellaneous loads will be connected to 120/208V 3 PH 4W branch circuit panelboards.

Where a centralized UPS is not provided, computer and other sensitive electronic loads will be fed through point-of-use, localized UPS units as required to meet the standards.

For equipment supplied by K-rated transformers, neutral bussing and conductors for distribution equipment feeding panelboards will be sized to accommodate harmonic currents generated by electronic power supplies.

For Surge Protective Devices (SPDs), a TVSS (Transient Voltage Surge Suppressor) will be provided either at the main switchboard and/or at distribution boards. The TVSS will comply with UL 1449. TVSS units will also be provided at the 120/208V panelboards served by K-rated transformers throughout the building.

Grounding System

A complete grounding system shall be provided per the National Electric Code (NEC). The electrical system shall be grounded to a common building grounding system, which utilizes grounding to building steel, building cold water pipe, and concrete-encased electrode. Grounding to cold water pipes shall only be to continuous metallic main pipe. Where the cold water pipe has insulated joints or plastic pipe connectors, properly sized jumper cables shall be specified to maintain the continuity of the pipe grounding.

The grounding system for utility service transformers shall be provided per the local utility company criteria. The building emergency generator shall be grounded per code.

Provide a copper main ground bus (MGB) in the main switchboard room and connect to the building grounding electrode system. Provide a grounding riser in the building with ground bus located at each electrical room. Transformers and other separately derived systems shall be bonded to this ground bus system in addition to bonding to other code-required connections.

Telecommunications equipment rooms shall be grounded per the requirements of Chapter 17 (Unified Communications). The telecommunications grounding system shall be connected to the main ground bus.

For existing buildings, the grounding shall tie back to the nearest building grounding electrode system, including the building steel and building cold water pipes.

Specify grounding grid for raised floor computer rooms. Within the room, bond all metallic pipes, conduits, and steel equipment housings to the grounding grid.

15.C EMERGENCY AND STANDBY POWER SYSTEMS

General Requirements

The need for and capacity of the emergency power system shall be carefully evaluated, based on the project size, location, and usage. The fuel storage capacity shall be based on the minimum requirements to provide life safety and egress lighting. In remote project areas with limited accessibility, or if the court building will also serve as an emergency operations center, the generator size and fuel storage capacity may be designed to meet local requirements, based on discussions with the AOC project manager.

Each project shall undergo and document an evaluation process to document the specific need for emergency and standby power. The evaluation shall include the following:

- Site utility reliability review: Document the power sources available, redundancy inherent in the utility supply, and outage history.
- Code analysis.
- Site accessibility for refueling.
- Statement of the impact(s) of utility power loss.
- Identify the specific systems/loads for support and categorize by requirements (code, function, etc.). Include backup time required for fuel/battery design.
- Review of appropriate generator or battery systems that best meet backup requirements.

Electrical generators to supply emergency power are to be provided only where it can be demonstrated that the electrical loads for the defined "critical" systems (listed in this section) are best accommodated by a generator set. Factors to be considered include locations with a history of significant outage occurrences or sustained periods of power interruptions. Except for special situations (mentioned in the first paragraph of this section), the duration of emergency power supply shall be determined by the building code. Additional consideration may be made based on the time necessary to prudently shut down critical systems and to safely evacuate and close the building, whichever time is greater.

For projects where an emergency generator is provided:

- The automatic emergency power system shall consist of a 120/208V or 277/480V 3 PH 4W diesel engine generator set, water-cooled radiator type, complete with integral base-mounted day tank. The engine generator set shall be located indoors, on the roof, or at grade. Exterior generator sets shall be provided with weatherproof, sound-attenuating enclosure to meet the acoustical requirements of the site.
- Bypass/isolation automatic transfer switches shall be provided. Provide open transition between normal and emergency positions, or as directed by the local utility provider.
- Specify engine-mounted critical-type exhaust muffler and double contained integral-type fuel oil day tank with fuel leak detection system
- Provide a loadbank for the generator sized for 30 percent of generator capacity. The loadbank may be shared with a centralized UPS, provided the loadbank is stationary (not generator mounted).
- Fuel oil storage tank may be above- or below-grade, with proper filling and monitoring systems. The day tank shall be of the manufacturer's standard size, based on the generator capacity.
- In buildings equipped with emergency power, the following areas in the building shall have emergency lighting on generator power as a minimum:
  - Detention areas, custody areas, and sallyport

- Exit signs
- Exit corridors
- Egress lighting for public corridors and stairwells
- Assembly rooms, such as courtrooms
- Communication equipment rooms
- Generator, electrical, mechanical, and elevator equipment rooms
- Security control offices

Systems where an outage of 10 seconds (to transfer from normal to emergency power) could damage essential equipment or impair safety shall be on UPS power connected to generator power. The areas shall include, but are not limited to, the following:

- Security control center, and main and secondary equipment, including cameras and communication systems
- Computer servers
- Telephone switches

The following systems shall be supplied with emergency or standby or UPS power:

- Air-conditioning equipment (i.e. fan coil units or computer room air conditioning units) serving the communications equipment rooms and computer equipment rooms
- Backup ventilation fans serving the aforementioned rooms
- Any alarm and security system, including video surveillance systems and communications systems
- Sprinkler system alarming devices and fire alarm systems
- Computer equipment system, via UPS
- Data communications equipment (on a case-by-case basis)
- Fire life safety system
- All parts of electrically operated detention systems, such as gates and lockup doors
- Two elevators: one public, one secure or private (on a case-by-case basis)
- Elevator machine room air-conditioning where elevators are provided with emergency power
- At least one emergency duplex convenience receptacle in electrical, mechanical, telecommunication, audiovisual, and elevator equipment rooms

Spare Capacity: All electrical panels fed from the emergency source(s) shall be adequately sized to power the building emergency and standby loads, in addition to providing the spare capacity listed in Table 15.2.

Uninterruptible Power System (UPS)

UPS shall be small, localized, rack-mounted units to serve individual racks or equipment. In a larger facility, one or more centralized UPS may be appropriate. During the project Schematic Phase, a review shall be provided of the projected UPS loads along with their locations and supporting functions in order to determine the optimal UPS system solution for the facility. In the study, the confirmation of the required battery backup time shall be confirmed, taking into consideration outage scenarios and the availability of onsite generators.

UPS for the data processing equipment shall include rectifier/battery charger, solid-state inverter, static bypass transfer switch, maintenance-free batteries sized for 15 minutes, and synchronized circuitry. External maintenance bypass switches shall be provided.

Coordination shall be included for the UPS and generator systems to address capacity and compatibility requirements.

Centralized UPS systems shall include a load bank for testing, and the load banks may be shared with the generator systems, provided the load bank is not generator mounted.

Installation Contractor Certification

The electrical system specifications shall require the installing contractor to certify that the work is installed in accordance with the applicable codes and standards. The system shall be tested, adjusted, and fully functional, and all necessary inspections and certificates of occupancy shall be obtained.

Intelligent Building System Interface

Coordinate with the building intelligent building system (IBS) division work to control, monitor, alarm, and data log the following electrical power information as a minimum:

- Building normal and emergency power consumption and demand.
- Load types by system as required to meet project LEED goals for Measurement and Verification.

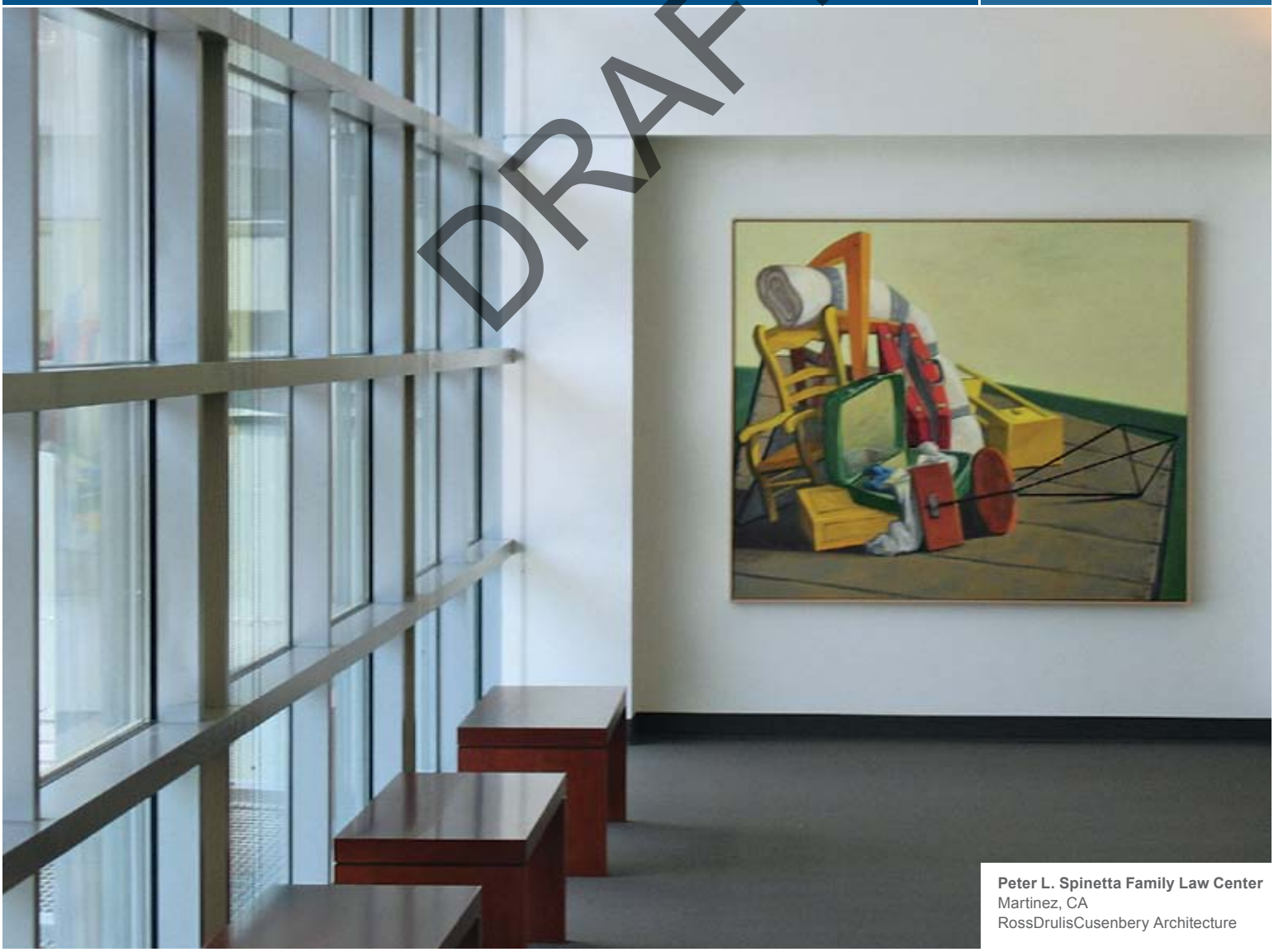
Coordinate with the IBS to provide system monitoring for the following electrical systems:

- Emergency generator alarms, including but not limited to engine trouble, low fuel, fuel leak alarm, low voltage, and loss of phase.
- UPS alarms, including but not limited to Load on Battery, Load on Bypass, high temperature alarm, and UPS emergency power off.
- Fire alarms: Supervisory and Trouble signals.

Coordinate with the IBS to provide interface for the following systems:

- Lighting controls, including interior and exterior lighting.

16 LIGHTING CRITERIA



Peter L. Spinetta Family Law Center
Martinez, CA
RossDrulisCusenbery Architecture

Designers may use a variety of methods to illustrate design concepts, such as computer simulations, calculations, renderings, models, and mockups. Mockups are encouraged when a project has the same or similar spaces repeated throughout the facility, such as courtrooms.

This chapter defines the general and technical criteria for lighting and encompasses recommendations for best practices, energy efficiency, sustainability, and creating productive work environments that emphasize the dignity and importance of activities conducted in the facility.

16.A OBJECTIVES

Lighting design in the court facility shall be functional, appropriate for users, energy efficient, and easy to maintain, and shall maximize use of appropriate technology. Daylight in occupied spaces is desirable, but must be carefully controlled to avoid glare, minimize heat gain, and, in some security-sensitive spaces, minimize views into the space from outside the building.

Custom light fixtures shall be discouraged, except in architecturally significant spaces where they are deemed necessary to advance the design concept.

16.B LIGHTING CRITERIA

Refer to Table 16.1 and Table 16.2 for recommended illuminance levels.

Reflectance Values

Indirect or direct/indirect lighting systems shall be the preferred system. The reflectance of surrounding surfaces greatly impacts the quality of the lighting system and energy efficiency levels. Surrounding surfaces shall comply with criteria noted in Table 16.3.

Lamp Selection

- Interior lighting systems shall be primarily fluorescent, with some metal halide lamps, to maximize energy efficiency and minimize maintenance.
- LED systems may be considered as the technology improves. Maintenance of such systems shall be discussed during the design process to ensure longevity of the installed system.
- Induction sources may be considered where relamping is difficult because of high ceilings or fixed furniture.
- Minimize the number of lamp types wherever possible, for ease of maintenance.
- Select long-life sources to minimize replacement and landfill contributions.
- Limit incandescent (including tungsten halogen or quartz) lamps to artwork and displays, or for detailed facial recognition in some areas.
- Utilize high-efficiency, high-efficacy (lumens per watt) light sources with low mercury content, to maximize energy efficiency and sustainability. Refer to Table 16.4 for recommended mercury content.
- Renovated facilities shall develop a plan to phase out and upgrade current mercury-containing fluorescent lamps to high-efficiency, low-mercury lamp technology.
- Within a facility, one type of 4' fluorescent lamp and two types of compact fluorescent (single ended) lamps shall provide most of the building lighting. The lighting system shall predominantly utilize one type of 4' fluorescent lamp in administrative, office, and back of house areas, while compact fluorescent lamps may be used sparingly in design-sensitive areas or where linear fluorescent sources are not feasible.
- All fluorescent lamps and metal halide lamps under 150 watts will use electronic ballasts. Such ballasts shall be NEMA Premium for any relevant ballast type. Fluorescent ballasts shall be programmed-start where connected to occupancy sensors or where the average use is less than three hours per start. Verify compatibility of selected electronic ballasts with assisted listening systems where programmed.
- Fluorescent lamps will be tri-phosphor (80+ CRI) and 3500K. Metal halide lamps will be 80+ CRI and 3000K. Design teams

Table 16.1 Recommended Interior Illuminance Levels

SPACE DESCRIPTION[3]	RECOMMENDED HORIZONTAL ILLUMINATION LEVEL (FC)[1]	RECOMMENDED VERTICAL ILLUMINATION LEVEL (FC)[4]	OTHER CONSIDERATIONS
Courtrooms			
Judge's Bench	45–55	10	Additional task lighting may be desirable from ceiling.
Clerk	45–55	10	Additional task lighting may be desirable from ceiling.
Spectator Seating	15–25	3	
Litigant's Table	45–55	10	Additional task lighting may be desirable from ceiling.
Podium	45–55	10	Additional adjustable task lighting recommended.
Witness Chair	30–40	5	
Offices			
Intensive VDT[2] use	30–40	—	Additional task lighting may be desirable.
Intermittent VDT use	45–55	—	Additional task lighting may be desirable.
Other Areas			
Conference Rooms	30–40	5	
Jury Assembly	10–30	5	Provide multiple levels of light for various room functions.
Waiting Areas/Lounge/Café	10	—	
High-Density Files	—	25–35	Vertical illumination to within 30" of the floor.
Public and Secure Circulation	15–20	—	
Staff Circulation	5–10	—	
Public Lobbies	15–20	—	
Holding Areas	25–35	5	
Restrooms	10–20	3	
Mechanical/Plumbing Rooms	10	—	
Electrical/AV/Telecom Room	50	—	

1. Value ranges are for average general illumination at workplane height unless noted otherwise. Task illumination requirements are higher.

2. Visual Display Terminal (VDT)

3. For areas not listed, refer to the latest edition of the Illuminating Engineering Society (IES) Lighting Handbook for light level guidelines.

4. Value ranges are for average illumination at facial height unless otherwise noted.

Table 16.2 Recommended Exterior Illuminance Levels

SPACE DESCRIPTION[1]	RECOMMENDED HORIZONTAL ILLUMINATION LEVEL (FC)[2]	RECOMMENDED VERTICAL ILLUMINATION LEVEL (FC)[3]	OTHER CONSIDERATIONS
Parking Areas			
Parking Garage—General	5.0 (1.0 min.)	0.5 min.	
Parking Garage—Ramps	5.0 (1.0 min.)	0.5 min.	Daytime minimum horizontal is 2.0 fc. Daytime minimum vertical is 1.0 fc.
Parking Garage—Entrance	5.0 (1.0 min.)	0.5 min.	Daytime minimum horizontal is 50 fc. Daytime minimum vertical is 25 fc. Daytime light level may include daylight.
Parking Garage—Stairways	2.0 min.	1.0 min.	
Open Parking Lots	2.5	0.25–0.5 min.	Provide 4:1 or 3:1 average to minimum uniformity ratio and 15:1 maximum to minimum uniformity ratio.
Other Exterior Areas			
Active Building Entries	5.0	3.0	
Inactive Building Entries	3.0	3.0	
Pedestrian Pathways	0.5–1.0	0.3	
Stairways	1.0	0.3	

1. *For areas not listed, refer to the latest edition of the Illuminating Engineering Society (IES) Lighting Handbook for light level guidelines.*
2. *Value ranges are for average general illumination at workplane height unless noted otherwise. All exterior target light levels to be determined per project based on security equipment, local ordinances (if any), and emergency egress requirements.*
3. *Value ranges are for average illumination at facial height unless otherwise noted.*

Table 16.3 Recommended Reflectance Levels

ROOM SURFACE	RECOMMENDED REFLECTANCE
Ceilings	Minimum reflectance shall not be below 85%.
Walls, systems furniture partitions	Generally, walls should not be below 60% reflective, but occasional accent walls that are between 40 and 60% reflective will be acceptable. The interior finish schedule shall have a column indicating light reflectance of any materials used in courtrooms or offices.
Floors	Approximately 20% reflective

working to develop a building integrated daylight lighting system for a facility may propose to consistently utilize a cooler color temperature for fluorescent and metal halide lamps, to be reviewed by AOC.

- For exterior lighting, use white light sources with a high CRI, such as metal halide and induction sources. Where low temperatures are not common, fluorescent lighting shall be considered. High- and low-pressure sodium sources shall not be used unless required by local or city ordinances. Mercury vapor sources shall not be used.
- For public art or other displays, the type of art and location shall be identified during design development, to ensure adequate, appropriate lighting.
- Design lighting and controls to accommodate videoconferencing where programmed in courtrooms, conference rooms, chambers, or mediation areas.

For courtroom lighting, ceramic metal halide sources, if considered, should address lamp warm-up and restrike times. Tungsten halogen sources may be used sparingly in courtrooms for specific design-sensitive elements.

- High-performance fluorescent T8 lighting systems utilizing third-generation high-lumen fluorescent T8 lamps and high-efficiency electronic ballasts shall be considered as a strategy to maximize energy efficiency and sustainability and minimize maintenance.
- Energy-saving T8 lamp systems may also be considered and shall require close coordination with AOC with regard to lamp purchasing agreements.
- Illuminated exit signs shall utilize light-emitting diode (LED) lamp technology and shall use less than 5 watts of electricity.

Fixture Selection

Lighting fixtures shall be selected on the basis of maintaining a 20-year life cycle with the facility. Fixtures shall be evaluated on the basis of effectiveness and long-term life cycle costs, especially characteristics and components that ensure longevity and quality, not only lowest first costs.

Visual Criteria

Fixtures shall be selected and located to minimize direct or reflected glare. When several fixtures are specified as equally acceptable, the specifier shall ensure that they meet equivalent performance standards.

Energy Efficiency Criteria

Efficient light sources can be optimized with fixtures that are designed for specific light sources, further enhancing system efficiency. The most efficient fixtures that provide visual comfort necessary for the activity shall be used.

Table 16.4 Recommended Mercury Content in Fluorescent Lamps

FLUORESCENT LAMP	CRITERIA
T-8 8'	Maximum 10 mg mercury
T-8 4' or shorter	Maximum 3.5 mg mercury
T-8 U-Bent	Maximum 6 mg mercury
T-5 Linear	Maximum 2.5 mg mercury
T-5 Circular	Maximum 9 mg mercury
Compact fluorescent, nonintegral ballast	Maximum 3.5 mg mercury
Compact fluorescent, integral ballast	Maximum 3.5 mg mercury Energy Star® qualified

Each project design team shall develop a lighting fixture specification that uses the least number of fixture types and lamps required to satisfy the design in an effort to simplify maintenance.

As design teams endeavor to reduce exterior lighting energy consumption during inactive periods at night, the exterior lighting design should strive to maintain the uniformity of light during the reduced light level scenario, which can help contribute to the sense of safety in pedestrian areas and parking lots at night.

Maintenance Criteria

Lighting maintenance (including but not limited to relamping) is a significant portion of the ongoing court building operating cost; the limited resources available for operation and maintenance must be conserved. Therefore lighting designs shall, at a minimum, provide:

- Readily apparent access to all fixtures for relamping and ballast replacement.
- Removable shielding devices with cables or chains to hold the device to the fixture during relamping.
- A minimum number of lamp types within the facility with sockets that are unique from each other to reduce relamping errors.
- A color-coded relamping diagram, provided at the end of construction.

16.C LIGHTING STRATEGIES

The following recommendations address various spaces in and around the facility. See also Section 16.F Light Fixture Images.

Exterior Lighting

Exterior lighting provides safety and security for those entering and exiting the building outside of daylight hours, and enhances the building's civic presence within the community. As a design element, exterior lighting can highlight the architectural elements and character of the building, while controlling glare.

Exterior lighting shall be compatible with security cameras used on the site. Typically, a high uniformity ratio, of 3:1 or 4:1, shall be used, with well-shielded fixtures. Lighting levels do not need to be high if the light source is of good color quality, uniformity is high, and glare is minimized. Lighting levels shall be determined for each project, based on camera technology and local site requirements. See Table 16.2 Recommended Exterior Illuminance Levels.

Exterior lighting shall not contribute to light pollution by throwing light beyond the property, causing glare and unwanted light for neighbors, or up into the sky, contributing to sky glow and obscuring nighttime vistas. USGBC's LEED for New Construction Version 3.0 (Sustainable Sites Credit 8) shall be used as a guideline for developing the exterior lighting plan, as shall the code-required light pollution reduction measures in the California Building Standards Code–Title 24.

Outdoor lighting shall have photo sensors for control.

Exterior fixtures should be specified to minimize the opportunity for vandalism. For example, in-grade landscape fixtures with vandal-resistant hardware are preferred over above-grade landscape adjustable accent lights.

Light bollards are not recommended, due to potential damage and maintenance issues.

Design teams may consider the use of fluorescent or LED sources in parking lot fixtures. However, some project sites may find their use problematic along perimeter zones with regard to Title 24 light pollution reduction compliance, since these fixtures may not have the optical performance required to minimize light trespass along the project boundary.

Exterior lighting shall be reduced rather than turned off from dusk to dawn and during hours of inactive periods in compliance with the 2010 California Green Building Standards Code, Title 24, Part 11. Lighting required for emergency lighting or nighttime security shall be exempt.

Security Lighting

Determine security lighting requirements at entries, screening stations, or wherever programmed, and coordinate with the security equipment specifications. Faces appearing in cameras must be lit.

In larger facilities with a centralized lighting control system, provide means within the security control center to manually override a reduced level of exterior lighting for security purposes.

Provide a comprehensive nighttime security lighting scheme to be discussed with the AOC security operations group and coordinated with the architectural design team to satisfy both security needs and architectural design intent establishing the nighttime civic presence of the facility.

Emergency Lighting

To maximize energy savings, design teams may consider providing means to turn off emergency lighting afterhours via transfer relay or similar means. Coordinate afterhours switching with AOC security requirements.

Provide integral battery packs or connection to an uninterruptible power source for select lights in the vicinity of the generator, within the generator enclosure, at the electrical service equipment, within the security control center and at the main emergency electrical distribution equipment to maintain operability during a power outage.

Coordinate all emergency egress lighting with current State Fire Marshal requirements, especially in egress stairwells.

Courtroom Lighting

Facial feature modeling is very important in the courtroom, except in the spectator area.

- Use a combination of direct and indirect lighting.
- Avoid harsh shadows, whether from electric light or daylight.
- Minimize direct and reflected glare.
- Ensure that fixture quality and appearance reflect the dignity of courtroom activities.
- Avoid trendy fixtures or materials; durable, aesthetic choices are best.

Audiovisual presentations are common in courtrooms. Lighting must be flexible enough to allow for dimmed ambient light levels, with sufficient light for note taking. For courtrooms with flat-screen monitors, ensure that light sources do not obscure the screen image. Provide multiple levels of switched controls or continuous dimming in all courtrooms.

Diffuse daylight, without direct sunlight penetration, is desirable, but will not be possible in all spaces. Where daylight is available, provide shading devices capable of darkening but not blacking out the room. In spaces where a direct view into the courtroom is a security concern, provide daylight by clerestories or skylights, or provide fixed louvers or baffles that prevent unwanted angles of view. Do not use diffusing glass below 8'-0" AFF for any glazing that can receive direct sunlight during any hours of courtroom occupancy. Where daylight is unavailable, supplement general illumination with other wall lighting such as wallwashers or sconces.

General Open and Private Offices Lighting

Office ceilings shall be suitable for indirect or both direct and indirect lighting. As with other spaces, minimizing glare and maximizing fixture efficiency are key considerations. Where the energy code requires additional controls for daylight zones, dimming is preferred to multilevel switching or stepped dimming.

Judges' Chambers Lighting

The judges' chambers have the same general illumination requirements as other offices. The chambers typically have several task areas. Provide supplementary task lighting as follows:

- Bookshelf wallwashers sufficient to light the books from the top shelf to the bottom. Requirements are similar to high-density files stacks.
- Overhead task lighting at the conference table.

Lobby Lighting

Lobby shape, size, finishes, and lamp types vary at each facility. Lighting shall complement the materials and architectural features, through the use of downlights, wallwashers, cove lights, and decorative fixtures. Select the most efficient source with good shielding to reduce glare. Public art in the lobby shall be identified during early design phases so that appropriate lighting can be specified.

Circulation Lighting

Circulation areas shall have even, diffuse illumination for wayfinding. Fixture selection and location shall be coordinated with directional signage and artwork. Limited accent lighting may be used to assist in wayfinding.

Exit stair lighting shall incorporate the use of occupancy-sensed light fixtures for energy savings. Each project shall verify with the California State Fire Marshal the specific control scheme acceptable with regard to exit illumination.

Holding Area Lighting

Select security-rated lighting fixtures for these areas resistant to penetration, distortion, and contraband concealment. Characteristics may include but are not limited to continuously seam-welded and smooth corners, completely concealed hinges, hardened security screws, and inner and outer lenses rated for the level of security required per space. (See Chapter 8, In-Custody Defendant Receiving, Holding, and Transport.)

High-Density File Lighting

Each row of file stacks shall have illumination from fixtures designed to provide good vertical illumination in a narrow space.

Transaction Counter Lighting

A glass or acrylic security barrier typically separates the public from staff in areas where public transactions occur. This barrier can create reflections from light fixtures that reduce visibility and the ability to view facial expressions. Reflections cannot be eliminated, but they can be minimized by limiting light output to horizontal work surfaces and using fixtures with a low surface brightness.
A glass or acrylic barrier that is intersected by an 18" or greater soffit at the ceiling will reduce reflections. Lighting layouts that are identical on both sides of the glazed material will minimize reflections. Indirect or direct/indirect lighting shall be avoided under these conditions, as the bright ceiling will be a source of reflected glare in the glazing.

Restroom Lighting

Lighting at mirrors shall be adequate to see without creating facial shadows. Lighting shall be evenly distributed within the stall areas. Light-color value wall surfaces are preferred over darker values. Refer to Table 16.3 Recommended Reflectance Levels.

Service Area Lighting

Lighting for electrical and mechanical rooms, janitor closets, and related areas shall consist of fluorescent striplights and wireguards.

Below-Grade Vehicle Area Lighting

At judges' parking, loading, receiving, and central holding areas, uniform lighting without shadows shall provide visibility and coverage if security cameras are used. Metal halide and induction sources shall be considered for these areas, along with fluorescent, where temperature is not a concern. Fluorescent and induction sources are preferred where on and off cycles are frequent, or where emergency lighting is required.

16.D LIGHTING CONTROLS

Courtrooms typically have multiple zones of control. Utilize the least complex, most intuitive system that will provide the required functions. In courtrooms with four or fewer zones of control where lighting can be controlled from one primary location with one or two additional three-way controls, standard wallbox switches and dimmers shall be used at a minimum. In courtrooms with more than four zones of control or multiple control location requirements, or if a room can be subdivided into smaller rooms with movable partitions, provide a preset dimming system. Controls shall be located to be convenient to court staff but not accessible to the public. Integrated AV/lighting touch-screen controls and wall-mounted lighting control modules are recommended.

Jury assembly rooms, large training rooms, and the security control room shall have dimmable lighting unless otherwise directed by AOC.

General

Occupancy controls that provide vacancy sensing are preferred in most spaces such that lights within a space are turned on manually and then turned off automatically when the room is vacant.

Demand response lighting systems, if considered for a project, shall be determined early in the design phase to coordinate required lighting specifications and lighting control systems.

In facilities where a centralized lighting control system and intelligent building system (IBS) are provided, an interface between the two systems shall be provided. Coordinate with AOC to determine functionality requirements (reporting, control, etc.).

Daylighting

Daylight-responsive (daylight-harvesting) controls shall meet or exceed the minimum criteria established by the California Building Standards Code–Title 24.

In spaces with natural light, luminaires located in the daylighted area shall be zoned separately from other luminaires.

Unless it can be demonstrated that daylight illumination is insufficient between March 22 and September 22, provide daylight harvesting controls. All luminaires in courtrooms or offices connected to the daylight harvesting system shall utilize continuous dimming ballasts or drivers. Lobbies, corridors, and other nonwork spaces may consider multiple-level switching or step-dim ballasts if continuous dimming is too costly.

Photosensors shall be filtered or calibrated to respond only to light in the visual range (no UV or IR), and adjusted for the human sensitivity spectral curve. Continuous dimming controls shall utilize a sliding set point algorithm.

The design set point for daylight dimming shall be 1.5 times the nighttime designed light level. For example, if the electric lights alone provide 30 fc, the luminaires shall not start to dim until the combined daylight and electric light reaches or exceeds 45 fc (30 x 1.5). The set point for daylight switching shall be 2.0 to 2.5 times the nighttime designed light level.

Quality Control

Provide a written Lighting Control Intent Narrative that explains the lighting control systems in common language, for client review and response during each design phase, and revised for submittal as part of the contract documents. Selected controls manufacturers shall be required to verify that their products, as submitted during the shop drawing phase, meet the control intent, or to indicate any exceptions and describe how they intend to satisfy the desired performance with their products.

The following light fixture images are for reference only and are not intended to require a particular manufacturer's specification.

16.E LIGHTING COMMISSIONING

Specifications shall include commissioning services to ensure that the building delivered at the end of construction has fully operational occupancy sensors, photo cells, and dimming systems that provide proper controls. Basic services shall include staff training for systems operation and troubleshooting.

16.F LIGHT FIXTURE IMAGES

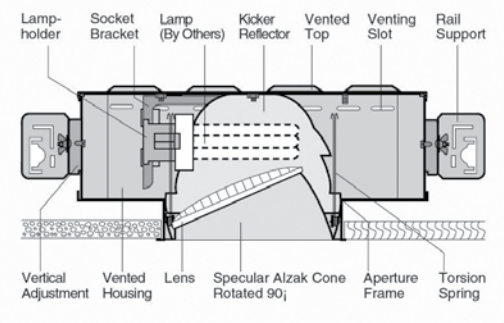


Figure 16.3 Wallwasher Fixture

Figure 16.1 Direct/Indirect Lighting Fixture

Figure 16.4 Tasklight

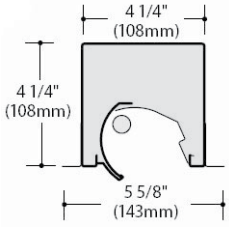


Figure 16.2 Linear Wallwasher Fixture

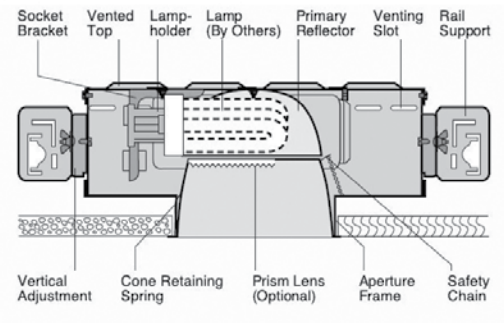


Figure 16.5 Downlight

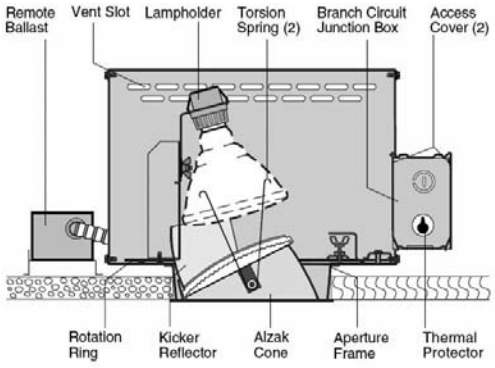


Figure 16.6 Wallwasher Fixture

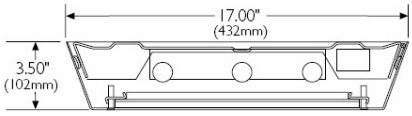


Figure 16.9 Security Holding Room Fixture

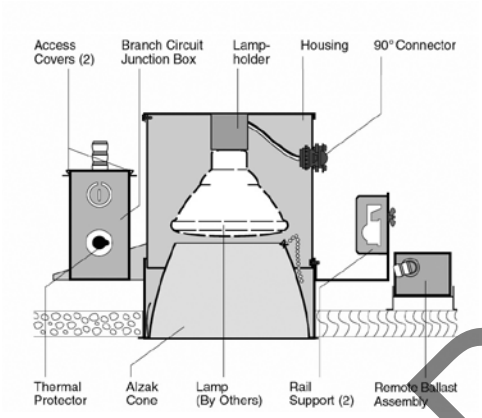


Figure 16.7 Downlight

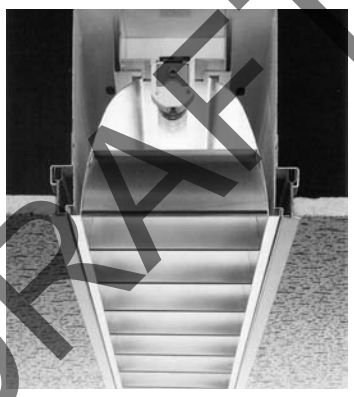


Figure 16.10 Low Brightness Direct Fixture

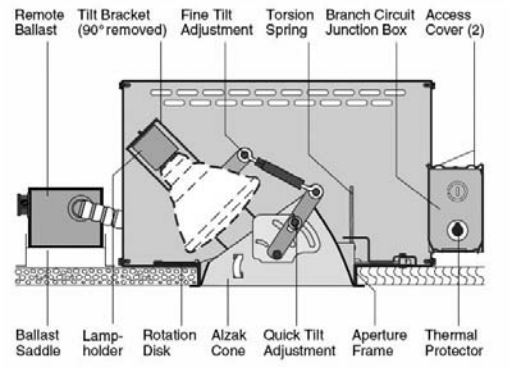


Figure 16.8 Accent Light

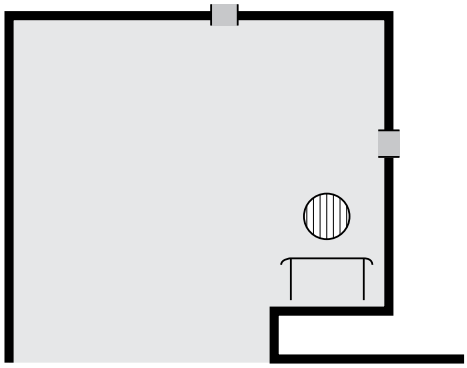


Figure 16.11 Cove for Restrooms

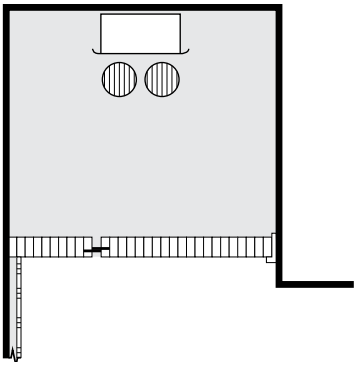


Figure 16.12 Cove for Restrooms

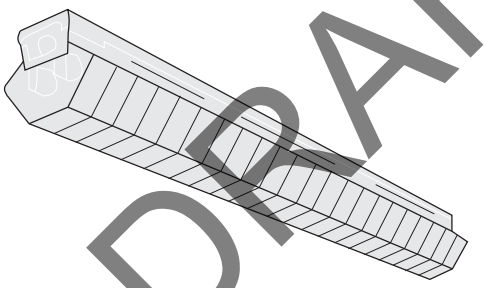


Figure 16.13 Striplight With Wireguard

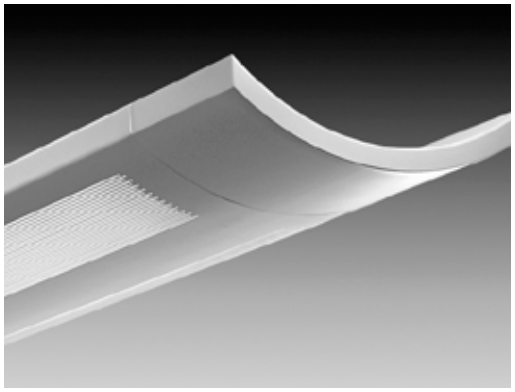


Figure 16.14 Direct/Indirect Lighting Fixture

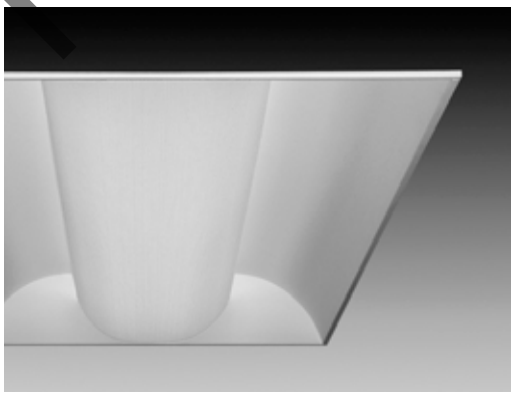
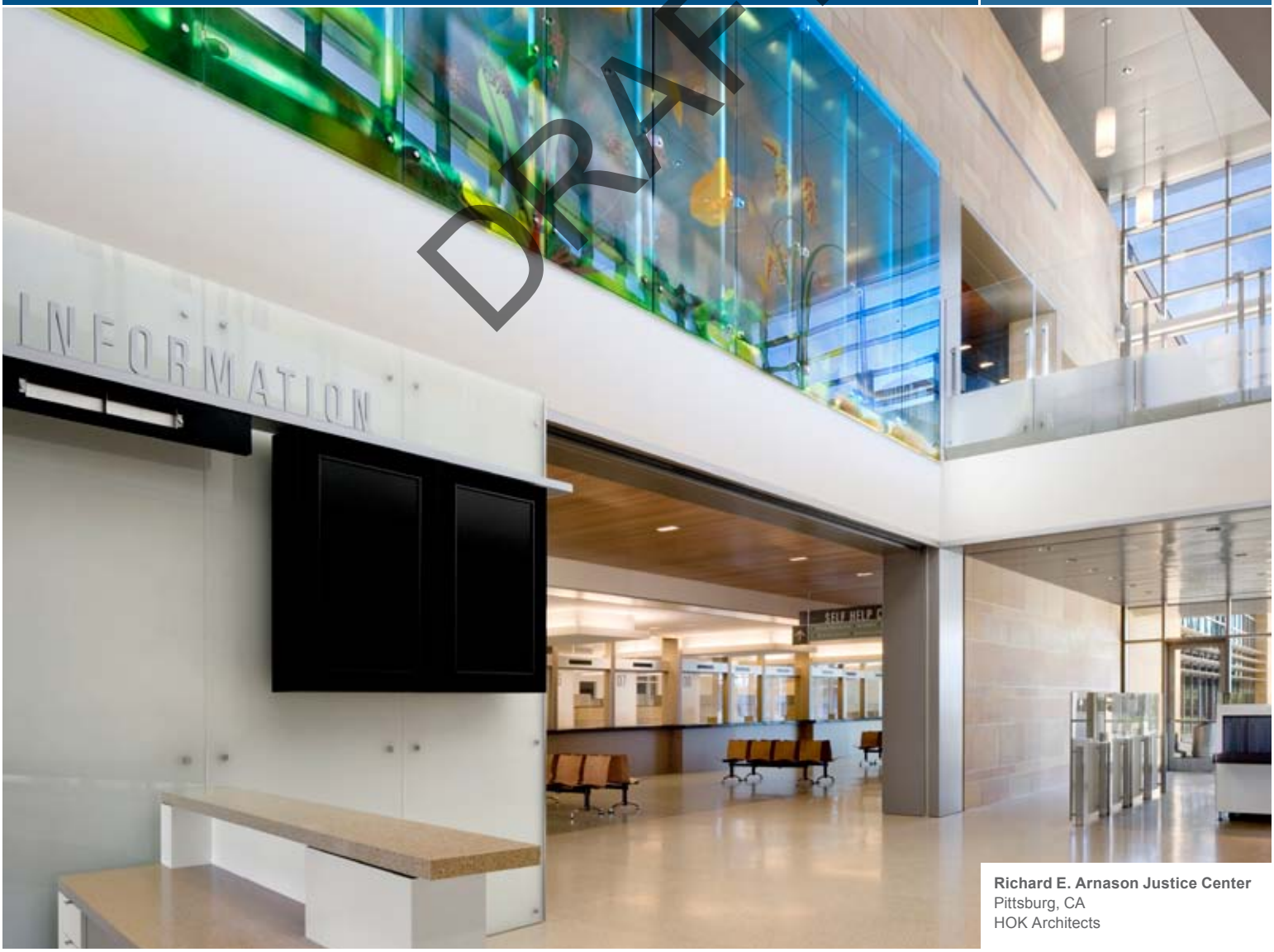


Figure 16.15 General Illumination Fixture

Figure 16.16 High-Efficiency Direct/Indirect Fixture

17 UNIFIED COMMUNICATIONS



Richard E. Arnason Justice Center
Pittsburg, CA
HOK Architects

DAVID WAKELY PHOTOGRAPHY

Effective technology systems are essential for daily courthouse operations. A technology program is required to be developed along with the architectural program. The design consultants, the AOC, and the court advisory team shall determine what is to be provided throughout the court building.

17.A GENERAL OVERVIEW

Introduction

Simply defined, a unified communications system is the convergence of building technologies over a network architecture and shared physical layer that supports the transport of IP-based communication signals. This emerging best practice has been made possible by ever-increasing bandwidths and numerous refinements in networking transmission techniques, allowing information to be transported utilizing Ethernet interfaces and IP-based technologies.

The unified communications technology design intent is to provide a basis for the development of a structured cabling infrastructure that supports a converged IP network solution. There are several identifiable benefits to implementing a converged network solution. Commercial benefits include lower capital expenditure and a reduction in the cost for maintenance and support. Considering the network, convergence provides increased network availability, scalability, and functionality. In addition, there are environmental benefits due to the reduction in materials and the need for building utility support such as power and cooling.

The technology program shall be predicated on the personnel available or required to support the technology and the extent and complexity of the technology embedded in a new court building. These factors will be the basis for decisions related to the implementation of a unified communications system, a converged IP network, and the structured cabling system.

Structured Cabling

The structured cabling goal is to provide a robust physical layer that supports high reliability, bandwidth capacity, and future flexibility to extend current and future technology services to each courthouse facility. Considering the communications services that may be deployed throughout courthouse facilities, the standards document will make recommendations related to the following:

- Communications rooms, including architectural, electrical, mechanical, grounding and bonding guidelines required to support infrastructure and equipment deployment.
- Distribution pathways to support the intrabuilding infrastructure.
- Communications backbone and horizontal connectivity distribution and the performance rating of the cable utilized to support the building utility services throughout the facility.
- Administration and verification with identification and testing of the communications infrastructure and system components.

Network Architecture

The integrated network will facilitate the convergence of the various intelligent building systems on a common, shared IP network. With a converged network architecture solution, information types employing Internet Protocol (IP) are transported over a common network. On the most basic network architecture level, all IP systems converge to share the structured cabling infrastructure that has been traditionally reserved for separate systems like the general voice and data network systems. The integrated network provides a single logical transport for the transmission of all converged systems and information within the facility.

Figure 17.1 illustrates the major components of the unified communications system—combining the spaces, pathways, connectivity or structured cabling, and end devices. Though not intended to convey each component or convey the overall unified communications

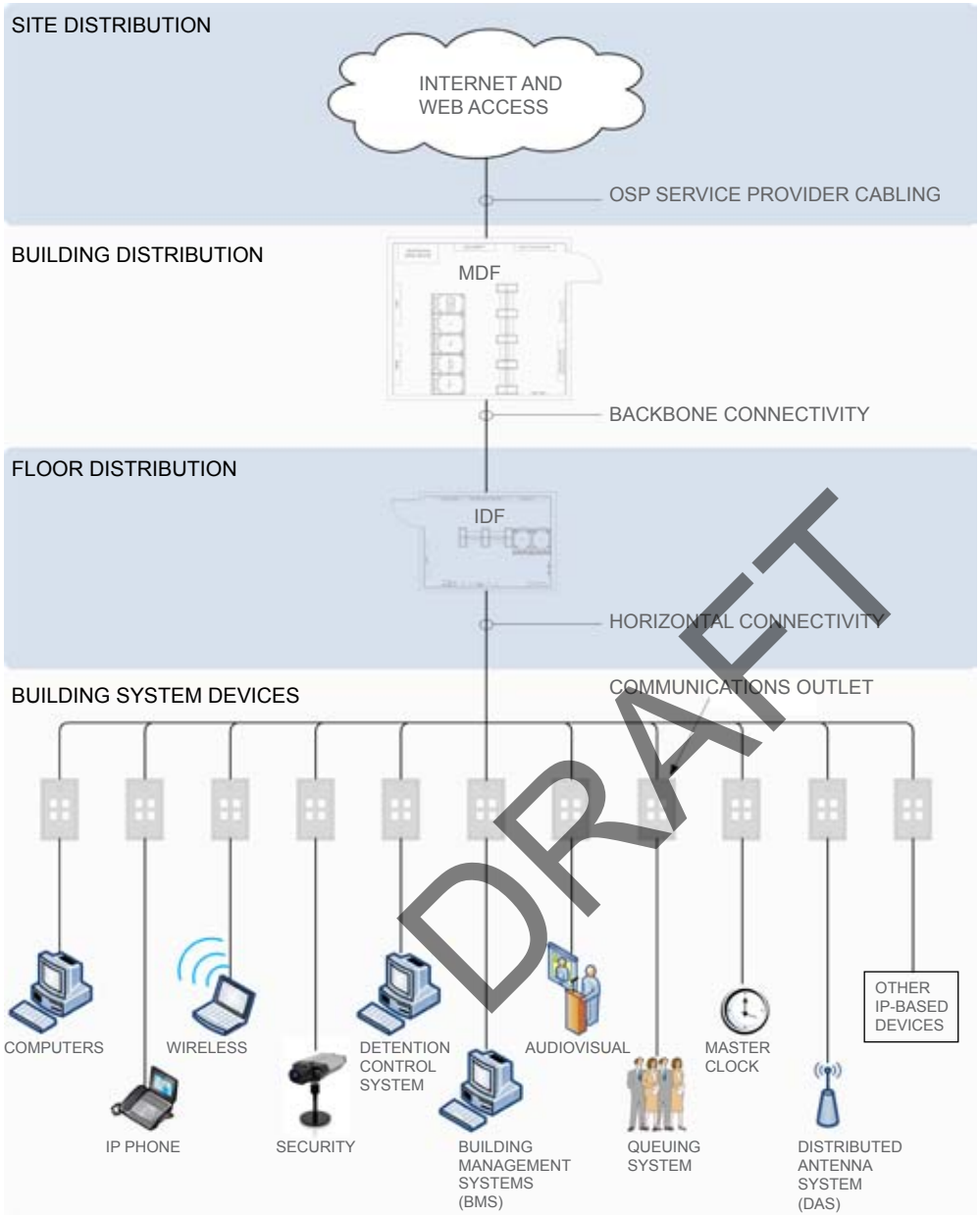


Figure 17.1 Layout Diagram of Structured Cabling Topology that Includes Building Systems

Alternate Consideration

Colocating an intermediate distribution facility (IDF) inside the main distribution facility (MDF) is an acceptable design practice

Related Reading

Chapter 19: Fire Protection Criteria for fire suppression requirements

system, this illustration should give the reader a visual reference of the components and how they interconnect.

See Appendix for the integrated network architecture diagram which illustrates the expected intelligent building systems under the unified communications system.

17.B COMMUNICATIONS SPACES

Service Entrance Facilities

An independent space, described as the service entrance facility, will be required within each court building to house service provider termination components and equipment or to serve as a splice point for incoming services.

The placement of the entrance facility should be evaluated on a case-by-case basis considering location of service provider networks "in the street," overall building size, and location of other building communications rooms. Whenever possible, colocate the entrance facility within the main distribution facility. Colocating the entrance facility within the main distribution facility minimizes the need to develop a separate, dedicated space.

The size and type of the entrance facility should be developed considering overall building design, square footage of the facility, quantity of incoming conduits, and types of services required. A dedicated space within the entrance facility should be allocated to "stub out" conduit pathways. At a minimum, a 48" wide x 12" deep floor-to-ceiling space should be allocated on one accessible wall to support up to six conduits.

Design Criteria

- To simplify incoming conduit pathways, consideration should be given to locating the entrance facility on the basement level (if applicable) or the ground level and close to a load-bearing wall.

Table 17.1 MDF Space Considerations

BUILDING TECHNOLOGY SYSTEM	TYPICAL MOUNTING LOCATION
Service Provider Fiber	2-post Relay Rack
Service Provider Copper	Wall
OSP/ISP Building Fiber	2-post Relay Rack
OSP/ISP Building Copper	Wall
Vertical Cable Management	Sides of Each Relay Rack
IP Network Hardware	2-post Relay Rack
Court IT Servers	Equipment Cabinet
Audiovisual Systems	Equipment Cabinet
Security Access Control Panels	Wall
Security Servers	Equipment Cabinet
DAS Connectivity	Wall
DAS Radio and Cellular Components	Equipment Cabinet
BMS Servers	Equipment Cabinet
BMS Control Panels	Wall
Detention System Servers	Equipment Cabinet
Technician Desk	Floor (min 4'W x 5'D)
Electrical Distribution Panel	Wall
Entrance Facility Conduits	Floor and Wall

- Provide adequate overhead space for conduit pathways that either enter the room from outside the building or extend connections to another communications space within the building.
- To accommodate entrance conduits, adequate clearance should be provided in front of the wall where the conduits terminate.
- Vertical cable runway sections should be used to route cables from the floor and ceiling conduit penetrations to the overhead cable runway.

Main Distribution Facility

This section refers to the main distribution facility (MDF) as a single space for the purpose of space planning only. In practice, the MDF will be subdivided between various operational units allocating space for termination fields, active components, equipment cabinets, and relay racks required to house building communications system control devices. In simple terms, the MDF room will function as the main hub or "headend" within each courthouse facility. See Table 17.1 for MDF space considerations.

Provide a minimum of one MDF room per courthouse building located on the lower floors with an accessible pathway to the loading dock or freight elevator. The MDF should not be located on any building exterior walls or below the flood level.

A well-designed MDF is imperative to the overall success of the IP network and the technology systems that function within a courthouse facility. Figure 17.2 presents a typical MDF layout for a smaller courthouse facility that provides space for five equipment cabinets and four relay racks. Minimum clearances are indicated, as they are critical to the functionality of all unified communications rooms and should be factored into the layout.

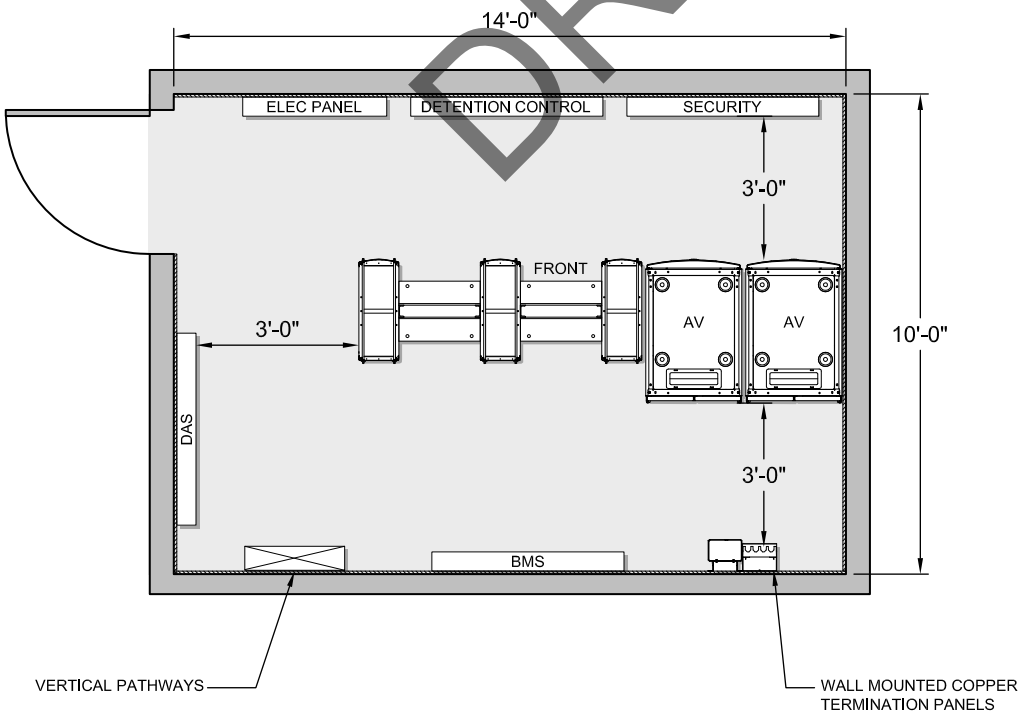


Figure 17.2 Typical Smaller Courthouse MDF Layout

Important Reference

An example of "active electronics" would be an IT network switch used to connect LAN network segments.

Multiple courtrooms may be served from a single IDF; however, close coordination of the various technology systems space requirements is imperative when developing the overall size of an IDF supporting a courtroom space.

Design Criteria

- Cabinets and relay racks shall be ANSI/EIA 310E compliant with a standard height of 7'.
- The standard size for an equipment cabinet is 24" wide x 42" deep.
- No restrooms, janitor closets, or piping with running water shall be located immediately above or next to the MDF.
- Internal wall surfaces should be covered with ¾" fire-rated plywood. Sealed concrete is an acceptable finish on floors
- Vertical cable runway sections should be used to route cables from the floor and ceiling conduit penetrations to the overhead cable runway.
- Provide outward swinging door(s) fitted with both a key and a card lock; minimum door size should be 42" wide x 90" high.
- Floor loading should be factored at 200 lbs/sq. ft. and confirmed on a case-by-case basis.
- A minimum of one relay rack should be reserved for the consolidation of service provider, county, and court WAN edge active equipment devices.
- At a minimum, utilize 10" double-sided vertical cable management between racks.
- Relay racks utilized for the termination of structured cabling should reserve 50 percent of the available rack unit space for active electronics.

Intermediate Distribution Facility

An intermediate distribution facility (IDF) is typically an enclosed architectural space for housing communications equipment, cabling terminations, and any cross connect cabling required to distribute communications signals throughout a localized area.

IDF spaces should be dedicated to communications systems use, centrally located on every floor, and stacked vertically through the building to enable efficient pathway and cabling distribution within each serving zone. IDF serving zones must allow for each

Table 17.2 IDF Space Considerations

BUILDING TECHNOLOGY SYSTEM	TYPICAL MOUNTING LOCATION
Intrabuilding Fiber	2-post Relay Rack
Intrabuilding Copper	Wall
Horizontal Cabling	2-post Relay Rack
Vertical Cable Management	Sides of each Relay Rack
IP Network Hardware	2-post Relay Rack
Audiovisual Systems	Equipment Cabinet
Security Access Control Panels	Wall
Security Servers	Equipment Cabinet
DAS Connectivity	Wall
BMS Control Panels	Wall
Detention System Servers	Equipment Cabinet
Detention System Control Panels	Wall
Electrical Distribution Panel	Wall
Vertical Conduit Pathways	Floor and Wall

individual twisted pair copper cabling segment to fall within the Ethernet distance limitations of 295'. Additional IDF spaces should be considered when the serving area is greater than 10,000 sq. ft. or the interior building space plan restricts the size of a single IDF, limiting the available space for equipment.

Typically, IDF room size recommendations are derived from square footages, factoring 1 outlet per typical 100 sq. ft. of work area. However, these general guidelines do not take into account the quantity of technology systems that courtroom IDF rooms are required to support; therefore, the general industry rule of thumb numbers should not apply. IDF rooms should be sized on a case-by-case basis considering the minimum clearances to accommodate the active electronics and termination components that each room houses.

Table 17.2 outlines the systems and their typical mounting locations that should be considered when developing the IDF size and interior design.

Figure 17.3 presents a typical IDF layout for a courthouse facility where two courtrooms are served from a single IDF. This IDF provides two AV cabinets (one per courtroom) and two relay racks for housing active electronics and structured cabling termination components. Minimum clearances are critical to the room design and are indicated for reference.

Design Criteria

- Cabinets and relay racks shall be ANSI/EIA 310D compliant with a standard height of 7'.
- The standard size for an equipment cabinet is 24" wide x 42" deep.

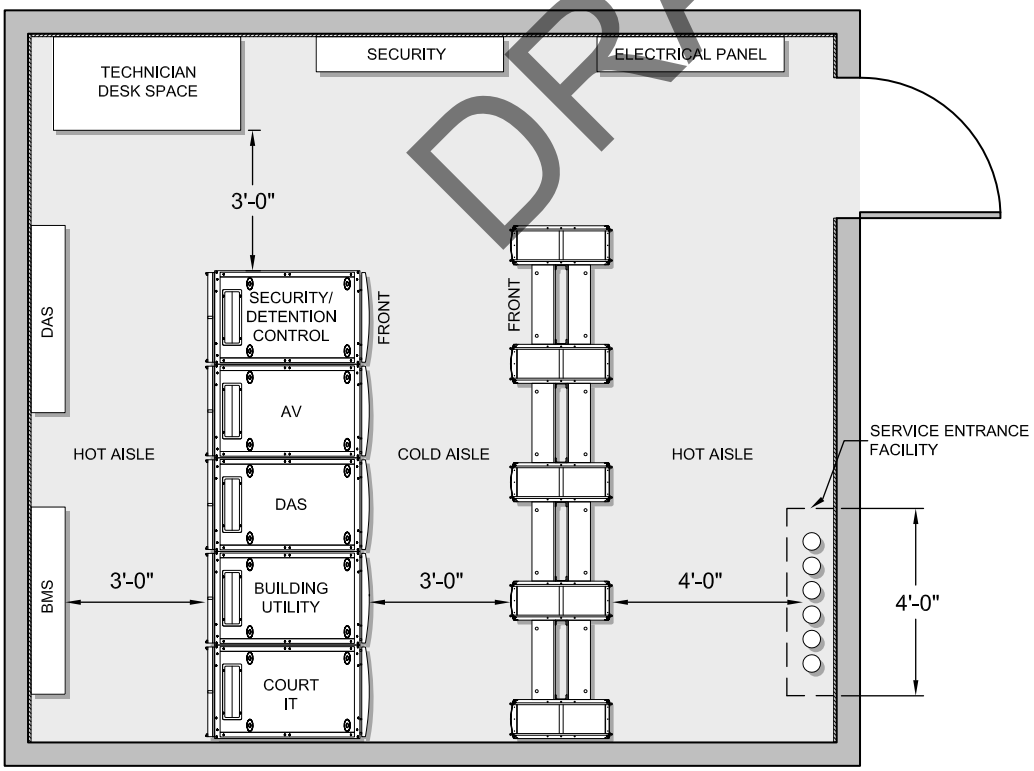


Figure 17.3 IDF Serving Two Courtrooms

Important Reference

2008 ASHRAE Environmental Guidelines for Datacom Equipment

Related Reading

Chapter 13: Mechanical Criteria

Chapter 15: Electrical Criteria

- No restrooms, janitor closets, or piping with running water shall be located immediately above or next to the IDF.
- Internal wall surfaces should be covered with ¾" fire-rated plywood.
- Sealed concrete is an acceptable finish on floors, and a finished ceiling should not be provided.
- Vertical cable runway sections shall be used to route cables from the floor and ceiling penetrations to the overhead cable runway grid.
- Provide a single outward swinging door fitted with both a key and a card lock; minimum door size is 36" wide x 90" high.
- Allocate space and adequate clearance for vertical conduit pathways.
- At a minimum, utilize 10" double-sided vertical cable management between racks.
- Relay racks utilized for the termination of structured cabling should reserve 50 percent of the available rack unit space for active electronics.

Electrical Systems

Although the main focus of this chapter is not the electrical system criteria, the technology systems located within communications rooms have specific power requirements. Therefore, this section provides an overview of the specific communications electrical needs that should be considered in the building-wide electrical design.

The full complement of technology-related systems housed inside communications spaces should have adequate UPS power backup to support electrical interruptions. A centralized UPS system is the preferred methodology for the distribution of short-term power when the main input power source fails. Among other things, this "best practice" provides benefits with increased space savings within the communications rooms and reduces maintenance costs.

In addition to UPS support, courthouse buildings provisioned with an emergency power generator must provide additional power backup to the same devices connected to the UPS system.

During preliminary building design, load estimates are required to begin the electrical system design and for space planning. Although the actual electrical equipment loads are calculated once the final systems equipment is defined, general load estimates are provided as a basis for design.

Typically, communications room electrical load ranges are estimated in Table 17.3.

Table 17.3 Electrical Load Estimates

NUMBER OF COURTROOMS	MDF (W/FT²)	IDF (W/FT²)
1–6	65–80	65–75
7–19	75–90	65–75
20+	80–100	65–75

Design Criteria

- Provide an overhead busway electrical distribution system within communications rooms. An electrical busway provides a more flexible power solution that accommodates a variety of receptacles and is more cost-effective over the life of the building.
- Isolated grounding circuits for communications equipment are not required unless equipment manufacturer mandates the use.
- Lighting should be provided in aisle ways parallel to rows of racks and cabinets and should not conflict with the cable management infrastructure inside the rooms.
- Lighting fixtures must not be powered from the same distribution panel as the room's power outlets.

Mechanical Systems

Mechanical system cooling units should be dedicated to the operation of the communications room they serve and located outside the room. Multiple floors should have discrete service, meaning not ganged together, and capable of providing 24/7/365 operation, independent of the "base building" system. System selection should be either packaged heat pumps (CW) or fan coils (CHW), based on case-by-case project analysis. Supply and return ducting should be directed at the respective cold and hot aisle layout within each communications room requiring cooling.

The units serving communications rooms should be on emergency generator power (when available) in order to provide continuous cooling in case of a building power outage. UPS backup power is not necessary for cooling units.

At a minimum, the mechanical systems should be designed to meet the current industry ASHRAE standard for allowable temperature and humidity parameters. For reference, the 2008 ASHRAE standard provides the following system parameters:

- Low end temp: 64.4°F (supply air to equipment)
- High end temp: 80.6°F (supply air to equipment)
- Low end moisture: 41.9°F dew point
- High end moisture: 60 percent relative humidity and 59°F dew point

Note: These recommended temperatures and conditions are for inlet air measurement entering the equipment and not necessarily room temperature.

During preliminary building design, the estimated MDF room BTUs/hr should be based on a minimum electrical load of 75W/sq. ft. In each IDF, the estimated BTUs/hr should be based on a minimum electrical load of 65W/sq. ft. These load estimates should be developed further as the building design moves forward and should be confirmed when equipment is determined.

Design Criteria

- Consideration of air-side-free cooling should be made based on climatic conditions.
- The mechanical systems should report to the BMS, building engineers, and IT support personnel, triggering alarms when the set parameters are exceeded.
- In general, no plumbing pipes (pressurized or unpressurized) should be allowed to go through any communications space unless they serve components within the room such as fire suppression systems. Water-filled pipes should route around communications rooms rather than through them.
- When water-filled pipes travel within a communications room, pipe isolation and drain pans must be provided.
- Roof drains or other sources of water should not be located above any communications rooms.

Grounding and Bonding

A uniform telecommunications grounding and bonding system should be provided between all communications rooms in accordance with TIA/EIA Commercial Building Grounding and Bonding standards, NEC requirements, and BICSI guidelines. The building-wide grounding system that provides each communications space with a dedicated grounding busbar shall be compliant with the NEC requirements.

Extended from the grounding busbar within each communications space, a common bonding network consisting of a series of insulated conductors should bond all communications components requiring a ground connection to the grounding busbar. Components typically bonded to the grounding busbar include, but are not limited to, equipment cabinets, relay racks, protector blocks, cable runways, and communication conduits.

Coordinate with local service providers to determine specific pathway requirements or best practices.

Satellite pathway should be designed considering each courthouse facilities' specific requirements.

Important Reference

BICSI TDMM (latest edition) for separation information from EMI sources and for pull box sizing guidelines

17.C DISTRIBUTION PATHWAYS

Design Overview

To meet the overall goal of convergence, communication pathways should be designed to support the distribution needs of all unified communications systems. Combining low-voltage cabling infrastructure onto shared pathways provides a well-organized functional approach to the distribution of connectivity whether outside or inside the courthouse building. In turn, a unified pathway design that takes into consideration the cable needs of each IP-based building technology enhances the flexibility of the distribution system over time, allowing for simplified changes or upgrades.

Outside Plant

In addition to the entrance conduits required for service provider connectivity, OSP pathways provide a means to route communications cabling outside the building. For a courthouse facility, this may include media connections to a television network pedestal, security entry control and camera devices, and landscaping control equipment. The OSP pathway system needs to be carefully coordinated with all site utilities. Industry standard components such as conduits, maintenance holes, pull boxes, or hand holes should be used to distribute connectivity in the OSP.

Service Entrance Conduits

Pathways and pulling points shall be dedicated to incoming service provider networks and not shared with other technologies or utilities. The quantity of service entrance conduits should be based on the size of the facility, the service provider circuits, and the level of redundancy required. Entrance conduit routing should be developed with site utilities and local service providers to ensure that the property line conduit termination point(s) have been successfully coordinated.

The minimum conduit quantities provided in Table 17.4 should be reviewed and may be revised when specific requirements for each facility are understood. Three distinct building categories have been defined to provide an initial design basis.

Inside Plant Pathways

A well-designed ISP distribution system must be designed to allow for day one capacity as well as the high likelihood of future moves, adds, and changes to provide numerous efficiencies over the life cycle of a building. The ISP pathways provide a means to successfully route and support all IP and non-IP low-voltage connectivity within a courthouse building. This includes larger conduit pathways for backbone connectivity between communications rooms and smaller conduit pathways for horizontal connectivity extended to wall and floor communications outlets.

Backbone Distribution System

From the service entrance facility, dedicated ISP conduit pathways shall extend to the MDF. When the service entrance facility is colocated within the MDF, conduit pathways shall extend directly from the OSP to the entrance facility space. An OSP to MDF conduit pathway system should be designed considering standard practices of the various service providers delivering connections to the building.

The design of backbone pathways between communications rooms should factor the many variables associated with connecting technology spaces together. The standard practice is to provide conduit pathways between the main communications rooms. In cases where IDF rooms are stacked, providing a pathway located in the same place within each IDF is the preferred vertical distribution methodology. Provide a functional and flexible backbone

Table 17.4 Service Entrance Conduit Quantities

NUMBER OF COURTROOMS	CONDUIT QUANTITY
1–6	3
7–19	6
20+	8

pathway design, including access and clearance, appropriate bend radii, and pull boxes, to allow for the successful distribution of communications backbone cabling.

The number of conduits per pathway varies depending on the number of communications cables required. Provide a minimum 20 percent for future growth when considering the total quantity of conduits required. Backbone conduit segments that are greater than 50' should have fabric duct separators installed for the length of the conduit run. A maximum fill rate of 40 percent should be factored for day one conduit capacity.

Satellite Distribution System

From the MDF, dedicated ISP conduit pathways should extend to the rooftop to support satellite antenna connectivity. The conduit pathway system should be designed considering the standard practices of service provider(s) delivering satellite service to the building. At a minimum, provide 2' conduit pathways from the roof to the MDF to support satellite requirements.

Horizontal Distribution System

Horizontal distribution pathways designed to accommodate low-voltage cabling systems can be grouped into two functional elements: the primary conveyance system, which is a cable tray that extends above the main corridors from the serving communications room, and secondary conveyance pathways, such as a conduit or noncontinuous support system provided from the cable tray to the communications outlet location. Coordination of each communications outlet location throughout the facility is critical, especially within the courtroom.

Basket or solid rail style cable trays are required for courtroom buildings due to their elevated capacities, increased robustness, and accessory components utilized for separation of the non-IP cable bundles such as BMS, AV, and security cabling. Accessibility and clearance requirements should be coordinated so the overall functionality of the conveyance system is enhanced.

Conduit pathways utilized for horizontal distribution shall be designed to accommodate the quantity of cables they are required to support. Coordinating final outlet locations and pathway design factoring millwork and other interior architectural parameters is critical within every courtroom. The current minimum conduit size for a standard communications outlet is 1¼". Wall-mounted electrical back boxes should have manufactured 1¼" knockouts to accommodate the conduit. Currently the largest available communications outlet back box is a 5" x 5" x 2⅞", which provides the greatest capacity when allowing for cabling bend radius constraints.

To minimize the overall number of floor penetrations, combined power and communications floor box and poke-through devices are acceptable for floor-mounted outlets. Size floor boxes and poke-through devices according to the number of low-voltage communications and electrical outlets at each outlet location. Specific attention should be given to floor depths and fire ratings when specifying floor boxes and poke-through devices.

In addition to the conveyance systems, reenterable UL-rated fire stop assemblies are required for through penetrations in all rated walls and floors. At a minimum, size the assembly considering the number of communications cables plus 20 percent future growth factor.

Design Criteria

- Install conduit runs in lieu of cable tray where access to the cable tray is restricted for more than 10'.
- Conduit pull boxes should only be located in easily accessible locations.
- Ground distribution pathways according to telecommunications industry standards.

Alternate Consideration

Large multifloor facilities may be better served utilizing second level backbone cabling distribution; i.e., a central IDF would serve as a termination point for backbone connectivity from other IDF spaces.

For each project, the design professional shall consider all building utility systems and verify the need for horizontal optical fiber media.

17.D BACKBONE CONNECTIVITY

As technology systems converge onto the IP network, efficiencies increase when a common backbone is utilized to distribute communication signals. Optical fiber cables shall be used as the primary backbone media, as they provide higher bandwidth and can extend greater distances than their copper counterpart. Multipair copper cabling has become the auxiliary backbone media utilized to extend analog or non-IP signal technology.

Coordinate the backbone and horizontal connectivity needs for CATV distribution on a case-by-case basis.

Optical Fiber

The current design base for first-level backbone connectivity, from the MDF to each IDF, is to deploy single-mode fiber (SMF) and 50/125 micron, laser optimized multimode fiber (LOMMF). The fiber cable performance characteristics described below are provided considering these two fiber types. As network design evolves to meet growing bandwidth needs, the strand quantities and types of optical fiber provided in the backbone segment should meet current project requirements, industry standards, and projected bandwidth benchmarks.

Single Mode

Backbone SMF cable should be capable of 10 Gigabit Ethernet signal transmission to 10,000 meters in the 1310nm operating window. Maximum attenuation for a SMF cable shall be no greater than 0.7dB per kilometer using 1310nm and 0.5dB per kilometer using 1550nm wavelengths respectively. Fusion spliced factory connectorized pigtails are the required termination practice for SMF cable. An SMF cable between the MDF and each IDF shall have a minimum of 12 strands.

Laser Optimized Multimode

Laser optimized multimode (LOMMF) cables should be capable of 10 Gigabit Ethernet signal transmission to 300 meters at 2000 MHz/km effective modal bandwidth, while allowing the use of low-cost, 850nm vertical cavity surface emitting laser (VCSEL). Maximum attenuation for LOMMF cable shall be no greater than 3.0dB per kilometer, and 850nm and 1.0dB per kilometer using 1300nm wavelengths respectively. A LOMMF cable between the MDF and each IDF shall have a minimum of 24 strands.

Cabling Criteria

- Provide a flexible, spirally wrapped interlocking armor over an individual jacketed and tight buffered cable.
- Terminate fiber cabling in fully enclosed fiber panels.
- Provide 20 percent spare termination capacity in the panel.
- Fiber connectors should be small form factor LC duplex.
- Connectivity shall be rated per the installation environment.

Multipair Copper

Multipair copper cable should extend from the MDF to each IDF room. Select a voice-grade Category-3 unshielded twisted pair (UTP) cable; minimum 25 pair.

Cabling Criteria

- Terminate cabling onto a 110-type wall field.
- Provide 20 percent spare termination capacity.
- Connectivity shall be rated per the installation environment.

17.E HORIZONTAL CONNECTIVITY

Horizontal connectivity, from the floor serving IDF space to each communications outlet location, is required to extend service to the various building system end devices that utilize the IP network. The transport medium most widely utilized in the “horizontal” is a twisted pair copper cable. Optical fiber cabling should be considered for outlet locations that are determined to be over distance.

Supplementing the hard-wired connections throughout the facility, a wireless local area network (WLAN) is required to provide additional connectivity to court staff. An understanding of the connectivity requirements for each system should be realized at the earliest phases in the design process.

Four-Pair Copper

Currently, the highest performance ratified cable determined by ANSI/TIA/EIA is category-6A, otherwise known as augmented category-6. A foil applied over unshielded twisted-pairs (F/UTP) shall be the minimum standard for jacketing of four-pair copper cables. As network bandwidth increases, the category performance rating of four-pair copper cable should be revised to meet current industry standards.

Cabling Criteria

- Each four-pair copper cable permanent link must fall within the Ethernet distance limitation of 295'.
- Each cable should show stable performance with documented electrical characterization out to 500 MHz.
- In communications rooms, terminate the cabling in angled patch panels.
- The end-to-end four-pair copper connectivity solution shall utilize shielded components.
- Connectivity shall be rated for the installation environment.

Wireless Local Area Network

Although the term wireless lends itself to the concept that hard-wired connections are not needed, a grid-type network of connection points dedicated to the wireless system is required. To achieve seamless 100 percent coverage throughout a courthouse facility, communications outlets are placed in accessible locations, typically above suspended ceilings. These dedicated wireless outlets are considered part of the structured cabling system and are passive wiring-only locations, intended for use by active wireless devices known as a wireless access point (WAP). WAP placement should be determined through independent analysis via specialized testing and survey techniques and should be developed alongside the active systems network architecture design.

Typical Outlet Configurations

A standard configuration can be applied to the quantity of cables per outlet and the location of outlets per room or device. Utilizing this configuration early in design, the design professional can begin validating early architectural space planning efforts and develop device outlet layouts that are consistent with previous court projects.

Shown in Table 17.5 is a matrix of typical communications outlets expected in a courthouse design. The matrix illustrates the typical quantity of horizontal four-pair copper cables for each communications outlet adjacent to the IP port activation strategy. The communications outlets and IP port activations are inclusive of the quantity needs of the various building systems.

The standard outlet housing or faceplate shall have a minimum of four-ports. All unused ports shall have a blank insert. A wall-mount phone faceplate is an exception.

The sketches in Figure 17.4 identify the typical wall, floor, and future outlet locations within the typical courtrooms.

17.F ADMINISTRATION AND VERIFICATION

The administration and verification of the structured cabling system are critical to the efficient functioning of a new courthouse facility through the design phase and construction build-out, and during technology systems implementation (either day one or during the life span of the building).

Important Reference

The communications system should comply with ANSI/ TIA/EIA 606A Administration standard.

Well-documented design processes where detailed specifications, drawings packages, and as-built drawings are submitted by the installing contractor are project requirements that should be strictly enforced. Project documentation of this type should be reviewed in detail for accuracy and completeness.

The structured cabling connectivity solution shall be certified by the component manufacturer(s) and provided with an extended minimum warranty period of 25 years.

Identification and Labeling

An identification system should be implemented to uniquely identify the unified communications infrastructure installed in the facility. Provide a unique and consistent alpha numeric identification system to form the basis for the development of a communications administration system database to be approved prior to final design.

Connectivity Testing

A complete set of test results verifying the installed link and channel performance parameter results for all cable types shall be provided. Testing for copper cabling should be performed utilizing, at a minimum, a level 4 testing device. For LOMMF cable, testing should be performed utilizing fiber modules incorporating 850nm VCSEL and 1310nm laser sources combined into a single output port.

The test result documentation shall at a minimum contain testing, verification, and documentation of all performance specification

Table 17.5 Communications Outlet Matrix

OUTLET TYPE	FOUR-PAIR CABLES	ACTIVE IP PORTS
Typical Office	3	2
Typical Systems Furniture	3	2
Typical Copier/Printer/Fax	2	2
WLAN Access Point	2	2
Digital Display	2	1
Audiovisual Projector	2	2
Elevator Control	1	0
Wall Phone	1	1
Audiovisual Control Panel	1	1
Security Control Panel	2	2
Security Camera	1	1
BMS Control Panel	2	1
Intercom	1	1
Lighting Control Panel	2	1
Judge position	3	3
Clerk	3	2
Court Reporter position	2	1
Witness position	2	1
Counsel Table	2	1
Lectern	4	4
Interpreters	2	1

parameters for the installed optical fiber and copper media. The documentation should be in both paper and electronic formats printed directly from the testing device software application.

As-Built Documentation

As-built should be developed in electronic format. At a minimum the following documents should be provided:

- Project site plan of all OSP infrastructure with labeling and identification of each element.
- Matrix of the communications cabling for type, location, splicing, physical routing, and count of all communications cabling.
- Communications OSP cable plant test results.
- Single line diagrams showing connectivity throughout the OSP, including all splice and termination locations inside and outside the building.
- Building floor plans showing communications outlet locations with cable identifications per location.
- Building floor plans showing communications outlet locations with building utility system usage per location.
- Building floor plans showing communications outlet locations with IP port activations per location.
- IP port activation matrix with per switch port to cable to IP address to VLAN identification.
- Building floor plans showing distributed antenna systems locations.

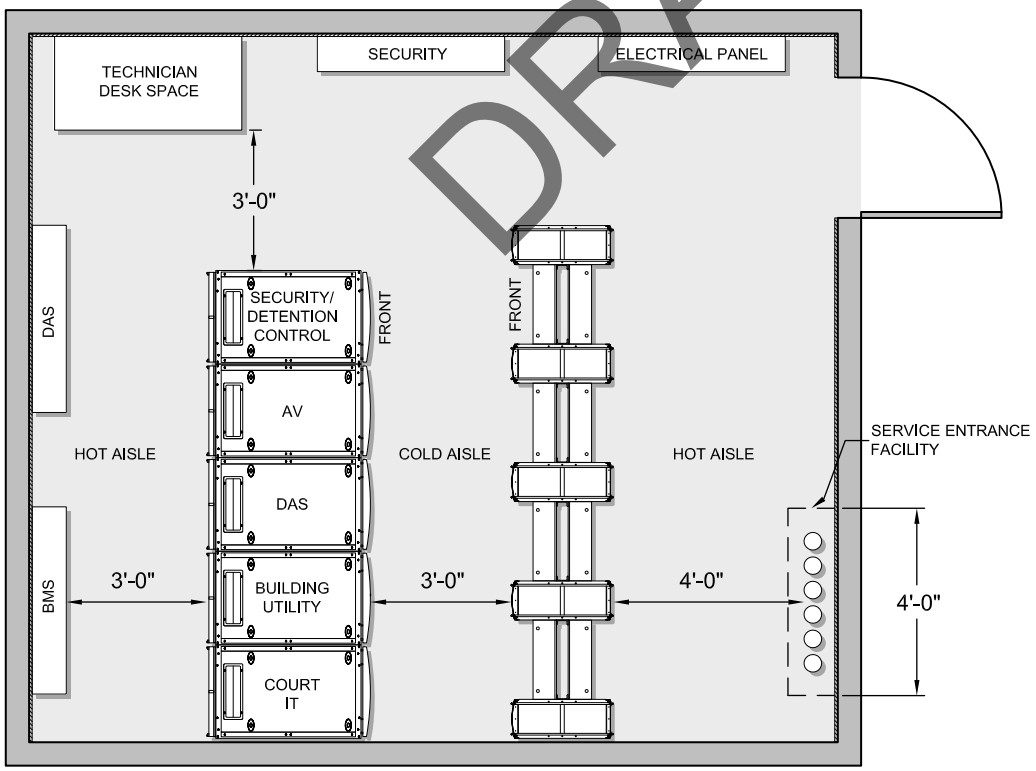


Figure 17.4 Multipurpose Courtroom with Corner Bench

Related Reading

Chapter 21: AOC LAN/WAN Architecture and Standards Document for IP network design principles and specific hardware elements

Individual project needs and requirements will determine actual network usage groups, applications, and services.

- Enlarged plans of the communications rooms.
- Building floor plans showing routing of communications pathways and pullbox locations.
- Building floor plans showing locations and types of UL firestop systems.
- Communications interior cable plant test results.
- Distributed antenna system (DAS).
- Single line diagram of all components of the DAS system, including infrastructure, connectivity, operating and safety devices, control panels, instrumentation, and annunciators.

17.G NETWORK ARCHITECTURE

Design Principles

The integrated or converged IP network architecture design goal is to develop an intelligent, converged network that provides a responsive, effective, and supportive environment so the superior courts can achieve their communications network objectives.

The converged IP-based network and structured IT infrastructure need to provide an "intelligent" transport facility that is effective in increasing building performance, functionality, and environmental sustainability. Additionally, the converged network should allow the integration, automation, and optimization of all communications systems and equipment that provide services to the building and the occupants.

Other design principles that the integrated IP network should adhere to include, but are not limited to:

- Maximize the efficiency of occupants.
- Allow effective resource management.
- Be responsive to user needs.
- Be able to adapt, integrate, and enhance new technologies.
- Accommodate and react to organizational changes.
- Be easy to operate and maintain.

Systems on the IP Network

In a converged network solution, all information types are transported over the networks employing the Internet Protocol (IP). On the most basic level (the physical level), converged services share the same structured cabling plant used by the general data network. The shared IP network provides a single logical network for the transmission of all converged IP system information within the facility.

The following courthouse technology systems are anticipated to be supported by the facility's converged IP network:

- Typical data for office applications
- Judicial-specific applications
- Case management systems
- Internet/Web access
- IP telephony system
- WLAN communications (Wi-Fi)
- Network management and network control traffic
- Security and access control systems
- Security video media
- Building management system
- Lighting control systems
- Digital signage system
- Video and streaming media
- Audiovisual systems
- Queuing system
- Master clock system
- IPTV systems

Individual project needs and requirements will determine which of the courthouse technology systems are needed and to what extent they will utilize the converged IP network.

IP Network Segregation

Table 17.6 is a matrix of the baseline network usage groups expected on the converged IP network that will need to be taken into account when designing the IP network segregation (e.g., IP addressing and VLAN schemes).

Network Availability

The primary design considerations of a high-availability network begin with the accumulation of the necessary information regarding the strategic business and system functionality requirements. After the primary information has been gathered, recommendations to achieve the required availability should be developed through the use of the latest communications technologies and converged network design principles.

The following design parameters shall guide the design process through to implementation, commissioning, and testing:

- Scalability: Scalability areas for consideration should include but are not limited to the following: switch port density in the LAN access and core/distribution layer and incoming service interface ports for WAN routers and voice gateways.
- Resiliency: Design a system with fault tolerance and/or fail-over capabilities to prevent system downtime due to a single point of failure.
- Redundancy: "Hot standby" redundancy (secondary paths) provides system resilience by delivering the capability to handle all the traffic and services of the primary system with minimal or no effect on the user base.
- Security: There is an important relationship between network security and network availability. A network that has been compromised may not be available to its regular user base or may not achieve the expected performance or availability levels. Careful consideration is required when designing an environment in which access to resources is restricted to users based on access lists, filtering, and passwords.
- Performance: Design criteria shall ensure the delivery of client-server based applications, including interfaces and link data rates; quality of services (queuing, loss, latency, and jitter); and application characteristics.
- Manageability: System design shall allow administrators to be proactive when dealing with day-to-day operations. Management areas include but are not limited to the following: device activity, bandwidth management, and software and system upgrades.
- Wireless: Design a converged network system to provide the user base with logical connectivity without being physically connected to the LAN infrastructure.
- Technology: A design consideration concerns the adoption of open architecture standards–based communications and networking models to allow interoperability between existing systems and future system enhancements.
- Environmental: With the implementation of a converged network system providing business-critical availability, the need to protect the physical equipment environment becomes increasingly important. Environmental considerations typically include power, air-conditioning, and secure access.

IP Network Hardware Design Elements

At the baseline level, the IP network hardware elements in Table 17.7 shall be included in the design and integration of the converged IP network wide area network (WAN) edge:

Determine type and capacity of IP network hardware elements needed on a per project base, as size of facility and number of active

Table 17.6 Network Segregation

SYSTEMS	SUBNET SEGREGATION	DEVICES
Data	Data (General User Data Traffic)	
	Data (Printer)	
	Data (Application Server Traffic)	
Voice	VOIP End Devices (Handsets, etc.)	
	VOIP Call Management	
BMS	BMS IP Controller	
	BMS Servers	
	BMS Monitor Workstations	
Security—SMS	Security Management System (SMS)	Security IP End Devices
	Security Management System (SMS)	Monitoring & Badge Workstations
	Security Management System (SMS)	Access Control Servers (ACS)
Security—DLCS	Detention Lock Control System (DLCS)	Intercom & PLC Controllers
	Detention Lock Control System (DLCS)	Monitoring Terminals
	Detention Lock Control System (DLCS)	Detention Control & Intercom Servers
Security	Video Media	Security IP Cameras
	Video Media	Monitoring Workstations
	Video Media	Media Video Recording Servers
Security—Duress	Duress Alarm System	Duress Alarm Controller
Audiovisual (AV)	AV Control & Monitoring	AV IP End Devices
	AV Control & Monitoring	AV Matrix
	Digital Signage, Queuing & IPTV	Display Panels
	Digital Signage, Queuing & IPTV	Media Servers
Wireless LAN (WLAN)	WLAN Trusted	
	WLAN Guest	
	WLAN Controller	
LAN to LAN	Routing LAN Core to LAN Core	
Wide Area Network (WAN) Edge	Routing Edge Public Subnets	
Extranet	Extranet Clients	

Table 17.6 Network Segregation *continued*

SYSTEMS	SUBNET SEGREGATION	DEVICES
Intrusion Detection System (IDS)	Intrusion Prevention System Monitoring	
Demilitarized Zone (DMZ)	DMZ Subnets	
Firewall (FW) to Core LAN	Routing FW to Core LAN	
Network Management	Network Management	

IP ports will vary significantly between projects. At a minimum, provide for 20 percent IP port and switching throughput expansion capability on all LAN core and LAN access switches.

The IP network hardware elements must be capable of accommodating the IP packet data traffic and IP device port needs of all the project-relevant building utility systems.

17.H DISTRIBUTED ANTENNA SYSTEM

Objectives

A distributed antenna system (DAS) is a network of spatially separated antenna nodes connected to a common source via a transport medium that provides radio and cellular wireless service throughout the facility. Due to the complexity of design factors related to developing an effective DAS system, the extent of this component of the unified communications system, considering its design, implementation, and use, must be defined in the overall technology program.

Coordination needs to take place to understand the needs of the court regarding which service providers should be supported and also to coordinate the approval for interconnection to all the required service provider macro networks. This coordination effort will also need to be extended to the public safety entities to accommodate the various frequencies the DAS-based system will support for emergency services and first responders.

Public Safety

At a minimum, the public safety entities that should be coordinated during the design phase are sheriff department, fire and rescue department, emergency medical services, and any other first responders. A list of all entities and their associated frequencies must be captured under the primary public safety requirements of the DAS system. The DAS system must be flexible enough to upgrade and allow for instances where the jurisdiction changes or adds system frequencies. Signaling repeated by portable radios shall pass through the repeater and rebroadcast to all receiving radios.

Coverage Areas

Radio coverage is the primary concern, followed by cellular coverage for a courthouse building. At a minimum, 97 percent floor

Table 17.7 IP Network Hardware Elements

WIDE AREA NETWORK (WAN)	LOCAL AREA NETWORK (LAN)
WAN Edge Routers or Switches	LAN Core Switches
Public Zone	LAN Access Switches
Firewalls	
Extranet Security Zone	
Demilitarized Zone (DMZ)	

Early determination and coordination of DAS system requirements are required for MDF space planning and layout.

area coverage should be provided for the radio system. Spaces requiring this level of service include the fire command center, security operations center, fire pump room, judicial chambers, exit stairs, exit passageways, elevator lobbies, standpipe cabinets, sprinkler section valve locations, and all mechanical room and communications spaces. Detention areas shall be provided with 100 percent radio coverage. General building area coverage should be within the allowable tolerance set by AOC but should not fall below a minimum of 90 percent floor area radio coverage.

Space Requirements and Connectivity

If required, the DAS system headend equipment, the base station, and other main components should be located within the MDF. There should be provisions for the MDF to support public safety and a variety of service provider cabinets. Wall space should be dedicated within the MDF for the DAS equipment panels and distribution equipment. Additionally, wall space in each IDF may need to be allocated to support DAS equipment and connectivity.

The DAS system will utilize the building ISP fiber backbone. Any coax, splitters, or other DAS distribution media will need to be incorporated into the overall pathway and connectivity requirements. Where RF-based technology requires the use of coaxial cable for horizontal connectivity, provide a RG-6 quad shielded cable.

Power

The DAS radio and cellular base station and other headend equipment must remain "up and running" during a power outage. It is critical that power distribution to this equipment be distributed via a centrally located UPS and be backed up with emergency generator power. The emergency power systems shall be capable of operating the radio and cellular systems on the DAS for a period of at least eight hours, unless otherwise required by the AHJ.

18 AUDIOVISUAL SYSTEMS

Sacramento Juvenile Court
Sacramento, CA
DLR Group

WHITTAKER PHOTOGRAPHY

Coordinate with unified communications, mechanical, and electrical disciplines to ensure that adequate power, cooling, and network bandwidth are provided for all audiovisual systems components to run concurrently and at peak performance.

For further information, see the sustainability section in Chapter 1: General Principles; Chapter 13: Mechanical Criteria; Chapter 15: Electrical Criteria; and Chapter 16: Lighting Criteria.

Various configurations in the layout of courtrooms are driven by the function or functions assigned to their operation. Refer to Chapter 5: Court Set for layout descriptions.

18.A AUDIOVISUAL DESIGN

Audiovisual systems are part of the technology program to be implemented in the planning of the courthouse as described in Chapter 17 (Unified Communications).

Provide an integrated, reliable, scalable, and sustainable audiovisual system to assist the courthouse with judicial proceedings and day-to-day administrative needs. Systems shall be easy to use and maintain, no matter the size and location of the facility or the number of staff employed. At a minimum, technical infrastructure shall be provided to accommodate all potential future enhancements or changes in technology.

18.B AUDIOVISUAL CRITERIA

The following criteria are to be followed when designing the audiovisual systems.

Reliability

Provide systems with a high level of reliability and ease of maintenance by implementing industry standard technologies and installation practices, as well as utilizing readily available components and materials. The systems shall be designed to ensure continued operation through the use of redundancy. Whenever possible, the design professional shall consider "hot-swappable" technologies.

Integration

All system components and infrastructure shall be fully integrated within the design of the courthouse. Provide equipment and cable management that is incorporated into the architectural elements, millwork, and furniture, concealing them from plain sight.

Provide integration with the telecommunications and information technology (IT) systems in order to gain efficiency within the building design. Whenever possible, all audiovisual and unified communications spaces, pathways, components, and cabling shall be shared, as well as in instances where the audiovisual system can utilize the IT systems for delivery of audio, video, and control signals.

Scalability

Provide a system that is nonproprietary, standards based, and scalable to allow for the future addition of components and/or functionality. The system components and technical infrastructure shall provide for a minimum of 15 percent expansion capability.

Sustainability

The system shall be designed to utilize environmentally conscious technologies, installation approaches, and power management strategies to reduce the impact on the building's electrical and mechanical systems and to promote overall facility efficiency.

18.C DESCRIPTION OF COURTHOUSE SPACES

Overview

Courthouses require audiovisual technology in a variety of different spaces. Table 18.1 includes the most common of these spaces and defines the minimum requirements of each type. Individual courthouses may contain specific spaces not listed in the table; the requirements for these spaces shall be determined during the programming phase of the project.

Standard Courtrooms

Standard courtrooms shall include the minimum requirements as described in Tables 18.1 and 18.2. Key design elements are specific to courtroom functionality and shall be included as listed. Optional systems may be specified during the programming phase and included in the initial outfitting. Infrastructure shall be designed to support all required and optional systems and components.

The design intent for all audiovisual-enabled spaces is to provide the necessary technical infrastructure to support the functionality

of the systems summarized in Table 18.1 at any time after the completion of the building. A well-planned infrastructure, however, shall be able to support the future deployment of audiovisual systems with no reconstruction and with minimal disruption to the daily operations of the building.

Figure 18.1 illustrates the distribution of technology elements in the courtroom. Wherever possible, colocate audiovisual services with the unified communication infrastructure. Refer to Chapter 17 (Unified Communications) for coordination information.

Jury Deliberation Rooms

Jury deliberation rooms shall be equipped with the functionality to allow for the viewing of any evidence presented in the courtroom. Interconnectivity shall be provided between the room system and the courthouse DEPS carts. These spaces may also be used as conference or meeting rooms, and the minimum infrastructure requirements as listed in Tables 18.1 and 18.2 shall also be included.

Jury Assembly Rooms

The jury assembly area consists of a single public space or multiple spaces that can be combined or separated to accommodate various functions and group sizes. The audiovisual systems in these spaces shall provide for speech reinforcement, paging, and the presentation of audiovisual materials to a group or groups of potential jurors. These areas may also be used as multipurpose spaces for public events or multimedia presentations to larger groups. Connectivity to the building-wide distribution system shall be provided for courtroom overflow applications as well as for cable access and court television program distribution.

Table 18.1 Minimum A/V Requirements—Courtroom

	Microphone, Gooseneck, Movable, Mutable	Microphone, Gooseneck, Fixed, Mutable	Audio Monitor Output	Audio Mix Output	Computer Video Input	Video Monitor Output	Control System Touch Panel Interface	Control System Keypad Interface (*)	Annotation System Interface	Real-Time Transcription Interface	Press / Media Interface
Bench	X		O		O	O	X	X		X	
Witness		X	O			O			X		
Clerk	X			X	O		X				
Court Reporter				X						X	
Jury Box		X				O					
Lectern		X			X		X		X		
Counsel Tables		X			X						
Gallery Seating						O					X

X = Minimum Requirement

O = Optional Requirement

(*) = Control functions at a minimum shall include audio and video mute and sound masking control.

Refer to Chapter 10: Building Support Services for additional information.

MDFs and IDFs are an integral part of the audio-visual systems backbone. Close coordination is necessary with the unified communications, mechanical, and electrical infrastructure systems to ensure a successful audiovisual technology deployment. Refer to the corresponding chapters for more information.

Unified communications pathways play a key role in the routing and distribution of cables for many of the building technology systems. The sharing of these pathways with the audiovisual systems is encouraged. Refer to Chapter 17: Unified Communications and Chapter 15: Electrical Criteria for standards and procedures.

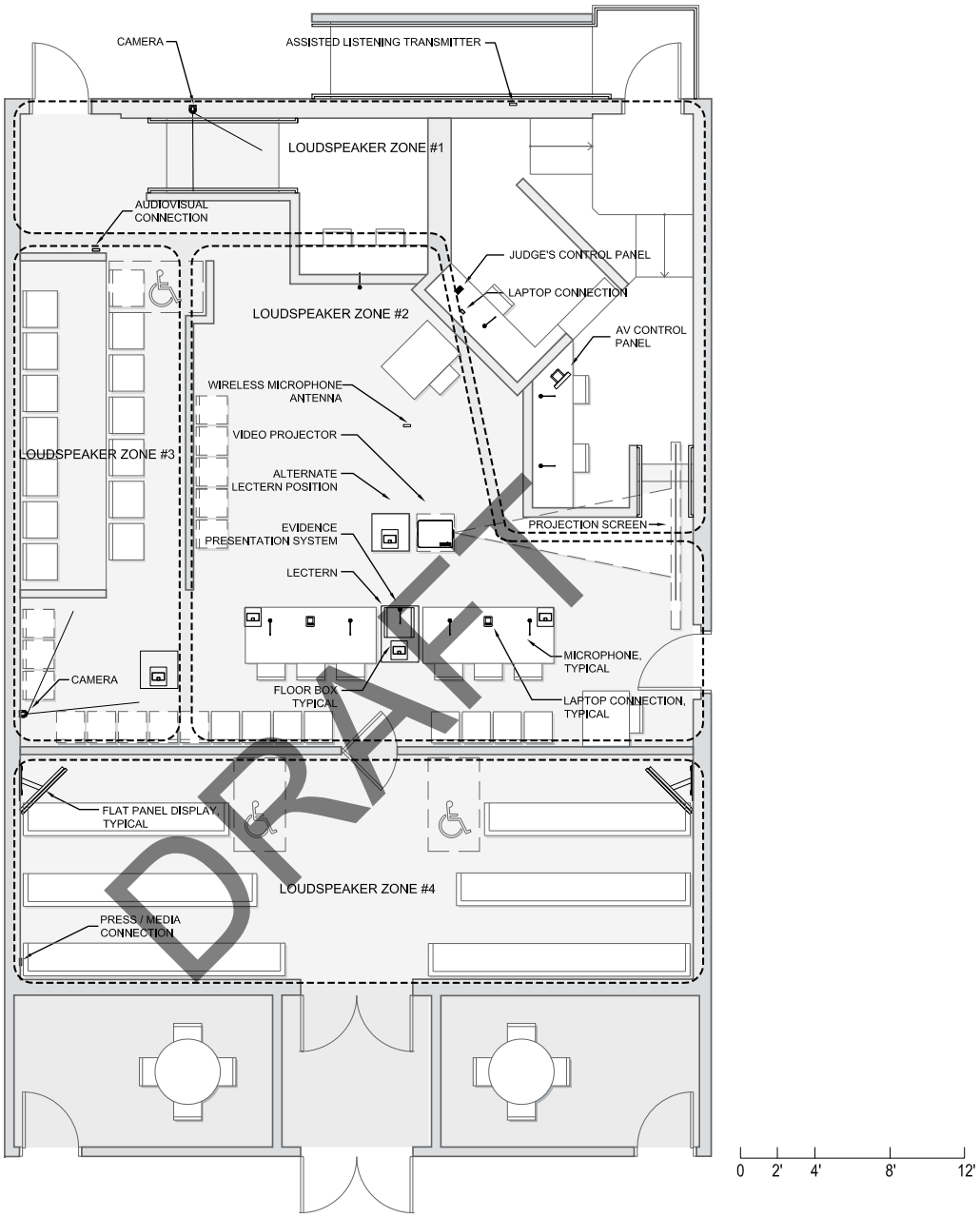


Figure 18.1 Typical Courtroom A/V Requirement

Conference/Training Rooms

Conference and training rooms shall provide support for audiovisual multimedia presentations and audio and video teleconferencing sessions with dedicated, portable, or shared equipment. Provide connectivity to the building-wide distribution system.

Media and Press Access

Provide a space within the courthouse for the media and press, to accommodate the dissemination of events to the public. This space may be part of the jury assembly area or a specific conference room in the facility. Connections to the building-wide audiovisual systems shall be provided.

A connection for media or press satellite uplink trucks shall be made available at a monument in a dedicated area located in the parking lot. If no suitable parking lot is available, an exterior wall of the courthouse shall be used. The designated area shall have an unobstructed view of the southern sky to allow for satellite connectivity. The monument shall provide redundant audiovisual connections; each connection shall include, at a minimum, two balanced audio, two high-definition capable video outlets, and one 20-amp power outlet.

18.D TECHNICAL INFRASTRUCTURE

Equipment Cabinets

All nonuser interface audiovisual components shall be installed in dedicated equipment cabinets located in the facility's MDF and IDF locations. Only user-essential equipment shall be installed in individual rooms.

Table 18.2 Minimum A/V System Requirements

	Assisted Listening Device	Speech Reinforcement	Program Audio Reinforcement	Audio Teleconferencing	Digital Signage	Video Presentation	Evidence Presentation Systems	Language Interpretation	CATV	Court Satellite Television	Video Display	Real-Time Transcription	Sound Masking System	Control System	Audiovisual Distribution System	Videoconferencing	Audio Video Recording	Digital Annotation
Standard Courtroom	X	X	X	X	I	X	I	X			X	X	X	X	X	I	I	I
Jury Deliberation Room			I			I		I			X			X				
Jury Assembly	X	X	X			X		X	X		X			X	X			
Small Conference Room						I					I				I			
Medium Conference Room						I					I				I			
Large Conference Room		I	I	I		X			I	I	X			X	X	I		
Training Room	I	X	X	I		X			I	X	X			X	X	I	I	
Self-Help Center/Workshop	X	X						X	I	I	X			X		X		
Children's Waiting Room			X			X					X							
Public Lobby	I				I						I			I	I			

X = Minimum Requirement for space

I = Minimum Infrastructure Requirement for space

Speech and audio reinforcement systems shall amplify program audio and enhance the voice of the speaker to ensure that all participants can adequately hear the material being presented.

Speech reinforcement loudspeakers shall be ceiling mounted and zoned appropriately for the application. Loudspeakers shall be distributed to provide even coverage throughout the space.

Cable Pathways

Where industry best practice allows, the audiovisual cabling shall utilize the telecommunications pathway infrastructure. Careful planning and design shall be observed to avoid signal cross-contamination. To ensure for the future convergence to IP-based equipment, no horizontal audiovisual pathway initiating at the MDF or IDFs shall be greater than the Ethernet distance limitation of 295'.

Power for Audiovisual Systems

Audiovisual equipment located in MDFs and IDFs shall be connected to the building's centralized uninterruptible power supply (UPS) to provide for voltage protection as well as adequate time for the audiovisual system to shut down during an electrical outage. Due to the sensitive nature of electronic equipment, careful coordination is required with the electrical systems to ensure appropriate grounding and bonding procedures. Refer to Chapter 17 (Unified Communications) and Chapter 15 (Electrical Criteria) for information.

Audiovisual equipment cabinets shall be provided with a managed-power distribution system to work in conjunction with the audiovisual control system, to implement remote power shutdown during periods of system inactivity or during an electrical outage.

18.E AUDIOVISUAL SYSTEMS DESCRIPTIONS

Speech and Audio Reinforcement System

Considerations shall be made when using wired microphones to utilize shock and vibration isolation mounts, mute switches, and illuminated notification rings. Wireless microphones shall utilize a design approach to contain the transmission from microphone to receiver within required area.

When RF-based microphones are utilized, the design professional shall conduct radio frequency sweep tests to ensure that correct allocation and sufficient bandwidth are available.

In courtroom applications, provide audio-processing systems with multitrack recording outputs and speaker zoning capabilities. In order to impair the hearing of courtroom participants while confidential conversations are being held at the judge's bench, the audio system shall be capable of providing sound-masking capabilities or "white noise" to any speaker zone.

Speech and audio reinforcement systems design shall follow the current release of the design standards established by ANSI/Infocomm Audio Coverage Uniformity in Enclosed Listener Areas (ACU). Refer to the Standards Chapter for additional standards applicable to the design of audiovisual systems.

Assisted Listening

An assisted listening system shall provide secure transmission of both speech and program audio to participants or members of the public, utilizing an infrared transmitter and headset receiver. The system shall provide a minimum of four independent channels per courtroom location.

When evaluating the types of assisted listening systems in the design as well as the quantities of headsets, refer to section 1104B.2 of the DSA California Access Compliance Code to ensure adequate provisioning.

Language Interpretation

The language interpretation system shall be telephone based and provide for up to three secure channels of live translation to participants and audience members by utilizing the alternate channels of the assisted listening system.

Video Display

Provide video display systems that will ensure that all participants can adequately view presented material on a common display. Display equipment shall be based on a common 16:9 or 16:10 aspect ratio and capable of a minimum resolution of WXGA. The size of the display shall be calculated so that the

height of the screen is equal to a minimum of one-sixth of the distance to the farthest viewer. All displays shall be placed so that the image is a minimum of 48" above the finished floor. Where projectors are used, motorized projection screens shall be provided. The video infrastructure, processing, and switching shall support both analog and digital devices with a minimum resolution of up to WUXGA, and be both Extended Display Identification Data (EDID) and High-bandwidth Digital Copy Protection (HDCP) compliant.

Digital Evidence Presentation System (DEPS)

The DEPS enables the presentation of audiovisual materials and three-dimensional objects to be viewed by the courtroom participants through the video display system. Source content may include audio and video playback devices, computer graphics, and document cameras. The system may be portable or dedicated, depending on the individual courthouse's needs.

Digital Annotation System

The digital annotation system shall allow real-time annotation over any still or motion content being viewed on the video display system. The system shall allow for simultaneous, but unique markups from multiple annotation tablets. A color printer shall be provided.

A digital annotation system may be integrated into the digital evidence presentation system.

Video Teleconferencing/Arraignment

The video teleconferencing systems in the courthouse enable real-time communication between two or more locations, including conference rooms, training rooms, holding facilities, and remote witness locations. In courtroom applications, the cameras shall be positioned to provide a clear view of the judge and the litigants and their attorneys, but not of members of the jury. Video teleconferencing CODECs shall be designed so they may be shared between courtrooms, conference rooms, or training rooms.

During the programming phase of the project, the design professional shall coordinate the data rates and transmission technology specific to the video teleconferencing systems between the court and other key facilities that require connectivity. Special lighting considerations and room finishes are typically required in spaces where video teleconferencing sessions are held. Refer to Chapter 16 (Lighting Criteria).

Real-Time Transcription

The system consists of a software package and equipment that enable the real-time display of the court reporter's transcript during the proceeding. At a minimum, the infrastructure shall support the distribution of content to the judge's bench location.

Control System

Provide a control system for the management, monitoring, operation, and notification of local and facility-wide audiovisual equipment. The system shall be interconnected to the court's scheduling or case management system as well as to building occupancy sensors in order to provide system startup, standby, and shutdown features based on room activity.

The control system shall be designed to utilize the unified communications infrastructure and the IP network for the distribution of commands and data.

Control systems provide simplified means of managing the functions of the audiovisual operations of the facility. In many cases, additional functionality is desirable in audiovisual-equipped spaces, such as the control of lighting fixtures or electric drapes. Consideration should be given to the integration of these systems into the control strategy on a per-project basis. All control system user-interface devices shall meet the requirements as stated in the DSA California Access Compliance Code.

A main distribution facility (MDF) is a space in which the core technology of the facility is concentrated. An MDF serves as a central point for the distribution of various subsystems that are part of the overall technology of the facility. Refer to Chapter 17: Unified Communications for additional information.

Refer to Chapter 11: Architectural Criteria for rooftop equipment information.

Building-Wide Distribution

Building-wide distribution systems enable the transport of content between audiovisual-enabled spaces. The transport of signals shall be digital and utilize the unified communications backbone of the building. At a minimum, the system shall provide connectivity from a designated courtroom to the exterior media/press monument and to a designated overflow court space.

MATV/CATV

MATV and CATV shall utilize the building-wide distribution pathways. Coordinate a designated area on the roof for satellite dish antennae with southern-facing roof exposure, including structural reinforcement and grounding to accommodate a minimum two 18" to 24" wide satellite dishes per court building. Provide technical infrastructure from the satellite dish location to the MDF where the signal shall be received and processed. CATV signals shall enter the facility via the main point of entry (MPOE) and be routed to the headend cabinet in the MDF using the unified communications backbone.

Administrative Office of the Courts (AOC-TV) Satellite Programming

Distribution of AOC programming takes place over digital broadcast satellite distribution (DBS). Inside the courthouse, satellite signals and content shall utilize the building-wide distribution system for transport and shall be combined with the CATV distribution system when both exist in the facility.

Digital Signage/Customer Flow Management

The digital signage system consists of video displays and signal transport methods capable of accepting and displaying information from local or remotely generated video content sources and software. Digital signage is used for wayfinding, display of the court calendar, and other visual messaging as required by the facility.

Customer flow management (CFM) systems direct the flow of customers in waiting areas for a service provided at the facility. The system consists of customer intake, queue tickets printing, and visual and audible announcements of the queuing process. Provide a minimum of one video display and speaker in the waiting area visually accessible to the public. Signal transport and system requirements shall be coordinated during the design phase.

Video displays shall be integrated with the architecture of the building to allow for adequate technical infrastructure, cooling, ventilation, and future display hardware upgrades. Refer to Chapter 11 (Architectural Criteria) for signage information.

Digital signage systems may be interconnected to the court scheduling system and the CFM system to provide additional layers of information to the public specific to court proceedings, directories, and information related to an individual courtroom.

18.F AUDIOVISUAL STANDARDS

- ANSI/INFOCOMM, Audio Coverage Uniformity in Enclosed Listener Areas (ACU)
- ANSI/INFOCOMM, Standard Guide for Audiovisual Systems Design and Coordination Processes
- BICSI AVDRM, AV Design Reference Manual
- All future Infocomm standards as they relate to technology elements of courthouse

When referring to the AV industry standards, the designer is encouraged to take into consideration the design elements and practices and their impact on the audiovisual budget of the project. A successful design implements the technology elements of the project in an efficient manner and attempts to meet the project's technical and budgetary objectives as much as possible.

See Appendix for more information.

19 ACOUSTICAL CRITERIA

Southwest Justice Center
Temecula, CA
Cannon Design

Factors to be considered in the acoustical design of the court facility include background noise levels, sound isolation, and room finishes. Courtrooms shall be quiet, shall be free of detectable echoes, and shall naturally enhance voice levels with strategic placement of sound-reflecting surfaces.

19.A OBJECTIVES

The goal of this chapter is to address acoustical criteria and best practices for room acoustics (reverberation and echo control), environmental noise reduction, sound isolation, speech privacy, and noise and vibration control of mechanical, electrical, plumbing, and vertical transportation equipment and systems. Each courtroom, except for very large courtrooms, shall be designed for effective spoken communication with minimum sound reinforcement. In the standard-sized trial courtroom, all participants shall be able to hear and be understood at normal speech volumes.

19.B ACOUSTICAL CRITERIA

Background Noise Levels

The acoustic design goal for HVAC systems is the achievement of a level of background noise that is unobtrusive in quality and low enough in level so it does not interfere with the function of the space being served. Background noise should exhibit no tonal characteristics or noticeable time-varying levels resulting from aerodynamic instability or turbulence. To achieve these goals, the Noise Criteria (NC) family of curves is used as a design tool. These curves define the recommended octave band limits of an acceptable background noise spectrum for a particular space use.

The "Sound and Vibration Control" chapter of the HVAC Applications ASHRAE Handbook lists acceptable NC ratings for various spaces. Refer to Table 19.1 for the recommended HVAC NC ratings for select spaces within the court facility.

Room Acoustics

Room acoustics, including reverberation and echo control, defines the quality of sound within a space. Room acoustics is affected by room size, shape, proportions, geometry, and finishes. The standard metric for determining how "live" or "dead" a room acts is called the reverberation time (RT60). Hard surfaces, such as untreated gypsum board, glass, and wood paneling, will cause greater sound reflections and longer reverberation in a space. Soft-surfaced materials, such as acoustical tile, carpet, and fabric-wrapped fiberglass panels, will result in less reverberation.

Reverberation is the effect of sound reflecting and steadily decaying in a room. Conversely, echoes are distinct, late-arriving reflections from discrete wall surface(s). Absorptive materials, as well as proper room shaping or the addition of diffusive panels, also help control any unwanted echoes.

Refer to Table 19.2 for room acoustic considerations for select court facility spaces.

Sound Isolation

Sound isolation is the capacity of a structure to prevent sound from being transmitted from one space to another. Sound isolation is quantified by two numerical ratings, Noise Isolation Class (NIC) and Sound Transmission Class (STC).

Table 19.1 Background Noise Criteria

NOISE CRITERIA	SPACE TYPE—ROOM(S)
NC30	Courtrooms
	Conference Rooms
	Meeting Rooms
	Training Spaces
NC 35	Judicial Chambers
	Enclosed Offices
	Jury Deliberation
	Clerk's Office
NC 40	Reception
	Lobbies
	Open Office Areas
	Corridors
	Dining Areas
NC 50	Warehouses
	Parking Garages

Table 19.2 Room Acoustics Requirements

SPACE TYPE	ROOM ACOUSTICS CONSIDERATIONS
Courtrooms	Reverberation time criteria between 0.6 and 1.0 seconds.
	The majority of the ceiling surface should be sound absorptive to help meet the reverberation time criteria.
	The wall behind the judge's bench, witness, and clerk should be hard surfaced to provide good projection of voice to the jury.
	The walls and ceiling at the rear of the courtroom (around the spectator seating area) should be finished with an efficient sound-absorptive material to prevent sound from reflecting back to the judicial area. This is especially important for the back wall, to alleviate the reflection of sound between the judge's bench and the far end of the courtroom.
	A hard-surfaced ceiling over the judge's bench, slightly inclined outward, will have the effect of projecting voice into the room without creating a flutter echo with the bench counter.
	The courtroom shall not be a long or narrow rectangle finished totally with sound-reflective materials. Such conditions can cause excessive flutter echo. Reducing the room length and using appropriately selected absorptive finish materials can alleviate potential issues.
Conference Rooms, Training Spaces	Reverberation time criteria between 0.6 and 1.0 seconds.
	The majority of the ceiling surface should be sound absorptive to help meet the reverberation time criteria.
	A minimum of two perpendicular walls should feature sound-absorptive material to reduce overall reverberation time and flutter echo.
	Carpet and upholstered furniture should be considered for conference and training rooms.
Enclosed Offices, Judicial Chambers, Jury Deliberation, Clerk's Office	The ceilings of these spaces should be a sound-absorptive material with a minimum noise Reduction coefficient (NRC) of 0.70.
Open Office Areas	The ceilings of open office spaces should be a sound-absorptive material with a minimum noise reduction coefficient (NRC) of 0.85.
	Reverberation time criterion less than 1.5 seconds.
Lobbies	If lobbies will function as more than just circulation and security check points (i.e., receptions, speeches, gatherings, etc.), the reverberation time criterion should be reduced to 1.0 second.
	A sound-absorptive ceiling is recommended in the lobby to help meet either reverberation time criteria.
	Additional absorptive wall material will be required to meet the 1.0 second reverberation time criterion.

NIC: A field-measured noise reduction from a building design element.

STC: Sound isolation performance as measured in a controlled laboratory.

STC and NIC are one-number rating systems that allow for an easy comparison of the acoustical performance between different constructions. The higher the STC or NIC rating of an assembly, the less sound transmitted through it.

Refer to Table 19.3 for sound-isolating performance requirements for court facility spaces. Where more than one STC rating can be applied to a specific adjacency, the higher STC rating shall be used for the assembly. Refer to the "Catalog of STC and IIC Ratings for Wall and Floor/Ceiling Assemblies" by the Office of Noise Control, California Department of Health Services, for rated assembly types, or to other similar documents.

In court facilities, greater sound isolation provides insulation from unwanted distracting noises and enhances speech privacy. Speech privacy within a space depends on the sound insulation performance of its partitions and doors, the background sound level, the loudness of speech, and the room finish treatment. Confidential speech privacy means that speech is detectable, though no individual words can be discerned. For normal or raised speech levels, confidential speech privacy should be achieved when the STC rating of the dividing construction plus the background NC level is greater than 80. A "raised" voice might occur during lively conversation or while using a speakerphone. For example, if the room adjoining the space under consideration has a background noise level of NC 30, the intervening partition must have an STC rating of 50 to achieve confidential. Unless a reliable source of background noise, such as a sound-masking system, is provided in the adjoining space, an STC 50 construction assembly is generally required to achieve confidential speech privacy.

A higher STC rating or louder background noise levels would be required to achieve confidential privacy for raised or loud voice levels. The limit of the speech range would be a "loud" voice, which occurs when the speaker is exerting maximum speech effort or when the speaker is amplified.

To achieve a "normal" speech privacy level, the sum of both numbers shall equal 70 or more. Normal speech privacy is defined as when a few words may be understandable, but complete sentences cannot be comprehended.

Doors

Doors to noise-sensitive areas should have sufficient transmission loss performance so the partition sound isolation is not compromised. Since there are typically gaps between the door and the frame, the doors in partitions of noise-sensitive rooms represent the acoustic weak link in the system. Refer to Table 19.4 for door requirements for select spaces within the court facility.

Operable Partitions

The following recommendations should be considered if operable partitions will be included within the court facility:

- The operable partition should be chosen with minimum ratings of STC 50 and NIC 42.
- If the operable partition is separating a conference room, training room, or jury assembly space, it would also be beneficial to use an operable partition that has an absorptive finish. The partitions should have a minimum rating of NRC 0.65.
- Perimeter conditions must be properly detailed to reduce the effect of flanking and to maintain the transmission loss performance of the operable partition. Important conditions to consider are as follows:
  - Provide an overhead barrier above the ceiling. The gypsum board barrier should be constructed without gaps and sealed comparable to a sound-rated partition.
  - Sidewall construction should be able to accept and withstand the pressure of the end partition panel. The sidewall finish must meet the end panel of the operable partition continuously. There should be no voids or reveals at baseboards, ceilings, etc.

Table 19.3 Sound Isolation Requirements

STC OF PARTITION[1]	SPACE TYPE & ADJACENCY
STC 65	Courtroom to Holding Cell
	Electrical Rooms containing transformers to NC 30 spaces
	Elevator Shafts to NC 30 spaces
	Hydraulic Elevator Equipment Room to NC 30 spaces
	Mechanical Rooms to NC 30 spaces
STC 55	Large or Special Proceedings Courtrooms to adjoining areas
	Jury Deliberation to adjoining areas
	Large Conference Rooms and Training Rooms to adjoining areas
	Judicial Conference Rooms to adjoining areas
	Toilet Rooms to adjoining areas—with plumbing[2]
	Computer and Server Rooms containing fans and cooling equipment to adjoining areas
STC 50	Courtrooms to adjoining areas
	Judicial Chambers to adjoining areas
	Small Conference Rooms to adjoining areas
	Family Law Mediator to adjoining areas
	Private Offices requiring confidential speech privacy
	Toilet Room to adjoining areas—no plumbing
	Telecommunications and AV Rooms with cooling equipment to adjoining areas
STC 45	Electrical Rooms with no transformers to adjoining areas
	Workroom to adjoining areas
	Jury Assembly area to adjoining areas
	Orientation Room to adjoining areas
	Private Offices requiring normal speech privacy
	Office Equipment Rooms to adjoining areas
	Waiting Rooms to adjoining areas
	Telecommunications and AV Rooms with minimal equipment to adjoining areas
STC 40	General Office Space to General Office Space

1. Partitions with doors need only be 10 points greater than the STC rating of the door.

2. The partitions between shared restrooms and the partitions between restrooms and occupied areas where the partition contains piping should feature two independent stud rows with a nominal 1" air space in between. The studs should not be bridged by any bracing. The two separate stud rows should provide enough room to prevent the piping contained within from directly contacting any part of the partition. Where the plumbing wall is adjacent to occupied space, both stud cavities should be filled with batt insulation, and a minimum two layers ⅝" gypsum board should be installed on the occupied side of the partition.

IIC = Impact Insulation Class

dB or dBA = Decibels

OITC = Outside-Inside Transmission Class

AHU = Air-Handling Units

VAV = Variable Air Valve

ANSI = American National Standards Institute

NEMA = National Electrical Manufacturer's Association

- The deployed horizontal operable partition should span entirely across the storage room through the closet to the farthest sidewalls. The panels should not end at the storage room doors. The design should be carefully coordinated with the operable partition manufacturer.

Impact Insulation

Impact noise, or "footfall" noise, is created when an object strikes a floor/ceiling assembly or when a person walks across a floor. The noise from the impact is transmitted through the assembly and into the space below. The ability of a floor/ceiling construction to insulate impact sounds can be determined by the Impact Insulation Class (IIC) rating. As with the STC rating, the higher the IIC value of the assembly, the better the construction is at reducing impact noises.

Typical floor/ceiling assemblies between occupied spaces within the court facility should achieve a minimum IIC rating of 50 to help reduce footfall noise between vertically adjacent areas.

Rooms with carpet should meet a minimum IIC 50 rating.

Table 19.4 Door Requirements

SPACE TYPE	DOOR REQUIREMENTS
Courtroom to Courtroom	Interconnecting doors are not recommended; use vestibules if possible. If vestibules are not possible, use only a laboratory-rated STC 53 door (or two fully gasketed doors in tandem).
Courtroom to Jury Deliberation	
Jury Deliberation	Laboratory-rated STC 43 (sound masking in corridor recommended for nonequipment rooms).
Judge's Chambers	
Judicial Conference	
Attorney Conference (to Public Corridor)	
Computer and Server Rooms containing fans and cooling equipment (to occupied areas)	
Mechanical Rooms (to occupied areas)	
Conference Rooms and Training Rooms	A minimum 1¾" solid-core wood door or hollow metal steel door with a full set of acoustical seals including perimeter gasketing, an automatic door bottom, and a removable center post or overlapping astragal between double doors.
Telecommunications and AV Rooms	
Courtroom Public Vestibule (both door sets)	
Courtroom to Secure Vestibule/Hallway	
Court Reporter	
Small Electrical Rooms (to occupied areas)	
Mediation Rooms	
Investigator's Office	
Private Offices Requiring Confidential Speech Privacy	

Spaces with hard-surfaced flooring materials, such as ceramic tile or wood, most likely will not meet IIC 50. For all spaces with hard-surfaced floor materials, consider installing a resilient underlayment material within the floor/ceiling assembly to help meet the minimum IIC rating requirement.

Environmental Criteria

- To identify noise levels in decibels (dB, or dBA) at a potential site under consideration, conduct an environmental noise study that tests for average and single event noise. Perform this study for all potential project sites, especially near roadways, highways, trains, busy urban areas, and flight paths. The duration of the noise study should range from 24 to 96 hours depending on the conditions at the site. The primary hours of measurement should coincide with the typical hours of courtroom use.
- Based on results of the environmental noise study, calculate minimum exterior façade Outside-Inside Transmission Class (OITC) ratings required to achieve an interior maximum single event noise level of 50 dBA. For intrusive noise from exterior sources, such as traffic, it is recommended to calculate the interior maximum single event noise level using L10. The L10 is the measured noise level that is exceeded 10 percent of the measurement period. It is also known as the intrusive noise level and is the level that may be noticed when engaging in activities requiring lesser degrees of concentration.

19.C BEST PRACTICES

The following general recommendations address noise reduction from mechanical, electrical, plumbing, and vertical transportation systems and equipment; sound isolation and speech privacy; and room acoustics.

Mechanical, Electrical, Plumbing, and Vertical Transportation Systems and Equipment Noise Control

- Locating air-handling units (AHUs) and other noisy equipment above courtrooms or other noise-sensitive spaces may require expensive and complicated mitigation measures, such as sound-attenuating ceilings, thickened slabs, or floating floors.
- Do not use rooftop "down discharge" air-handling units if possible. Instead, use side-discharge units, maximizing the length of ductwork between the unit and the roof penetration point. Noise mitigation of down discharge units may be prohibitively complicated and expensive.
- Provisioning space for sound attenuators is advisable early in the HVAC system design. Typical attenuators would be 5' in length and should be planned for the intake and discharge side of each main air-moving system. Ductwork prior to and following each attenuator should be straight and ideally equal to a minimum of two duct diameters in length.
- Do not locate variable air valve (VAV) units above courtrooms chambers, or conference and other rooms with a noise criteria level of NC 35 or less. Instead, locate VAV boxes in corridors or unoccupied spaces. If this is not possible, a gypsum board ceiling or an enclosure around the VAV box may be required.
- Locating fan-powered VAV boxes above spaces with a noise criterion of NC 45 or less may require expensive and complicated sound-attenuating ceilings.
- Do not exceed 1¼" of static pressure at VAV box inlets.
- Select air diffusers at least five points below the NC rating of the room they serve.
- Locate volume dampers at least 10' upstream from air diffusers in rooms with an NC criterion of NC 35 or less. Do not use face dampers.

- Consider installing a minimum 3' insulated-type flexible duct before all supply diffusers and return grilles. The flexible duct should be free of kinks or deformities.
- Maximum duct velocities shall be designed to meet the requirements listed in the "Sound and Vibration Control" chapter of the ASHRAE HVAC Applications Handbook.
- Vibration-isolate all mechanical and plumbing equipment per the requirements listed in the "Sound and Vibration Control" chapter of the ASHRAE HVAC Applications Handbook.
- All mechanical water, domestic water, and steam piping shall be resiliently supported as described in the "Sound and Vibration Control" chapter of the ASHRAE HVAC Applications Handbook.
- Do not use seismic restraints that are integral to vibration isolators. Independent seismic restraints are preferred.
- Ductwork attached to the fan discharge is to be connected with a flexible connection.
- Pipe and conduit penetrations through full-height partitions shall be slightly oversized and sealed airtight with resilient sealant. Penetrations through floors should also be slightly oversized and sealed airtight with resilient sealant. A neoprene pad should be installed between all pipe clamps and the structure. There shall be no direct contact between the penetrating element and the structure.
- Non-fire-rated ducts penetrating full-height partitions shall have a clear distance of 1¼" around the perimeter. The perimeter void must be packed with glass-fiber batts at both ends and caulked airtight with a nonshrinking, nonhardening, flexible acoustical sealant with a backer rod, if required.
- Pipes should be sized for a maximum velocity of 4 fps for pipe 2" and smaller and 10 fps for larger pipe sizes.
- To vibration-isolate transformers, inverters, rectifiers, and UPS, use flexible conduit and resilient neoprene mounts with a minimum static deflection of ¼".
- Avoid locating transformer rooms near sensitive locations. If this not possible, consider a double stud partition construction.
- Penetrations of cable trays through full-height partitions shall be packed tightly with heavy-density putty once the cables are pulled.
- Emergency generators will often require acoustical provisions such as exhaust mufflers, spring vibration isolators. and low-pressure drop attenuators at the discharge and intake louvers. It is recommended to locate the emergency generator within the building, away from any noise-sensitive areas if possible.
- Provide transformers with sound levels that do not exceed the following maximums in accordance with NEMA and ANSI standards. The manufacturer is to verify that the actual sound levels comply by conducting sound tests, before shipping to the project site.
  - 25–50 KVA, 45 dB
  - 51–150 KVA, 50 dB
  - 151–300 KVA, 55 dB
  - 301–500 KVA, 60 dB
- Resilient piping attachments are recommended to isolate the plumbing piping and fixtures from the structure when the plumbing runs adjacent to occupied noise-sensitive areas. There shall be no direct contact of plumbing piping to studs or the back of drywall.
- Limit pressure at fixtures to 70 psi to reduce noise generation.

- Pipes and conduits should not pass through sensitive spaces to service other areas.
- Toilet rooms should be located away from noise-sensitive spaces. Do not put plumbing in walls next to or common with these spaces.
- Holding cell toilet fixtures should not be installed on partitions adjacent to occupied noise-sensitive spaces. Stainless steel fixtures are typically used within holding cells. Stainless steel fixtures create a substantial amount of noise as compared with porcelain fixtures.
- Specify quiet devices such as quiet-type flush valves and taps with full-ported nozzles and nonsplash aerators. If toilet rooms are unavoidably next to sensitive spaces, use siphon-jet, tank-type water closets with adjustable flow valves.
- Install air chambers or shock-absorbing devices to prevent water hammer in lines subject to abrupt shutoff.
- All vertical transportation systems, such as hydraulic elevators, traction elevators, or escalators, should incorporate the most effective vibration isolation system available from the elevator manufacturer to limit the amount of structure-borne noise introduced to the building. Elements to consider include, but are not limited to, pumps, motors, hydraulic lines, equipment rooms, hoists, sheaves, control units, roller wheel, and guide rails.

Sound Isolation and Speech Privacy

- Partitions with greater mass or larger insulated air spaces result in higher sound isolation performance. Flanking paths, such as above-ceiling ducts or window mullions at partitions, degrade sound isolation performance.
- It is recommended to use the lightest gauge studs possible. The stud depth as well as the stud spacing of the partition should also be considered. The greater the stud depth and stud spacing, the better the partition should perform acoustically.
- Higher levels of sound isolation are required for incompatible adjacencies or when acoustically sensitive spaces are located near sound-generating equipment.
- Sound-rated partitions shall be sealed with nonhardening acoustical sealant around the entire perimeter. Nonhardening acoustical sealant should also be used at partition intersections.
- Full-height partitions shall be required between adjacent rooms where confidential speech privacy or high levels of sound isolation are required.
- For partitions requiring normal speech privacy, use a foam seal tape between the top of partition and the lay-in ceiling, or extend partition 6" above ceiling.
- Consider providing a sound-masking system where the partition construction does not allow adequate speech privacy.
- For adjacent spaces along exterior window façade where speech privacy is required, the joint detail between the partition and the mullion will need to be carefully coordinated. It may be necessary to treat the window mullion with a layer of wood or gypsum board on each side of the partition where the partition intersects the exterior window.
- Sound-isolating doors: Doors with cam-lift hinges and thresholds work best. For standard hinges, use a threshold with integral gasketing. Doors with drop-bottom gasketing will require periodic maintenance to align seals. Do not use noisy panic hardware.
- Sound-isolating doors: Use dual gaskets, such as compression sound gaskets and smoke gaskets, in tandem.
- Avoid duct paths that will create "crosstalk" between spaces.

- The return-air path for rooms requiring confidential speech privacy should utilize a fully ducted return system. If this is not possible, install acoustically lined sound-boots with at least one 90-degree turn on the return grilles. Aim the air opening away from corridor.
- Recessed junction boxes must be offset at least 16" on opposing sides of sound-rated construction.
- Recessed junction boxes four-gang and smaller are to have the back and sides sealed airtight using sheet caulking. Junction boxes larger than four-gang require gypsum board backing.
- Conduit must not bridge independently framed sound-rated partitions or resilient ceilings by rigidly connecting to the framing. Flexible conduit connections are required.

Room Acoustics

- In excess, reverberation can adversely affect speech intelligibility. However, a room with too much sound absorption on its wall surfaces can be perceived as acoustically "dead." To achieve the proper balance of sound-reflecting versus sound-absorbing surfaces, alternating "hard" and "soft" surfaces can be installed on the sidewalls in 4' wide segments. The panels shall be arranged such that a hard-surfaced panel directly faces a soft panel on the opposing wall.
- Typical fabric-wrapped sound-absorbing panels shall be a minimum of 1" thick with a minimum NRC of 0.80.
- Fabric for acoustical panels must be porous. Do not use fabric with acrylic or other backings.
- Acoustically absorptive materials installed on walls and ceilings should be as uniformly distributed as possible to achieve the target reverberation time as well as good speech intelligibility throughout the space.
- Avoid concave or domed surfaces. If these surfaces cannot be avoided, they must be acoustically treated. Convex surfaces are preferred.
- Gypsum board and other hard-surfaced ceilings over tables and counters with microphones shall be avoided.
- Ornate, irregular, or convex surfaces will minimize echoes.

20 FIRE PROTECTION CRITERIA

Fresno Juvenile Delinquency Center
Fresno, CA
KMD Architects and Planners

This chapter defines the general and technical criteria for fire protection systems, including recommendations and minimum acceptable performance criteria.

NFPA = National Fire Protection Association

AHJ = Authorities Having Jurisdiction

AWWA = American Water Works Association

DPDT = Double Pole, Double Throw Switch

ASTM = American Society for Testing & Materials

20.A OBJECTIVES

Fire protection systems protect life and property from fire through standardization of design, installation, and testing requirements for sprinkler systems, based upon sound engineering principles, applicable state fire code, and field experience. The following criteria set minimum acceptable standards for design and installation of automatic fire sprinkler systems. New technology and alternate arrangements may be applied with written AOC approval, but they shall not reduce safety levels prescribed by these criteria or by state fire and building codes.

Designers shall use the criteria to develop fire protection systems for new buildings, retrofit of existing unsprinklered buildings, or interior renovation of existing buildings. When the criteria are applied to interior renovations of existing structures, designers shall provide systems that meet design parameters of either the existing fire protection system or these criteria that satisfy applicable codes.

20.B FIRE PROTECTION CRITERIA

Interior Finishes

Wood used in construction that is required to be fire retardant must be treated with fire retardant chemicals by a pressure impregnation process or other method that treats the materials throughout (as opposed to surface treatment).

Automatic Sprinkler Systems

All sprinkler systems must be wet-pipe sprinkler systems, unless installed in areas subject to freezing.

Automatic sprinkler system zones shall be established by the installation of floor control assemblies for all floors in multistory buildings, including basements.

Automatic sprinkler system designs (wet pipe) shall achieve the minimum design criteria listed in Table 20.1.

Hydraulic designs of sprinkler systems shall incorporate a safety factor of 10 percent of the available water supply pressure at the system demand flow rate. High pressure systems shall be limited to a maximum working pressure of 300 psi.

Automatic sprinkler designs shall be prepared and sealed by a licensed California fire protection engineer for new construction projects. Subsequently, the required shop drawings, including hydraulic calculations, for construction approval may be done by licensed C-16 fire protection contractors.

Pressure seal type fittings or methods of joining pipes shall not be permitted.

Sprinkler system control valves must be located in accessible spaces. Sprinkler system control valves are not permitted in above-ceiling spaces.

Table 20.1 Minimum Design Criteria for Automatic Sprinkler System Designs (Wet Pipe)

OCCUPANCY CLASSIFICATION	DESIGN DENSITY (GPM/FT2)	DESIGN AREA (FT2)	HOSE STREAM ALLOWANCE (GPM)*	DURATION OF SUPPLY (MINUTES)
Light Hazard	0.10	3,000	100*	60
Ordinary Hazard Group 1	0.15	3,000	250*	60
Ordinary Hazard Group 2	0.20	3,000	250*	90
Extra Hazard Group 1	0.30	3,000	500*	120
Extra Hazard Group 2	0.40	3,000	500*	120

**Combined inside/outside*

Non-fire-protection connections shall not be permitted.

- On-site water storage, where required, shall be designed and installed per NFPA Standard 22.
- For fire sprinkler systems in mechanical rooms, provide sprinkler system per NFPA requirements using corrosion-resistant, standard response sprinkler heads rated for 200°F.
- Coordinate location of each sprinkler head with reflected ceiling plan, including lighting, diffuser, and grille layout. Sprinklers shall be installed in center-of-tile locations for suspended ceilings, based on the dimension of the ceiling tiles.
- Coordinate the location, signage, keying, and access of fire sprinkler shutoff and zone valves with the local fire authorities. Access and signage shall be obvious. Visibility shall not be blocked by equipment.
- Coordinate sprinkler drain locations with plumbing drawings.
- Specify sprinkler head guards to be installed on any heads subject to possible damage. Sprinkler head guards shall be UL listed.

Sprinkler guards must be provided in the following locations:

- Sprinklers installed within elevator machine rooms and elevator pits.
- Sprinklers installed within electrical closets.
- Sprinklers installed within electrical equipment rooms.
- Sprinklers installed less than 7'-6" above the floor.
- Sprinkler guards to provide protection from mechanical damage shall be provided for all sprinklers in MDF rooms, unless concealed type sprinklers are installed.

On retrofit projects, replace existing standard response sprinklers in light hazard areas with quick response sprinklers only in areas being retrofitted.

Hydrants

Design installation to comply with NFPA 24 and NFPA 1141 except as follows, and meeting requirements of the California State Fire Marshal and the local fire department.

- Contact the responding fire department for hydrant requirements.
- Maximum spacing between hydrants shall not exceed 300'. Locate hydrants such that every portion of the exterior of every building shall be within 300' of a hydrant, with consideration given to accessibility and obstructions. Nominal distance between a fire hydrant and the building fire department connection shall be 50'.
- Wet barrel hydrants are preferred where piping is not subject to freezing.
- Locate hydrants adjacent to paved areas, no closer than 3' and no farther than 7' from roadway shoulder or curb line, accessible to fire department apparatus. Barrels shall be long enough to permit at least 18" clearance between center of pumper connection and grade. Pumper connection shall be perpendicular to street to allow straight line connection to pumper.
- Design site grading for surface drainage away from hydrant.
- Mark hydrants to comply with NFPA 2891 if local fire department has no preference.

Fire Pump Requirements

Evaluate fire pump requirements based on building size, number of floors, occupancy, and available city water pressure. Specify fire pump, jockey pump, and associated control system in accordance with NFPA requirements.

- Specify that a single vendor furnish pumps, motors, transfer switches, and all controls, and that equipment be UL listed.
- Require the pump manufacturer/representative to provide the services of a qualified engineer for startup and acceptance test, in the presence of local fire and authorities having jurisdiction (AHJ).

A fire pump must start automatically at 10 psi below pressure maintenance pump (jockey pump) start pressure. The fire pump must be manually shut down, except that operation by automatic periodic exercise timers used for the required maintenance run times is to be incorporated. The fire pump installation must include a test header and a flow meter.

- Where an emergency generator is required, coordinate electric fire pump starter type with generator for adequate starting capacity.

Piping Requirements

- Specify all aboveground sprinkler piping to be Schedule 40, black steel, ASTM A-135, and all underground sprinkler piping to be ductile iron, class 50, AWWA C151, with cement mortar lining conforming to AWWA C104, with 1-mil thick exterior petroleum asphalt coating. For corrosive soil areas, the underground piping shall be encased in polyethylene encasement in accordance with AWWA C105 and with cathodic protection.
- Black steel piping is to be used for all aboveground sprinkler piping.
- Steel piping having a corrosion-resistant ratio less than 1 is not permitted to be installed.
- Plain-end fittings are not permitted to be installed.
- The sprinkler system drainage piping shall be specified as galvanized steel pipe with galvanized threaded malleable iron fittings.
- Specify corrosion protection for buried ductile iron pressure piping and supports. All wrapping shall be site installed. Specify cathodic protection as necessary for local conditions.
- Installation: Install aboveground pipe, fittings, and hangers in accordance with NFPA-13 and local code requirements, including seismic sway and uplift bracing. Additional requirements per earthquake bracing shall be in accordance with NFPA-13, or a structural engineer shall sign the sway bracing details.
- Reducers: Make reductions in pipe sizes with one-piece reducing fitting. Bushings will not be acceptable, except when standard fittings of proper size are not manufactured.
- Provide next to sprinkler main risers a framed, printed sheet protected by transparent plastic, safety glass, or plexiglass cover with brief instructions regarding all necessary aspects of sprinkler controls and emergency procedure.
- Drains: Install main drain at riser and auxiliary drains at all low points in the system on each floor. Install inspector's test drains on sprinkler system at main riser assembly. Five or fewer trapped heads may be drained through a plugged fitting. Route the drain pipes for each sprinkler riser and test connections to the building sanitary sewer system. Sewer system has to accommodate full flow for main drain.
- Exposed piping supplying chrome-plated hose valves or fire department connections shall be painted (color to be approved by architect). Chrome-plated wall or floor escutcheons shall be provided at point of concealment.
- Install a hinged chrome-plated escutcheon at all visible wall, floor, and ceiling pipe penetrations in finished areas.

- Do not run piping through elevator hoistways, machine rooms, machinery spaces, or enclosures unless piping is serving these spaces. Branch sprinkler piping serving those spaces shall be provided with a supervised branch shutoff valve located at an accessible location outside these spaces. Furnish supervisory switch at these valves.
- Do not run piping through electrical rooms unless piping is serving these spaces. Coordinate piping layouts to prevent installation directly over electrical equipment. If pipe routing over equipment is unavoidable, provide drain pans under piping to prevent leaking pipe drips from damaging equipment while maintaining sprinkler coverage.
- Local water purveyor or fire department/ building department requirements for corrosion protection, if any, shall be incorporated into the project requirements.
- Continuous detectable warning tape shall be installed directly above all underground fire service line piping, approximately 1' below the finished grade surface.
- When backflow preventers are installed in fixed fire protection systems for new buildings, test connection must be provided downstream of all backflow prevention valves for flow tests at system demand.
- Provide valves in underground water distribution lines to isolate leaks and to allow water to supply the remainder of the loop. Locate isolation valves so that not more than four discharge points (sprinkler systems, hydrants, or standpipe systems) will be taken out of service by any one break in the line.

Valve Requirements

Specify valves that are UL listed for the application and pressure classification and manufactured by companies with a full line of fire protection system components.

Piping Specialties

- Specify piping specialties that are UL listed and made by a single manufacturer.
- Specify pressure gauges to be 3½" dial with dial range twice the system working pressure, ¼" bottom connection, and shutoff valve.
- Specify flow switches with adjustable time delays, UL listed. Each must have two contacts for local and remote alarms, DPDT.
- Specify inspector's test and drain valve assembly in accordance with NFPA-13.
- Specify the valve supervisory switch to be UL listed, 120 VAC/30 V DC, with DPDT.
- Other specialty items shall be specified as by NFPA-13 or local conditions and codes.

Specify the sprinkler heads to be UL-listed automatic sprinklers in accordance with the following:

- Specify temperature rating of 155°F–165°F, except when application requires higher rating.
- Specify 200°F temperature rating for sprinkler heads in all switchgear rooms, electrical rooms, elevator machine rooms, mechanical rooms, skylights, and where required by NFPA.
- Specify institutional quick-response sprinkler heads for holding cell areas.
- Specify standard response type sprinkler heads, either upright, sidewall, or pendant, in open ceiling areas and for switchgear rooms, electrical rooms, elevator machine rooms, mechanical rooms, and other service areas.

Fire Department Connections

Specify the fire department connections (FDC) to be provided in accordance with NFPA, California Fire Code, and local fire department requirements. Threads shall conform to standards of all responding fire departments.

The FDC shall be cast brass or ductile iron body with drop clappers. Provide chrome-plated brass plate with lettering as required by the local fire authorities. Provide chrome-plated brass female snoots with rigid pin lug hose thread swivels, pin lugs, and chains. All hose inlets and threads, (National Standard Thread—NST), shall conform to local fire department requirements.

Sprinkler Control Valves

Specify sprinkler control valves to be UL listed, all with supervisory switches.

Double Check Detector Valve Assembly

Specify that double check detector valve (DCDV) assembly shall be UL listed.

Post Indicator Valve Assembly

When required by the local authorities, specify UL-listed post indicator valve (PIV) assembly. PIVs shall be monitored by the building fire alarm system.

MDF/Server Equipment Room Protection

Sprinkler heads should be provided with sprinkler guards. Pre-action sprinkler systems are not recommended. The sprinkler system for the room can have a separate, dedicated, manually operated, isolation valve with a supervisory switch and a separate flow switch located outside the protected area in an accessible location. Both the supervisory switch and the flow switch should be connected to the building fire alarm system. If approved by AOC, an automatic gaseous fire suppression system in high-valued critical facilities rooms shall use gaseous agent Novec 1230. Detection system will be cross-zoned or counting zone photoelectric detectors. Minimum two-detector activation is required before discharge sequence can begin. Quantity of detectors shall be determined by airflow within hazard area but not exceeding 250 sq. ft. per detector. Minimum detection to be provided for each room shall be three counting zone detectors or four cross-zoned detectors.

Coordination

Fire protection systems shall be coordinated with other specification sections, such as earthwork, architectural, site utilities, concrete, plumbing, structural, electrical, sheet metal, and mechanical.

All electrical equipment provided under fire protection systems shall be specified with wiring diagrams for interfacing with electrical work.

Coordinate with the building fire alarm system for transmitting all flow and tamper alarms.

Guarantee

Specify that fire protection work shall be free from defects of workmanship and materials for two years after filing notice of completion, and remedy any defects developing during this period, free of charge. Manufacturers whose equipment has a longer guarantee period shall provide a written guarantee.

Installation Contractor Certification

Specify that the fire protection system shall require the installation contractor to submit all certificates in triplicate indicating approval of work, approval or performance of tests, and final inspection issued by fire marshal before final acceptance of sprinkler system.

Cleaning

Specify that the sprinkler heads placed prior to painting be covered with paper or plastic bags, which shall be removed only after painting is completed.

20.C FIRE ALARM SYSTEM OBJECTIVES

Fire alarm system design shall provide safe installation and operations through standardization, installation, and testing requirements, based upon sound engineering principles, applicable state and local codes, and field experience. The criteria set minimum acceptable requirements for design and installation of the building fire alarm system.

Designers shall use these criteria to develop fire alarm systems for new buildings, retrofit of existing buildings, or interior renovation of existing buildings. When the criteria are applied to the design of interior renovations of existing structures, the designer shall provide systems that meet either the design parameters of the existing building fire alarm system or these criteria, whichever result in a system that satisfies applicable codes.

20.D FIRE ALARM SYSTEM CRITERIA

The fire alarm and notification system shall be UL listed, California State Fire Marshal approved, and manufactured by firms regularly engaged in manufacturing fire detection, alarm, and communications systems; of types, sizes, and electrical characteristics required; and whose products have been in satisfactory use in similar service for not less than five years. The fire alarm system shall be a fully addressable system. Class B wiring shall be acceptable except for connections (signaling circuits) between the main fire alarm control panel and the distributed fire alarm remote panels, where Class A wiring shall be provided. Minimum conduit size will be ¾".

The fire alarm system shall be specified with the following:

- Fire alarm system shall use closed loop initiating device circuits with individual zone supervision, individual indicating device circuit supervision, incoming, and standby power supervision.
- For low-rise buildings, the fire alarm control panel shall be located in the security command center unless another location is mandated by code. Provide a fire alarm remote annunciator inside the building in a location adjacent to the main entrance.

All fire alarm systems installed in buildings must be an emergency communication system (voice notification system) when any one of the following conditions exists:

- The building is two or more stories in height above the level of exit discharge.
- The total calculated occupant load of the building is 300 or more occupants.
- The building is subject to 100 or more occupants above or below the level of exit discharge.

The emergency communication system must provide an automatic voice message in response to the receipt of a signal indicative of a fire emergency. Manual control with the capability of making live voice announcements must also be furnished to provide occupants notification on either a selective or all-call basis.

Fire alarm and emergency communication system control equipment that is installed in non-high-rise buildings must be located within a room separated from the remainder of the building by one-hour fire-resistive construction. Refer to Chapter 10 for room requirements.

All fire alarm signals (i.e., alarm, supervisory, and trouble signals) must be automatically transmitted via a digital alarm communicator over leased phone lines to a UL-listed central station service. Operation of a duct smoke detector is permitted to initiate a supervisory signal.

Manual fire alarm boxes must be installed in accordance with the requirements in NFPA 72 and the California Fire Code.

Fire alarm control units (FACUs) and annunciators shall be semirecessed in finished areas.

The fire alarm system shall be coordinated with other specification sections, such as architectural, site utilities, plumbing, fire sprinkler system, electrical, telephone, data, security, intelligent building systems, and mechanical systems.

For new buildings, fire alarm system wiring will be in-conduit. Only compression fittings are to be used.

All wiring entering or exiting a fire alarm control panel must be clearly labeled marking destination/source and purpose (e.g., Fan #22 Shutdown).

All fire alarm systems are to have 60-hour standby with 15 minutes of alarm battery backup.

Smoke detectors must be installed in accordance with the requirements in NFPA 72 and the California Fire Code. Provide individually addressable smoke detectors appropriate for the application in the following locations: all elevator lobbies, uninterruptible power supply rooms, electrical switch gear rooms, transformer vaults, telephone exchanges, mechanical rooms, and elevator machine rooms. When smoke detection is installed in rooms having high voltage equipment, the smoke detection must not be installed directly above the high voltage equipment. MDF Rooms containing server or mainframe computer equipment shall be provided with smoke detection connected to the fire alarm system, unless there is already separate smoke detection provision (e.g., in clean agent systems).

Visible notification appliances are not permitted to be installed in exit stairwells.

All non-high-rise fire alarm systems must have an annunciator located near the primary fire department entrance to the building (exception: when the fire alarm control panel is already present in this location).

Fire alarm system signaling line circuits (SLCs) shall be installed with isolation modules in sufficient number and location to limit the potential number of impaired devices from a single circuit failure to a maximum of eight devices.

High-rise Fire alarm systems (including smoke control system) design shall be prepared by a California registered fire protection engineer; deferred construction shop drawings may be prepared by a C-10 fire alarm contractor.

Quality Assurance

All materials specified shall be the best available, new, and approved by UL and the California State Fire Marshal.

Specify that all panels and peripheral devices shall be the standard product of a single fire alarm system manufacturer, under the appropriate UL category.

- Installer shall be qualified with at least five years of successful installation experience on projects with fire detection, alarm, and communications systems installation work similar to that required for the project.
- Comply with NEC as applicable to construction and installation of fire detection, alarm, and communication system components and accessories.
- The fire detection, alarm, and communication system components and accessories shall comply with all federal and state standards.

Identification

Specify that the proper identification and signage be provided at each fire alarm panel, conduits, branch circuits, pull boxes, and J-boxes using industry standard materials and methods.

Guarantee

Specify that the fire alarm work shall be free from defects of workmanship and materials for two years after filing notice of completion and remedy any defects developing during this period, free of charge. Manufacturers whose equipment has a longer guarantee period shall provide a written guarantee. Specifications should include fire alarm contractor to provide a minimum two-year warranty for all fire alarm systems. The fire alarm contractor shall provide required inspection, testing, and maintenance services at least every six months throughout the warranty period.

Tests and Adjustments

Specify that after installation has been completed, the entire system be tested in accordance with the NFPA-72 by the contractor in the presence of the authority having jurisdiction (AHJ).

Installation Contractor Certification

Specify that the fire alarm system installation contractor shall submit all certificates in triplicate indicating approval of work, approval or performance of tests, and final inspection issued by local authorities.

21 APPENDIX

TOPIC PAGE

Note

* Can be retrieved in separate PDF portfolio from AOC website

All new facilities designed and constructed using the Facilities Standards shall comply with the following codes, standards and guidelines, and any other applicable nationally recognized code, standard and guideline. Requirements exceeding those expressed in the list below are described in the Facilities Standards text. The latest adopted code edition, standard, or guideline in effect as of the commencement of the schematic design phase of the specific court project shall be used, regardless of dates shown in this document.

21.A BUILDING CODES AND STANDARDS

The following codes and standards shall apply:

- California Building Code
- California Building Standards Code–Title 24, Part 11 California Green Building Standards Code (Cal Green) Mandatory Measures
- California Government Code
- California Code of Regulations, Title 24
- California Energy Code
- Americans With Disabilities Act (ADA)
- American Disability Act Accessibility Guidelines (ADAAG) (Section 11)
- Principles of Universal Design
- Division of the State Architect (DSA) Access Checklist
- Interpretation of CBC Regulations for Occupancy Category Applicable to California Courts Buildings by Rutherford & Chekene June 5, 2009*

21.B STRUCTURAL DESIGN CODES AND STANDARDS

The codes, standards, and design guidelines listed in this section are developed within the industry and represent acceptable procedures for design and construction. The documents are mandatory only where required by applicable codes. The list is not intended to limit the use of other reference documents.

Codes

- CBC: California Building Code
- IBC: International Building Code
- ACI 318-08: Building Code Requirements for Structural Concrete and Commentary
- ACI 530-08: Building Code Requirements and Specification for Masonry Structures and Related Commentaries
- AISC 341-05: Seismic Provisions for Structural Steel buildings
- AISC 358-05: Prequalified Connections for Special and Intermediate Steel moment Frames For Seismic Applications
- AISC 360-05: Specification for Structural Steel Buildings

Standards

- AISC 303-05: Code of Standard Practice for Steel Buildings and Bridges
- ASCE 7-05: Minimum Design Loads for Buildings and Other Structures
- ASCE 31-03: Seismic Evaluation of Existing Buildings
- ASCE 41-06: Seismic Rehabilitation of Existing Buildings
- ASCE 25-06: for Earthquake-Actuated Gas Shutoff Devices
- NFPA 13: Standards for Fire Sprinkler Piping

Guidelines

- AISC Design Guide Series 11: Floor Vibrations Due to Human Activity
- ATC-40: Seismic Evaluation and Retrofit of Concrete Buildings
- ATC-58: PACT Program Software

- FEMA 74: Reducing the Risks of Nonstructural Earthquake Damage: A Practical Guide
- FEMA 413: Installing Seismic Restraints for Electrical Equipment
- FEMA 412: Installing Seismic Restraints for Mechanical Equipment
- FEMA 460: Seismic Considerations for Steel Storage Racks Located in Areas Accessible to the Public
- FEMA: HAZUS Program Software
- Single Degree of Freedom Structural Response Limits for Antiterrorism Design—PDC-TR 06-08 Rev 1: U.S. Army Corp of Engineers Protective Design Center Technical Report, 20 October 2006 (Distribution Unlimited)
- UFC 4-023-03: Design of Buildings to Resist Progressive Collapse, Unified Facilities Criteria , Unified Facilities Criteria (UFC, 27 January 2010)

21.C MECHANICAL DESIGN CODES AND STANDARDS

Unless specifically directed otherwise by the program document, the following HVACR codes, standards, and preferred design concepts below shall be used as guidelines for design.

The latest editions of publications and standards listed below are intended as guidelines for design. They are mandatory only where referenced as such in the text of this chapter or in applicable codes. The list is not meant to restrict the use of additional guides or standards. When publications and standards are referenced as mandatory, any recommended practices or features shall be considered "required."

Codes

- California Mechanical Code
- California Electrical Code
- California Fire Code
- California Plumbing Code
- California Code of Regulations Title 8, Industrial Safety Orders

Standards

- ANSI/EIA/CEA—709.1- B-2000 Control Network Protocol Standards
- AMCA: Air Movement and Control Association Inc. Certification Ratings
- American National Standards Association Standards
- American Society of Testing and Materials
- American Society of Mechanical Engineers: ASME Manuals
- American Society of Plumbing Engineers: ASPE Data Books
- ARI: Air-Conditioning and Refrigeration Institute Standards
- ASHRAE: Standard 15: Safety Code for Mechanical Refrigeration
- ASHRAE: Standard 52.2: Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size
- ASHRAE: Seismic Restraint Manual Guidelines for Mechanical Systems
- ASHRAE: Standard 55: Thermal Environmental Conditions for Human Occupancy
- ASHRAE: Standard 62n: Ventilation for Acceptable Indoor Air Quality
- ASHRAE: Standard 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings
- ASHRAE: Standard 100: Energy Conservation in Existing Buildings
- ASHRAE: Standard 105: Standard Method of Measuring and Expressing Building Energy Performance

Note

* Can be retrieved in separate PDF portfolio from AOC website

- ASHRAE: Standard 111: Practices for Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems
- ASHRAE: Standard 114: Energy Management Control Systems Instrumentation
- ASHRAE: Standard 135n: BACnet: A Data Communication Protocol for Building Automation and Control Networks
- ASHRAE HVAC System Duct Design
- California Energy Code: Nonresidential Alternative Calculation Manual Standards
- CISPI Standards: Cast Iron Soil Pipe Institute
- EIA/TIA Standard 862: Building Automation Systems Cabling Standards for Commercial Buildings
- Factory Mutual Standards
- National Fuel Gas Code Standard 54
- National Fire Protection Association: Standard 96
- National Fire Protection Association: Standard 13
- Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA)
- SMACNA HVAC Duct Construction Standards: Metal and Flexible
- SMACNA HVAC Air Duct Leakage Test Manual
- SMACNA Fire, Smoke, and Radiation Damper Installation Guide for HVAC Systems
- Underwriters Laboratories Standards

Design Guides

- ASHRAE: Guideline #4: Preparation of Operating and Maintenance Documentation for Building Systems
- California Energy Code: Nonresidential Alternative Calculation Manual Guidelines
- California Public Utilities Commission: Pacific Gas and Electric Company: Saving By Design Program
- California Public Utilities Commission: Pacific Gas and Electric Company and Portland Energy Conservation, Inc. (PECI): Building Commissioning Design Guidelines
- California Public Utilities Commission: Pacific Gas and Electric Company Title 24 Nonresidential Mechanical and Acceptance Test Requirements
- IRI: International Risk Insurance
- ISA: Instrument Society of America: Instrument Data Sheet Formats
- IRI: International Risk Insurance
- Lonmark Protocol Guidelines
- National Institute for Occupational Safety and Health: Guidance for Protecting Building Environments from Airborne Chemical, Biological, or Radiological Attacks 20.3 Electrical Codes and Standards

Codes

- NFPA-70 National Electrical Code
- ANSI Std. C-2 National Electrical Safety Code
- NFPA-101 Life Safety Code
- California Code of Regulations, Title 24, all parts, and California Building Code

Standards

- ANSI Standard 241 Recommended Practice for Electric Power Systems in Commercial Building (IEEE Gold Book)
- ANSI Standard 493 Recommended Practice for Design of Reliable Industrial and Commercial Power Systems (IEEE Gold Book)

- ANSI Standard P-1110 Recommended Practice for Powering and Grounding Sensitive Electronic Equipment (IEEE Emerald Book)
- Underwriters Laboratories (UL)

Codes

- California Code of Regulations, Title 24
- California Building Code
- California Fire Code
- California Electric Code
- California Mechanical Code
- California Energy Code
- National Electric Code

Standards

- ANSI/EIA/CEA—709.1- B-2000 Control Network Protocol Specification
- ASHRAE: Standard 62.1: Ventilation for Acceptable Indoor Air Occupancy
- ASHRAE: Standard 111: Practices for Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems
- ASHRAE: Standard 114: Energy Management Control Systems Instrumentation
- ASHRAE: Standard 135n: BACnet: A Data Communication Protocol for Building Automation and Control Networks
- ASHRAE: Guideline #4: Preparation of Operating and Maintenance Documentation for Building Systems
- EIA/TIA Standard 862, Building Automation Systems Cabling Standards for Commercial Buildings
- California Nonresidential Alternative Calculation Method (ACM) Approval Manual, California Energy Code
- ISA: Instrument Society of America: Instrument Data Sheets
- Lonmark Standards by Echelon

Guidelines

- AMCA: Air Movement and Control Association Inc.
- California Public Utilities Commission: California Pacific Gas and Electric Company and Portland Energy Conservation, Inc. (PECI): Energy Design Resources
- California Public Utilities Commission: Pacific Gas and Electric Company and Portland Energy Conservation, Inc. (PECI): Pacific Energy Center, Building Commissioning Design Guidelines
- California Public Utilities Commission: Pacific Gas and Electric Company: California title 24 Energy Code, Pacific Energy Center, Nonresidential Mechanical and Acceptance Test Requirements
- California Public Utilities Commission: California Pacific Gas and Electric Company: Pacific Energy Center, DDC Control Sequences for Demand Reduction and Energy Savings
- Specifying Digital Controls: www.ddc-online.org
- Specifying Lonmark: www.echelon.com, Lonmark Interoperability Guidelines

21.D HVACR AUTOMATIC CONTROLS CODES AND STANDARDS

Codes

- California Code of Regulations, Title 24
- California Building Code
- California Fire Code
- California Electric Code
- California Mechanical Code
- California Energy Code
- National Electric Code

Note

* Can be retrieved in separate PDF portfolio from AOC website

Standards

- ANSI/EIA/CEA—709.1- B-2000 Control Network Protocol Specification
- ASHRAE: Standard 62.1: Ventilation for Acceptable Indoor Air Occupancy
- ASHRAE: Standard 111: Practices for Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems
- ASHRAE: Standard 114: Energy Management Control Systems Instrumentation
- ASHRAE: Standard 135n: BACnet: A Data Communication Protocol for Building Automation and Control Networks
- ASHRAE: Guideline #4: Preparation of Operating and Maintenance Documentation for Building Systems
- EIA/TIA Standard 862, Building Automation Systems Cabling Standards for Commercial Buildings
- California Nonresidential Alternative Calculation Method (ACM) Approval Manual, California Energy Code
- ISA: Instrument Society of America: Instrument Data Sheets
- Lonmark Standards by Echelon

Guidelines

- AMCA: Air Movement and Control Association Inc.
- California Utilities Commission: California Pacific Gas and Electric Company and Portland Energy Conservation, Inc. (PECI): Energy Design Resources
- California Utilities Commission: Pacific Gas and Electric Company and Portland Energy Conservation, Inc. (PECI): Pacific Energy Center, Building Commissioning Design Guidelines
- California Utilities Commission: Pacific Gas and Electric Company: California Title 24 Energy Code, Pacific Energy Center, Nonresidential Mechanical and Acceptance Test Requirements
- California Utilities Commission: California Pacific Gas and Electric Company: Pacific Energy Center, DDC Control Sequences for Demand Reduction and Energy Savings
- Specifying Digital Controls: www.ddc-online.org
- Specifying Lonmark: www.echelon.com, Lonmark Interoperability Guidelines
- Office of Court Construction and Management Facilities Design Guidelines—Instrumentation and Control for Heating, Ventilating Air Conditioning Systems—Building Automation Systems: Direct Digital Control, July 27, 2010 Program Requirements Overview*
- Interim Facilities Design Standard, Revision 1.1: Institutional grade, energy efficient, high reliability, central station air-handling units (30-year life) by Dennis Leung*
- Judicial Council of California Memorandum: Performance Standards for HVAC and Building Automation Systems for facilities greater than 100,000 gross square feet, December 9, 2010*

21.E ELECTRICAL CODES AND STANDARDS

Codes

- NFPA-70 National Electrical Code
- ANSI Std. C-2 National Electrical Safety Code
- NFPA-101 Life Safety Code
- California Code of Regulations, title 24, all parts, and California Building Code

Standards

- ANSI Standard 241 Recommended Practice for Electric Power Systems in Commercial Building (IEEE Gold Book)
- ANSI Standard. 493 Recommended Practice for Design of Reliable Industrial and Commercial Power Systems (IEEE Gold Book)
- ANSI Standard P-1110 Recommended Practice for Powering and Grounding Sensitive Electronic Equipment (IEEE Emerald Book)
- Underwriters Laboratories (UL)
- Back-up generator requirements matrix by Dennis Leung and Shawn Sen July 7, 2010*

Lighting design shall comply with CCR, Title 24, Building Codes for energy efficiency standards.

The Illuminating Engineering Society of North America (IESNA) provides lighting design criteria. Applicable design criteria for spaces typically found in AOC facilities are listed below. While these are guidelines, there may be extenuating circumstances where the criteria are inadequate. In those cases, the design team shall provide an analysis explaining why the IESNA recommendations are inadequate, and an analysis of the proposed system that shall meet user requirements.

21.F TELECOMMUNICATIONS STANDARDS AND REFERENCE DOCUMENTS

Apply the following standards when designing telecommunications systems:

- Judicial Branch of California, Administrative Offices of the Courts, LAN/WAN Network Architecture and Standards (December 17, 2010, Version 3.1)
- ANSI/EIA-310-D: Cabinets, Racks, Panels and Associated Equipment Standard—1992
- ANSI/TIA-492.AAAC-B: Detail specification for 850 nm Laser-Optimized, 50-mm Core Diameter/125-mm Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers – 2009
- ANSI/TIA-492.CAAB: Detail Specification for Class lVa Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak—2005
- ANSI/TIA-526.14-B: OFSTP-14, Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant—2010
- ANSI/TIA/EIA-568-C-1—Commercial Building Telecommunications Cabling Standard Part 1: General Requirements 2009
- ANSI/TIA/EIA-568-C-2—Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components 2009
- ANSI/TIA/EIA-568-C.3: Commercial Building Telecommunications Cabling Standard—Part 3 Optical fiber cabling components—2008
- ANSI/TIA/EIA-569-B: Commercial Building Standard for Telecommunications Pathways and Spaces—2004
- ANSI/TIA/EIA-598-C: Optical Fiber Color Coding—2005
- ANSI/TIA/EIA-606-A: Administration Standard for Commercial Telecommunication Infrastructure—2007
- ANSI/J-STD-607-A: Commercial Building Grounding and Bonding Requirements for Telecommunication—2002
- ANSI/TIA/EIA-758-A: Customer-owned Outside Plant Telecommunications Infrastructure Standard—2004
- ANSI/IEEE 802.3ae: 10Gb/s Ethernet Standard—2002
- ANSI/IEEE 802.3af & at: Power Over Ethernet Standards

Note

* Can be retrieved in separate PDF portfolio from AOC website

** Attached within the Appendix

- ANSI/IEEE 802.11: Wireless Ethernet Standards, including 802.11a, 802.11b, 802.11g and 802.11n—2002
- ANSI/TIA-942: Telecommunications Infrastructure for Data Centers—2010
- BICSI Telecommunications Distribution Methods Manual (TDMM) 12th Edition
- BICSI Information Transport Systems Installation Manual (ITSIM) 5th Edition
- BICSI Outside Plant Design Reference Manual (OSPDRM)—4th Edition
- BICSI Wireless Design Reference Manual (WDRM)—3RD Edition
- All Bulletins, Addenda or the most recent edition issued by ANSI/TIA/EIA and BICSI in conjunction with the above referenced standards and guidelines
- AOC LAN/WAN Architecture and Standards, October 2, 2010*
- LAN/WAN Diagram (Integrated Architecture Network Diagram)—developed by Shen, Milson & Wilke, Inc.**

21.G AUDIOVISUAL STANDARDS

The following standards shall apply:

- California Building Code
- California Electrical Code
- ANSI/INFOCOMM 2M-2010, Standard Guide for Audiovisual Systems Design and Coordination Processes.
- ANSI/INFOCOMM 1M-2009, Audio Coverage Uniformity in Enclosed Listener Areas (ACU)
- AV Installation Handbook—Second Edition, Infocomm International, 2009
- AV Design Reference Manual, Infocomm International, 2006
- Dashboard for Controls Design Reference, Infocomm International, 2005

21.H NOISE ATTENUATION CODES AND STANDARDS

The following codes and standards shall apply:

- ASHARAE HVAC Applications Handbook, Sound and Vibration Control Chapter, American Society of Heating, Refrigerating and Air-Conditioning Engineers
- ANSI/AMCA 330, Laboratory Method of Testing to Determine the Sound Power in a Duct
- AMCA 300, Reverberant Room Method for Sound Testing of Fans
- AMCA 301, Methods for Calculating Fan Sound Ratings from Laboratory Test Data
- ARI 260, Sound Rating of Ducted Air Moving and Conditioning Equipment
- ARI 443, Air-Conditioning and Refrigeration Institute: Standard for Sound Rating of Fan Coil Air Conditioner
- ASTM E 477, American Society for Testing and Materials: Test for Duct Lining and Silencer Performance
- ASTM C 423, American Society for Testing and Materials: Method for Measuring Sound Absorption
- ASTM E 90, American Society for Testing and Materials: Method for Measuring Sound Transmission Loss
- ASTM E 413, American Society for Testing and Materials: Determination of Sound Transmission Class
- ASTM E 492, Standard Test Method for Laboratory Measurement of Impact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine
- ASTM E 1332, Standard Classification for Determination of Outdoor-Indoor Transmission Class
- SMACNA, Sheet Metal and Air Conditioning Contractors National Association

21.J FIRE PROTECTION CODES AND STANDARDS

Fire protection design shall comply with the requirements of the prevailing State of California Building Code, California Fire Code, applicable NFPA Standards, and the local jurisdiction requirements.

Prevailing Codes

- California Building Code
- California Fire Code
- Plumbing Code
- California Electrical Code

Standards

- NFPA-10—Portable fire extinguishers
- NFPA-13—Installation of sprinkler systems
- NFPA-14—Installation of standpipe and hose systems
- NFPA-20—Installation of centrifugal fire pumps
- NFPA-24—Installation of private fire service mains and their appurtenances
- NFPA-25—Water-based fire protection systems
- NFPA-70—National Electric Code
- NFPA-72—National Fire Alarm Code
- NFPA-2001—Clean Agent Fire suppression System
- Underwriters Laboratories (UL)
- Owner's Underwriter requirements
- Requirements for incorporating delayed egress locks—from CBC*
- Requirements for incorporating access controlled egress doors—from CBC*

21.K SUSTAINABILITY STANDARDS

- LEED (Leadership in Energy and Environmental Design) Green Building Rating System, United States Green Building Council (USGBC)

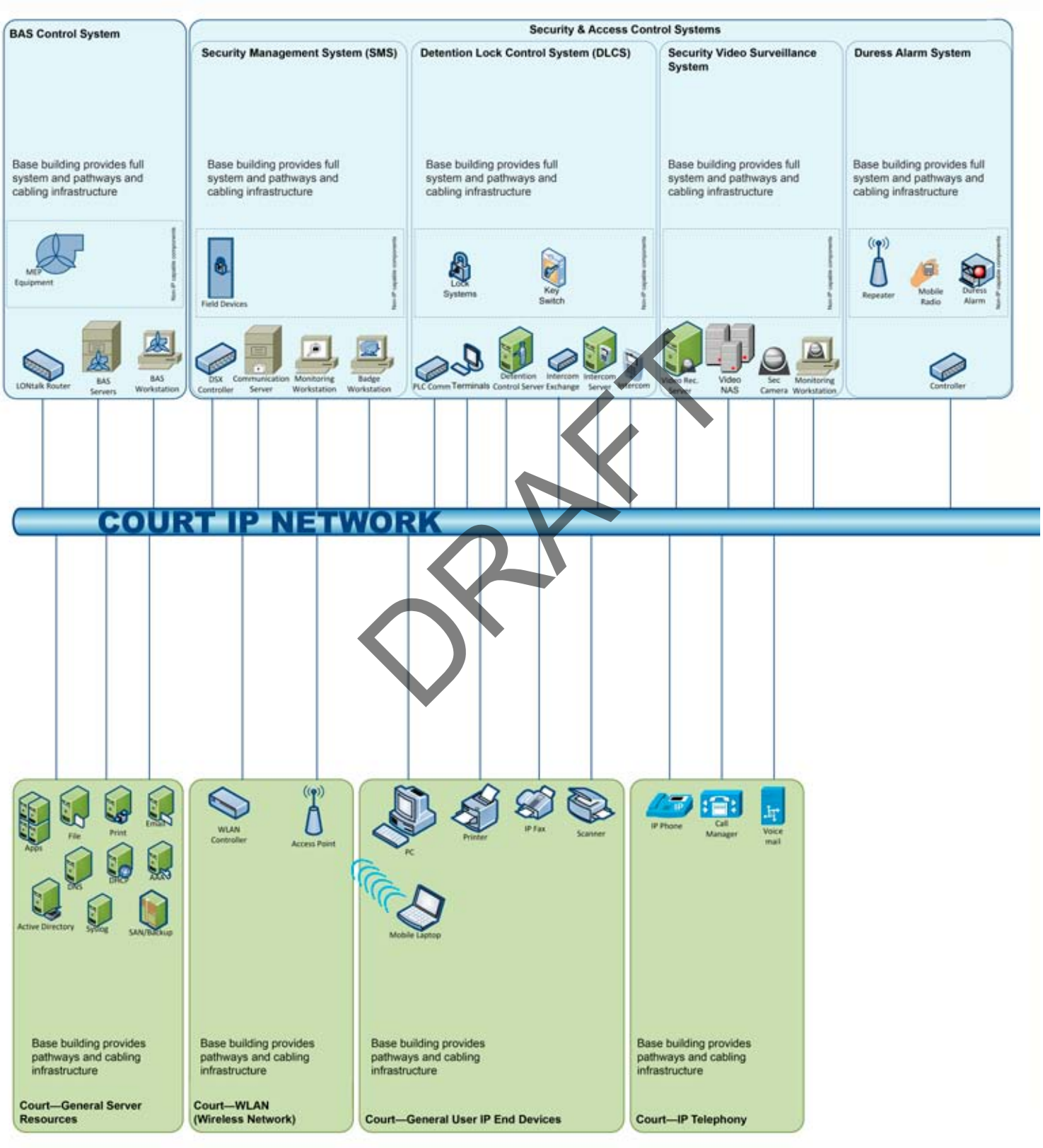
21.L ACCESSIBILITY STANDARDS

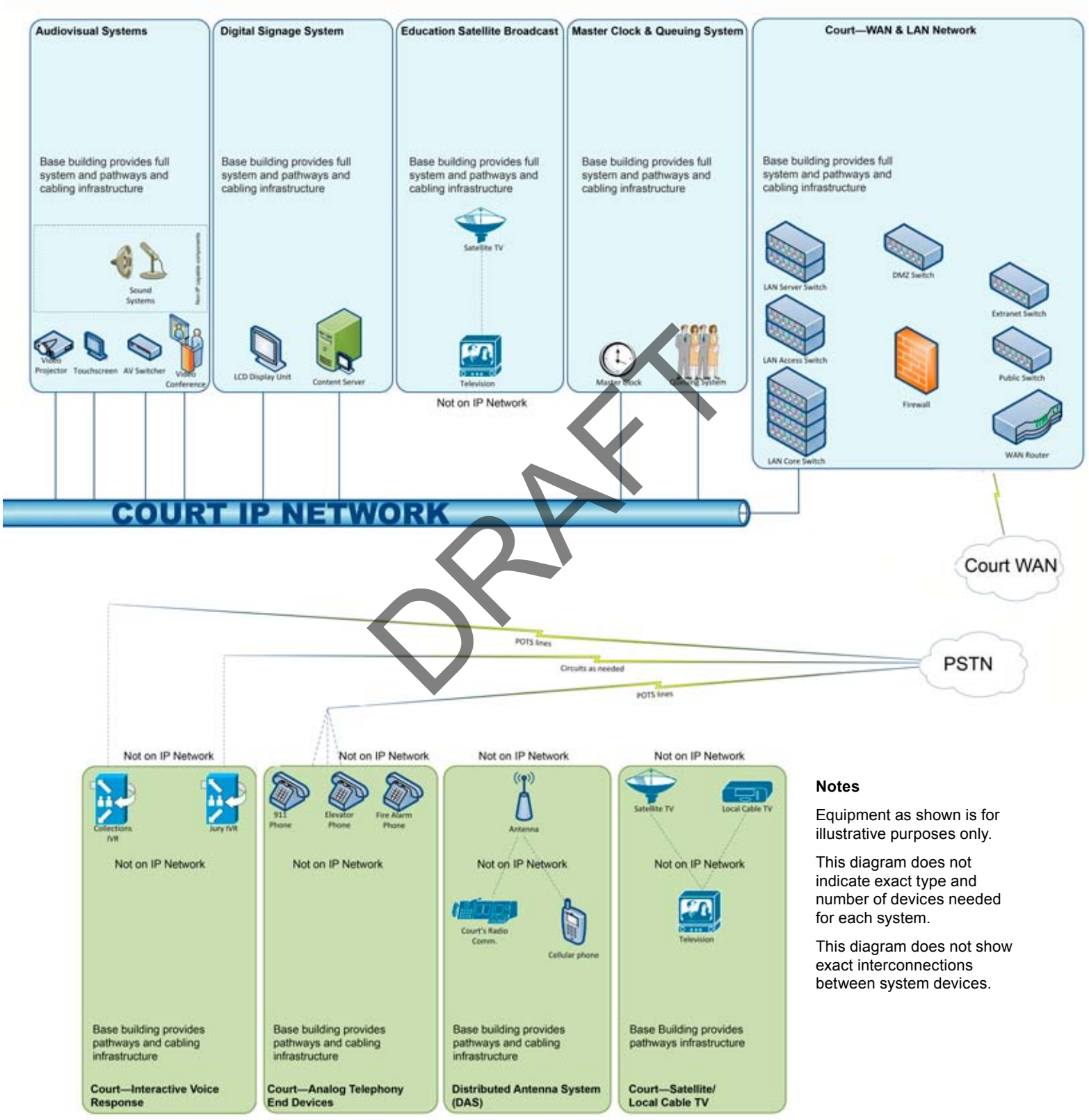
- Principals of Universal Design, latest version
- California Disabled Accessibility Guidebook 2003 (CALDAG)
- Americans With Disabilities Act (ADA)
- Uniform Federal Accessibility Standards (UFAS)
- ADA Accessibility Guidelines (ADAAG) (Section 11)
- Updated ADAAG (July 2004)
- California Code of Regulations, Title 24
- Division of the State Architect (DSA) Access Checklist

21.M OTHER STANDARDS AND REFERENCES

- Separation Between In-Custody Juveniles and In-Custody Adults in Courthouses: April 22, 2011, By Greg Allen Barker, Jay Farbstein & Associates*
- Memorandum of Understanding with Division of State Architect for Changes in Level in Courtrooms (per California Building Code, 2010 Edition)
- Security Systems Design Brief, January 21, 2011*
- Training and Conference Room Standards Report by Huntsman, September 8, 2009*
- US Army Corps of Engineers Protective Design Center Document—DDC-TR-0608 Rev. 1

INTEGRATED ARCHITECTURE NETWORK DIAGRAM





Notes

Equipment as shown is for illustrative purposes only.

This diagram does not indicate exact type and number of devices needed for each system.

This diagram does not show exact interconnections between system devices.

ACKNOWLEDGEMENTS

The AOC acknowledges the contributions of the following individuals for their input and guidance during the creation of the California Trial Court Facilities Standards; 2011 edition.

Office of Court Construction and Management

Mr. Lee Willoughby
Mr. S. Ernie Swickard
Mr. Clifford Ham
Ms. Pearl Freeman
Ms. Nora Freiwald
Mr. Patrick Gilleran
Mr. Dennis Leung
Mr. Patrick McGrath
Ms. Kristine Metzker
Mr. Jun Bock Quan
Mr. Leland Roberts
Mr. Shawn Sen
Mr. Steve Sundman
Mr. Gary Swanson

Administrative Office of the Courts

Mr. Michael Derr
Mr. Dennis Duncan
Mr. Edward Ellestad
Mr. Gavin Lane
Ms. Jennifer Willard

Project Consultants Skidmore, Owings & Merrill LLP

Mr. Gene Schnair
Mr. Steven Sobel
Ms. Lynn Taylor
Ms. Tamara Dinsmore
Mr. David Diamond
Ms. Corey Greer
Mr. Lonny Israel
Ms. Teri Gardiner
Ms. Laura Shifley
Mr. Peter Lee

WSP Flack + Kurtz

MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION ENGINEERS

Mr. Clark Bisel
Mr. Stephen Scaife
Ms. Caroline Fenlon-Harding

Weidlinger Associates, Inc.

BLAST ENGINEERS

Dr. Robert Smilowitz

Shen, Milson, Wilke, Inc.

ACOUSTIC ENGINEERS

Ms. Tracie Ferguson

AUDIOVISUAL CONSULTANTS

Mr. Stephen Shea
Mr. Gil Lopez

IT SYSTEMS

Mr. Herbert Els
Mr. Kevin Eldredge
Mr. Peter Campbell

Kroll Security Group

SECURITY ENGINEERS

Mr. Roy L. Parks
Mr. Michael Bolduc

Horton Lees Brogden

LIGHTING CONSULTANTS

Ms. Angela McDonald
Ms. Lilian Fu

Rolf Jensen & Associates, Inc.

CODE CONSULTANTS

Mr. Kerwin Lee

Ricci Greene

COURT PROGRAMMING

Mr. Rob Fisch

HOLDING & DETENTION

Ms. April Pottorff

PSA-Dewberry, Inc.

HOLDING & DETENTION

Mr. Bradley R. Hall
Mr. James M. Matarelli

HOK Architects

Mr. Charles Oraftik
Mr. Duncan Broyd
Mr. Robert Schwartz

AECOM

ARCHITECTS

Mr. Michael Griebel
Ms. Susan Oldroyd

Editor

Ms. Judith Dunham

GLOSSARY

A

AABC Associated Air Balance Council

AC Alternating Current

ACI American Concrete Institute

ACU Audio Coverage Uniformity

ADA America With Disabilities Act

ADPI Air Diffusion Performance Index

ADR Alternate Dispute Resolution

AHJ Authority Having Jurisdiction

AHU Air Handling Unit

AISC American Institute of Steel Construction Inc.

ALS Assistive Listening System

AMCA Air Movement and Control Association

ANSI American National Standards Institute

AOC Administrative Office of the Courts

ARI Air-Conditioning & Refrigeration Institute

ASCE American Society of Civil Engineers

ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers

ASSE American Society of Safety Engineers

ASTM American Society for Testing and Materials

ATC Applied Technology Council

AV Audiovisual

AVDRM Audiovisual Design Reference Manual

AWWA American Water Works Association

AWG American Wire Gauge

AWI Architectural Woodwork Institute

B

BICSI Building Industry Consulting Services International

BGSF Building Gross Square Feet

BMS Building Management System

BOC Board of Corrections

BTU British Thermal Unit

C

CBC California Building Code

CATV Community Antenna Television (Cable Television)

CCR California Code of Regulations

CCTV Closed Circuit Television

CEA Consumer Electronics Association

CEA Canadian Electrical Association

CEO Court Executive Officer

CFM Cubic Feet per Minute

CFM Customer Flow Management

CGSF Component Gross Square Feet

CMP Cable Management Panel

CMU Concrete Masonry Unit

CODEC Compressor–Decompressor

CPTED Crime Prevention Through Environmental Design

CRI Color Rendering Index

CSO Court Security Officer

CV Constant Velocity

D

DBS Digital Broadcast Satellite

dB Decibels

dBA Decibels, A-Weighted

DAS Digital Antenna System

DC Direct Current

DCDV Double Check Detector Valve

DCV Demand Controlled Ventilation

DDC Direct Digital Control

DEPS Digital Evidence Presentation System

DNA Deoxyribonucleic Acid

DP Differential Pressure

DPDT Double-Pole, Double-Throw

DSA Division of the State Architect

DVD Digital Versatile Disc

DX Direct Expansion

E

EDID Extended Display Identification Data

EIA Electronic Industries Alliance

ELFEXT Equal-Level Far-End Crosstalk

EMI Electromagnetic Interference

EMS Energy Management System

EMT Electrical Metallic Tubing

ENG Electronic News Gathering

ENT Electrical Nonmetallic Tubing

EPA Environmental Protection Agency

EPDM Ethylene Propylene Dimonomer

F

fc Foot Candle

FCC Federal Communications Commission

FCCC Federal City Communications Corporation

FCS Family Court Services

FDC Fire Department Connections

FEMA Federal Emergency Management Agency

FEMP Federal Energy Management Program

FPM Foot per Minute

F/UTP Foiled Twisted Pair

G

GPM Gallon per Minute

GUI Graphical User Interface

H

HDCP High-bandwidth Digital Copy Protection

HEPA High Efficiency Particulate Air

HP Horsepower

HVAC Heating Ventilation, Air Conditioning

HVACR Heating, Ventilation, Air Conditioning and Refrigeration

I

IAQ Indoor Air Quality

IBC International Building Code

IHW Instantaneous Hot Water

IIC Impact Insulation Class

IDF Intermediate Distribution Facility

IMC Intermediate Metallic Conduit

IP Internet Protocol

IPLV Integrated Part-Load Values

IPTV Internet Protocol Television

IS Information Systems

ISO International Organization for Standardization

ISP Inside Plant

IT Information Technology

IVR Interactive Voice Response

K

KPa Kilo-Pascal

KVA Kilo-volt-amps

L

LAN Local Area Network

LCCA Life Cycle Cost Analysis

LCD Liquid Crystal Display

LED Light Emitting Diode

LEED Leadership in Energy and Environmental Design

LOMMF Laser Optimzed Multimode Fiber

LPS Litres per Second

M

MATV Master Antenna Television

MERV Minimum Efficiency Reporting Value

MCC Motor Control Center

MDF Main Distribution Facility

MPOE Main Point of Entry

MW Mega Watt

MSF Modular Systems Furniture

N

NC Noise Criteria

NEC National Electrical Code

NEMA National Electrical Manufacturers Association

NEXT Neat-End Cross Talk

NFPA National Fire Protection Association

NIC Noise Isolation Class

NRC Noise Reduction Coefficient

NSC Nonstructural Seismic Coordinator

NSF Net Square Feet

NST National Standard Thread

O

OCCM Office for Court Construction and Management

OITC Outside-Inside Transmission Class

OSHA Occupational Safety & Health Administration

OSP Outside Plant

OTDR Optical Time Domain Reflectometer

P

PC Personal Computer

PDC Protective Design Center

pH Potential of Hydrogen

PH Phase

PIV Post Indicator Valve

PoE Power over Ethernet

PPM Parts per Million

PS-ELFEXT Power-Sum Equal Level Far-End Crosstalk

psi Pounds per Square Inch

psig Pounds per Square Inch Gauge

psi-msec Pounds per Square Inch Milli-second

PSNEXT Power-Sum Near-End Crosstalk

PVC Polyvinyl Chloride

R

RG Radio Grade

RMS Root-Mean-Square

RPM Revolution per Minute

RT Reverberation Time

RF Radio Frequency

S

SF Square Feet

SMACNA Sheet Metal and Air Conditioning Contractors National Association

SMF Single-mode Fiber

STC Sound Transmission Class

T

TBE Test and Balance Engineer

TDMM Telecommunications Distribution Methods Manual

TEFC Totally Enclosed Fan-Cooled

THHN Thermoplastic High Heat Resistant Nylon Coated

THW Thermoplastic Heat and Water Resistant Insulated Wire

THWN Thermoplastic Heat and Water Resistant Nylon Coated

TIA Telecommunications Industry Association

TTY Teletype

TVSS Transient Voltage Surge Suppressor

U

UFC Unified Facilities Criteria

UL Underwriters Laboratories

UPS Uninterruptible Power Supply

USC United States Code

USGBC United States Green Building Council

UTP Unshielded Twisted Pair Cabling

V

V Volts

VA Volt-amps

VAC Volts Alternating Current

VAV Variable Air Valve

VAV Variable Air Volume

VCSEL Vertical Cavity Surface Emitting Laser

VCR Video Cassette Recorder

VCT Vinyl Composition Tile

VDT Video Display Tube

VFD Variable Frequency Drives

VLAN Virtual Local Area Network

VOC Volatile Compounds

W

WAN Wide Area Network

WAP Wireless Access Point

WG Water Gauge

WLAN Wireless Local Area Network

WRB Weather Resistive Barrier

WXGA (Wide XGA) A wide screen resolution of 1280x800, 1366x768 or 1300x768 pixels

WUXGA (Wide Ultra XGA) A wide screen resolution of 1920x1200 or 1920x1080 pixels

X

XHHN Cross-Linked High Heat Water Resistant Insulated Wire